Chapter-1 Rational Numbers

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction to rational numbers properties of rational number.	Students will be aware of the properties of rational numbers.	Using various example, explain and prove the properties of rational number. For every rational number a 8b a + b and a × b are commutative but a – b and a ÷ b are not commutative. Explain using examples.	Is $\frac{-7}{8} - \frac{3}{8}$ same as $\frac{-3}{8} - \frac{7}{8}$?
Representation of rational numbers on the number line	(will be able represent rational number on the number line)	Recall the representation of fractions on a number line. Demonstrate the method on the black board.	Represent $-2\frac{3}{4}$ on the number line.
Operations of rational numbers	Students will be able to add, subtract, multiply and divide rational numbers.	Using examples from the book and recalling the method of operation of fractions and at the same line the operations of integers explain the various operations – add, subtract multiply and divide.	Solve 1) Subtract $\frac{-7}{4}$ from $\frac{-3}{9}$ 2) $\frac{-8}{7} + \left(\frac{-4}{3}\right) \times \frac{-2}{3}$
Insertion of rational numbers between two rational numbers.	Students will be able to insert rational numbers between two given rational numbers.	Encourage children to conclude that half of the sum of two rational number lies between them and thus a rational number can be obtained between any two rational numbers. Explain to the children that there lie many rational number between any two rational number.	Insert 2 rational numbers between $\frac{-8}{6}$ and $\frac{-9}{6}$

Exercise 1.1

1. i) $\frac{3}{17}+\frac{5}{17}$

$\Rightarrow \frac{8}{17}$ **Ans.**

ii) $\frac{-1}{13}+\left(\frac{-4}{13}\right)$

$\Rightarrow \frac{-1}{13}\frac{-4}{13}$

$\Rightarrow \frac{-5}{13}$ **Ans.**

iii) $\frac{-2}{9}+\left(\frac{-6}{11}\right)$

$\Rightarrow \frac{2}{9}+\frac{-6}{11}$

$\Rightarrow \frac{22-54}{99}$

$\Rightarrow \frac{-32}{99}$ **Ans.**

iv) $\frac{2}{7}+\left(\frac{-3}{9}\right)$

$\Rightarrow \frac{2}{7}+\frac{-1}{3}$

$\Rightarrow \frac{6-7}{21}$

$\Rightarrow \frac{-1}{21}$ **Ans.**

v) $\frac{-5}{13}+\frac{11}{26}$

$\Rightarrow \frac{-10+11}{26}$

$\Rightarrow \frac{1}{26}$ **Ans.**

vi) $\frac{7}{16}+\frac{-3}{8}$

$\Rightarrow \frac{7-6}{16}$

$\Rightarrow \frac{1}{16}$ **Ans.**

2. i) $\frac{6}{11}+\frac{38}{9}+\frac{1}{1}$

$\Rightarrow \frac{54+418+99}{99}$

$\Rightarrow \frac{473}{\cancel{99}}$

$\Rightarrow \frac{561}{99}$

$\Rightarrow 5\frac{16}{99}$ **Ans.**

$\Rightarrow 5\frac{6}{9}$

$\Rightarrow 5\frac{\cancel{2}}{\cancel{3}}$ **Ans.**

ii) $\frac{-7}{9}+\frac{46}{17}\frac{-1}{3}$

$\Rightarrow \quad \frac{-119+414-51}{153}$

$\Rightarrow \quad \frac{244}{153}$

$\Rightarrow \quad 1\frac{91}{153}$ **Ans.**

iii) $\frac{-6}{7}\frac{-5}{6}\frac{-25}{84}$

$\Rightarrow \quad \frac{-72-70-25}{84}$

$\Rightarrow \quad \frac{-167}{84}$

$\Rightarrow \quad -1\frac{83}{84}$ **Ans.**

3. i) $\frac{-4}{3}\frac{+2}{7}=\frac{2}{7}\frac{-4}{3}$

$\Rightarrow \quad \frac{-28+6}{21}=\frac{6-28}{21}$

$\Rightarrow \quad \frac{-22}{21}=\frac{-22}{21}$

$\Rightarrow \quad -1\frac{1}{21}=-1\frac{1}{21}$

Hence, cmmutative law verified

ii) $\frac{2}{5}+\frac{4}{9}=\frac{4}{9}+\frac{2}{5}$

$\Rightarrow \quad \frac{18+20}{45}=\frac{20+18}{45}$

$\Rightarrow \quad \frac{38}{45}=\frac{38}{45}$

Hence, commutative law verified

iii) $\frac{33}{11}+\frac{4}{13}=\frac{4}{13}+\frac{33}{11}$

$\Rightarrow \quad \frac{3}{1}+\frac{4}{13}=\frac{4}{13}+\frac{3}{1}$

$\Rightarrow \quad \frac{39+4}{13}=\frac{4+39}{13}$

$\Rightarrow \quad 3\frac{4}{13}=3\frac{4}{13}$

Hence commutative law verified

4. i) Additive immerse of $\frac{-12}{23}$ *is* $\frac{12}{23}$

ii) Additive immerse of $\frac{-72}{121}$ *is* $\frac{72}{121}$

iii) Additive immerse of $\frac{2}{13}$ *is* $\frac{-2}{13}$

5. $-(-x)=x$

i) $-\left(\frac{-102}{133}\right)=\frac{102}{133}$

ii) $-\left(\frac{-150}{-170}\right)$

$\Rightarrow \quad -\frac{150}{170}=-\frac{150}{170}$

iii) $-\frac{-26}{19}=\frac{26}{19}$

6. i) rational

ii) $\frac{-52}{47}$

iii) $\frac{-12}{17}$

iv) $\frac{3}{8}\left[\left(\frac{-1}{12}\right)\right]\frac{+9}{10}$ $\frac{3}{5 \quad 0}$

$\Rightarrow \frac{3}{8}\left[\frac{-35+54}{60}\right]+\left[\frac{6+35}{60}\right]$

$\Rightarrow \frac{\cancel{3}}{8}\times\frac{19}{\cancel{60}_{20}}+\frac{41}{60}$

$\Rightarrow \frac{19}{60}+\frac{41}{60}$

$\Rightarrow \frac{57+328}{480}$

$\Rightarrow \frac{\cancel{385}^{77}}{\cancel{480}_{96}}$

$\Rightarrow \frac{77}{96}$ **Ans.**

7. a + (b+c) = (a+b) + c

$\Rightarrow \frac{-11}{27}+\left(\frac{4}{9}\frac{-5}{18}\right)=\frac{-11}{27}+\frac{4}{9}-\frac{5}{18}$

$\Rightarrow \frac{-11}{27}+\left(\frac{8-5}{18}\right)=\left(\frac{-11+12}{27}\right)\frac{-5}{18}$

$\Rightarrow \frac{-11}{27}+\frac{3}{18}=\frac{1}{27}\frac{-5}{18}$

$\Rightarrow \frac{-22+9}{54}=\frac{2-15}{54}$

$\Rightarrow \frac{-13}{54}=\frac{-13}{54}$

Hence associative law verified

Exercise 1.2

1. i) $\frac{13}{13}\frac{-4}{5}$

$\Rightarrow \frac{60-52}{65}$

$\Rightarrow \frac{8}{65}$ **Ans.**

ii) $\frac{-4}{9}-\left(\frac{-1}{8}\right)$

$\Rightarrow \frac{-}{9}+\frac{1}{8}$

$\Rightarrow \frac{-32+9}{72}$

$\Rightarrow \frac{-23}{72}$ **Ans.**

iii) $\frac{-1}{11}\frac{-4}{9}$

$\Rightarrow \frac{-9-44}{99}$

$\Rightarrow \frac{-53}{99}$ **Ans.**

iv) $\frac{-2}{7}\frac{-3}{14}$

$\Rightarrow \frac{-4-3}{14}$

$\Rightarrow \frac{-7}{14}$

$\Rightarrow \frac{-1}{2}$ **Ans.**

v) $\frac{-5}{18}-\left(\frac{-2}{9}\right)$

$\Rightarrow \frac{-5}{18}\frac{+2}{9}$

$\Rightarrow \frac{-5+4}{18}$

$\Rightarrow \frac{-1}{18}$ **Ans.**

iv) $\frac{15}{21}-\left(\frac{-13}{42}\right)$

$\Rightarrow \frac{15}{21}+\frac{13}{42}$

$\Rightarrow \frac{30+13}{42}$

$\Rightarrow \frac{43}{42}$

$\Rightarrow 1\frac{1}{42}$ **Ans.**

2. i) $\frac{4}{5}\frac{-5}{28}$

$\Rightarrow \frac{112-25}{140}$

$\Rightarrow \frac{87}{140}$ **Ans.**

ii) $\frac{4}{21}-\frac{-8}{21}$

$\Rightarrow \frac{4}{21}+\frac{8}{21}$

$\Rightarrow \frac{12}{21}$ **Ans.** $\Rightarrow \frac{4}{7}$ **Ans.**

iii) $\frac{-3}{14}\frac{+2}{21}$

$\Rightarrow \frac{-9+4}{42}$

$\Rightarrow \frac{-5}{42}$ **Ans.**

iv) $\frac{-13}{36}+\frac{5}{18}$

$\Rightarrow \frac{-13+10}{36}$

$\Rightarrow \frac{-3}{36}$

$\Rightarrow \frac{-1}{12}$ **Ans.**

v) $\frac{25}{33}+\frac{9}{22}$

$\Rightarrow \frac{50+27}{66}$

$\Rightarrow \frac{77}{66}$

$\Rightarrow 1\frac{11}{66}$ **Ans. /** $\Rightarrow 1\frac{1}{6}$ **Ans.**

vi) $\frac{-3}{28}\frac{-1}{14}$

$\Rightarrow \frac{-3-2}{28}$

$\Rightarrow \frac{-5}{25}$ **Ans.**

3. The other number = $\frac{9}{25}\frac{-3}{10}$

$\Rightarrow \frac{9}{25}\frac{-3}{10}$

$\Rightarrow \frac{3}{50}$ **Ans.**

4. The other number = $\frac{-2}{13}\frac{+8}{15}$

$\Rightarrow \frac{-30+104}{195}$

$\Rightarrow \frac{74}{195}$ **Ans.**

5. $\frac{5}{9}+\frac{7}{18}$

$\Rightarrow \frac{10+7}{18}$

$\Rightarrow \frac{17}{18}$ Should be added **Ans.**

6. $\frac{-2}{13}\frac{+5}{39}$

$\Rightarrow \frac{-6+5}{39}$

$\Rightarrow \frac{-1}{39}$ Should be added **Ans.**

7. $\frac{-5}{26}\frac{-1}{13}$

$\Rightarrow \frac{-5-2}{26}$

$\Rightarrow \frac{-7}{26}$ **Ans.**

8. $x - \# y - x$

$\frac{-4}{17}\frac{-2}{6} \neq \frac{-2}{6}\frac{-4}{17}$

$\Rightarrow \frac{-24-34}{102} \neq \frac{-34-24}{102}$

$\Rightarrow \frac{-58}{102} \neq \frac{10}{102}$

Hence verified

9. $x - (y-3) \neq (x-y) + 3$

$\Rightarrow \frac{4}{9}-\left(\frac{-7}{12}+\frac{2}{3}\right)=\left(\frac{4}{9}+\frac{7}{12}\right)+\left(\frac{2}{3}\right)$

$\Rightarrow \frac{4}{9}-\left(\frac{-7}{12}+\frac{2}{3}\right)=\left(\frac{4}{9}+\frac{7}{12}\right)\frac{-2}{3}$

$\Rightarrow \frac{4}{9}-\left(\frac{-7+8}{12}\right)=\left(\frac{16+21}{36}\right)\frac{-2}{3}$

$\Rightarrow \frac{4}{9}\frac{-1}{12}=\frac{37}{36}\frac{-2}{3}$

$\Rightarrow \frac{16-3}{36}=\frac{37-24}{36}$

$\Rightarrow \frac{13}{36}=\frac{13}{36}$

Hence verified

10. $\frac{7}{15}+\left(\frac{-3}{5}\right)+\frac{2}{5} \neq \frac{2}{5}+\left(\frac{-3}{5}\right)+\frac{7}{5}$

$\Rightarrow \frac{7}{15}\frac{-3}{5}+\frac{2}{5} \neq \frac{2}{5}\frac{-3}{5}+\frac{7}{5}$

$\Rightarrow \frac{7}{15}\frac{-1}{5} \neq \frac{-1}{5}+\frac{7}{5}$

$\Rightarrow \frac{7-3}{15} \neq \frac{6}{5}$

$\Rightarrow \frac{4}{15} \neq \frac{6}{5}$

Hence, not verified

Exercise 1.3

1. i) $\frac{-11}{\cancel{9}} \times \frac{\cancel{9}}{5}$

$\Rightarrow \frac{-11}{5}$

$\Rightarrow -2\frac{1}{5}$ **Ans.**

iv) $\frac{\cancel{-625}^{125}}{\cancel{72}_{8}} \times \frac{\cancel{9}}{\cancel{-25}_{\cancel{5}}}$

$\Rightarrow \frac{25}{8}$

$\Rightarrow 3\frac{1}{8}$ **Ans.**

2. i) $\frac{5}{26} \times \frac{-4}{3}$

$\Rightarrow \frac{\cancel{-20}^{10}}{\cancel{78}_{39}}$

$\Rightarrow \frac{-10}{39}$ **Ans.**

ii) $\frac{\cancel{-6}}{\cancel{14}_{2}} \times \frac{\cancel{-7}}{\cancel{36}_{6}}$

$\Rightarrow \frac{1}{12}$ **Ans.**

iii) $\frac{-7}{\underset{64}{128}} \times 2$

$\Rightarrow \frac{-7}{64}$ **Ans.**

iv) $\frac{-27}{\cancel{10}_{5}} \times \frac{\cancel{-8}^{4}}{15}$

$\Rightarrow \frac{\cancel{108}^{36}}{\cancel{75}_{25}}$

$\Rightarrow 1\frac{11}{25}$ **Ans.**

3. i) $\left(\frac{\cancel{8}^{4}}{5} \times \frac{-3}{\cancel{2}}\right) + \left(\frac{-3}{10} \times \frac{9}{16}\right)$

$\Rightarrow \frac{-12}{5} + \left(\frac{-27}{160}\right)$

$\Rightarrow \frac{-12}{5}\frac{-27}{160}$

$\Rightarrow \frac{-384-27}{160}$

$\Rightarrow \frac{-411}{160}$

$\Rightarrow -2\frac{91}{160}$ **Ans.**

ii) $\left(\frac{-2}{4}\right)-\frac{8}{\cancel{6}}\times\frac{\cancel{12}^{2}}{5}$

$\Rightarrow \frac{-2}{4}\frac{-16}{5}$

$\Rightarrow \frac{-10-64}{20}$

$\Rightarrow \frac{-74}{20}$

$\Rightarrow -3\frac{\cancel{14}^{7}}{\cancel{20}_{10}}$

$\Rightarrow -3\frac{7}{10}$ **Ans.**

iii) $\left(-4\times\frac{1}{123}\right)+\left(\frac{8}{9}\frac{-12}{3}\right)$

$\Rightarrow \frac{-1}{3}+\left(\frac{-4}{9}\right)$

$\Rightarrow \frac{-1}{3}\frac{-4}{9}$

$\Rightarrow \frac{-3-4}{9} \Rightarrow \frac{-7}{9}$ **Ans.**

iv) $\left(-4\times\frac{1}{4}\right)\times\frac{7}{9}+\frac{2}{5}$

$\Rightarrow -1\times\left(\frac{35+18}{45}\right)$

$\Rightarrow -1\times\frac{53}{45}$

$\Rightarrow \frac{-53}{45}$

$\Rightarrow -1\frac{8}{45}$ **Ans.**

4. i) Multiplicative inverse of $\frac{-17}{15} is \frac{-15}{17}$

ii) Multiplicative inversr of $\frac{1}{4} is \frac{4}{1}$

iii) Multiplicative inversr of $\frac{-5}{11} is \frac{-11}{5}$

iv) Multiplicative inversr of $\frac{7}{8} is \frac{8}{7}$

5. $(x+y)\times z = x\times z + y\times z$

$\left(\frac{-2}{3}\times\frac{1}{5}+\left(\frac{-2}{3}\right)\right)\times -4=\left(\frac{-2}{3}\times\frac{1}{5}\times -4\right)$

$\left(+\frac{-2}{3}\times -4\right)$

$\Rightarrow \left(\frac{-2}{15}\frac{-2}{3}\right)\times -4=\left(\frac{-2}{15}\times\frac{-4}{1}\right)+\left(\frac{8}{3}\right)$

$\Rightarrow \left(\frac{-2-10}{15}\right)\times -4=\frac{8}{15}+\frac{8}{3}$

$\Rightarrow \frac{-12}{15}\times -4=\frac{8+40}{15}$

$\Rightarrow \frac{48}{15}=\frac{48}{15}$

Hence, verified

Exercise 1.4

1. i) $\frac{2}{115} \div \frac{18}{23}$

$\Rightarrow \frac{\cancel{2}}{\cancel{115}_{5}} \times \frac{\cancel{23}}{\cancel{18}_{9}}$

$\Rightarrow \frac{1}{45}$ **Ans.**

ii) $\frac{-3}{\cancel{25}_{5}} \times \frac{5}{3}$

$\Rightarrow \frac{1}{5}$ **Ans.**

iii) $\frac{-16}{21} \div \frac{-8}{7}$

$\Rightarrow \frac{^{2}\cancel{-16}}{\cancel{21}_{3}} \times \frac{\cancel{-7}}{\cancel{8}}$

$\Rightarrow \frac{2}{3}$ **Ans.**

iv) $\frac{-7}{11} \div \left(\frac{-3}{44}\right)$

$\Rightarrow \frac{-7}{\cancel{11}} \times \frac{\cancel{-44}^{4}}{3}$

$\Rightarrow \frac{28}{3}$

$\Rightarrow 9\frac{1}{3}$ **Ans.**

2. i) $4 \div \frac{1}{4}$

$\Rightarrow 4 \times 4$

$\Rightarrow 16$ **Ans.**

ii) $\frac{-3}{25} \div \left(\frac{-1}{3}\right)$

$\Rightarrow \frac{-3}{25} \times -3$

$\Rightarrow \frac{9}{25}$ **Ans.**

iii) $0 \div \frac{-4}{9}$

$\Rightarrow 0 \times \frac{-9}{4}$

$\Rightarrow 0$ **Ans.**

iv) $\frac{-5}{8} \div \frac{35}{24}$

$\Rightarrow \frac{-\cancel{5}}{\cancel{8}} \times \frac{\cancel{24}^{3}}{\cancel{35}_{7}}$

$\Rightarrow \frac{-3}{7}$ **Ans.**

3. The other number $= \frac{-9}{48} \div \frac{-2}{99}$

$\Rightarrow \frac{-9}{\cancel{48}_{16}} \times \frac{\cancel{99}^{33}}{2}$

$\Rightarrow \frac{-297}{32}$

$\Rightarrow -9\frac{9}{32}$ **Ans.**

4. $P = \frac{-25}{9} \div \frac{5}{3}$

$\Rightarrow \frac{-\cancel{25}^{5}}{\cancel{9}_{3}} \times \frac{\cancel{3}}{\cancel{5}}$

$\Rightarrow \frac{-5}{3}$

$\Rightarrow -1\frac{2}{3}$ **Ans.**

5. $\frac{-13}{8} + \frac{5}{12}$

$\Rightarrow \frac{-39+10}{24}$

$\Rightarrow \frac{-29}{24}\ \frac{-13}{8} \times \frac{5}{12}$

$\Rightarrow \frac{-65}{96}$

$\frac{-29}{24} \div = \frac{65}{96}$

$\Rightarrow \frac{-29}{\cancel{24}_{12_6}} \times \frac{-\cancel{96}^{48^{24^4}}}{65}$

$\Rightarrow \frac{116}{65}$

$\Rightarrow 1\frac{51}{65}$ **Ans.**

6. i) $\frac{3}{4} \div \frac{1}{8} \boxed{\neq} \frac{1}{8} \div \frac{3}{4}$

ii) $\frac{5}{11} \times \frac{2}{21} \boxed{=} \frac{2}{21} \times \frac{5}{11}$

iii) $\frac{4}{11} \div \frac{11}{4} \boxed{\neq} -1$

iv) $\frac{8}{4}\frac{-2}{15} \boxed{\neq} \frac{2}{15}\frac{-8}{2}$

Exercise 1.5

1. i) $\frac{-1}{25} \times \frac{6}{25}$

$\Rightarrow \frac{-1\times 4}{25\times 4} = \frac{-4}{100}$

$\frac{6\times 4}{25\times 4} = \frac{28}{100}$

$\frac{-3}{100} \times \frac{-2}{10} \times \frac{-1}{100}$ **Ans.**

ii) $\frac{0}{1} \times \frac{9}{11}$

$\Rightarrow \frac{0\times 9}{11}$

$\Rightarrow \frac{1}{11} \times \frac{2}{11} \times \frac{3}{11}$ **Ans.**

iii) $\frac{3\times 4}{1\times 4} = \frac{12}{4}$

$\Rightarrow \frac{3\times 4}{1\times 4} = \frac{12}{4}$

$\Rightarrow \frac{13}{4} > \frac{14}{4} > \frac{15}{4}$ **Ans.**

iv) $\frac{-1}{3} > \frac{2}{9}$

$\Rightarrow \frac{-3 > 2}{9}$

$\Rightarrow \frac{-2}{9} > \frac{1}{9} > \frac{0}{9}$ **Ans.**

v) $\frac{-6}{13} > \frac{-1}{4}$

$\Rightarrow \frac{-12 > -13}{52}$

$\Rightarrow \frac{-12 \times 4}{52 \times 4} = \frac{-48}{208}$

$\Rightarrow \frac{-12 \times 4}{52 \times 4} = \frac{52}{208}$

$\Rightarrow \frac{-48}{208} > \frac{-50}{208} > \frac{-51}{208}$ **Ans.**

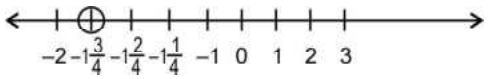
2. i) – 4, – 5, – 6 ore three rational numers lesson — 3.

ii) $\frac{-3}{7} > \frac{-4}{7} > \frac{-5}{7}$ are less than $\frac{-2}{7}$.

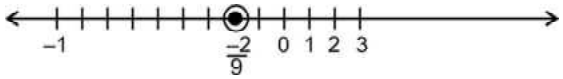
iii) $\frac{12}{23} > \frac{13}{23} > \frac{14}{23}$ are grater than $\frac{11}{23}$.

iv) $\frac{1}{10} > \frac{2}{10} > \frac{3}{10}$ are grater then $\frac{-1}{10}$.

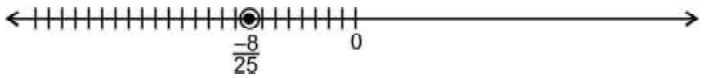
3. i) $\frac{-7}{4} = -1\frac{3}{4}$



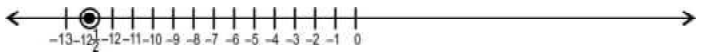
ii) $\frac{-2}{9}$



iii) $\frac{-8}{25}$



iv) $\frac{-25}{2} = -12\frac{1}{2}$



Sub Assessment-1

1. i) $\frac{1}{2} + \frac{1}{4}\frac{-1}{3}$

$\Rightarrow \frac{6+3-4}{12}$

$\Rightarrow \frac{5}{12}$ **Ans.**

ii) $\frac{1}{15} \times \left(\frac{70+21}{30}\right)$

$\Rightarrow \frac{1}{15} \times \frac{91}{30}$

$\Rightarrow \frac{91}{450}$

iii) $\frac{1}{7} \times \frac{\cancel{2}}{3} \times \frac{-5}{\cancel{63}}$

$\Rightarrow \frac{-5}{63}$ **Ans.**

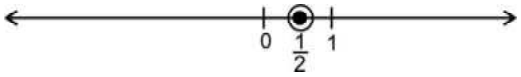
iv) $\frac{1}{2}\times(7\div 7-1)$

$\Rightarrow \frac{1}{2}\times(1-1)$

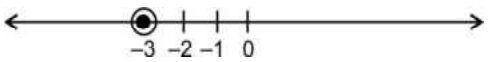
$\Rightarrow \frac{1}{2}\times 0$

$\Rightarrow 0$ **Ans.**

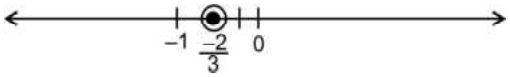
2. i) $\frac{1}{2}$



ii) $\frac{-9}{3}3=-3$



iii) $\frac{-2}{3}$



3. i) $\frac{0}{1}>\frac{-1}{4}$

$\Rightarrow \frac{0>-1}{4}$

$\frac{0\times 4}{4\times 4}=\frac{0}{16}$

$\frac{-1\times 4}{4\times 4}=\frac{-4}{16}$

$\Rightarrow \frac{-3}{16}>\frac{-2}{16}>\frac{-1}{16}$ **Ans.**

ii) $\frac{-11}{2}>\frac{-22}{3}$

$\Rightarrow \frac{-33>-44}{6}$

$\Rightarrow \frac{-33\times 4}{6\times 4}=\frac{-132}{24}$

$\Rightarrow \frac{-44\times 4}{6\times 4}=\frac{-176}{24}$

$\Rightarrow \frac{-133>-134>-135}{24\,24\,24}$ **Ans.**

4. i) Multiplicative inverse of -5 is $\frac{-1}{5}$

ii) Multiplicative inverse of $\frac{-7}{9}$ *is* $\frac{-9}{7}$

iii) Multiplicative inverse of $\frac{-1}{3}$ *is* -3

iv) Multiplicative inverse of $\frac{-6}{11}$ *is* $\frac{-11}{6}$

5. i) rational numbers less then

$\frac{-3}{4}$ *are* $\frac{-4}{4}>\frac{-5}{4}$

ii) rational numbers greater than

$\frac{-3}{4}$ *are* $\frac{-4}{4}>\frac{-5}{4}$

6. c) infinite rational numbers

7. a) additive inverse

8. $\frac{\cancel{15}^{3}}{\cancel{24}_{\cancel{6}2}}\times\frac{-\cancel{16}^{\cancel{4}2}}{\cancel{5}}$

$\Rightarrow -2$ **Ans.**

9. $\frac{-3}{5}\times\frac{11}{8}$

$\Rightarrow \frac{-33}{40}$ **Ans.**

10. True

Chapter-2 Exponents and Powers

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of Exponents and Powers		Explain 10 the students about repeated multiplication can be written in short form in exponential form $3 \times 3 \times 3 \times 3 = 3$ exponents box	Express –34 3 in exponential form Evaluates $\left(\frac{1}{2}\right)^3 \times \left(\frac{1}{5}\right)^2$
Laws of Exponent	Students will be able to solve sums by applying various laws of exponents	Explain all the laws of exponent by gluing egs for each. For eq. $(x^m)^n$ Explain as $(2^3)^4 = 2^{3\times4} = 2^{12}$ Do various sums bared on laws of exponent sums involving simplification using laws of exponent.	Simplify and wrta in exponential form $\left(\frac{2}{8}\right)^8 \div \left(\frac{2}{5}\right)^{-3}$

Exercise 2.1

1. i) Base = $\frac{1}{3}$

   Exponent = 3

   ii) Base = $\frac{-3}{4}$

   Exponent = 6

   iii) Base = –1

   Exponent = 7

   iv) Base = $\frac{5}{11}$

   Exponent =2

   v) Base = $\frac{8}{-17}$

   Exponent = 4

2. i) $15 \times 15 \times 15 \times 15$

   $17 \times 17 \times 17 \times 17$

   $= \frac{15^4}{17^4}$

   $= \left(\frac{15}{17}\right)^4$ **Ans.**

   ii) $(-3) \times (-3) \times (-3) \times (-3) \times (-3)$

   $7 \times 7 \times 7 \times 7 \times 7$

   $= \frac{(-3)^5}{7^5}$

$= \left(\frac{-3}{7}\right)^5$

iii) $\frac{2\times2\times2\times2\times2\times2}{(-3)\times(-3)\times(-3)\times(-3)\times(-3)\times(-3)}$

$= \frac{2^6}{(-3)^6}$

$= \frac{2^6}{3^6}$

$= \left(\frac{2}{3}\right)^6$ **Ans.**

iv) $\frac{(-4)\times4\times(-4)\times4}{-5\times5\times5\times5}$

$= \frac{-(4\times4)\times\{-(4\times4)\}}{-(5\times5\times5\times5)}$

$= \frac{4\times4\times4\times4}{-(5\times5\times5\times5)}$

$= \frac{4^4}{-(5)^4}$

$= -\left(\frac{4}{5}\right)^4$ **Ans.**

3. i) $\frac{216}{1000}$

$= \frac{2^3\times3^3}{2^3\times5^3}$

$= \frac{(2\times3)^3}{(2\times5)^3}$

$= \frac{6^3}{10^3}$

$= \left(\frac{6}{10}\right)^3$ **Ans.**

ii) $\frac{64}{729}$

$= \frac{2^6}{3^6}$

$= \left(\frac{2}{3}\right)^6$ **Ans.**

iii) $\frac{-1}{1000}$

$= \frac{-1}{2^3\times5^3}$

$= \frac{-1}{(2\times5)^3}$

$= \frac{-1}{10^3}$

$= \left(\frac{-1}{10}\right)^3$ **Ans.**

iv) $\frac{-25}{36}$

$= \frac{-(5)^2}{6^2}$

$= -\left(\frac{5}{6}\right)^2$ **Ans.**

4. i) $5^3 \times 2^4$

$= 125 \times 16$

$= 2000$ **Ans.**

ii) $\left(\frac{-1}{3}\right)^5 \times \left(\frac{3}{4}\right)^4$

$= \frac{-1}{\cancel{243}_{3}} \times \frac{\cancel{81}}{256}$

$= \frac{-1}{768}$ **Ans.**

iii) $\left(\frac{-1}{2}\right)^5 \times \left(\frac{-1}{4}\right)^3$

$= \left(\frac{-1}{2}\right)^5 \times \frac{(-1)^3}{\left(2^2\right)^3}$

$= \frac{(-1)^5}{2^5} \times \frac{(-1)^3}{2^6}$

$= \frac{(-1)^{5+3}}{5^{5+6}}$

$= \frac{(-1)^8}{2^{11}}$

$= \frac{1}{2^{11}}$

$= \left(\frac{1}{2}\right)^{11}$ **Ans.**

Exercise 2.2

1. i) $2^3 \times 2^5$

$= 2^{3+5}$

$= 2^8$ **Ans.**

ii) $(-3)^5 \times (-3)^2$

$= (-3)^{5+2}$

$= (-3)^7$ **Ans.**

iii) $\left(\frac{3}{4}\right)^4 \times \left(\frac{3}{4}\right)^6$

$= \left(\frac{3}{4}\right)^{4+6}$

$= \left(\frac{3}{4}\right)^{10}$

iv) $\left(\frac{-1}{3}\right)^5 \times \left(\frac{-1}{3}\right)^4$

$= \left(\frac{-1}{3}\right)^{5+4}$

$= \left(\frac{-1}{3}\right)^9$

v) $3^8 \div 3^6$

$= 3^{8-6}$

$= 3^2$ **Ans.**

vi) $(-3)^6 \div (-3)$

$= (-3)^{6-1}$

$= (-3)^5$ **Ans.**

vii) $\left(\frac{2}{5}\right)^4 \div \left(\frac{2}{5}\right)^3$

$= \left(\frac{2}{5}\right)^{4-3}$

$= \left(\frac{2}{5}\right)^1$ **Ans.**

viii) $\left(\frac{-3}{4}\right)^6 \div \left(\frac{-3}{4}\right)^2$

$= \left(\frac{-3}{4}\right)^{6-2}$

ix) $3^6 \div \left(\frac{-3}{4}\right)^4 \times 2^{-2} = \left(\frac{3}{4}\right)^4$ **Ans.**

$= 3^{6-8} \times 2^{-2} \times 2^2$

$= 3^{-2} \times 2^{-2+2}$

$= 3^{-2} \times 2^0$

$= 3^{-2} \times 1$

$= 3^{-2}$ **Ans.**

x) $(-3) \div (-3)^6$

$= (-3)^{1-6}$

$= (-3)-5$ **Ans.**

xi) $\left(\frac{2}{5}\right)^3 \div \left(\frac{5}{2}\right)^{-4}$

$= \left(\frac{2}{5}\right)^3 \div \left(\frac{2}{5}\right)^4$

$= \left(\frac{2}{5}\right)^{3-4}$

$= \left(\frac{2}{5}\right)^{-1}$ **Ans.**

xii) $\left(\frac{-3}{4}\right)^2 \div \left(\frac{-3}{4}\right)^6 \times \left(\frac{-3}{4}\right)^0$

$= \left(\frac{-3}{4}\right)^{2-6} \times 1$

$= \left(\frac{-3}{4}\right)^{-4}$

$= \left(\frac{3}{4}\right)^{-4}$ **Ans.**

2. i) $(2^3)^6$

$= 2^{18}$ **Ans.**

ii) $[(-1)^5]^4$

$= (-1)^{20}$

$= (1)^{20}$ **Ans.**

iii) $\left[\left(\frac{-2}{3}\right)^3\right]^4$

$= \left(\frac{-2}{3}\right)^{12}$

$= \left(\frac{2}{3}\right)^{12}$ **Ans.**

iv) $\left[\left(\frac{5}{4}\right)^3\right]^6$

$= \left(\frac{5}{4}\right)^{18}$ **Ans.**

v) $\left\{\left[\left(\frac{8}{11}\right)^5\right]^3\right\}^{-1}$

$= \left\{\left(\frac{8}{11}\right)^{15}\right\}^{-1}$

$= \left(\frac{8}{11}\right)^{-15}$ **Ans.**

vi) $\left[\left\{\left(\frac{-5}{6}\right)^5\right\}^5\right]^2$

$= \left[\left(\frac{-5}{6}\right)^{25}\right]^2$

$= \left(\frac{-5}{6}\right)^{50}$

$= \left(\frac{5}{6}\right)^{50}$ **Ans.**

3. i) $(-1)^7 \times (-1)^9 = (-1)^P$

$\Rightarrow (-1)^{7+7} = (-1)^P$

$\Rightarrow (-1)^{16} = (-1)^P$

$\because$ Bases are same Powers should also be equal.

$\therefore$ P = 16 **Ans.**

ii) $\left(\frac{3}{5}\right)^3 \times \left(\frac{3}{5}\right)^{12} = \left(\frac{3}{5}\right)^{5P}$

$\Rightarrow \left(\frac{3}{5}\right)^{3+12} = \left(\frac{3}{5}\right)^{5P}$

$\Rightarrow \left(\frac{3}{5}\right)^{15} = \left(\frac{3}{5}\right)^{5P}$

$\because$ Bases are same, Powers should also beequal.

$\therefore$ 5P = 15

$\Rightarrow$ P = $\frac{\cancel{15}^{3}}{\cancel{5}}$

= 3 **Ans.**

iii) $\left(\frac{7}{9}\right)^{21} \times \left(\frac{7}{9}\right)^3 = \left(\frac{7}{9}\right)^{3P}$

$\Rightarrow \left(\frac{7}{9}\right)^{21+3} = \left(\frac{7}{9}\right)^{3P}$

$\Rightarrow \left(\frac{7}{9}\right)^{24} = \left(\frac{7}{9}\right)^{3P}$

$\because$ Bases are same, Powers should also be equal.

$\therefore$ 3P = 24

$\Rightarrow$ P = $\frac{\cancel{24}^{8}}{\cancel{3}}$

= 8 **Ans.**

iv) $(6^5)^7 = 6^{P-1}$

$\Rightarrow 6^{35} = 6^{P-1}$

$\because$ Bases are same, Powers should also be equal.

$\therefore$ P – 1 = 35

$\Rightarrow$ P = 35 + 1

= 36 **Ans.**

v) $\left[\left(\frac{3}{7}\right)^2\right]^6 = \left(\frac{3}{7}\right)^{P+5}$

$\Rightarrow \left(\frac{3}{7}\right)^{12} = \left(\frac{3}{7}\right)^{P+5}$

$\because$ Bases are same, Powers will also be equal.

$\Rightarrow$ P + 5 = 12

$\therefore$ P = 12 – 5

= 7 **Ans.**

vi) $[(-8)^2]^{-4} = (-8)^{2P}$

$\Rightarrow (-8)^{-8} = (-8)^{2P}$

$\because$ Bases are same, Powers should also be equal.

$\therefore$ 2P = – 8

$\Rightarrow$ P = $\frac{-\cancel{8}^{-4}}{\cancel{2}}$

= – 4

vii) $(-2)^{13} \div (-2)^{11} = (-2)^{2P}$

$\Rightarrow (-2)^{13-11} = (-2)^{2P}$

$\Rightarrow (-2)^2 = (-2)^{2P}$

$\because$ Bases are same, Powers should also be equal.

$\therefore$ $2P = 2$

$\Rightarrow$ $P = \frac{\cancel{2}}{\cancel{2}}$

$= 1$ **Ans.**

viii) $\left(\frac{11}{13}\right)^{25} \div \left(\frac{11}{13}\right)^{24} = \left(\frac{11}{13}\right)^{P}$

$\Rightarrow \left(\frac{11}{13}\right)^{25-24} = \left(\frac{11}{13}\right)^{P}$

$\Rightarrow \left(\frac{11}{13}\right)^{1} = \left(\frac{11}{13}\right)^{P}$

$\because$ Bases are same, Powers will also be equal.

$\therefore$ $P = 1$ **Ans.**

4. i) $\left[\left(\frac{1}{4}\right)^{3}\right]^{2} \times \left(\frac{1}{4}\right)^{5}$

$= \left(\frac{1}{4}\right)^{6} \times \left(\frac{1}{4}\right)^{5}$

$= \left(\frac{1}{4}\right)^{4+5}$

$= \left(\frac{1}{4}\right)^{11}$ **Ans.**

ii) $[(-6)^3]^2 \div [(-6)^2]^3$

$= (-6)^6 \div (-6)^6$

$= (-6)^{6-6}$

$= (-6)^0$

$= 1^1$ **Ans.**

iii) $45^4 \times \frac{1}{45^3}$

$= 454 - 3$

$= 45^1$ **Ans.**

iv) $3^9 \times \frac{1}{3^{18}}$

$= \frac{1}{3^{18-9}}$

$= \frac{1}{3^9}$ **Ans.**

v) $\left(\frac{-2}{41}\right)^4 \times \left(\frac{-2}{41}\right)^{13} \times \left(\frac{41}{2}\right)^{19}$

$= \frac{(-2)^4 \times (-2)^{13} \times 41^{19}}{41^4 \times 41^{13} \times 2^{19}}$

$= \frac{(-2)^{4+13} \times 41^{19}}{41^{4+13} \times 2^{19}}$

$= \frac{(-2)^{17} \times 41^{19}}{41^{17} \times 2^{19}}$

$= -\frac{41^{19-17}}{2^{19-17}}$

$= -\frac{41^2}{2^2}$

$= -\left(\frac{41}{2}\right)^2$ **Ans.**

vi) $\frac{6^3 \times 15^2 \times 2^5}{2^3 \times 3^4}$

$= \frac{(2\times 3)^3 \times (3\times 5)^2 \times 2^5}{2^3 \times 3^4}$

$= \dfrac{2^{3} \times 3^3 \times 3^2 \times 5^2 \times 2^5}{2^{3} \times 3^4}$

$= \dfrac{3^{3+2} \times 5^2 \times 2^5}{3^4}$

$= 3^{5-4} \times 5^2 \times 2^5$

$= 3^1 \times 5^2 \times 2^5$ **Ans.**

vii) $\left[(-5)^2\right]^3 \times \dfrac{1}{\left[(-5)^2\right]^4}$

$= (-5)^6 \times \dfrac{1}{(-5)^8}$

$= \dfrac{1}{(-5)^{8-6}}$

$= \dfrac{1}{(-5)^2}$

$= \left(\dfrac{1}{5}\right)^2$ **Ans.**

viii) $\left[\left(\dfrac{-1}{3}\right)^7\right]^9 \times 3^{60}$

$= \left(\dfrac{-1}{3}\right)^{63} \times 3^{60}$

$= \dfrac{(-1)^{63} \times 3^{60}}{3^{63}}$

$= \dfrac{-1}{3^{63-60}}$

$= \dfrac{-1}{3^3}$

$= \left(\dfrac{-1}{3}\right)^3$ **Ans.**

ix) $\dfrac{10^2 \times 3^3 \times 6^2}{5^{-2} \times 3^3}$

$= \dfrac{(2\times5)^2 \times 3^3 \times (2\times3)^2}{5^{-2} \times 3^3}$

$= \dfrac{2^2 \times 5^2 \times 3^3 \times 2^2 \times 3^2}{5^{-2} \times 3^3}$

$= \dfrac{2^{2+2} \times 5^2 \times 3^2}{5^{-2}}$

$= 2^4 \times 5^{2-(-2)} \times 3^2$

$= 2^4 \times 5^{2+2} \times 3^2$

$= 2^4 \times 5^4 \times 3^2$

$= (2\times5)^4 \times 3^2$

$= 10^4 \times 3^2$ **Ans.**

x) $6^{19} \times 6^{18} \times \dfrac{1}{6^{30}}$

$= \dfrac{6^{19+18} \times 1}{6^{30}}$

$= \dfrac{6^{37}}{6^{30}} = 6^{37-30}$

$= 67$ **Ans.**

Exercise 2.3

1. i) 8^0

$= 1$ **Ans.**

ii) $\left(\dfrac{1}{3}\right)^0$

$= 1$ **Ans.**

iii) $\left(\frac{-6}{7}\right)^0$

$= 1$ **Ans.**

iv) $4^0 - 3^0 + 8^0$

$= 1 - 1 + 1$

$= 1$ **Ans.**

v) $\left(\frac{3}{5}\right) \times \left(\frac{3}{5}\right)^3 \div \left(\frac{3}{5}\right)^4$

$= \left(\frac{3}{5}\right)^{1+3} \div \left(\frac{3}{5}\right)^4$

$= \left(\frac{3}{5}\right)^{4-4}$

$= \left(\frac{3}{5}\right)^0$

$= 1$ **Ans.**

vi) $\left[\left(\frac{1}{3}\right)^9 \times \left(\frac{1}{3}\right)^3\right] \div \left[\left(\frac{1}{3}\right)^{15} \div \left(\frac{1}{3}\right)^3\right]$

$= \left[\left(\frac{1}{3}\right)^{9+3}\right] \div \left[\left(\frac{1}{3}\right)^{15-3}\right]$

$= \left(\frac{1}{3}\right)^{12} \div \left(\frac{1}{3}\right)^{12}$

$= \left(\frac{1}{3}\right)^{12-12}$

$= \left(\frac{1}{3}\right)^0$

$= 1$ **Ans.**

2. $\left[\left(\frac{2}{11}\right)^{18} \times \left(\frac{2}{11}\right)^5\right] \div \left[\left(\frac{2}{11}\right)^7 \times \left(\frac{2}{11}\right)^6\right]$

$= \left[\left(\frac{2}{11}\right)^{18+5}\right] \div \left[\left(\frac{2}{11}\right)^{7+6}\right]$

$= \left(\frac{2}{11}\right)^{23} \div \left(\frac{2}{11}\right)^{13}$

$= \left(\frac{2}{11}\right)^{23-13}$

$= \left(\frac{2}{11}\right)^{10}$ **Ans.**

3. i) 5^{-1}

$= \frac{1}{5}$ **Ans.**

ii) $(-6)-2$

$= \left(\frac{-1}{6}\right)^2$

$= \left(\frac{1}{6}\right)^2$

$= \frac{1}{36}$ **Ans.**

iii) $\left(\frac{-3}{5}\right)^{-3}$

$= \left(\frac{-5}{3}\right)^3$

$= \frac{-125}{27}$ **Ans.**

iv) $\left(\frac{3}{8}\right)^{-3} \div \left(\frac{3}{16}\right)^{-3}$

$= \left(\frac{3}{2^3}\right)^{-3} \div \left(\frac{3}{2^4}\right)^{-3}$

$= \left(\frac{2^3}{3}\right)^{3} \div \left(\frac{2^4}{3}\right)^{3}$

$= \frac{2^9}{3^3} \div \frac{2^{12}}{3^3}$

$= \frac{2^9}{3^3} \times \frac{3^3}{2^{12}}$

$= \frac{2^9}{\cancel{3^3}} \times \frac{\cancel{3^3}}{2^{12}}$

$= \frac{1}{2^{12-9}} = \frac{1}{2^3} = \frac{1}{8}$ **Ans.**

v) $(3^{-1} - 4-)^{-1}$

$= \left(\frac{1}{3} - \frac{1}{4}\right)^{-1}$

$= \left(\frac{4-3}{12}\right)^{-1}$

$= \left(\frac{1}{12}\right)^{-1}$

$= 12$ **Ans.**

4. i) $\left(\frac{-1}{9}\right)^{-1}$

$= (-9)^{1}$

ii) $\left(\frac{2}{7}\right)^{3} \times \left(\frac{2}{7}\right)^{-6}$

$= \left(\frac{2}{7}\right)^{3+(-6)}$

$= \left(\frac{2}{7}\right)^{3-6}$

$= \left(\frac{2}{7}\right)^{-3}$

$= \left(\frac{7}{2}\right)^{3}$ **Ans.**

iii) $4^9 \div 4^{-10}$

$= 4^{9-(-10)}$

$= 4^{9+10}$

$= 4^{19}$ **Ans.**

iv) $(7^8 \div 7^0) \times 7^3$

$= 7^{8-0} \times 7^3$

$= 7^{8+3}$

$= 7^{11}$ **Ans.**

v) $\left(6^{-1} \times 4^{-1}\right) \times \frac{1}{6^{-1}}$

$= \left(\frac{1}{6} \times \frac{1}{4}\right) \times 6$

$= \frac{1}{\cancel{24}_{4}} \times \cancel{6}$

$= \frac{1}{4}$

$= \frac{1}{2^2}$

$= \left(\frac{1}{2}\right)^2$ **Ans.**

vi) $\left(6^{-1}+8^{-1}\right)^{-1}+\left(3^{-1}+2^{-1}\right)^{-1}$

$= \left(\frac{1}{6}+\frac{1}{8}\right)^{-1}+\left(\frac{1}{3}+\frac{1}{2}\right)^{-1}$

$= \left(\frac{4+3}{24}\right)^{-1}+\left(\frac{2+3}{6}\right)^{-1}$

$= \left(\frac{7}{24}\right)^{-1}+\left(\frac{5}{6}\right)^{-1}$

$= \frac{24}{7}+\frac{6}{5}$

$= \frac{120+42}{35}$

$= \left(\frac{160}{35}\right)^1$ **Ans.**

vii) $(1^{-1}+2^{-1}+3^{-1})\times 4^{-1}$

$= \left(1+\frac{1}{2}+\frac{1}{3}\right)\times\frac{1}{4}$

$= \left(\frac{6+3+2}{6}\right)\times\frac{1}{4}$

$= \frac{11}{6}\times\frac{1}{4}$

$= \left(\frac{11}{24}\right)^1$ **Ans.**

5. $\left(\frac{-2}{7}\right)^{-4}+\left(\frac{-2}{7}\right)^{12}=\left\{\left(\frac{-2}{7}\right)^3\right\}^x\times\left(\frac{-2}{7}\right)^{-1}$

$\Rightarrow \left(\frac{-2}{7}\right)^{-4+12}=\left(\frac{-2}{7}\right)^{3x}\times\left(\frac{-2}{7}\right)^{-1}$

$\Rightarrow \left(\frac{-2}{7}\right)^{8}=\left(\frac{-2}{7}\right)^{3x+(-1)}$

$\Rightarrow \left(\frac{-2}{7}\right)^{8}=\left(\frac{-2}{7}\right)^{3x-1}$

$\because$ Bases are same, Powers will also be equal.

$\therefore \quad 3x - 1 = 8$

$\Rightarrow 3x = 8 + 1$

$\Rightarrow x = \frac{\cancel{9}^{3}}{\cancel{3}}$

$= 3$ **Ans.**

6. $\left(\frac{-6}{5}\right)^{-2}\div\left(\frac{3}{5}\right)^{-1}$

$= \left(\frac{-5}{6}\right)^2\div\left(\frac{5}{3}\right)$

$= \left(\frac{5}{6}\right)^2\div\left(\frac{5}{3}\right)$

$= \frac{5^2}{(9\times 3)^2}\div\frac{5}{3}$

$= \frac{5^2}{2^2\times 3^2}\times\frac{3}{5}$

$= \frac{5^{2-1}}{3^{2-1}\times 2^2}$

$= \frac{5}{3\times 4}$

$= \frac{5}{12}$

$\therefore$ The required number is $\frac{5}{12}$ **Ans.**

7 .i) $\frac{9^2 \times 27 \times x^4}{3^2 \times 3^4 \times x^2}$

$= \frac{\left(3^2\right)^2 \times 3^3 \times x^{4-2}}{3^{2+4}}$

$= \frac{3^{4+3} \times x^2}{3^6}$

$= 3^{7-6} \times x^2$

$= 3^1 \times x^2$

$= 3x^2$ **Ans.**

ii) $\frac{2^{-5} \times 15^{-3} \times 500}{5^{-6} \times 6^{-5}}$

$= \frac{2^{-5} \times (3 \times 5)^{-3} \times 2^2 \times 5^3}{5^{-6} \times (2 \times 3)^{-5}}$

$= \frac{2^{-5+2} \times 3^{-3} \times 5^{-3} \times 5^3}{5^{-6} \times 2^{-5} \times 3^{-5}}$

$= \frac{2^3 \times 3^{-3} \times 5^{-3+3}}{5^{-6} \times 2^{-5} \times 3^{-5}}$

$= 2^{3-(-5)} \times 3^{-3(-5)} \times 5^{0-(-6)}$

$= 2^{3+5} \times 3^{-3+5} \times 5^{0+6}$

$= 2^8 \times 3^2 \times 5^6$ **Ans.**

8. $\left(\frac{6}{35}\right)^2 \div \left(\frac{3}{7}\right)^4$

$= \frac{6^2}{35^2} \div \frac{3^4}{7^4}$

$= \frac{(3 \times 2)^2}{(7 \times 5)^2} \div \frac{3^4}{7^4}$

$= \frac{3^2 \times 2^2}{7^2 \times 5^2} \div \frac{3^4}{7^4}$

$= \frac{3^2 \times 2^2 \times 7^4}{7^2 \times 5^2 \times 3^4}$

$= \frac{2^2 \times 7^{4-2}}{5^2 \times 3^{4-2}}$

$= \frac{2^2 \times 7^2}{5^2 \times 3^2}$

$= \frac{4 \times 49}{25 \times 9} = \frac{196}{225}$

$\therefore$ The required number is $\frac{196}{225}$ **Ans.**

9. $2^{-4} \div \left(\frac{-1}{16}\right)^3$

$= 2^{-4} \div \frac{(-1)^3}{\left(2^4\right)^3}$

$= 2^{-4} \div \left(\frac{-1}{2^{12}}\right)$

$= 2^{-4} \times \left(-2^{12}\right)$

$= -\left(2^{-4} \times 2^{12}\right)$

$= -2^{-4+12}$

$= -2^8$

$= -256$

$\therefore$ The required number is – 256 **Ans.**

Self Assessment-2

1. i) $\left(\frac{1}{3}\right)^9 \times \left(\frac{1}{3}\right)^7 \div \left[\left(\frac{1}{3}\right)^4 \times \left(\frac{1}{3}\right)^5\right]$

$= \left(\frac{1}{3}\right)^{9+7} \div \left[\left(\frac{1}{3}\right)^{4+5}\right]$

$= \left(\frac{1}{3}\right)^{16} \div \left(\frac{1}{3}\right)^9$

$= \left(\frac{1}{3}\right)^{16-9}$

$= \left(\frac{1}{3}\right)^7$ **Ans.**

ii) $4^0 - 6^0 + 8^0 - 9^0$

$= 1 - 1 + 1 - 1$

$= 0$ **Ans.**

iii) $6_{-1} \times 4_{-1} \times 6$

$= \frac{1}{\cancel{6}} \times \frac{1}{4} \times \cancel{6}$

$= \frac{1}{4}$ **Ans.**

2. Eight raised to the Power of $-3 = (8)^{-3}$

$= \left(\frac{1}{8}\right)^3$

$= \frac{1}{512}$

$= \ldots\ldots\ldots\ldots$ of $\frac{1}{512} = 512$

$= \ldots\ldots\ldots\ldots$ of eight raised to the Power of -3 is 512 **Ans.**

3. $\frac{81}{1296}$

$= \frac{3^4}{2^4 \times 3^4}$

$= \frac{3^4}{(2 \times 3)^4}$

$= \frac{3^4}{6^4}$

$= \left(\frac{3}{6}\right)^4$ **Ans.**

4. i) $(-3)^5 \times (-3)^3 = (-3)^{2x}$

$= (-3)^{5\times3} = (-3)^{2x}$

$= (-3)^8 = (-3)^{2x}$

$\because$ Bases are same, Powers should be equal.

$\therefore \quad 2x = 8$

$x = \frac{\cancel{8}^4}{\cancel{2}}$

$= 4$ **Ans.**

ii) $(24)^7 = 2^{x+3}$

$= 2^{28} = 2^{x+3}$

$\because$ Bases are same, Powers should be equal.

$\therefore \quad x + 3 = 28$

$\Rightarrow \quad x = 28 - 3$

$= 25$ **Ans.**

5. 6750

$= 2^1 \times 3^3 \times 5^3$

$= 2^1 \times (3\times5)^3$

$= 2^1 \times 15^3$ **Ans.**

6. $\left(\frac{2}{3}\right)^3 \times \left(\frac{1}{2}\right)^4$

$= \frac{2^3}{3^3} \times \frac{1^4}{2^4}$

$= \frac{1}{2^{4-3} \times 3^3}$

$= \frac{1}{2^1 \times 3^3}$

$= \frac{1}{3^3 \times 2}$

$=$ d) $\frac{1}{3^3 \times 2}$ **Ans**

7. $\frac{-27}{64}$

$= -\frac{3^3}{2^6}$

$= \frac{(-3)^3}{2^6}$

$=$ a) $\frac{(-3)^3}{2^6}$

8. d) $\left(\frac{8}{5}\right)^{-1}$

9. a) $2^{-4} \times 3^2$

10. a) $x^m \times x^n = x^{mn}$

11. d) 2^3

12. $3^{P+1} = 81$

$\Rightarrow 3^{P+1} = 3^4$

$\because$ Bases are same, Powers should be equal.

$\therefore P + 1 = 4$

$\Rightarrow P = 4 - 1$

$= 3$

$\therefore$ d) 3

13. b) 1

Chapter-3 Squares and Square roots

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction square number or a perfect square	To understand what is a square number.	Define a square number as the square of a natural number. For egs $100=10^2$ hence 100 is a square number.	Is 363 a perfect square?
Properties of Square numbers	Able to identify whether the given number is a perfect square or not.	Explain the properties by giving different egs. • A number ends with 2,3,7 or 8 will not be a perfect square. • From the unit digit write the unit's digit in the square number • Number of natural numbers between two consecutive perfect squares. • Write a perfect square as the sum of two consecutive integers. • Write a perfect square n^2 as the sum of first n odd numbers starting with 1	
Square roots by different methods	To find the square root of a given number by different methods 1) By successive subtraction 2) By prime factorization	Explain the square root of a number as, if $a = b^2$ then b is called the square root of a and it is denoted by $\sqrt{a}$. $25 = 5^2$ then $\sqrt{25} = 5$ Explain the three methods of finding the square root of a given number by demonstrating different examples.	Find the square root of 0.0361 by division method.

Exercise 3.1

1. i) Given number is 304

2	304
2	152
2	76
2	38
19	19
	1

∴ $304 = (2\times2) \times (2\times2) \times 19$

∵ 304 cannot expressed as the Product of pours of factors equal prime

∴ 304 is not a perfect square. (Ans)

ii) Given number is 187

11	187
17	17
	1

∴ $187 = 11 \times 17$

∵ 187cannot be expressed as the product of pours of equal hrime factors.

∴ 187 is not a perfect square. (Ans.)

iii) Given number is 343

7	343
7	49
7	7
	1

∴ $343 = (7\times7) \times 7$

∵ 343 cannot be expressed as the product of hirs of equal hrime ofctars,

∴ 343 is not a parfect square **(Ans.)**

iv) Given number is 729

3	729
3	243
3	81
3	27
3	9
3	3
	1

∴ $729 = (3\times3) \times (3\times) \times (3\times3)$

∵ 729 can be exprassed as the product of pairs

∵ of equal prime fotars,

∵ 729 is a perfect square. (Ans.)

2. i) Given number is 625

5	625
5	125
5	25
5	5
	1

∵ 625 expressed as the product of pairs of equal prime pactors,

∵ 625 is a perfect square [Hence, proued]

∵ $\sqrt{625} = \sqrt{(5\times5)\times(5\times5)}$

$= 5\times5$

$= 25$ **Ans.**

ii) Given number is 196

2	196
2	98
7	49
7	7
	1

∴ $196 = (2\times2) \times (7\times7)$

$\because$ 196 can be exprassed as the product of pairs of equal prime factors,

$\therefore$ 196 is a perfect squase.[Hence, prouded]

$\therefore \sqrt{196} = \sqrt{(2\times2)\times(7\times7)}$

$= 2 \times 7$

$= 14$ **Ans.**

iii) Given number is 484

2	484
2	242
11	121
11	11
	1

$\therefore$ $484 = (2\times2) \times (11\times11)$

$\because$ 484 can be exprassed as the product of pairs of equal prime factors,

$\therefore$ 484 is a perfect square. [Hence, proued,

$\therefore \sqrt{484} = \sqrt{(2\times2)\times(11\times11)}$

$= 2\times11$

$= 22$ **Ans.**

iv) Given number is 225

3	225
3	75
5	25
5	5
	1

$\therefore$ $225 = (3\times3) \times (5\times5)$

$\because$ 225 can be exprassed as the product of pairs of equal prime factors,

$\therefore$ 225 is a perfect square. [Hence, proued]

$\therefore \sqrt{225} = \sqrt{(3\times3)\times(5\times5)}$

$= 3\times5$

$= 15$ **Ans.**

3. i) Given number is 52

2	52
2	26
13	13
	1

$\therefore$ $52 = (2\times2) \times 13$

$\because$ Here one 13 is left unpaired so, to make 52 into a perfect square it must be divided by 13.

$\because$ The smallest number by which 52 must be divided to make a perfect square is 13. (Ans)

ii) Given number is 72

2	72
2	36
2	18
3	9
3	3
	1

$\therefore$ $72 = (2\times2) \times 2 \times (3\times3)$

Here, one 2 is left unpaired. so, to make 72 into a perfect square, it must be divided by 2.

$\therefore$ The smallest number by which 72 must by dwrided to make ti a perfect square is 2. (Ans)

iii) Given number is 252

2	252
2	126
3	63
3	21
7	7
	1

$\therefore$ $252 = (2\times2) \times (3\times3) \times 7$

Here one 7 is left unpaired so, make the given number into a perfect square, it must be divided by 7.

$\therefore$ The smallest mumber by which 252 must by divided ake it a perfect square is 7. (Ans)

4. i) Given number is 396

2	396
2	198
3	99
3	33
11	11
	1

$\therefore$ $396 = (2\times2) \times (3\times3) \times 11$

Here, one 11 is left unpaired to make the given number into a perfect square, 11 must be paired square.

$\therefore$ To make the given number into a perfect square, the given number must be multiplied by 11.

$\therefore$ The smallest number by which 396 must be square is 11. (Ans)

ii) Given number is 2420

2	2420
2	1210
5	605
11	121
11	11
	1

$\therefore$ $2420 = (2\times2) \times 5 \times (11\times11)$

Here, one 5 is left unpaired.

$\therefore$ To make the given into a perfect square it must be multiplied by 5.

$\therefore$ The smallest number be which 2420 must be multilied to make it a perfect square is. (Ans)

iii) Given number is 1734

2	1734
3	867
17	289
17	17
	1

$\therefore$ $1734 = 2\times3 \times (17\times17)$

Here, one and one 3 ore left unpaired to make the given number into a perfect square, it must be multiplied 2 and 3 i, e, $2 \times 3 = 6$.

$\therefore$ The smallest number by which 1734 must be multiplied to make it a perfect square is 6. (Ans)

vi) Given numbrer is 961

31	961
31	31
	1

$\therefore$ $961 = (31\times31)$

$\because$ 961 can be expressed as the product os pairs of equal prime factors,

$\therefore$ 961 is a perfect square. (Ans)

Exercise 3.2

1. i) Since 5323 has 3 as its unit place,

$\therefore$ 5323 is not a perfect square.

ii)

iii) Since, 2007 has 7 as its unit place,

∴ 2007 as not a perfect squaer.

iv)

v) Since, 8523 has 3 as its unit place,

∴ 8523 is not a perfect square.

2. i) Unit digit of the square of 61 will be 1.

ii) Unit digit of the square of 59 will be 1.

iii) Unit digit of the square of 84 will be 6.

iv) Unit digit of the square of 26 will be 6.

v) Unit digit of square of 53 will be 9.

vi) Unit digit of the square of 27 will be 9.

3. i) Since 51 is an add natural number,

∴ 51^2 is also add.

ii) Since 62 is an even natural number,

∴ 62^2 is also even.

iii) Since 80 is an even natural number,

∴ 80^2 is also even.

iv) Since 75 is an add natural number,

∴ 75^2 is also an odd number

v) Since 29 is an add natural number,

∴ 29^2 is also add.

vi) Since 100 is an even natural number,

∴ 100^2 is also even.

4. i) $(42)^2 - (41)^2$

= $(42+41)(42-41)$ [$\because a^2-b^2=(a+b)(a-b)$

= 83×1

= 83 **Ans.**

ii) $(35)^2 - (34)^2$

= $(35+34)(35-34)$ [$\because a^2-b^2=(a+b)(a-b)$]

= 69×1

= 69 **Ans.**

iii) $(100)^2 - (99)^2$

= $(100+99)(100-99)$ [$\because a^2-b^2=(a+b)(a-b)$

= 199×1

= 199 **Ans.**

iv) $(20)^2 - (19)^2$

= $(20+19)(20-19$ [$\because a^2-b^2=(a+b)(a-b)$]

= 39×1

= 39 **Ans.**

v) $(68)^2 - (67)^2$

= $(68+67)(68-67)$ [$\because a^2-b^2=(a+b)a-b$)

= 135×1

= 135 **Ans.**

vi) $(34)^2 - (33)^2$

= $(34+33)(34-33)$ [$\because a^2-b^2(a+b)(a-b)$

= 67×1

= 67 **Ans.**

5. i) Here there are two successive odd natural number starting with 1.

∴ $1 + 3 = 4$

$\sqrt{4} = 2$

∴ $2^2 = 1 + 3$ **Ans.**

ii) Here there are two successive odd natural number starting with 1.

∴ $1 + 3 + 5 + 7 + 9 = 25$

$\sqrt{25} = 5$

∴ $5^2 = 1 + 3 + 5 + 7 + 9$ i.e. 25 **Ans.**

iii) Here there are 8 successive odd natural numbers starting with 1.

∴ $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 = 64$

$\sqrt{64} = 8$

∴ $82 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$ i. e. 64 **Ans.**

iv) Here Here are 10 successive odd natural numbers starting wigh 1.

$\therefore$ $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = 100$

$\sqrt{100} = 10$

$\therefore$ $10^2 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19$ **Ans.**

v) Here there are 4 successive odd natural numbers starting with 1.

$\therefore$ $1 + 3 + 5 + 7 + = 16$

$\sqrt{16} = 4$

$\therefore$ $4^2 = 1 + 3 + 5 + 7$ **Ans.**

6. i) Given number is 64.

$\therefore$ 64–1 = 63, 63–3 = 60, 60–5 = 55, 55–7 = 48, 48–9 =39, 39–11 = 28, 28–13 = 15, 15–15 = 0

$\therefore$ 64 = 1+3+5+7+9+11+13+15 **Ans.**

ii) Given number is 81.

$\therefore$ 81–1 = 80, 80–3 = 77, 77–5 = 72, 72–7 = 65, 65–9 = 56, 56–11 = 45, 45–13 = 32, 32–15 = 17, 17–17 = 0.

$\therefore$ 81 = 1+3+5+7+9+11+13+15+17 **Ans.**

iii) Given number is 121.

$\therefore$ 121–1 = 120, 120–3 = 117, 117–5 = 112, 112–7 = 105, 105–9 = 96, 96–11 = 85, 85–13 = 72, 72–15 = 57, 57–17 = 40, 40–19 = 21, 21–21 = 0.

$\therefore$ 121= 1+3+5+7+9+11+13+15+17 +19+21 **Ans.**

iv) Given number is 16

$\therefore$ 16–1 = 15, 15–3 = 12, 12–5 = 7, 7–7 = 0

$\therefore$ 16 = 1+3+5+7 **Ans.**

v) Given number is 25

$\therefore$ 25–1 = 24, 24–3 = 21, 21–5 = 16, 16¬7 = 9, 9–9 = 0.

$\therefore$ 25 = 1+3+5+7+9 **Ans.**

vi) Given number is 196.

$\therefore$ 196–1 = 195, 195–3 = 192, 192–5 = 187, 187–7 = 180, 180–9 = 171, 171–11 = 160, 160–13 = 147, 147–15 = 132, 132–17 = 115, 115–19 96, 96–21 = 75, 75–23 = 52, 52–25 27, 27–27 = 0.

$\therefore$ 196 = 1+3+5+7+9+11+13+15+17 +19+21+23+25+27 **Ans.**

7. i) No of number between 23^2 i.e. n^2 and 24^2 i.e. $(n+1)^2$ is $2\times23 = 46$. **Ans.**

ii) No of number between 16^2 i.e. n^2 and 17^2 i.e. $(n+1)^2$ is $2\times16 = 32$ **Ans.**

iii) No of number between 35^2 i.e. n^2 and 36^2 i.e. $(n+1)^2$ is $2\times35 = 70$ **Ans.**

iv) No of number between 100^2 i.e. n^2 and 101^2 i.e. $(n+1)^2$ is $2\times100 = 200$. **Ans.**

v) No of number between 213^2 i.e. n^2 and 214^2 i.e. $(n+1)^2$ is $2\times213 = 426$ **Ans.**

vi) No of number between 54^2 i.e. n^2 and 55^2 i.e. $(n+1)^2$ is $2\times54 = 108$. **Ans.**

Exercise 3.3

1. i) Given number is 225

3	225
3	75
5	25
5	5
	1

$\therefore$ $225 = (3\times3) \times (5\times5)$

$\therefore$ $\sqrt{225} = \sqrt{(3\times3)\times(5\times5)}$

$= 15$ **Ans.**

ii) Given number is 441

3	441
3	147
7	49
7	7
	1

$\therefore$ $441 = (3\times3) \times (7\times7)$

$\therefore$ $\sqrt{441} = \sqrt{(3\times3)\times(7\times7)}$

$= 21$ **Ans.**

iii) Given number is 729

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\therefore$ $729 = (3\times3) \times (3\times3) \times (3\times3)$

$\therefore$ $\sqrt{729} = \sqrt{(3\times3)\times(3\times3)\times(3\times3)}$

$= 3 \times 3 \times 3$

$= 27$ **Ans.**

iv) Given number is 2025

3	2025
3	675
3	225
3	75
5	25
5	5
	1

$\therefore$ $2025 = (3\times3) \times (3\times3) \times (5\times5)$

$\therefore$ $\sqrt{2025} = \sqrt{(3\times3)\times(3\times3)\times(5\times5)}$

$= 3 \times 3 \times 5$

$= 45$ **Ans.**

v) Given number is 4096

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$\therefore$ $4096 = (2\times2) \times (2\times2) \times (2\times2) \times (2\times2) \times (2\times2) \times (2\times2)$

$\therefore$ $\sqrt{4096}$

$= \sqrt{(2\times2)\times(2\times2)\times(2\times2)\times(2\times2)\times(2\times2)\times(2\times2)}$

$= 2\times2\times2\times2\times2\times2$

$= 64$ **Ans.**

vi) Given number is 7056

2	7056
2	3528
2	1764
2	882
3	441
3	147
7	49
7	7
	1

$\therefore$ $7056 = (2\times2) \times (2\times2) \times (3\times3) \times (7\times7)$

$\therefore$ $\sqrt{7056} = \sqrt{(2\times2)\times(2\times2)\times(3\times3)\times(7\times7)}$

$= 2\times2\times3\times7$

$= 84$ **Ans.**

vii) Given number is 1521

3	1521
3	507
13	169
13	13
	1

$\therefore$ $1521 = (3\times3) \times (13\times13)$

$\therefore$ $\sqrt{1521} = \sqrt{(3\times3)\times(13\times13)}$

$= 3\times13$

$= 39$ **Ans.**

viii) Given number is 11025

3	11025
3	3675
5	1225
5	245
7	49
7	7
	1

$\therefore$ $11025 = (3\times3) \times (5\times5) \times (7\times7)$

$\therefore$ $\sqrt{11025} = \sqrt{(3\times3)\times(5\times5)\times(7\times7)}$

$= 3\times5\times7$

$= 105$ **Ans.**

ix) Given number is 15876

2	15876
2	7938
3	3969
3	1323
3	441
3	147
7	49
7	7
	1

$\therefore$ $15876 = (2\times2) \times (3\times3) \times (3\times3) \times (7\times7)$

$\therefore$ $\sqrt{15876} = \sqrt{(2\times2)\times(3\times3)\times(3\times3)\times(7\times7)}$

$= 2\times3\times3\times7$

$= 126$ **Ans.**

2. i) Given number is $42.25 = \frac{\cancel{4225}^{845}}{\cancel{100}_{20}} = \frac{169}{4}$

$\therefore$ $\sqrt{42.25} = \sqrt{\frac{4225}{100}} = \sqrt{\frac{169}{4}}$

$= \frac{\sqrt{169}}{\sqrt{4}} \quad \frac{13}{2} = 6.5$

$= \sqrt{42.25}$ 6 . 5 **Ans.**

iii) Given number is $6.25 = \frac{\cancel{625}^{125^{25}}}{\cancel{100}_{20_4}} = \frac{25}{4}$

$\therefore \quad \sqrt{6.25} = \sqrt{\frac{625}{100}} = \sqrt{\frac{25}{4}} = \sqrt{\frac{25}{4}}$

$= \quad \sqrt{\frac{5}{2}} = 2.5$

$= \quad \sqrt{6.25}\ 2.5$ **Ans.**

iv) Given number is $1\frac{63}{81} = \frac{144}{81}$

$\sqrt{1\frac{63}{81}} = \sqrt{\frac{144}{81}} = \frac{\sqrt{144}}{\sqrt{81}}$

$= \frac{\cancel{12}^{4}}{\cancel{9}_{3}} = \frac{4}{3} = 1\frac{1}{3}$

$= \quad \sqrt{1\frac{63}{81}} = 1\frac{1}{3}$ **Ans.**

3. Given number is 252

2	252
2	126
3	63
3	21
7	7
	1

$\therefore \quad 252 = (2\times2) \times (3\times3) \times 7$

Here, one 7 is left unpaired.

to make 252 into a perfect square, it must be multiplied by 7.

The smallest number by which 252 must be multipled to make it a perfect square is 7 (Ans)

$\therefore \quad 252\times7 = (2\times2) \times (3\times3) \times (7\times7)$

$\Rightarrow \quad 1764 = (2\times2) \times (3\times3) \times (7\times7)$

$\therefore$ The required square number = 1764

$\therefore \quad \sqrt{1764} = \sqrt{(2\times2)\times(3\times3)\times(7\times7)}$

$= \quad 2\times3\times7$

$= \quad 42$ **Ans.**

4. Given number is 2925

3	2925
3	975
5	325
5	65
13	13
	1

$\therefore \quad 2925 = (3\times3) \times (5\times5) \times 13$

Here, one 13 is left unpaired.

To make the given number into a perfect square, it must be divided by 13.

The smallest number by which 2925 must be divided to make it a perfect square is 13. (Ans)

$\therefore \quad 2925 \div 13 = (3\times3) \times (5\times5)$

$\Rightarrow \quad 225 = (3\times3) \times (5\times5)$

$\therefore$ The reqiured square number is 225

$\therefore \quad \sqrt{225} = \sqrt{(3\times3)\times(5\times5)}$

$= \quad 3\times5$

$= \quad 15$ **Ans.**

5. Let no of rows be x.

$\therefore$ no of plants in each sow = x.

Lotal no of plants to be planted = 1225

5	1225
5	245
7	49
7	7
	1

$\therefore \quad x\times x = 1225$

$\Rightarrow \quad x^2 = 1225$

$\Rightarrow \quad \sqrt{x^2} = \sqrt{1225}$

$\Rightarrow \quad x = \sqrt{(5\times5)\times(7\times7)}$

$= \quad 5\times7$

$= \quad 35$

$\therefore$ no of rows = 35

$\therefore$ no of plants in each row = 35 **Ans.**

6. Let total strength of class be x.

Amount each student contributed = Rs. x.

Total amount contributed = Rs. 1156

2	1156
2	578
17	289
17	17
	1

$\therefore \quad x\times x = 1156$

$\Rightarrow \quad x^2 = 1156$

$\Rightarrow \quad \sqrt{x^2} = \sqrt{1156}$

$\Rightarrow \quad x = \sqrt{(2\times2)\times(17\times17)}$

$= \quad 2\times17$

$= \quad 34$

$\therefore$ Total strength of class = 34 **(Ans.)**

7. Let no of rows be x.

$\therefore$ No of saplings in each sow = x

No of saplings the gardener wanto to plant = 2000

$\therefore \quad x\times x = 2000$

$\Rightarrow \quad x^2 = 2000$

$\Rightarrow \quad \sqrt{x^2} = \sqrt{2000}$

$\Rightarrow \quad x = \sqrt{2000}$

$$\begin{array}{r} \overline{2}\overline{0}\overline{0}\overline{0}\,(44 \\ 16 \\ 84\overline{)400} \\ \underline{336} \\ 64 \end{array} \qquad \begin{array}{r} 84 \\ \times 4 \\ \hline 336 \end{array}$$

We get remainder 64.

$\therefore$ No of sapling left = 64 **(Ans)**

Exercise 3.4

1. i) Given number is 196

$$\begin{array}{r} 1 \\ \overline{1}\overline{9}\overline{6}\,(14 \\ 1 \\ 24\overline{)096} \\ \underline{96} \\ \times \end{array}$$

$\therefore \quad \sqrt{196} = 14$ **(Ans.)**

ii) Given number is 81

$$\begin{array}{r} 81\,(9 \\ \underline{81} \\ \times \end{array}$$

$\therefore \quad \sqrt{81} = 9$ **(Ans.)**

iii) Given number is 169

$$\begin{array}{r} 1\overline{6}\overline{9}\,(13 \\ 1 \\ 23\overline{)069} \\ \underline{69} \\ \times \end{array}$$

$\therefore \quad \sqrt{169} = 13$ **(Ans.)**

iv) Given number is 225

$$\begin{array}{r} 2\overline{2}\overline{5}\,(15 \\ 1 \\ 25\overline{)125} \\ \underline{125} \\ \times \end{array}$$

$\therefore \quad \sqrt{225} = 15$ **(Ans.)**

v) Given number is 100

$\therefore \quad \sqrt{100} = 10$ **(Ans.)**

vi) Given number is 144

$$\begin{array}{r|l} 1 & \\ \hline 1 & 96 \;(14 \\ \hline 1 & \\ \hline 24 & 096 \\ & 96 \\ & \times \end{array}$$

$\therefore \quad \sqrt{144} = 12$ **(Ans.)**

2 .i) Given number is 25

5	25
5	5
	1

$\therefore \quad 25 = (5\times5)$

$\therefore \quad \sqrt{25} = \sqrt{(5\times5)}$

$= \quad 5$ **(Ans.)**

ii) Given number is 144

2	144
2	72
2	36
2	18
3	9
3	3
	1

$\therefore \quad 144 = (2\times2) \times (2\times2) \times (3\times3)$

$\therefore \quad \sqrt{144} = \sqrt{(2\times2)\times(2\times2)\times(3\times3)}$

$= \quad 2\times2\times3$

$= \quad 12$ **(Ans.)**

iii) Given number is 729

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\therefore \quad 729 = (3\times3) \times (3\times) \times(3\times)$

$\therefore \quad \sqrt{729} = \sqrt{(3\times3)\times(3\times3)\times(3\times3)}$

$= \quad 3\times3\times3$

$= \quad 27$ **(Ans.)**

iv) Given number is 256

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$\therefore \quad 256 = (2\times2) \times (2\times2) \times (2\times2) \times (2\times2)$

$\therefore \quad \sqrt{256} = \sqrt{\begin{array}{l}(2\times2)\times(2\times2) \\ \times(2\times2)\times(2\times2)\end{array}}$

$= \quad 2\times2\times2\times2$

$= \quad 16$ **(Ans.)**

v) Given number is 576

2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

$\therefore \quad 576 = (2\times2) \times (2\times2) \times (2\times2) \times (3\times3)$

$\therefore \quad \sqrt{576} = \sqrt{(2\times2)\times(2\times2)\times(2\times2)\times(3\times3)}$

$= \quad 2\times2\times2\times3$

$= \quad 24$ **(Ans.)**

vi) Given number is 225

3	225
3	75
5	25
5	5
	1

$\therefore \quad 225 = (3\times3) \times (5\times5)$

$\therefore \quad \sqrt{225} = \sqrt{(3\times3)\times(5\times5)}$

$= \quad 3\times5$

$= \quad 15$ **(Ans.)**

3. i) Given number is 7.29

$7.\overline{29}\,(2.7$

$47\overline{)329}$

4

329

$\times$

$\therefore \quad \sqrt{7.29} = 2.7$ **(Ans.)**

$47 \times 7 = 329$

$45 \times 5 = 225$

ii) Given number is 6.25

$6.\overline{25}\,(2.5$

$45\overline{)225}$

4

225

$\times$

$\therefore \quad \sqrt{6.25} = 2.5$ **(Ans.)**

iii) Given number is 1.4641

$1.\overline{4641}\,(1.21$

$22\overline{)046}$

1

$241\overline{)241}$

44

241

$\times$

$\therefore \quad \sqrt{1.4641} = 1.21$ **(Ans.)**

iv) Given number is 9.61

$9.\overline{61}\,(3.1$

$61\overline{)061}$

9

61

$\times$

$\therefore \quad \sqrt{9.61} = 3.1$ **(Ans.)**

v) Given number is 0.2704

$0.\overline{27}\overline{04}\,(0.52$

$05\overline{)027}$

0

$102\overline{)204}$

25

204

$\times$

$\therefore \quad \sqrt{0.2704} = 0.52$ **(Ans.)**

vi) Given number is 19.36

$\overline{19}.\overline{36}\,(4.4$

$84\overline{)336}$

16

336

$\times$

$\therefore \quad \sqrt{19.36} = 4.4$ **(Ans.)**

4. i) Given number is 242

2	242
11	121
11	11
	1

$\therefore \quad 242 = 2 \times (11\times11)$

Here, one 2 is unpaired.

$\therefore$ To make the given number into a perfect square it must be multiplied by 2.

$\therefore$ The smallest number by which 242 must be multiplied to make it a perfect square is 2. (Ans)

$\therefore \quad 242 \times 2 = (2 \times 2) \times (11 \times 11)$

$\Rightarrow$ $484 = (2\times2)\times(11\times11)$

$\therefore$ The required square number is 484.

$\therefore$ $\sqrt{484} = \sqrt{(2\times2)\times(11\times11)}$

$= 2\times11$

$= 22$ **(Ans.)**

ii) Given number is 578

2	578
17	289
17	17
	1

$\therefore$ $578 = 2\times(17\times17)$

Here, one 2 is left unaired.

$\therefore$ To make the given number into a ferfect square it must be multiplied by 2.

$\therefore$ The smallest number by which 578 must be multiplied to make it a perfect square is 2. (Ans)

$\therefore$ $578\times2 = (2\times2)\times(17\times17)$

$\Rightarrow$ $1156 = (2\times2)\times(17\times17)$

$\therefore$ The required square number is 1156

$\therefore$ $\sqrt{1156} = \sqrt{(2\times2)\times(17\times17)}$

$= 2\times17$

$= 34$ **Ans.**

5. i) Given number is 75

5	75
5	25
5	5
	1

$\therefore$ $75 = 3\times(5\times5)$

$\therefore$ To make the given number into a perfect square it must be divided by 3

$\therefore$ The smallest number by which 75 must be divided to make it a perfect square is 3 **Ans.**

$\therefore$ $75\div3 = (5\times5)$

$\Rightarrow$ $25 = (5\times5)$

$\therefore$ The required sqyare bynver us 25

$\therefore$ $\sqrt{25} = \sqrt{5\times5}$

$= 5$ **Ans.**

ii) Given number is 363

3	363
11	121
11	11
	1

$\therefore$ $363 = 3\times(11\times11)$

blere, one 3 is left unpaired

$\therefore$ To make the given number into a perfect square it must be divided by 3.

$\therefore$ The smallest number by which 363 must be divided to make it a perfect square is 3. **(Ans)**

$\therefore$ $363\div3 = (11\times11)$

$\Rightarrow$ $121 = (11\times11)$

$\therefore$ The required square number = 121

$\therefore$ $\sqrt{121} = \sqrt{(11\times11)}$

$= 11$ **Ans.**

iii) Given number is 800

2	800
2	400
2	200
2	100
2	50
5	25
5	5
	1

$\therefore$ $800 = (2\times2)\times(2\times2)\times2\times(5\times5)$

Here, are 3 is left unpaired

$\therefore$ To make the given number into a perfect square it must be divided by 2

$\therefore$ The smallest number by which 800 must be divided to make it a perfect square is 2. **Ans.**

$\therefore$ $800 \div 2 = (2\times2)\times(2\times2)\times(5\times5)$

$\Rightarrow$ $400 = (2\times2)\times(2\times2)\times(5\times5)$

$\therefore$ The required square number is 400.

$\therefore$ $\sqrt{400} = \sqrt{(2\times2)\times(2\times2)\times(5\times5)}$

$= 2\times2\times5$

$= 20$ **(Ans)**

6. i) Given number is 3169

$$\begin{array}{r} \overline{31}\ \overline{69}\,(56 \\ 25 \\ \hline 106\,)\,669 \\ 636 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 106 \\ \times\ 6 \\ \hline 636 \end{array}$$

We get the remainder 33.

This means that $(56)^2$ is less than 3169 by 33

$\therefore$ If we subtract 33 from 3169 we get $(54)^2$ which is a perfect square.

$\therefore$ The smallest number that must be subtracted from 3169 to make it a perfect square is 33. (**Ans.**)

ii) Given number is 2965

$$\begin{array}{r} \overline{29}\ \overline{65}\,(54 \\ 25 \\ \hline 104\,)\,465 \\ 416 \\ \hline 49 \end{array}$$

We get the remainder 49.

This means that $(54)^2$ is less than 2965 by 49.

$\therefore$ If we subtract 49 from 2965 we get $(54)^2$ which is a perfect square.

$\therefore$ The smallest number that must be subtracted from 2965 to make it a perfect square is 49. (**Ans.**)

iii) Given number is 2510

$$\begin{array}{r} \overline{25}\ \overline{10}\,(50 \\ 25 \\ \hline 100\,)\,010 \\ 000 \\ \hline 10 \end{array}$$

We get the remainder 10.

This means that $(50)^2$ is less than 2510 by 10.

$\therefore$ If we subtract 10 from 2510 we get $(50)^2$ which is a perfect square.

$\therefore$ The smallest number that must be subtracted from 2510 to make it a perfect square is 10. (**Ans.**)

iv) Given number is 6138

$$\begin{array}{r} \overline{61}\ \overline{38}\,(78 \\ 49 \\ \hline 148\,)\,1238 \\ 1184 \\ \hline 54 \end{array}$$

We get the remainder 54.

This means that $(78)^2$ is less than 6138 by 54.

$\therefore$ If we subtract 54 from 6138 we get $(78)^2$ which is a perfect square.

$\therefore$ The smallest number that must be subtracted from 6138 to make it a perfect square is 54. (**Ans.**)

v) Given number is 3825

$$\begin{array}{r} \overline{38}\ \overline{25}\,(61 \\ 36 \\ \hline 121\,)\,225 \\ 121 \\ \hline 104 \end{array}$$

We get the remainder 104.

This means that $(61)^2$ is less than 3825 by 104.

$\therefore$ If we subtract 104 from 3825 we get $(61)^2$ which is a perfect square.

$\therefore$ The smallest number that must be subtracted from 3825 to make it a perfect square is 104. (**Ans.**)

vi) Given number is 2736

$$\begin{array}{r} \overline{27}\ \overline{36}\,(52 \\ 25 \\ \hline 102\,)\,236 \\ 204 \\ \hline 32 \end{array}$$

We get the remainder 32.

This means that $(52)^2$ is less than 2736 by 32.

$\therefore$ If we subtract 32 from 2736 we get $(52)^2$ which is a perfect square.

$\therefore$ The smallest number that must be subtracted from 2736 to make it a perfect square is 32. (**Ans.**)

Self Assessment-3

1. i) Given number is 625

5	625
5	125
5	25
5	5
	1

$\therefore$ $625 = (5\times5)\times(5\times5)$

$\therefore$ $\sqrt{625} = \sqrt{(5\times5)\times(5\times5)}$

$= 5\times5$

$= 25$ **(Ans)**

ii) Given number is 5.76 i.e. $\frac{576}{100}$

2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

$\therefore$ $576 = (2\times2)\times(2\times2)\times(2\times2)\times(3\times3)$

$\therefore$ $\sqrt{576} = \sqrt{(2\times2)\times(2\times2)\times(2\times2)\times(3\times3)}$

$= 2\times2\times2\times3$

$= 24$

$\therefore$ $\sqrt{5.76} = \sqrt{\frac{576}{100}} = \frac{\sqrt{576}}{\sqrt{100}} = \frac{24}{10} = 2.4$ **Ans.**

iii) Given number is 1.69 i.e. $\frac{169}{100}$

13	169
13	13
	1

$\therefore$ $169 = (13\times13)$

$\therefore$ $\sqrt{169} = \sqrt{(63\times13)}$

$= 13$

$\therefore$ $\sqrt{1.69} = \sqrt{\frac{169}{100}} = \frac{\sqrt{169}}{\sqrt{100}} = \frac{13}{10} = 1.3$ **Ans.**

iv) Given number is $\frac{64}{289}$

2	64
2	32
2	16
2	8
2	4
2	2
	1

17	289
17	17
	1

$\therefore \quad 64 = (2\times2)\times(2\times2)\times(2\times2)$

$\therefore \quad \sqrt{64} = (2\times2)\times(2\times2)\times(2\times2)$

$= 2\times2\times2$

$= 8$

$\therefore \quad 289 = (17\times17)$

$\therefore \quad \sqrt{289} = \sqrt{(17\times17)}$

$= 17$

$\therefore \quad \sqrt{\frac{64}{289}} = \frac{\sqrt{64}}{\sqrt{289}} = \frac{8}{17}$ **Ans.**

2. i) Given number is 4356

$$\begin{array}{r} \overline{43}\ \overline{56}\,(66 \\ 36 \\ \hline 126\,)\,756 \\ 756 \\ \hline \times \end{array}$$

$\therefore \quad \sqrt{4356} = 66$ **Ans.**

ii) Given number is 0.0361

$$\begin{array}{r} 0.\overline{03}\overline{61}\,(0.19 \\ 0 \\ \hline 01\,)\,003 \\ 001 \\ \hline 29\,)\,261 \\ 261 \\ \hline \times \end{array}$$

$\therefore \quad \sqrt{0.0361} = 0.19$ **Ans.**

iii) Given number is 729

$$\begin{array}{r} 7\overline{29}\,(27 \\ 4 \\ \hline 47\,)\,329 \\ 329 \\ \hline \times \end{array}$$

$\therefore \quad \sqrt{729} = 27$ **Ans.**

iv) Given number is $\frac{144}{10000}$

$$\begin{array}{r} 1\overline{44}\,(12 \\ 1 \\ \hline 22\,)\,044 \\ 44 \\ \hline \times \end{array}$$

$$\begin{array}{r} 1\overline{0000}\,(100 \\ 1 \\ \hline 20\,)\,000 \\ 000 \\ \hline 200\,)\,00000 \\ 00000 \\ \hline \times \end{array}$$

$\therefore \quad \sqrt{144} = 12$

$\therefore \quad \sqrt{10000} = 100$

$\therefore \quad \sqrt{\frac{144}{10000}} = \frac{\sqrt{144}}{\sqrt{10000}} = \frac{12}{100} = 0.12$ **Ans.**

3. Given number is 52

2	52
2	26
13	13
	1

$\therefore \quad 52 = (2\times2)\times13$

Here, one 13 is left unpaired.

$\therefore$ To make the given number into a perfect square, it must be multiplied by 13.

$\therefore$ The smallest number by which 52 must be multiplied to make it a perfect square is 13. **(Ans)**

4. Given number is 242

2	242
11	121
11	11
	1

$\therefore$ $242 = 2\times(11\times11)$

Here, one 2 is left unpaired.

$\therefore$ To make the given number into a perfect square, it must be divided by 2.

$\therefore$ The smallest number by which 242 must be divided to make it a perfect square is 2. **(Ans)**

5. Let length of side of square be (x) metre.

Area of square field = 484 m^2

$\therefore$ $x = x = 484$

$\therefore$ $x^2 = 484$

$\Rightarrow$ $\sqrt{x^2} = \sqrt{484}$

$\Rightarrow$ $x = 22$

$\therefore$ Langth of each side of square field = 22m

Ans Length of each side of square field = 22m

6. b) 363
7. c) 8
8. d) 9
9. a) 121
10. c) 15 and 16
11. a) 225
12. a) d) 2
13. d) 50
14. Given number is 48

2	48
2	24
2	12
2	6
3	3
	1

$\therefore$ $48 = (2\times2) \times (2\times2) \times 3$

Here, one 3 is left unpaired.

$\therefore$ To make the given number into a perfect square, it must be multiplied by 3.

$\therefore$ The smallest number by which 48 must be should be multiplied to make it a perfect square is 3.

$\therefore$ b) 3. **(Ans)**

Chapter-4 Cubes and cube roots

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction: cube of a number and perfect cubes	To understand the meaning of cube and identify the perfect cubes	The product $a \times a \times a = a^3$ is called the cube of a. $2 \times 2 \times 2 = 2^3 = 8$ is a cube. If a number can be expressed as the cube of a natural number the number is called a perfect cube. $64 = 4^3$ hence 64 is a perfect cube. Demonstrate more examples.	$21^3 - 20^3 = ?$
Verify the given number a perfect cube or not.	To know how to verify a given number is a perfect cube or not.	Write the given number as the product of prime factors. Make groups of equal factors taking 3 at a time. If there is any factor left without group then the given number is not a perfect cube. $32 = 2 \times 2 \times 2 \times 2 \times 2$. $\therefore$ 32 is not a perfect cube $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$ $\therefore$ 64 is a perfect cube. Give more examples to the children.	Is 125 perfect cube?
Cube root of a number	To find the cube root of a number by the method of prime factorization.	If $a^3 = b$ then a is called the cube root of b and it is denoted by the symbol $\sqrt[3]{27} = 3^3$ $\therefore$ $\sqrt[3]{27} = 3$. To find the cube root of a number. Write the given number as the product of prime factors. Make groups of equal factors taking 3 at a time. Take one factor from each group and their product will be the cube root of	Evaluate: $\sqrt[3]{216 \times 64}$

Exercise 4.1

1. i) Since 8 is an even number,

∴ $\sqrt[3]{8}$ is also an even number.

∴ 8 is the cube of an even number.

ii) Since 1331 is an add number,

∴ $\sqrt[3]{1331}$ is also an add number.

∴ 1331 is the cube of an add number.

iii) Since 6859 is an add number,

∴ $\sqrt[3]{6859}$ is also an add number.

∴ 6859 is the cube of an add number.

2. i) Given number is 125

5	125
5	25
5	5
	1

∴ 125 = (5×5×5)

∴ 125 can be expressed as the product of triplets of equal prime factors,

∴ 125 is a perfect cube. (**Ans**)

ii) Given number is 125

2	72
2	36
2	18
3	9
3	3
	1

∴ 72 = (2×2×2) × 3×3

∴ Here, two 3 are left after grouping into triplets.

∴ 72 cannot be expressed as the product of triplets of equal prime factors,

∴ 72 is not a perfect cube. (**Ans**)

iii) Given number is 800

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

∴ 8000 = (2×2×2) × (2×2×2) × (5×5×5)

∴ 8000 can be expressed as the product of triplets of equal prime factors,

∴ 8000 is a perfect cube. (**Ans**)

iv) Given number is 100.

2	100
2	50
5	25
5	5
	1

∴ 100 = 2×2 × 5×5

∴ Here, neither 2 nor 5 can be grouped into triplets.

∴ 100 cannot be expressed as the product of triplets of equal prime factors,

∴ 100 is not a perfect cube. (**Ans**)

v) Given number is 81

3	81
3	27
3	9
3	3
	1

∴ 81 = (3×3×3) × 3

∴ Here, one 3 is left after grouping into triplets.

∴ 81 cannot be expressed as the product of triplets of equal prime factors,

∴ 81 is not a perfect cube. (**Ans**)

vi) Given number is 243

3	243
3	81
3	27
3	9
3	3
	1

∴ $243 = (3\times3\times3) \times 3\times3$

∴ Here, two 3 are left after grouping into triplets.

∴ 243 cannot be expressed as the product of triplets of equal prime factors,

∴ 243 is not a perfect cube. (**Ans**)

3. i) Given number is 72

2	72
2	36
2	18
3	9
3	3
	1

∴ $72 = (2\times2\times2) \times 3\times3$

∴ Here, two 3 are left after grouping into triplets.

∴ 72 is not a perfect cube.

To make the given number into a perfect cube, it must be multiplied by 3.

∴ The smallest number by which 72 must be multiplied to make it a perfect cube is 3. (**Ans**)

ii) Given number is 400

2	400
2	200
2	100
2	50
5	25
5	5
	1

∴ $400 = (2\times2\times2) \times 2\ 5\times5$

∴ Here, one 2 and two 5 are left after grouping into triplets.

∴ 400 is not a perfect cube.

To make the given number into a perfect cube, it must be multiplied by $2\times2\times5$ i.e. 20.

∴ The smallest number by which 400 must be multiplied to make it a perfect cube is 20. (**Ans**)

iii) Given number is 675

3	675
3	225
3	75
5	25
5	5
	1

∴ $675 = (3\times3\times3) \times 5\times5$

∴ Here, two 5 are left after grouping into triplets.

∴ 675 is not a perfect cube.

To make the given number into a perfect cube, it must be multiplied by 5.

∴ The smallest number by which 675 must be multiplied to make it a perfect cube is 5. (**Ans**)

iv) Given number is 128

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

∴ $128 = (2\times2\times2) \times (2\times2\times2)\times2$.

∴ Here, one 2 is left after grouping into triplets.

∴ 128 is not a perfect cube.

To make the given number into a perfect square, it must be multiplied by 2×2 is 4.

∴ The smallest number by which 128 must be multiplied to make it a perfect cube is 3. (**Ans**)

v) Given number is 81

3	81
3	27
3	9
3	3
	1

∴ $81 = (3\times3\times3) \times 3$

∴ Here, one 3 is left after grouping into triplets.

∴ 81 is not a perfect cube.

To make the given number into a perfect cube, it must be multiplied by 3×3 i.e. 9.

∴ The smallest number by which 81 must be multiplied to make it a perfect cube is 9. (**Ans**)

vi) Given number is 192

2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

∴ $192 = (2\times2\times2) \times (2\times2\times2) \times3$

∴ Here, one 3 is left after grouping into triplets.

∴ 192 is not a perfect cube.

To make the given number into a perfect cube, it must be multiplied by 3×3 i.e. 9.

∴ The smallest number by which 192 must be multiplied to make it a perfect cube is 9. (**Ans**)

4. i) Given number is 750

2	750
3	375
5	125
5	25
5	5
	1

∴ $750 = 2\times3 \times (5\times5\times5)$

∴ Here, one 2 and one 3 are left after grouping into triplets.

∴ 750 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by 2 and 3 i.e. $2\times3 = 6$.

∴ The smallest number by which 750 must be divided to make it into a perfect cube is 6. (**Ans**)

ii) Given number is 625

5	625
5	125
5	25
5	5
	1

$\therefore$ $625 = (5\times5\times5)\times5$

$\therefore$ Here, one 5 is left after grouping into triplets.

$\therefore$ 625 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by 5.

$\therefore$ The smallest number by which 625 must be divided to make it into a perfect cube is 5. (**Ans**)

iii) Given number is 250

2	250
5	125
5	25
5	5
	1

$\therefore$ $250 = 2\times(5\times5\times5)$

$\therefore$ Here, one 2 is left after grouping into triplets.

$\therefore$ 250 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by 2.

$\therefore$ The smallest number by which 250 must be divided to make it into a perfect cube is 2. (**Ans**)

iv) Given number is 2662

2	2662
11	1331
11	121
11	11
	1

$\therefore$ $2662 = 2\times(11\times11\times11)$

$\therefore$ Here, one 2 is left after grouping into triplets.

$\therefore$ 2662 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by 2.

$\therefore$ The smallest number by which 2662 must be divided to make it into a perfect cube is 2. (**Ans**)

v) Given number is 2400

2	2400
2	1200
2	600
2	300
2	150
2	75
5	25
5	5
	1

$\therefore$ $2400 = (2\times2\times2)\times2\times2\times3\times5\times5$

$\therefore$ Here, two 2, one 3 and two 5 are left after grouping into triplets.

$\therefore$ 2400 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by $2\times2\times3\times5\times5$ i.e. 300.

$\therefore$ The smallest number by which 2400 must be divided to make it into a perfect cube is 300. (**Ans**)

vi) Given number is 750

3	135
3	45
3	15
5	5
	1

$\therefore$ $135 = (3\times3\times3) \times 5$

$\therefore$ Here, one 5 is left after grouping into triplets.

$\therefore$ 135 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by 5.

$\therefore$ The smallest number by which 135 must be divided to make it into a perfect cube is 5. (**Ans**)

Exercise 4.2

1. i) Given number is 1331

11	1331
11	121
11	11
	1

$\therefore$ $1331 = (11\times11\times11)$

$\therefore$ $\sqrt[3]{1331} = \sqrt[3]{11\times11\times11}$

$= 11$ (**Ans**)

ii) Given number is 2197

13	2197
13	169
13	13
	1

$\therefore$ $2197 = (13\times13\times13)$

$\therefore$ $\sqrt[3]{2197} = \sqrt[3]{13\times13\times13}$

$= 13$ (**Ans**)

iii) Given number is 729

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\therefore$ $729 = (3\times3\times3) \times (3\times3\times3)$

$\therefore$ $\sqrt[3]{729} = \sqrt[3]{(3\times3\times3)\times(3\times3\times3)}$

$= 3\times3$

$= 13$ (**Ans**)

iv) Given number is 3.375 i.e. $\frac{3375}{1000}$

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

$\therefore$ $3375 = (3\times3\times3) \times (5\times5\times5)$

$\therefore$ $\sqrt[3]{3375} = \sqrt[3]{(3\times3\times3)\times(5\times5\times5)}$

$= 3\times5$

$= 15$

$\therefore \sqrt[3]{3.375} = \sqrt[3]{\frac{3375}{1000}} = \frac{\sqrt[3]{3375}}{\sqrt[3]{1000}} = \frac{15}{10}$

$= 1.5$ **Ans.**

v) Given number is 27000

2	27000
2	13500
2	6750
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

$\therefore$ $27000 = (2\times2\times2)\times(3\times3\times3)\times(5\times5\times5)$

$\therefore \sqrt[3]{27000} = \sqrt[3]{(2\times2\times2)\times(3\times3\times3)\times(5\times5\times5)}$

$= 2\times3\times5$

$= 30$ (**Ans**)

vi) Given number is 2.744 i.e. $\frac{2744}{1000}$

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

$\therefore$ $2744 = (2\times2\times2)\times(7\times7\times7)$

$\therefore \sqrt[3]{2744} = \sqrt[3]{(2\times2\times2)\times(7\times7\times7)}$

$= 2\times7$

$= 14$ (**Ans**)

2. i) Given number is 6859

19	6859
19	361
19	16
	1

$\therefore$ $6859 = (19\times19\times19)$

$\therefore \sqrt[3]{6859} = \sqrt[3]{19\times19\times19}$

$= 19$ (**Ans**)

ii) Given number is 32768

2	32768
2	16384
2	8192
2	4096
2	2048
2	1024
2	512
	256

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$\therefore$ $32768 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)$

$\therefore \sqrt[3]{32768} = \sqrt[3]{(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)}$

$= 2\times2\times2\times2\times2$

$= 32$ (**Ans**)

iv) Given number is 91125

3	91125
3	30375
3	10125
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

$\therefore$ $91125 = (3\times3\times3)\times(3\times3\times3)\times(5\times5\times5)$

$\therefore \sqrt[3]{91125} = \sqrt[3]{(3\times3\times3)\times(3\times3\times3)\times(5\times5\times5)}$

$= 3\times3\times5$

$= 45$ (**Ans**)

iv) Given number is 8000

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

$\therefore$ $8000 = (2\times2\times2)\times(2\times2\times2)\times(5\times5\times5)$

$\therefore \sqrt[3]{8000} = \sqrt[3]{(2\times2\times2)\times(2\times2\times2)\times(5\times5\times5)}$

$= 2\times2\times5$

$= 20$ (**Ans**)

v) Given number is 10648

2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

$\therefore$ $10648 = (2\times2\times2)\times(11\times11\times11)$

$\therefore \sqrt[3]{10648} = \sqrt[3]{(2\times2\times2)\times(11\times11\times11)}$

$= 2\times11$

$= 22$ (**Ans**)

vi) Given number is 4913

17	4913
17	289
17	17
	1

$\therefore$ $4913 = (17\times17\times17)$

$\therefore \sqrt[3]{4913} = \sqrt[3]{(17\times17\times17)}$

$= 17$ (**Ans**)

3. L.H.S $= \sqrt[3]{64}\times\sqrt[3]{125}$

$= 4\times5$

$= 20$

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

R.H.S $= \sqrt[3]{64\times125}$

$= \sqrt[3]{8000}$

$= \sqrt[3]{(2\times2\times2)\times(2\times2\times2)\times(5\times5\times5)}$

$= 2\times2\times5$

$= 20$

$\therefore$ L.H.S = R.H.S [Hence, proved]

4. $\sqrt[3]{5-\frac{10}{27}}$

$= \sqrt[3]{\frac{135-10}{27}}$

$= \sqrt[3]{\frac{125}{27}}$

$= \frac{\sqrt[3]{125}}{\sqrt[3]{27}}$

$= \frac{5}{3}$

$= 1\frac{2}{3}$ (**Ans**)

5. i) Given number is $2\frac{93}{125}$ i.e. $\frac{343}{125}$

$\therefore \quad \sqrt[3]{2\frac{93}{125}} = \sqrt[3]{\frac{343}{125}}$

$= \frac{\sqrt[3]{343}}{\sqrt[3]{125}}$

$= \frac{7}{5}$

$= 1\frac{2}{5}$ (**Ans**)

ii) Given number is 0.729 i.e. $\frac{729}{1000}$

$\therefore \quad \sqrt[3]{0.729} = \sqrt[3]{\frac{729}{1000}}$

$= \frac{\sqrt[3]{729}}{\sqrt[3]{1000}}$

$= \frac{9}{10}$

$= 0.9$ (**Ans**)

6. Let length of edge of cube be (x) cm. volume of cube = 10.648 cm^3.

$\therefore \quad (x)\,(x)\,(x) = 10.648$

$\Rightarrow \quad x^3 = 10.648$

$\Rightarrow \quad x = \sqrt[3]{10.648}$

$= \sqrt[3]{\frac{10648}{1000}}$

$= \frac{\sqrt[3]{10648}}{\sqrt[3]{1000}}$

2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

$= \frac{\sqrt[3]{(2\times2\times2)\times(11\times11\times11)}}{10}$

$= \frac{2\times11}{10}$

$= \frac{22}{10}$

$= 2.2$

$\therefore$ Length of edge of cube = 2.2 cm. (**Ans**)

7. Given number is 1715

5	1715
7	343
7	49
7	7
	1

$\therefore \quad 1715 = 5\times(7\times7\times7)$

Here, one 5 is left after grauping into triplets.

$\therefore$ 1715 is not a perfect cube.

To make the given number into a perfect cube it must be mulitiplied by 5×5 i.e. 25.

$\therefore$ The emallest number by which 1715 must be multiplied to make it a perfect cube is 25. (**Ans**)

$\therefore \quad 1715\times15 = (5\times5\times5)\times(7\times7\times7)$

$\Rightarrow$ $42875 = (5\times5\times5)\times(7\times7\times7)$

$\Rightarrow$ $\sqrt[3]{42875} = \sqrt[3]{(5\times5\times5)\times(7\times7\times7)}$

$= 5\times7$

$= 35$ (**Ans**)

8. Let the required number be x. Cube of the required number = x^3

$\therefore$ ATQ $x^3 - 2^4 = 3$

$\Rightarrow$ $x^3 = 3 + 24$

$\Rightarrow$ $x^3 = 27$

$\Rightarrow$ $x = \sqrt[3]{27}$

$= 3$

$\therefore$ The required number is 3. (**Ans**)

Self Assessment-4

1. i) $11^3 = 1331$

ii) $8^3 = 512$

iii) $10^3 = 1000$

iv) $19^3 = 56859$

2. i) Given number is 2197

13	2197
13	169
13	13
	1

$\therefore$ $2197 = (13\times13\times13)$

$\therefore$ $\sqrt[3]{2197} = \sqrt[3]{(13\times13\times13)}$

$= 13$ (**Ans**)

ii) Given number is 15625

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

$\therefore$ $15625 = (5\times5\times5)$

$\therefore$ $\sqrt[3]{15625} = \sqrt[3]{(5\times5\times5)\times(5\times5\times5)}$

$= 5\times5$

$= 25$ (**Ans**)

iii) Given number is 729

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\therefore$ $729 = (3\times3\times3)\times(3\times3\times3)$

$\therefore$ $\sqrt[3]{729} = \sqrt[3]{(3\times3\times3)\times(3\times3\times3)}$

$= 3\times3$

$= 9$ (**Ans**)

iv) Given number is 1331

11	1331
11	121
11	11
	1

$\therefore$ $1331 = (11\times11\times11)$

$\therefore$ $\sqrt[3]{1331} = \sqrt[3]{(11\times11\times11)}$

$= 11$ (**Ans**)

3. Volume of cubical box = 1728 cm^3.

Let dimensions of cubical box be ($x \times x \times x$).

$\therefore$ $x \times x \times x = 1728$

$\Rightarrow$ $x^3 = 1728$

$\Rightarrow$ $x = \sqrt[3]{1728}$

$= 12$

$\therefore$ Dimensions of cubical box = 12 cm × 12 cm × 12 cm.

Ans. Dimensions of cubical box

= 12 cm × 12 cm × 12 cm

4. Given number is 1715

5	1715
7	343
7	49
7	7
	1

$\therefore$ $1715 = 5 \times (7 \times 7 \times 7)$

Here, one 5 is left after grouping into triplets.

$\therefore$ 1715 is not a perfect cube.

To make the given number into a perfect cube, it must be divided by 5.

$\therefore$ The smallest number by which 1715 must be divided to make it into a perfect cube is 5. (**Ans**)

5. b) –125
6. c) $2^2 \times 3^4$
7. b) 64
8. c) The cube of a positive number is positive.
9. $21^3 - 20^3$

   $= 9261 - 8000$

   $= 1261$

   $\therefore$ d) none of these
10. b) 10
11. c) $8a^3$
12. a) 1
13. b) 12167
14. b) 2
15. c) 3

Chapter-5 Playng with numbers

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Numbers in general form and some interesting properties	Students will be able to write number in general form and will be aware of some properties of numbers.	Using examples explain some properties for eg. Sum of a two digit number ab and number obtained on reversing its digits is divisible by 11 and sum of digits i.e. a + b eg. 87. Reversed no = 78 Sum = 165 $\therefore$ 165 is divisible by 11 and also divisible by 8 + 7 = 15.	
Puzzle with digits	Students will be able to find the unknown digits in the puzzle of digits	Using various puzzle formed by digit, play with the students and help them find unknown digits	12 A 6 AB A09 Find A

Chapter-6 Percentage and its applications

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of percentage and its conversion to fraction, ratio and decimal and vice-versa	Students will be able to convert percentage to fraction, ratio, decimals and vice-versa	Practice with the students recalling the conversions of percentage to other forms. Worksheets can be done.	Convert 80% ratio, de and fraction.
Finding a percentage of a given quantity and increase/decrease percent	Students will be able to calculate the percentage of a given quantity and also calculate increase/decrease percentage.	Do various types of sums based on finding percentage of a given quantity or vice-versa and increase/decrease. Explain with real life examples. Ask the students to take out their exercise book ask them to count the total number of pages and number of pages used. Help them calculate the percentage of pages used.	1. If 6.5% of a number is 78, find the number. 2. Decrease the number 250 by 6%.
Profit, loss and discount	Students will be able to calculate, profit, loss and discount	Divide the of class into groups ask them to prepare a menu for a canteen, and sold, item and total income. Ask them to decide the investment amount, and help them calculate profit/loss and express as percentage. More sums from the tent book can be done	If an almirah is boug at ₹11000, selling at a discount of 20%, the shopkeeper gamid 10%. Find the marked price

Sales Tax	Students will be aware of the concept of sales tax and its calculation	Sums from tent book and real-life scenario based wood problem can be done with the students	An article was sold at ₹12420 including 8% sales tax. What is the price of article excluding sales tax.

Exercise 6.1

1. i) $\frac{3}{4}\times 100 = 75\%$ **Ans.**

ii) $\frac{1}{5}\times 100 = 20\%$ **Ans.**

iii) $\frac{7}{10}\times 100 = 70\%$ **Ans.**

iv) $\frac{6}{25}\times 100 = 24\%$ **Ans.**

v) $\frac{1}{9}\times 100 = 11\frac{1}{9}\%$ **Ans.**

vi) $\frac{2}{3}\times 100 = 66\frac{2}{3}\%$ **Ans.**

vii) $\frac{30}{100} = 3 : 10$ **Ans.**

viii) $\frac{8}{100} = 2 : 25$ **Ans.**

ix) $\frac{105}{100} = 21 : 20$ **Ans.**

3. i) $\frac{30}{100}\times 70 = 21$ **Ans.**

ii) $\frac{20}{100}\times 80 = 16$ **Ans.**

4. i) $\frac{x}{100}\times 50 = 20$

or, $x = \frac{20\times 100}{50}$

$x = 400$ **Ans.**

ii) $\frac{x}{100}\times 750 = 150$ **Ans.**

or, $x = \frac{150\times 100}{750}$

$= 20$ **Ans.**

5. $\frac{10}{100}x = 65$ **Ans.**

or, $x = \frac{65\times 100}{10}$

$x = 650$ **Ans.**

6. $\frac{18}{20}\times 100$

$= 90$ **Ans.**

7. $\frac{x}{100}\times 150 = 96$

or, $n = \frac{96\times 100}{150}$

8. Students having Hindi as mother tongue

$= 40$

Students not having Hindi as mother tongue

$= 100 - 40$

$= 60\%$

$= \frac{60}{100} \times 60$

$= 36$ Students **Ans.**

9. Money spent on food $= \frac{20}{100} \times 55000$

$= ₹11000$

10. $\frac{x-30}{100} x = 56$

or, $\frac{70x}{100} = 56$

or $n = \frac{56 \times 100}{70}$

$= 80$

New number $= \frac{80+30}{100} \times 80$

$= 80 + 24$

$= 104$ **Ans.**

11. Let the no of working days $= x$

ATP $\frac{85}{100} \times x = 204$

or, $x = \frac{204 \times 100}{85}$

$n = 240$

12. Price in 201 $= 120 + \frac{10}{100} \times 120$

$= 120 + 12$

$= ₹132$

13. Decrease $= 75000 - 60000$

$= 15000$

Decrease $= \frac{15000}{75000} \times 100$

$= 20\%$

14. i) Price in 2014 $= x$

$52 = x - \frac{4}{100} \times n$

$52 = \frac{96n}{100}$

or, $\frac{52 \times 100}{96} = n$

or,

ii) Price in 2016 $= 52 + \frac{4}{100} \times 52$

$= ₹54.08$

15. Let B's income be x

A's income $= x - \frac{20}{100} n$

$= \frac{80n}{100}$

Deft in income $= x - \frac{80n}{100}$

$= \frac{20n}{100}$

% Defference $= \frac{20n \times 100}{800 \times x}$

$= 25\%$

16. Let the last year value be x.

ATP $160000 = x - \frac{20n}{100}$

or, $160000 = \frac{80n}{100}$

or, $\frac{160000 \times 100}{80} = x$

or, ₹2,00,000 Ans.

17. Let the cost of be ₹100

Ne price $= 100 + \frac{25}{100} \times 100$ ₹125

Increase = ₹25

% reduction in consumption $= \frac{25}{125} \times 100$

$= 20\%$

18. Let the income be ₹x.

Money deft after charily $= x - \frac{5x}{100}$

$= \frac{95n}{100}$

ATP $\text{Tax} = \frac{8}{100} \times \frac{95n}{100}$

$5472 = \frac{8}{100} \times \frac{95n}{100}$

or $\frac{5472 \times 100 \times 100}{8 \times 95} = x$

or, x = ₹72000

∴ His income is ₹72000.

Exercise 6.2

1. i) $\text{SP} = \left(\frac{100 + \text{P}\%}{100}\right) \times cp$

$= \frac{100 + 10}{100} \times 8500$

$= \frac{110}{100} \times 8500$

= ₹9350

OR

SP = cp + Profet

$= 8500 + \frac{10}{100} \times 8500$

= ₹9350

2. i) $\text{CP} = \left(\frac{100}{100 + \text{P}\%}\right) \times \text{SP}$

$= \left(\frac{100}{100 + 4}\right) \times 520$

$= \frac{100}{104} \times 520$

= ₹500 (**Ans**)

ii) $\text{CP} = \left(\frac{100}{100 - \text{L}\%}\right) \times \text{SP}$

$= \left(\frac{100}{100 - 30}\right) \times 700$

$= \frac{100}{70} \times 700$

= ₹1000 (**Ans**)

3. SP = ₹720 Loss = 10%

$\text{CP} = \left(\frac{100}{100 - 10}\right) \times 720$

$= \frac{100}{90} \times 720$

= ₹800 (**Ans**)

4. Total CP = 50000 + 1000 = ₹60,000

L = 2%

SP = CP – Loss.

$$= 60000 - \frac{2}{100} \times 60000$$

$$= ₹58800 \text{ (Ans)}$$

5. CP of 4 pers = SP of 5 pers

CP of 1 pen = SP of $\frac{5}{4}$ pen

$\therefore$ CP = $\frac{5}{4}$SP. or SP = $\frac{4}{4}$CP.

$\because$ $\frac{6}{5} < 1$ it is a loss

L = 6P – SP

$= \text{CP} - \frac{4}{5}\text{CP}$

$$\text{Loss} = \frac{\text{CP}}{5}$$

$$\text{L\%} = \frac{\text{CP}}{5 \times \text{LP}} \times 100 = 20\% \text{ (Ans)}$$

6. Let the CP be ₹n.

$$\text{SP} = n + \frac{5}{100}n = \frac{105n}{100}$$

ATP. $\frac{105n}{100} - 630$ = SP with loss 2%

or, $\frac{105n}{100} - 630 = n - \frac{2}{100}n$

or, $\frac{105n - 63000}{100} = \frac{98n}{100}$

or, $105n - 98n = 63000$

or, $7n = 63000$

or, $n = ₹9000$ **(Ans)**

7. CP = 3,20,000, SP = 3,04,000

L = 3,20,000 – 3,04,000

$= ₹16000$

$$\text{L\%} = \frac{16000}{320000} \times 100$$

$= 5\%$ **(Ans)**

$$\text{New SP} = 320000 + \frac{5}{100} \times 320000$$

$= ₹3,36,000$ **(Ans)**

8. CP = ₹n SP = ₹644

$$\text{gain} = \frac{1}{6} \qquad \text{CP} = \frac{x}{6}$$

$$\text{gain\%} = \frac{x \times 100}{6 \times x}$$

$= 16.67\%$

9. SP of 12 oranges = 12

SP of 1 oranges = $\frac{72}{12}$₹6

Let the CP of 1 orange ₹n

$$\text{L} = \frac{25}{100} \times n$$

SP = CP – loss

$$6 = x - \frac{25n}{100}$$

$$6 = \frac{75n}{100}$$

or $n = \frac{600}{75}$₹8

$\therefore$ CP of 1 orainge = ₹8

New SP of 100 orange = 1000

New Sp of 1 orange $= \frac{1000}{100}$

$= ₹10$

Gain = 10 – 8 = ₹2

$$\text{Gain\%} = \frac{2}{8}\times 100$$

$$= 25\% \text{ (Ans)}$$

10. CP of 1 eggs $= ₹3.5$

$$\text{eggs rolten} = \frac{8}{100}\times 100$$

$$= 8 \text{ eggs}$$

$$\text{eggs broten} = \frac{15}{100}\times 100$$

$$= 15 \text{ eggs}$$

$$\text{eggs left} = 100 - 8 - 15$$

$$= 77$$

$$\text{CP of 100 eggs} = ₹3.5 \times 100$$

$$= ₹350$$

$$\text{profit expected} = \frac{10}{100}\times 350$$

$$= ₹35$$

$$\text{New SP} = 350 + 35$$

$$= ₹385$$

$$\text{SP of each egg} = \frac{385}{77} ₹5 \text{ (**Ans**)}$$

11.

Table-1	Table-2
CP $= ₹1200$	CP $= ₹1200$
SP $= 1200+\frac{20}{100}\times 1200$	SP $= 1200+\frac{10}{100}\times 1200$
$= 1200 + 240$	$= 1200 - 120$
$= ₹1440$	$= ₹1080$

$$\text{Total CP} = 1200 + 1200 = ₹2400$$

$$\text{Total SP} = 1440 + 1080 = ₹2520$$

$$\text{Profit} = 2520 - 2400$$

$$= ₹120$$

$$\text{P\%} = \frac{120}{2400}\times 100$$

$$= 5\% \text{ (**Ans**)}$$

Exercise 6.1

1. i) $\text{SP} = \text{MP} - \text{Discount}$

$$= 360 - \frac{8}{100}\times 360$$

$$= ₹331.20$$

ii) $$\text{SP} = 5000 - \frac{10}{100}\times 5000$$

$$= ₹4750$$

iii) $$\text{SP} = 450 - \frac{12}{100}\times 450$$

$$= ₹396$$

iv) $$\text{SP} = 1000 - \frac{3}{100}\times 1000$$

$$= ₹970$$

2. i) Let the MP be $₹n$

$$\text{MP} = 450 + \frac{10n}{100}$$

$$\text{or, } n - \frac{10n}{100} = 450$$

$$\text{or, } \frac{90n}{100} = 450$$

$$\text{or, } n = \frac{450\times 100}{90}$$

$$= ₹500$$

ii) Let MP be $₹n$

$\therefore$ SP = MP – discount

$$4900 = n - \frac{2n}{100}$$

$$4900 = \frac{98n}{100}$$

or $n = \frac{4900 \times 100}{98}$

or$_1$ $n = ₹5000$

iii) $60000 = n - \frac{20n}{100}$

$60000 = \frac{80n}{100}$

or$_1$ $\frac{60000 \times 100}{80} = n$

or$_1$ $n = 75000$

iv) $414 = n - \frac{8n}{100}$

or $414 = \frac{92n}{100}$

or$_1$ $\frac{414 \times 100}{92} = n$

or$_1$ $n = ₹450$

3. i) MP = 65 SP = 52

Discount = 65 – 52

= 13

$D\% = \frac{13}{65} \times 100$

= 20%

ii) Discount = 3800 – 3420

= 380

$D\% = \frac{380}{3800} \times 100$

= 10%

iii) Discount = 700 – 560

= 140

$D\% = \frac{140}{700} \times 560$

= 112

iv) Discount = 3000 – 2000

= 1000

$D\% = \frac{1000}{3000} \times 100$

= 33.33%

4. SP = ₹5400

D% = 28%

SP = MP – D

$5400 = x - \frac{28x}{100}$

or, $5400 = \frac{72n}{100}$

or $\frac{5400 \times 100}{72} = n$

or$_1$ $n = ₹7500$

∴ Marked price = ₹7500

5. Let the MP of the article be ₹100

Price after 1st discout $= 100 - \frac{20}{100} \times 100$

$= ₹80$

Price after 2nd discount $= ₹80 - \frac{15}{100} \times 80$

$= 80 - 12$

$= ₹68$

Triagle discount $= 100 - 68$

$= 32\%$

6. MP = ₹18500

Price after 1st discount $= 18500 - \frac{20}{100} \times 18500$

$= 18500 - 3700$

$= ₹14800$

Price after 2nd discount $= 14800 - \frac{5}{100} \times 14800$

$= 14800 - 740$

$= ₹14060$

7. Let the MP be ₹n.

$$SP = \left(1-\frac{d_1}{100}\right)\left(1-\frac{d_2}{100}\right)\times MP$$

$$912 = \left(1-\frac{5}{100}\right)\left(1-\frac{25}{100}\right)\times n$$

$$912 = \frac{95}{100}\times\frac{75}{100}\times n$$

or $\quad \frac{912\times100\times100}{95\times75} = n$

or $\quad n = ₹1280$

MP = ₹1280 (**Ans**)

8. MP = ₹n.

$$SP = n - \frac{5n}{100}$$

$$= \frac{95n}{100}$$

9. $$SP = \left(1-\frac{d_1}{100}\right)\left(1-\frac{d_2}{100}\right)\times MP$$

$$= \left(1-\frac{10}{100}\right)\left(1-\frac{4}{100}\right)\times 450$$

$$SP = \frac{90}{100}\times\frac{96}{100}\times 450$$

SP = ₹388.80

10. CP = ₹11000

$$SP = 11000 - \frac{20}{100}\times 11000$$

$= ₹8800$

Exercise 6.4

1. SP = ₹72

B Price paid = SP + Sales Tax

$$= 72 + \frac{10}{100}\times 72$$

$= ₹79.20$

2. Amt to be paid $= 450 + \frac{6}{100}\times 450$

$= 450 + 27$

$= ₹477$ (**Ans**)

3. Price after discount $= ₹2400 - \frac{25}{100}$

$= 2400 - 600$

$= ₹1800$

Price after sales tax $= 1800 + \frac{12}{100}\times 1800$

$= 1800 + 216$

$= ₹2016$

4. MP = ₹1600

Price after discount $= 1600 - \frac{20}{100}\times 1600$

$= 1600 - 320$

$= ₹1280$

Price after sales tax $= 1280 + \frac{6}{100}\times 1280$

$= 1280 + 76.80$

Price paid by shopkeeper = ₹1356.80

SP of shopkeeper = Prirled price = ₹1600

SP (with sales tax) $= 1600 + \frac{6}{100}\times 1600$

$= 1600 + 96$

$= ₹1696$

Profit = 1696 – 1356.80

= ₹339.20 (**Ans**)

5. LP = ₹7200

ST = ₹1800

$$\text{Tax\%} = \frac{1800}{7200} \times 100$$

$$= 25\%$$

6. Let the basic price be n.

$$67200 = n + \frac{12n}{100}$$

$$\text{or}_1 \quad 67200 = \frac{112n}{100}$$

$$\text{or} \quad n = \frac{67200 \times 100}{112}$$

= 60,000 (**Ans**)

7. 30552 = basic price + 14% of basic price

$$\text{or}_1 \; 30552 = n + \frac{14n}{100}$$

$$\text{or} \; 30552 = \frac{114n}{100}$$

$$\text{or} \quad n = \frac{30552 \times 100}{114}$$

= ₹26800

8. LP = 850

Tax = 901 – 850

= 51

$$\text{Tax\%} = \frac{51}{850} \times 100$$

= 6% (Ans)

Self Assessment-6

1. $$\text{Red house} = \frac{30}{100} \times 60 = 18 \text{ students}$$

$$\text{Blue house} = \frac{25}{100} \times 60 = 15 \text{ students}$$

$$\text{Green house} = \frac{20}{100} \times 60 = 12 \text{ students}$$

yellow house = 100 – (30% – 25% – 20%)

= 100 – 75%

= 25%

$$= \frac{25}{100} \times 60 = 15 \text{ students}$$

2. Increase = 20,20,000–20,00,000

= 20,000/-

$$\text{Increase \%} = \frac{20000}{200000} \times 100$$

= 10% (**Ans**)

3. $$\text{CP} = \left(\frac{100}{100 - loss\%}\right) \times \text{SP}$$

$$= \frac{100}{100 - 25} \times 7500$$

$$= \frac{100}{75} \times 7500$$

CP = ₹1000

$$\text{New SP} = 1000 + \frac{7}{100} \times 1000$$

= 1000 + 70

= ₹1070

4. Let the MP be ₹100.

$$\text{Price after 1}^{st}\text{ discount} = 100 - \frac{1}{100} \times 100$$
$$= ₹99$$
$$\text{Price after 2}^{nd}\text{ discount} = 99 - \frac{5}{100} \times 99$$
$$= ₹94.05$$
$$\text{Total Discount} = ₹100 - 94.05$$
$$= ₹5.95$$
$$\text{Disscount\%} = \frac{5.95}{100} \times 100$$
$$= 5.95\%$$

5. $\text{SP} = ₹700$
$\text{Customer pays} = ₹735$
$\text{Tax} = 735 - 700$
$= 35$
$$\text{tax\%} = \frac{35}{700} \times 100$$
$= 5\%$ (**Ans**)

6. $$\text{SP} = 400 - \frac{8}{100} \times 400$$
$= 400 - 32$
$= ₹368$

Ans. option (a)

7. $$\frac{11}{100} \times n = 33$$
$$n = \frac{3300}{11}$$
$= 300$

Ans. option (a)

8. $$\text{SP} = 2000 + \frac{12}{100} \times 2000$$
$= ₹2240$

Ans. option (b)

9. $\text{Discout} = 600 - 570$
$= 30$
$$= \frac{30}{600} \times 100$$
$= 5$

Ans. option (d)

10. $$\text{SP} = 7000 - \frac{4}{100} \times 7000$$
$= ₹6720$

Ans. option (c)

11. $$10000 - \frac{10}{100} \times 10000$$
$= ₹1000$

Ans. option (b)

12. $100 - 36$
$= 64\%$
$$\text{other kind} = \frac{64}{100} \times 1275$$
$= 816$

Ans. option (b)

13. $$10000 + \frac{10}{100} \times 10000$$
$= 11000$

Ans. option (b)

Chapter-7 Simple and compound interest

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Simple Interest	Students will be able to calculate the simple interest and amount.	Explain the formula's using which students will be able to calculate interest SI = $\frac{P\times T\times R}{100}$ and also derive other formulas of P = $\frac{SL\times 100}{T\times R}$, T = $\frac{SL\times 100}{P\times R}$ and R = $\frac{SL\times 100}{P\times T}$	If ₹3500 is be at 7% SI per fid the SI for ears and am at the end of …. years?
Compound interest (using simple interest formula and compound interest formula)	Students will be aware of the difference of CL and SI. They will be aide to calculate compound interest using formula.	Explain the difference between simple interest and compound interest using an example. Sums from text book can be done for practice.	Rahil borrowed ₹ 20,000 from his friend at 18% per annum simple interest the lent it out to Rubina at the same rate by compound interes. Fund his gain after 2 years.

Exercise 7.1

1. i) P = ₹18,000

T = 1yrs 6= $1\frac{6}{12}=\frac{18}{12}$ yrs R = 3?

ST = $\frac{P\times T\times R}{100}$ = 18000 × $\frac{15}{12}\times\frac{3}{100}$

Ant = 18000 + =18810 (Ans

= ₹810 **(Ans)**

ii) I = 1000 × $\frac{3}{12}\times\frac{8}{100}$ Ant = 1000 + 20

= ₹1020

= 20 **(Ans)**

iii) I = $\frac{500\times 5\times 3}{100}$ Ant = 500 + 75

= ₹575 **(Ans)**

= ₹75 **(Ans)**

2. i) T = $\frac{SI\times 100}{PR}$

ii) T = $\frac{6080\times 100}{38000\times 4}=\frac{1650\times 100}{15000\times 5.5}$

= 4 years **(Ans)**

= 2 years **(Ans)**

iii) T = $\frac{3600\times 100}{6000\times 15}$

= 4 **(Ans)**

3. i) $P = \frac{SI \times 100}{T \times R}$

$= \frac{35000 \times 100}{5 \times 14}$

= ₹50000 **(Ans)**

ii) $P = \frac{2304 \times 100}{12 \times 3}$

= ₹6400

iii) $P = \frac{1650 \times 100}{3 \times 3.5}$

= ₹22,000

4. i) $R = \frac{SI \times 100}{P \times T}$

$= \frac{395.20 \times 100}{2460 \times 12}$

= 1%

ii) $R = \frac{1395.75 \times 100}{9305 \times 5}$

= 3%

iii) $R = \frac{60 \times 100}{1000 \times 3}$

= 2%

5. $R = \frac{I \times 100}{P \times T} = \frac{1080 \times 100}{4500 \times 2}$

= 12% **(Ans)**

6. $P = \frac{SI \times 100}{T \times R}$

$= \frac{17355 \times 100}{7.5 \times 1}$

= ₹2,31,400 **(Ans).**

7. SI = 10250 – 5000

= ₹5250

$P = \frac{SI \times 100}{P \times T}$

$= \frac{5250 \times 100}{5000 \times 21}$

= 5% **(Ans)**

If R% = 7% then $7 = \frac{SI \times 100}{P \times T}$

$= \frac{5250 \times 100}{5000 \times 7}$

= 15 years **(Ans)**

8.

Cose 1	Cose 2
P = 5600	P = 5000
T = 4 years	T = 5 years
R = 3%	R = 10%.
$SI = \frac{5600 \times 4 \times 3}{100}$	$SI = \frac{5000 \times 5 \times 10}{100}$
= ₹672	= ₹2500

Cose 2 i.e. 5000 for 5 years @ 10% is a between

9. Interest paid by shyam = $\frac{2000 \times 5 \times 28}{100}$

= ₹25600

Interest Received by shyam

$= \frac{20000 \times 5 \times 28}{100}$

(i.e interest paid by manju)

= ₹28000

Shyams gain = 28000 – 25600

= 2400 **(Ans)**

10. Interest $= \frac{180000 \times 5 \times 10}{100}$

= ₹400,00

Amount to be paid = 80000 + 40000

= 120,000

Value of gold chain = 1,20,000 – 30,000

= 90,000 **(Ans)**

11. Let the principal be 'P'

$SI1 = \frac{P \times 3 \times 8}{100}$ $SI2 = \frac{P \times 2 \times 9}{100}$

$= \frac{24P}{100}$ $= \frac{18P}{100}$

ATP.

SI1 = SI2 + 96

$0.9, = \frac{24P}{100} - \frac{18P}{100} = 96$

$\frac{6P}{100} = 96$

$P = \frac{96 \times 100}{100}$

P = ₹1600

Ans: ₹1600

12. $T = \frac{SI \times 100}{P \times R}$ SI = 6720 – 5600

= ₹1120

$= \frac{1120 \times 100}{6600 \times 4}$

= 6% **(Ans)**

13. Let principal be ₹ p, then amount = ₹3p

Interest = 3p – p

= 2p

$R = \frac{SI \times 100}{P \times T}$

$8 = \frac{2p \times 100}{P \times 5}$

14. A = ₹6960 in 2 years Let Principal be ₹p

A = ₹7440 in 3 years

I_1 = 6960 – P I_2 = 7440 – p

$R = \frac{(6960 - P) \times 100}{P \times 2}$ $R = \frac{(7440 - P) \times 100}{P \times 3}$

Since rales are same in both cases

$\therefore \quad \frac{(6960 - P) \times 100}{2P} = \frac{(7440 - P) \times 100}{3P}$

or, 3 (6960 – P) = 2 (7440 – P)

or, 20880 – 3P = 14880 – 2P

or, 20880 – 14880 = 3P – 2P

or, 6000 = P

or, P = 6000

P = ₹6000

$R = \frac{(6960 - 6000) \times 100}{6000 \times 2}$

$= \frac{960 \times 100}{6000 \times 2}$

= 8%

Ans. ₹6000, 8%

Exercise 7.2

1. P = 4000

   R = 4%

   T = 3 years

   i) Interst for the 1st year $= \frac{4000 \times 1 \times 4}{100}$

   $= ₹160$ **(Ans)**

   Amt at the end of 1st year = 4000 + 160

   = ₹4160

   Principal for 2nd year = ₹4160

   Interest for the 2nd year $= \frac{4160 \times 1 \times 4}{100}$

   = ₹166.40

   ii) Amount at the end of 2nd year = 4160 + 166.40

   = ₹4326.40 **(Ans)**

   iii) Principal for 3rd year = 4326.40

   Interest for 3rd year $= \frac{₹4326.40 \times 1 \times 4}{100}$

   = ₹173.06 **(Ans)**

2. **1st year**

   P_1 = 50,000 R = 10%

   $I_1 = \frac{50000 \times 10 \times 1}{100}$

   I_1 = ₹5000

   A = P1+I1

   = 50000 + 5000

   A = ₹55,000

   2nd year

   P_2 = ₹55,000 R = 10%

   $I_2 = \frac{55000 \times 10 \times 1}{100}$

   = ₹5500

Amount = 55000 = 5500

= ₹60,500 **(Ans)**

3. 1st year

P^1 = 32000

$$I^1 = \frac{32000 \times 7 \times 1}{100}$$

i) = ₹2240 **(Ans)**

ii) Amt at the end of 1st year = 32000 + 2240

= ₹34,240 **(Ans)**

iii) **2nd year**

P_2 = ₹34,240

$$I_2 = \frac{34240 \times 1 \times 7}{100}$$

= ₹2396.80**(Ans)**

iv) Amount at the end of 2nd year 34240+2396.80

= ₹36636.80 **(Ans)**

4. **1st half year**

$$I_1 = \frac{12000 \times 1 \times 10}{100}$$

= ₹1200

A_1= 12000+1200

= ₹13200

2nd half of 1st year

$$I_2 = \frac{13200 \times 1 \times 10}{100}$$

=1320

A_2 = 13200+1320

= ₹14,520

CI = 145200 – 1200

= 2520

= ₹14520 **Ans:**

5. **1st half year**

$$I_1 = \frac{6000 \times 1 \times 15}{100 \times 2}$$

= ₹450

A_1 = 6000 + 450

= ₹6450

2nd half of 1st year

$$I_2 = \frac{6450 \times 1 \times 15}{100 \times 2}$$

= ₹483.75

A_2 = 6450 + 483.75

= ₹6933.75

3rd half year

$$I_3 = \frac{6933.75 \times 1 \times 15}{100 \times 2}$$

$= ₹520.03$

$A_3 = 6933.75 + 520.03$

$= ₹7453.78$

$CI = 7453.78 - 6000 = 1453.78$

6. **1st year**

$$I_1 = \frac{8500 \times 1 \times 4}{100}$$

$= ₹340$

$A_1 = ₹8500 + 340 = ₹8840$

2nd year

$$I_2 = \frac{8840 \times 1 \times 5}{100}$$

$= ₹442$

$A_2 = 8840+442$

$= ₹9282.$

3rd year

$$I_3 = \frac{9282 \times 1 \times 6}{100}$$

$= ₹556.92$

$A_3 = 9282+556.92$

$= ₹9838.92$

$CI = 9838.92–8500$

$= ₹1638.92$

7. **1st year**

$$I_1 = \frac{8000 \times 15 \times 1}{100}$$

$= ₹1200$ $A_1 = 8000+1200$ $= ₹9200$

2nd year

$$I_2 = \frac{9200 \times 15 \times 1}{100}$$

$= ₹1380$ $A2 = 9200+1300$ $= 10,580$

3rd year

$$I_3 = \frac{1080 \times 15 \times 1}{100}$$

$= ₹1587$

$CI = I_1+I_2+I_3$

$= 1200+1300+1587$

$= ₹4167$

Exercise 7.3

1. i) $A = P\left(\frac{1+R}{100}\right)^n$

$$A = 90000\left(\frac{1+6}{100}\right)^2$$

$$= 90000 \times \frac{106}{100} \times \frac{106}{100}$$

$A = 1,0,1,124$

$CI = 101124 – 90000$

$= ₹11,124$

Ans: 1,01,124 and 11,124

ii) $A = 8000\left(\frac{1+5}{100}\right)^2$

$$= 8000 \times \frac{105}{100} \times \frac{105}{100}$$

$A = ₹8820$

$CI = 8820 – 8000$

$= ₹820$

Ans: ₹8820, 820

2. Amount to be paid $= 14000\left(\frac{1+8}{100}\right)^2$

$$= 14000 \times \frac{105}{100} \times \frac{105}{100}$$

$= ₹16329.60$

Ans: ₹16329.60

3. $A = P\left(\frac{1+R/2}{100}\right)^{2n}$

$= 16000\left(\frac{1+5}{100}\right)^{3/\cancel{2}\times\cancel{2}}$

$= 16000 \times \frac{105}{100} \times \frac{05}{100} \times \frac{105}{100}$

$= ₹185200$

4. Interest paid by Ritika $= \frac{20000 \times 18 \times 1}{100}$

$= ₹3600$

Amt recevied by Ritika $= P = \left(\frac{1+R/4}{100}\right)^{4n}$

(i.e amt paid by Rupali $= 20\backslash 000\left(\frac{\cancel{1+4.5}}{\cancel{100}}\right)^{4\times 1}$

$= 20000 \times \frac{104.5}{100} \times \frac{104.5}{100} \times \frac{104.5}{100} \times \frac{104.5}{100}$

$= ₹1638.92$

Interest recevied Ritika $= 23850.37 – 20000$

$= 3850.37$

Profit $= 3850.37 – 3600$

$= ₹250.37$

5. CI

$A = 50000 \times \left(\frac{1+10}{100}\right)^2$

$= 50000 \times \frac{110}{100} \times \frac{110}{100}$

$= ₹60,500$

SI

$SI = \frac{50000 \times 10 \times 2}{100}$

$= ₹10,000$

CI = 60500 – 50000

= ₹10,500

Diff = 10500–10000

= ₹500 **(Ans)**

6. Annually

$$A = 10000\left(\frac{1+10}{100}\right)^2$$

$$= 10000 \times \frac{110}{100} \times \frac{110}{100}$$

= ₹12100

Semi Annually

$$A = 10000\left(\frac{1+5}{100}\right)^4$$

$$= 10000\ \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100}$$

= ₹12155.06

Diff = 12155.06 – 12100

= ₹55,.06 **(Ans)**

7. $$\text{Amt} = 12000\left(\frac{1+5}{100}\right)^2$$

$$= 12000 \times \frac{105}{100} \times \frac{105}{100}$$

= ₹13230

Price of sing = 13230 – 12250

= ₹980 **(Ans)**

Self Assesment -7

1. $$T = \frac{50 \times 100}{200 \times 5}$$

= 5 years.

2. $$A = 10000\left(\frac{1+5}{200}\right)^{2\times 2}$$

$$= 10000 \times \frac{205}{100} \times \frac{205}{100} \times \frac{205}{100} \times \frac{205}{100}$$

= 11037.13.

I = 11038.13 – 10000

= ₹1037.13 **(Ans).**

3. $$A = P\left(\frac{1+5}{100}\right)^2$$

$$= P \times \frac{105}{100} \times \frac{105}{100}$$

$$= \frac{11025P}{10000}$$

CI = A – P

$$205 = \frac{11025P}{10000} - 12100$$

$$205 = \frac{205 \times 10000}{1025}$$

$= 205 \times 10000 = 1025P.$

$$P = \frac{205 \times 10000}{1025}$$

$= ₹2000$ **(Ans).**

4. $P = ₹\ 1000$

$A = ₹\ 2000$

$I = ₹1000$

$T = 16$ yr

$$R = \frac{1000 \times 1000}{16 \times 1000}$$

$= 6.25\%$ **(Ans)**

5. $I = 2750 - 2500$

$= ₹\ 250$

$$T = \frac{250 \times 100}{2500 \times 8}$$

$= 1.25$ years.

6. $$ST = \frac{2500 \times 3 \times 2}{100}$$

$= ₹150$

= Option (b) **(Ans):**

7. $$A = 4000 \times \frac{105}{100} \times \frac{105}{100}$$

$= ₹\ 4410$

$I = 4410 - 4000$

$= ₹410$

= Option (d) **(Ans):**

Q 81015 Take from the back of the book.

Chapter-8 Direct and Inverse Variation

<table>
<tr><th>Topics</th><th>Learning Outcomes</th><th>Teaching Learning Activity</th><th>Questions on Hots</th></tr>
<tr>
<td>Direct Proportion</td>
<td>The children should be able to verify whether the given quantities are in direct proportion</td>
<td>Two quantities which are varying in the same direction (either increaser or decreasing) together in such a way that the ratio of the quantities are in the same ratio, are said to be in the direct proportion.
If x and y are given quantities in direct proportion the $\frac{x}{y}$ is constant at any stage. The direct proportion is represented by x a y Egs. A machine in a factory produces 840 bottles in six hours. How many bottles will it produce in five hours.
<table>
<tr><td>No. of bottles</td><td>840</td><td>X</td></tr>
<tr><td>Time (hrs)</td><td>6</td><td>5</td></tr>
</table>
$$\frac{840}{6} = \frac{x}{5}$$
Practice more problems.</td>
<td>Are the variable x and y in direct proportion
<table>
<tr><td>x</td><td>8</td><td>12</td><td>16</td></tr>
<tr><td>y</td><td>20</td><td>30</td><td>40</td></tr>
</table>
</td>
</tr>
<tr>
<td>Indirect Proportion</td>
<td>They should be able distinguish between the direct and indirect proportion.</td>
<td>Two quantities which are varying in the opposite direction (one is Increasing and one is decreasing) in such a way that the product of there is a constant at any stage are said to be in inverse proportion.
If x and y are in the inverse proportion then x × y is a constant. It</td>
<td>A man travelled for 20 hours at the speed of 4km/hr to reach a place. How much till will he take if be travel at a speed of 80 km/hr ?</td>
</tr>
</table>

		is represented by the symbol x a $\frac{1}{y}$. Egs. A man has enough food to feed 20 animals for 6 day How long would the food last if there were 10 more animals No. of days: 6, x No. of animals: 20, 30 Do more problems from the text book	
Problems based on application of Direct and Inverse variation Time and work	Students will be able to solve problem based on time and work.	Practice problem sums based on time and work. Pick two students. One student can solve a book in 6 days while the other student solves it in 12 days. How long will they take if both solve the book together.	A tank can be filled by one tap in 4 hours. It is emptied by a pipe in 6 hours. How long will it take to fill the tank if both the tap and pipe are opened together?

Exercise 8.1

1.

x	4	1	b	20	6
y	6	a	18	c	d

$$\frac{x}{y} = \frac{4}{6} = \frac{1}{a}$$

ar, $a = \frac{1}{4} \times 6$

$a = \frac{3}{2} = 1\frac{1}{2}$ **(Ans)**

Again $\frac{4}{6} = \frac{b}{18}$ $\frac{4}{6} = \frac{20}{c}$

Or $b = \frac{4 \times 18}{6}$ = Or, $c = \frac{20 \times 6}{4}$

= 12 **(Ans)** = 30 **(Ans)**

$\frac{4}{6} = \frac{6}{d}$

Or, $d = \frac{6}{4} \times 6$

= 9 **(Ans)**

2. Cloth cost

7m ₹210 In Direct proportion

15m? $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

since it in direct roportion

$$\frac{7}{210} = \frac{15}{x}$$

Or, n = $\frac{210 \times 15}{7}$

= ₹450

Cost of 15m cloth is ₹450.

3. APPles Cost

90kg ₹729.90

27kg ?

Since they are is direct Uaralion

$$\frac{90}{729.90} = \frac{27}{x}$$

Or, $x = \frac{729.90}{90} \times 27$

= ₹218.97

4. No of brain contri bulion

12 ₹1320

x ₹550

Since they are in direct proportion

$$\frac{12}{1320} = \frac{x}{555}$$

Or, $\frac{12 \times 550}{1320} = x$

Or, $x = 5$

∴ 5 friends will wntrubate

5. Dislonce Time

75 1.5

1050 x

$$\frac{75}{1.5} = \frac{1050}{x}$$

Or, $x = \frac{105 \times 1050}{75}$

= 21 hr

∴ The frain will take 21 hours.

6. Earnings weeks

₹8085 20

₹3234 x

Since they are in direct proportion

$$\frac{8085}{20} = \frac{3234}{x}$$

Or, $x = \frac{20}{8085} \times 3234$

x = 8

∴ An earns is 8 weeks.

7. no of students no of pages

65 455

x 1274

Since they are in direct proportion

$$\frac{65}{455} = \frac{x}{1274}$$

Or, $\frac{65 \times 1274}{455} = x$

Or, x = 182

Ans. 182 students

8. Sugar cakes.

1075 35

x 105

Since they are in direct proportion

$$\frac{1.75}{35} = \frac{x}{105}$$

Or, $\frac{1.75 \times 105}{35} = x$

x = 5.25 kg

Ans. 25 kg

9. Boards Thickness

12 65mm

312 ?

Since they are in proportion

$$\frac{12}{65} = \frac{312}{x}$$

Or, $x = \frac{65 \times 312}{12}$

x = 1690mm or 1m 69cm.

Ans: 1690mm

10. map Actual.

1 1.3×10^5

5 x

$\frac{1}{5} = \frac{1.3 \times 10^5}{x}$

Or $x = 1.3 \times 10^5 \times 5$

$= 6.5 \times 10^5$

Exercise 8.2

1.

a	40	20	y	4	t
b	1	x	10	z	20

Since they are inversely related

$a \times b = 40 \times 1 = 20 \times x$

Or, $\frac{40 \times 1}{20} = x$

or $x = 2$

$40 \times 1 = y \times 10$

or, $\frac{40 \times 1}{10} = y$

or, $y = 4$

$40 \times 1 = 4 \times z$ $40 \times 1 = t \times 20$

or $\frac{40 \times 1}{4} = z$ or $\frac{40 \times 1}{20} = t$

or t = 10 or, t = 2

2. workers Days.

125 16

100 ?

Since they are in inverse proportion

$125 \times 16 = 100 \times x$

or, $\frac{125 \times 16}{100} = x$

or, $x = 20$

Ans: 20 days

3. Days Men

40 30

x 25

Since they are in inverse proportion

$40 \times 30 = x \times 25$

or, $\frac{40 \times 30}{25} = x$

or, x =

4. Tops hrs

5 8

16 x

Since they are in inverse proportion

$5 \times 8 = 16 \times x$

or, $x = \frac{6 \times 8}{16}$

2.5 hours

Ans: 2.5 hours.

5. Men houres Days

27 11 18 days

54 11 x

Since they are in inverse Proportion

$27\times18 = 54\times x$

or, $\frac{27\times18}{64} = x$

or, $x = 9$

Ans: 9 days.

6.

Time	Speed. (km/hr)
7	2.8
x	3.5

Since they are in inverse proportion

$7\times2.8 = x\times3.5$

or, $\frac{7\times2.8}{3.5} = x$

or, $x = 5.6$

Ans: 5.6 hours.

7.

Machines	Days.
42	56
x	48

Since they are in inverse proportion

$42\times56 = x\times48$

or, $\frac{42\times56}{48} = x$

or, $x = 49.$

Ans: 49 machines.

8.

Laborers	hours
14	45
x	35

Since they are in inverse proportion

$14\times45 = x\times35$

or, $\frac{14\times45}{35} = x$

or, $x = 18$

Ans: 18 laborers.

9.

workers	Days
20	70
20+8	x

Since they are in inverse proportion

$20\times70 = 28\times x$

or, $\frac{20\times70}{28} = x$

or, $x = 50$

Ans: 50 days.

10.

Cottles	Days
1500	20
1500–x	50 Let the cottles sold be x

Since they are in inverse Proportion

$1500 \times 20 = (1500 - x) \times 50$

or, $\frac{1500\times20}{50} = 1500 - x$

or, $600 = 1500 - x$

or, $x = 900$

Ans: 900 cottles were sold.

Exercise 8.3

1. A's 1 day work $= \frac{1}{24}$

B's 1 day work $= \frac{1}{5}$

C's 1 day work $= \frac{1}{12}$

(A + B + C)'s 1 day work $= \frac{1}{24}+\frac{1}{5}+\frac{1}{12}$

$= \frac{5+24+10}{120}$

$= \frac{13}{40}$

$\frac{13}{40}$ part of work is done in 1 day.

$\therefore$ 1 work will be done in $\frac{1\times 40}{13}$ day.

$= \frac{40}{13}$

$= 3\frac{1}{13}$ days.

Note: to convert the part of work into no of days just reciprocate the value.

2. (A + B)'s 1 day work $= \frac{1}{15}$

(B + C)'s 1 day work $= \frac{1}{12}$

(A + C)'s 1 day work $= \frac{1}{10}$

$(A+B)+(B+C)+(A+C) = \frac{1}{15}+\frac{1}{12}+\frac{1}{10}$

2(A + B +C)'s 1 day work $= \frac{4+5+1}{60}$

$= \frac{15}{60}$

$= \frac{1}{4}$

(A + B + C)'s 1 day work $= \frac{1}{4\times 2} = \frac{1}{8}$

A's 1 day work $= \frac{1}{8} - \left(\frac{1}{12}\right)$

$\left[A+B+C-(B+C)\right]$

$= \frac{1}{24}$ Part of work.

$\therefore$ A alone complete the work in 24 days.

3. A's 1 day work $= \frac{1}{25}$

B's 1 day work $= \frac{1}{30}$

(A + B)'s 5 day work $= \left(\frac{1}{25}+\frac{1}{30}\right)\times 5$

$= \left(\frac{6+5}{150}\right)\times 5$

$= \frac{11}{30}$

work left $= \frac{1-11}{30}$

$= \frac{30-11}{30}$

$= \frac{19}{30}$ Part of work.

Ans: $\frac{19}{30}$ Part of work.

4. (A + B)'s 1 day work $= \frac{1}{8}$

(B + C)'s 1 day work $= \frac{1}{12}$

(A + B + C)'s 1 day work $= \frac{1}{6}$

(A + B + C) – (A + B + B + C) = (A + C)

$\therefore$ (A + C)'s 1 day work

$= \frac{1}{6} - \left(\frac{1}{8}+\frac{1}{12}\right) = \frac{1}{8}$

$\therefore$ $(A + C)^s$ 1 day work is $\frac{1}{8}$

$\therefore$ A + C can do the work in 8 day.

5. A's 1 day work = $\frac{1}{9}$

B's 1 day work = $\frac{1}{12}$

(A + B)'s 1 day work = $\frac{1}{9}+\frac{1}{12}$

$= \frac{7}{36}$

$\therefore$ A + B cando the work in $\frac{36}{7}$ or $5\frac{1}{7}$ days.

6. A's 1 day work $= \frac{1}{16}$

B's 1 day work $= \frac{1}{32}$

C's 1 day work $= \frac{1}{48}$

(A + B + C)'s 8 day work

$= 8 \times \left(\frac{1}{16}+\frac{1}{32}+\frac{1}{48}\right)$

$= \frac{6+3+2}{96}$

$= \frac{11}{12}$

work left $= \frac{1-11}{12}$

$= \frac{12-11}{12} = \frac{1}{12}$ Part of work

$\frac{1}{16}$ work is 1 day

1 work $\frac{1}{1}\times 16$

$\frac{11}{12}$ work $= 16\times\frac{11}{12} = \frac{44}{3}$ days

7. A's 1 day work $= \frac{1}{15}$

B's 1 day wor $= \frac{1}{12}$

C's 1 day work $= \frac{1}{12}$

(A + B + C)'s 1 day work

$= \frac{1}{15} + \frac{1}{12} + \frac{1}{12}$

$= \frac{4+5+3}{60}$

$= \frac{12}{60}$ Partofwork.

(A + B + C)'s 2 day work

$= \frac{12}{60}\times 2$

$= \frac{12}{30} = \frac{2}{5}$ Part of work

work left $= \frac{1-2}{5}$

$= \frac{3}{5}$ Part fo work.

(A + B)'s 1 day work = $\frac{1}{15}+\frac{1}{12}$

$= \frac{4+5}{60} = \frac{9}{60}$ A + B can do $\frac{3}{20}$ work in 1 day

$= \frac{3}{20}$ Part of work A + B can do $\frac{3}{5}$ work in $= \frac{1 \times 20}{3} \times \frac{3}{5}$

$= 4$ days.

8. A + B's 1 day work $= \frac{1}{18}$

(B + C)'s 1 day work $= \frac{1}{24}$

(C + A)'s 1 day work $= \frac{1}{36}$

(A + B) + (B + C) (C + A) $= \frac{1}{18} + \frac{1}{24} + \frac{1}{36}$

2 (A + B + C)'s 1 day work $= \frac{4+3+2}{72}$

2 (A + B + C)'s 1 day work $= \frac{1}{8 \times 2} = \frac{1}{16}$ Part of work.

A + B + C can do The work in 16 days

9. (A + B)'s 1 day work $= \frac{1}{12}$

(B + C)'s 1 day work $= \frac{1}{15}$

(C + A)'s 1 day work $= \frac{1}{20}$

2 (A + B + C)'s 1 day work $= \frac{1}{12} + \frac{1}{15} + \frac{1}{20}$

$= \frac{5+4+3}{60}$

2 (A + B + C) $= \frac{12}{60} = \frac{1}{5}$

$$(A + B + C)\text{'s work} = \frac{1}{5 \times 2} = \frac{1}{10} \text{ Part of work.}$$

$$A\text{'s work} = (A + B + C) - (B + C)$$

$$= \frac{1}{10} - \frac{1}{15}$$

$$= \frac{1}{10} - \frac{1}{15} = \frac{1}{30}$$

A can do the work in 30 days.

10. Pipe A's 1 day hour work $= \frac{1}{10}$

Pipe B's 1 day hour work $= \frac{1}{15}$

Pipe (A + B)'s 1 hour work $= \frac{1}{10} + \frac{1}{15}$

$$= \frac{5}{30} = \frac{1}{6} \text{ Part of tank}$$

$\therefore$ A + B together will fill the tank in 6 hours.

11. Top A's 1 day hour work $= \frac{1}{6}$

Top B's 1 day hour work $= \frac{1}{8}$

Top C's 1 day hour work $= \frac{1}{10}$

$$A + B + C = \frac{1}{6} + \frac{1}{8} + \frac{1}{10}$$

$$= \frac{20 + 5 + 12}{120} = \frac{47}{120}$$

$$= \frac{47}{120}$$

Ans: $\frac{47}{120}$ hours

13. A's 1 day minite work $= \frac{1}{11}$

B's 1 day minite work $= \frac{1}{15}$

C's 1 day minite work $= \frac{1}{10}$

Ans 3 working together 1 minite owrk $= \frac{1}{11} + \frac{1}{15} - \frac{1}{10}$

Self Assessment 8

1. $\frac{1.4}{b} = \frac{2.8}{14}$ $\frac{2.8}{14} = \frac{a}{21}$

or $b = \frac{1.4 \times 14}{2.8}$ or $a = \frac{2.8 \times 21}{14}$

$b = 7$ (Ans) $a = 4.2$ (Ans).

2.

Books	Weight
35	2.8
60	x

Since they are in direct proportion

$$\frac{35}{2.8} = \frac{60}{x}$$

or$_1$ $x = \frac{60 \times 2.8}{35}$

x = 4.8 kg.

Ans. 4.8 kg.

3.

Men	Days
10	20
8	x

Since they are in inverse proportion

$10 \times 20 = 8 \times x$.

or$_1$ $\frac{10 \times 20}{8} = n$

or $n = 25$

Ans. 25 days

4. Raj's 1 hour work $= \frac{1}{7}$

Manoj's 1 hour work $= \frac{1}{14}$

Raj + manoj $= \frac{1}{7} + \frac{1}{14} = \frac{2+1}{14} = \frac{3}{14}$ part of work.

Ans. $\frac{14}{3}$ or $4\frac{2}{3}$ hours

5. $\left(\frac{1}{15} + \frac{1}{12} + \frac{1}{20}\right) \times 4$ is 4 days work of A + B + C

$= \left(\frac{4+5+3}{60}\right) \times 4$

$= \frac{12}{60} \times 4$

$= \frac{4}{5}$ part of work work left $= 1 - \frac{4}{5} = \frac{1}{5}$ part

A + B 1 day work $= \frac{1}{15} + \frac{1}{12}$

$= \frac{4+5}{60} = \frac{9}{60} = \frac{3}{20}$ part of work

$\frac{3}{20}$ part of work is done in 1 day

1 work $= \frac{1}{3} \times 20$

$= \frac{20}{3}$ days

$\frac{1}{5}$ work $= \frac{20}{3} \times \frac{1}{5} = \frac{4}{3} = 3\frac{1}{3}$ days (Ans)

6. To 9 take answer from the back.

10. $4 \times 14 = x \times 7$

$$\frac{4 \times 14}{7} = x$$

$$n = 8$$

Ans: option (c)

11. $$\frac{125}{625} = \frac{72}{x}$$

$$x = \frac{72 \times 625}{125}$$

$$x = 360 \text{ kg}$$

Ans. option (a)

12. Ans: option (b) decreases

Chapter-9 Algebraic Expressions and identities

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction to variables and constants Algebraic Expression	The students will be able to understand the difference between variables and constants and form algebraic expression	Explain to the students the concept of variable as with changing values, concept of constants. Using examples explain formation of algebraic expression as a combination of variables constants and operators eq. 3n + 5	Form algebraic expresses A number x subtracted from 5 terms a number y.
Terms of an expression, and coefficients we and unlike Terms and types of polynomials	The students will be able to identify the terms and coefficient and types of polynomials. They will be able to identify like and unlike terms	Explain to the students that terms are separated by '+' or '–' with examples explain the numerical coefficient and coefficient. Explain to the students that terms hove same variables are called like terms and terms having different variables are called unlike terms. Do worksheet based on these concepts.	How many terms are there? $3 \times x + 4 \times y + x \div 5$ Is $3x^2y$ and $3yx^2$ like terms?
Addition, subtraction, multiplication and division of polynomials	The students will be able to perform all operations of polynomials	Demonstrate with the help of various examples all operations and simplification to clear the concept of all operations. Sums from textbook to be done.	Solve. $(2xy + xy + 3x^2)$ $(5xy + xy)$
Identities	The students will be able to use the four standard identities.	Explain to the students the four standard identities $(x + b)(x + b) = x^2 + (a + b)x + ab$ $(a + b)^2 = a^2 + 2ab + b^2$ $(a - b)^2 = a^2 - 2ab + b^2$ $(a + b)(a - b) = a^2 - b^2$	Evolutions using ideating 10.9×9.7

Exercise 9.1

1. (i) $-19x$ and $2x$

$\Rightarrow -19x + 2x$

$\Rightarrow -19x$

(ii) $2x + y$ and. $-11x - 9y$

$\Rightarrow (2x + y) + (-11x - 9y)$

$\Rightarrow 2x + y - 9y$

$\Rightarrow -9x - 8y$

(iii) $a^2 b^2 - 4ab + C$ and $7a^2 b^2 - 7c$

$\Rightarrow a^2 b^2 - 4ab + C + 7a^2 b^2 - 7c$

$\Rightarrow 8a^2 b^2 - 4\,ab - 6c$

(iv) $8a + 6b - c, 4a + b + 7c - 2a + 5b - 9c$

$\Rightarrow 8a + 6b - c + 4a, + b + 7c - 2a + 5b - ac$

$\Rightarrow 10a + 12b - 3c$ **Ans.**

(v) $2\,xy - 4yz, 5xy + a\,z\,x, 3xy + 7yz + 11\,zx\,xy + yz + zx$

$\Rightarrow 11x + 4xz + 21zx$ **Ans.**

2. (i) 89 from -90) $\Rightarrow -90a - 8a$

$\Rightarrow -98a$ Ans.

(ii) $2x - 11y$ from $x + y$

$\Rightarrow x + y - 2x + 11y$

$\Rightarrow -x + 12y$ **Ans.**

(iii) $\phi q - qr + rs$ from $-6pq + 12ar + 7rs$

$\Rightarrow -6\phi q + 12qy + 7rs - (Pq - qr + rs)$

$\Rightarrow -6\phi q + 12\,qr + 7rs - Pq + qr - rs.$

$\Rightarrow -7\phi q + 13qr + 6rs$ **Ans.**

(iv) $a + b - 4c$ from $6a - 20b + rd$

$\Rightarrow 6a - 20b + 8d - a - b + 4c$

$\Rightarrow Sa - 21b + 12$

(v) $xy + yz + zx$ from $-xy - yz - zx$

$\Rightarrow \quad xy - yz - zx - xy - yz - zx$

$\Rightarrow -2xy - 2yz - 2zx$

$\Rightarrow -2\,(xy + yz + zx)$ **Ans.**

3). $18x - 12y\ 9z$

$-(x + y - 2z)$

$\Rightarrow 18x - 12y + 9z - x - y +$

$\Rightarrow 12x - 13y + 11z$ Ans.

4) $8a + 9b - 4c$

$\frac{-a}{8a}\ \frac{-b}{+8}\ \frac{+c}{-8c}$ **Ans.**

5) $-17x - 4y - 8z$

$\frac{7x + y + 0}{10 + 3y - 8z}$ **Ans.**

6) $12x - 4$

$\frac{-5 + 0}{7x - 4}$ **Ans.**

7) $4\phi + 2q - (2m\ ,\ <q)$

$\Rightarrow 4p + 2q - 2m + 5q$

$\Rightarrow 4p - 2m + 7q$

Now,

$\phi - 8q + m - 1$

$4p + 7q - 2m + 0$

$5p + 4q - m - 1$ **Ans.**

8) ..... $8a^2 - 4bc - 4$

$4a^2 + 3bc + 5$

$3a^2 - 2bc - 2$

$10a^2 - 3bc - 1$ **Ans.**

Exercise 9.2

1. (i) $-2a\ 8 - 4a$

$\Rightarrow 8a^2$ **Ans.**

(ii) x & $-2y$

$\Rightarrow -2xy$

(iii) $-8bc$ & 2

$\Rightarrow -6bc$ **Ans.**

(iv) $-xy$ & $3z$

$\Rightarrow -3xyz$

(v) $\frac{3}{4}a^2 \times \frac{7}{4}a^2 b^3$

$\Rightarrow \frac{21}{16}\ a^4\ b^3$ **Ans.**

(vi) $3a^3 \times \frac{7}{2}b^2 \times 3c$

$\Rightarrow \frac{63}{2}\ a^3\ b^2\ c$

2. (i) $6ab \times (3a - b)$

$\Rightarrow 18a^2\ b - 6ab^2$

(ii) $-2 + (z - 1)$

$-z^2 + z$ **Ans.**

(iii) Any $(2 - 5x)$

$\Rightarrow$ Any $- 10x^2y$

(iv) $2(a - 7bc)$

$\Rightarrow 2a - 14bc$

(v) $\frac{3}{4}\ a^2\ (a^2b - 3ab)$

$\Rightarrow \frac{3}{4}a^4\ b - \frac{9}{4}\ a^3\ b$

(vi) $\frac{5}{2}xy\ (x^2\ y + \frac{4}{10}xy)$

$\Rightarrow \frac{5}{2}x^3\ y^2 + x^2\ y^2$ **Ans.**

3. (i) $(a + b)\ (a - b)$

$\Rightarrow a^2 - b^2$

(ii) $(2a - 3b)\ (2 - 3x)$

$\Rightarrow abx$ **Asn.**

(iii) $(a \div 1)\ (3a - b + 3c)$

$\Rightarrow 3a^2 - ab + 2ac \div 3a - b \div 3c$ **Ans.**

(iv) $(5a - 5b)\ a - 1 \div 3b)$

$\Rightarrow 5a^2 - 5a \div 15ab - 5ab \div 5b - 1$

$\Rightarrow 5a^2 - 5a \div 10ab - 5b - 15\ b^2$

$\Rightarrow 5\ (a^2 - a \div 2ab \div b - 3b^2\ )$ **Ans.**

(v) $(3 + y + z)\ 2 + 3y - 5_2)$

$\Rightarrow 6 + 9y - 15z + 2y + 3y^2 - 5yz + 2z$

$\Rightarrow 6 + 11y - 13z + 6y^2 - 5yz - 5z.$

(vi) $(a + b) \times (a - b + c)$

$\Rightarrow a^2 - b^2 + 2bc - c^2$

$\Rightarrow a^2 - (b^2 - 2bc + c^2)$

$\Rightarrow a^2 - (b - c)^2$ **Ans.**

(vii) $(3x^2 + 4^2 - z^2)\ 5x^3 - 3y^2 + 5)$

$\Rightarrow 15x^5 - 9x^2\ y^2 + 15x^2 + 5x^3\ y^2 - 3y^4$ $5y^2$

$- 5x^3\ z^2 + 3y^2\ z^2 - 5z^2$

$\Rightarrow 15x^5 - 9x^2\ y^2 + 15x^2 + 5x^3\ y^2 - 3y^4 +$ $5y^2$

$- 5x^3\ z^2 + 3y^2\ z^2 - 5z^2$ **Ans.**

(viii) $(3x^2 - 2xy - 4y^2)\ (2x - 3y - 5)$

$\Rightarrow 6x^3 - 9x^2\ y - 15x^2 - 4x^2\ y + 6xy^2 +$ $10x\ y - 8xy^2 + 12y^3 + 20y^2$

$\Rightarrow 6x^2 - 18x^2\ y - 15x^2 - 2xy^2 + 10xy -$ $2^x + 12y^3 + 12y^3 + 20y^2$ **Ans.**

4) $1 = x^2 - 2x + 3$

$b = 4x^2 + x - 4$

Asea = L – b

$= \quad (3x^2 - 2x + 3)\ (4x^2 + x - 4)$

$\Rightarrow 12x^4 + 3x^3 - \cancel{12x^2} - 8x^3 - 2x^2 + 8$

$+ \cancel{12x^2} + 3x - 12$

$\Rightarrow 12x^4 - 5x^3 - 2x^2 + 11x - 12$

$\Rightarrow 12x^4 - 5x^3 - 2x^2 + 11x - 12$ **Ans.**

Exercise 9.3

1. (i) $(P - 11)\ (P + 11)$

$\Rightarrow P2 - 121$ **Ans.**

(ii) $(x + 3)\ (x - 3)$

$\Rightarrow x^2 - 9$ **Ans.**

(iii) $(2y - 5)\ (2y - 5)$

$\Rightarrow 4y - 20y + 25$

(iv) $(3a + ab)\ (3a + ab)$

$\Rightarrow 9a^2 + 54ab + 81b^2$

(v) $\left(3y - \frac{1}{4}\right)\ \left(3y - \frac{1}{4}\right)$

$\Rightarrow (3y)^2 - \left(\frac{1}{4}\right)^2$

$\Rightarrow 9y^2 - \frac{1}{16}$ **Ans.**

(vi) $(P - 0.2)(P - 0.2)$

$\Rightarrow P^2 - 0.4P + 0.04$

2. (i) $(4a - 5)(4a + 6)$

$\Rightarrow 16a^2 + 24a - 20a - 30$

$\Rightarrow 16a^2 + 4a - 30$

$\Rightarrow 2(8a^2 + 2a - 15)$ **Ans.**

(ii) $(x + 3)(x + 7)$

$\Rightarrow x^2 + 7x + 3x + 21$

$\Rightarrow x^2 + 10x + 21$ **Ans.**

(iii) $\left(3y - \frac{1}{4}\right)\left(3y - \frac{1}{2}\right)$

(iv) $(x - 7)(x - 9)$

$\Rightarrow x^2 - 9x - 7x + 49$

$\Rightarrow x^2 - 16x + 49$ **Ans.**

3. (i) $(81)^2$

$\Rightarrow (9 \times 9)^2$

$\Rightarrow 9^2 \times 9^2$

$\Rightarrow 81 \times 81$

$\Rightarrow 6561$ **Ans.**

(ii) $(63)^2 \Rightarrow (60 + 3)^2$

$\Rightarrow (60)2 + (3)2 + 2060.3$

$\Rightarrow 3600 + 9\ 360$

$\Rightarrow 3969$

(iii) $(100 - 3)^2$

$\Rightarrow (100)^2 + (3)^2 - 2.100.3$

$\Rightarrow 10000 + 9 - 600$

$\Rightarrow 9991\ 9409$ **Ans.**

4. (i) 6.3×6.5

$\Rightarrow (6 + 0.3)(6 + 0.5)$

$\Rightarrow 62 + (0.3 + 0.5)\ 6 + 0.15$

$\Rightarrow 36 + 0.8 \times 6\ 0.15$

$\Rightarrow 40.95$

(ii) 1078×93

(iii) 8.2×8.7

$\Rightarrow (8 + 0.2)(8 + 0.7)$

$\Rightarrow 82 + (0.2 + 0.7)\ 8 + ...$

$\Rightarrow 64 + 7.2 + 6.14$

$\Rightarrow 71.34$

5. (i) 97×103

$\Rightarrow (100 - 3)(100 + 3)$

$\Rightarrow 100^2 - 3^2$

$\Rightarrow 10000 - 9$

$\Rightarrow 9991$

(ii) 19.2×20.8

$\Rightarrow (20 - 0.8)(20 + 0.8)$

$\Rightarrow 20^2 - (0.8)^2$

$\Rightarrow 399.36$

(iii) 50.7×49.3

$\Rightarrow (50 + 0.7)(50 - 0.7)$

$\Rightarrow (50)^2 - (0.7)^2$

$\Rightarrow 500 - 0.49 = ...$

6. (i) $102^2 - 98^2$

$\Rightarrow (100 + 2)^2 - (100 - 2)^2$

$\Rightarrow (100 + 2 + 100 - 2)\ 100 + 2 - 100 - 2)$

$\Rightarrow (102 + 98)(102 - 98)$

$\Rightarrow 200 \times 4$

$\Rightarrow 800$ **Ans.**

(ii) $(20.5)^2$

$\Rightarrow (20 + 0.5)(20 + 0.5)$

$\Rightarrow 20^2 + (0.5)^2 + 2.20\ .0.5$

$\Rightarrow 400 + 025 + 20$

$\Rightarrow 420.25$

(iii) $(57)^2\ (60 - 3)(60 - 3)$

$\Rightarrow 60^2 + 3^2 - 2.\ 60.3$

$\Rightarrow 3600 + 9 - 360$

$\Rightarrow 3249$ **Ans.**

7. (i) $\left(x+\frac{1}{x}\right)^2$

$\Rightarrow x^2 + \frac{1}{x^2} + 2$

$\Rightarrow 23 + 2\ 25$

$\Rightarrow x+\frac{1}{x} = \sqrt{25} = 5$ **Ans.**

(ii) $\left(x-\frac{1}{x}\right)$ x2 + $\frac{1}{x^2} - 2 \Rightarrow 23 - 2 = 21$

$\therefore\ x-\frac{1}{x} = \sqrt{21}$ **Ans.**

8.a + b – 9, ab = 10

$\therefore (a + b)^2 = (9)^2$

$\Rightarrow a^2 + b^2 + 2ab = 81$

$\Rightarrow a^2 + b^2 + 20 = 81$

$\Rightarrow a^2 + b^2 = 81$ **Ans.**

9.a – b = 16, $a^2 + b^2 = 42$

$\Rightarrow (a - b)^2 = (16)^2$

$\Rightarrow a^2 + b^2 - 2ab = 256$

$\Rightarrow -2ab = 256 - 42$

$\Rightarrow ab = \frac{214}{-2}^{107}$, $\therefore$ ab = – 107

10. $\left(x+\frac{1}{x}\right)^2 = (5)^2 \Rightarrow x^2 + \frac{1}{2^2} + 2 = 25$

(i) $\therefore\ x^2 + \frac{1}{2^2} = 23$

(ii) $\left(x^2 \frac{1}{x^2}\right) = (23)^2$

$\Rightarrow x^4 + \frac{1}{x^4} + 2 = \sqrt{29}$

$\Rightarrow x^4 + \frac{1}{x^4} = \sqrt{27}$ **Ans.**

11. $a^2 + b^2 = 8$, ab = 4

$\Rightarrow (a + b)^0 = a^2 + b^2 + 2ab$

$\Rightarrow (a + b)^2 = 8 + 2.4$

$\Rightarrow (a + b)^2 - 16$

$\Rightarrow a + b = \sqrt{16} = 4$

12. $a^2 - b^2 = 36$, a – b = 9

$\Rightarrow (a + b)\ (a - b) = a^2 - b^2$

$\Rightarrow (a + b) \times 9 = 36$

$\Rightarrow a + b = \frac{36}{9}$

$\therefore$ a + b = 4 **Ans.**

13. a + b = 7, ab = 6

$\Rightarrow (a + b)^2 = (7)^2$

$\Rightarrow a^2 + b^2 + 2ab = 49$

$\Rightarrow a^2 + b^2 + 12 = 49$

$\Rightarrow a^2 + b^2 = 37$ **Ans.**

14. a – b = 8, $a^2 + b^2 - 25$

$\Rightarrow (a - b)^2 = (8)^2$

$\Rightarrow a^2 + b^2 - 2ab = 64$

$\Rightarrow 25 - 2ab = 64$

$\Rightarrow ab = 64 - 25$

$\Rightarrow ab = 9.75$

Chapter-10 Factorization

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of factors and concept of factors of an algebraic term.	The students will be dear with the concept of factor and will be able to find the factor and HCF of terms.	Using examples explain the factors of terms and help students. Calculate HCF eq. 3xy and 6y Factors of $3xy$ = 3, x, y Factors of $6y$ = 2, 3, y Common factors = 3, y $\therefore$ HCF = $3y$	Find the HCF of 15 $a^2b^2c^2$ and $12a^4bc^4$
Factorization	The students will be able to factorize expressions using different methods.	Explain the different methods of factorization (i) By taking out common factors (ii) By regrouping terms (iii) By middle term factorization (iv) By using identities. Using different examples, explain all the method. Practice sums to be done from the book.	Factorise i) $3x^2y + 2xy - 3x^2 - 2x$ (ii) $25a^4 - \frac{1}{81}$

Exercise 10.1

1. i) 4CF of $5x, -30x^2$
   $= -5x$
   ii) HCF of $-16xy, -24xy$
   $= -8xy$
   iii) HCF of $2ab, -4ab^2, 8b$
   $= 2b$
   iv) HCF of $x^2, x^3, -x^4$
   $= x^2$
2. i) $16x + 40$
   $= 4\ (4x + 10)$
   ii) $4x + yx + zx$
   $= x\ (4 + y + z)$
   iii) $x^2 - x$
   $= x\ (x - 1)$
   iv) $3x - 12$
   $= 3\ (x - 4)$
   v) $2x - 12x^2 - 4x^3$
   $= 2x\ (1 - 6x - 2x^2)$
3. i) $21py^2 - 56py$
   $= 7py\ (3y - 8)$
   ii) $16x^2 + 8x^3$
   $= 8x^2\ (2 + x)$
   iii) $4x^3 - 6x^4$
   $= 2x^3\ (2 - 3x)$
   iv) $-5a + 6ac$

$= a\ (-5a + 6c)$

v) $ab + acb - adb$

$= ab\ (1 + c - d)$

4. i) $12a^2\ b + 6ab^2 - 9abc$

$= 3ab\ (4a + 2b - 3c)$

ii) $ab^2 + a^2\ cb - adb^2$

$= ab\ (a + ac - abd)$

5. i) $3(a + 2b)^2 + 2\ (a + 2b)$

$= 2\ (x + 2y)^2\ \{(x + 2y)^2 + 8\}$

ii) $3a\ (a^2 + b^2) + 7b\ (a^2 + b^2)$

$= (a^2 + b^2)\ (3a + 7b)$

7. i) $xy - x^2 - y + x$

$= x\ (y - x) - 1\ (y - x)$

$= (x - 1)\ (y - x)$

ii) $3x^2\ y + 2xy - 3x^2 - 2x$

$= xy\ (3x + 2) - x\ (3x + 2)$

$= (3x + 2\ (\ xy - x)$

8. i) $-2bx - 4by + 3ax + 6ay$

$= -2\text{b}\ (x + 2y) + 3a\ (x + 2y)$

$= (x + 2y)\ (3\text{a} - 2\text{b})$

ii) $5x + 20y + 3x^2 + 12yx$

$= 5\ (x + 4y) + 3x\ (x + 4y)$

$= (5 + 3x)\ (x + 4y)$

9. i) $ax + by + ay + bx$

$= ax + ay + by + bx$

$= a\ (x + y) + \text{b}\ (y + x)$

$= (\text{a} + \text{b})\ (x + y)$

ii) $x^2 + xy - x - y$

$= x\ (x + y) - 1\ (x + y)$

$= (x - 1)\ (x + y)$

10. i) $6xy^2 - 3xy - 10y + 5$

$= 3xy\ (2y - 1) - 5\ (2y - 1)$

or, $(3xy - 5)\ (2y - 1)$

ii) $3ax - 6ay - 8by + 4bx$

$= 3a\ (x - 2y) + 4\text{b}\ (-2y + x)$

$= (3a + 4b)\ (x - 2y)$

11. i) $x^2 + 2y\ (1 + y) + y^3$

$= x^2 + 2y + 2y^2 + y^3$

$= x\ (x + y) + y^2\ (x + y)$

$= (x + y^2)\ (x + y)$

ii) $ab^2 + b\ (a - 1) - 1$

$= ab^2 + ab - b - 1$

$= ab\ (b + 1) - 1\ (b + 1)$

$= (ab - 1)\ (b + 1)$

Exercise 10.2

1. i) $a^2 + 10a + 25$

$= a^2 + 2.5.\text{a} + 5^2$

$= (a + 5)^2$

$= (a + 5)\ (a + 5)$

[usin idenlity $a^2 + 2ab + b^2 + (a + b)^2$]

ii) $49x^2 + 42xy + 9y^2$

$= (7x)^2 + 2.7 \times 3y + (3y)^2$

$= (7x + 3y)^2$

$= (7\text{x} + 3\text{y})\ (7\text{x} + 3\text{y})$

iii) $x^2 + 20x + 100$

$= x^2 + 2.10.x + 10^2$

$= (x + 10)^2$

$= (x + 10)\ (x + 10)$

2. i) $121x^2 - 66xy + 9y^2$

$= (11 + x)^2 - 2.11x - 3y + (3y)^2$

$= (11x - 3y)^2$

$= (11x - 3y)\ (11x - 3y)$

ii) $4x^2 - 12x + 9$

$= (2x)^2 - 2.2x\ .3 + 32$

$= (2x - 3)^2$

$= (2x - 3)\ (2x - 3)$

iii) $a^2 + 10a + 25$

$= a^2 + 2.5.a + 5^2$

$= (a + 5)^2$

$= (a + 5)\ (a + 5)$

3. i) $144x^2 - 1$

$= (12x)^2 - 1^2$

$= (12x + 1)\ (12x - 1)$

(were $a^2 - b^2 = (a + b)\ (a - b)$

ii) $4 - 9x^2$

$= 2^2 - (3x)^2$

$= (4 - 3x)\ (4 + 3x)$

iii) $1 - x^4$

$= 1^2 - (x^2)^2$

$= (1 + x^2)\ (1 - x^2)$

$= (1 + x^2)\ (1 + x)\ (1 - x)$

4. i) $98x^2 - 72y^2$

$= 2(49x^2 \neg 36y^2$

$= \{(7x)^2 - (6y)^2\}$

$= 2(7x + 6y)\ (7x - 6y)$

ii) $\frac{25}{4}x^2 - 81y^2$

$= \left(\frac{5}{2}x\right)^2 - (9y)^2$

$= \left(\frac{5}{2}x + 9y\right)\left(\frac{5}{2}x - 9y\right)$

2. i) $169 - P^4$

$= 13^2 - (P^2)^2$

$= (13 + P^2)\ (13 - P^2)$

ii) $5y^5 - 405y$

$= 5y\ (y^4 - 81)$

$= 5y\{(y^2)^2 - 9^2)\}$

$= 5y\ (y^2 - 9)\ (y^2 + 9)$

$= 5y\ (y + 3)\ (y - 3)\ (y^2 + 9)$

iii) $64a^2 - 9b^2 + 56ac + 21\ bc$

6. i) $\frac{38^2 - 22^2}{16}$

$= \frac{(38 + 22)(38 - 22)}{16}$

$= \frac{60 \times \cancel{16}}{\cancel{16}}$

$= 69$ **Ans.**

ii) $(766)^2 - (234)^2$

$= (766 + 234)\ 766 - 234)$

$= 1000 \times 532$

$= 532000$ (**Ans.)**

Exercise 10.3

1. i) $x^2 + 3x + 2$

$= x^2 + 2x + x + 2$

$= x\ (x + 2) + 1\ (x + 2)$

$= (x + 1)\ (x + 2)$

ii) $a^2 + 10a + 24$

$= a^2 + 6a + 54a + 24$

$= a\ (a + 6) + 4\ (a + 6)$

$= (a + 4)\ (a + 6)$

iii) $P^2 - 23P + 42$

$= P^2 - 21P - 2P + 42$

$= P\ (P - 21) - 2\ (P - 21)$

$= (P - 2)\ (P - 21)$

iv) $3x^2 + 14x + 8$

$= 3x^2 + 12x + 2x + 8$

$= 3x\ (x + 4) + 2\ (x + 4)$

$= (3x + 2)\ (x + 4)$

v) $6x^2 + 11x + 4$

$6x^2 + 8x + 3x + 4$

$= 2x\ (3x + 4) + 1\ (3x + 4)$

$= (2x + 1)\ (3x + 4)$

vi) $10P^2 - 21P + 8$

$10P^2 - 16_P - 5_P + 8$

$= 2P\ (5P - 8) - 1\ (5P - 8)$

$= (2P - 1)\ (5P - 8)$

vii) $10 - 3t - t^2$

or $t^2 + 3t - 10$

$= t^2 + 5t - 2t - 10$

$= t(t + 5) - 2(t + 5)$

$= (t - 2)(t + 5)$

viii) $6x^2 y^2 + 5xy - 6$

Let $xy = a$

$6a^2 + 5a - 6$

$= 6a^2 + 9a - 4a - 6$

$= 3a(a + 3) - 2(a + 3)$

$= (3a - 2)(a + 3)$

$.....a = xy$

$(3xy - 2)(xy + 3)$

ix) $12(x - 2y)^2 - 17(x - 2y) + 6$

Let $x - 2y = a$

$12a^2 - 17a + 6$

$= 12a^2 - 9a - 8a + 6$

$\Rightarrow 3a(4a - 2) - 2(4a - 3)$

or, $(3a - 2)(4a - 3)$

or, $\{3(x - 2y) - 2\}\{4(x - 2y) - 3\}$

or, $(3x - 6y - 6)(4x - 8y - 12)$

x) $2(a - b)2 - 5(a - b) - 12$

Let $a - b = x$

$2x^2 - 5x - 12$

or, $2x^2 + 8x - 3x - 12$

or, $2x(x + 4) - 3(x + 4)$

$= (2x - 3)(x + 4)$

$= (2a - 2b - 3)(a - b + 4)$

x) $12x^2 + 5x - 7$

$= 12x^2 + 12x - 7x - 7$

$= 12x(x + 1) - 7(x + 1)$

$= (12x - 7)(x + 1)$

xii) $(2x - y)^2 + 5(2x - y) + 6$

Let $2x + y + a$

$= a^2 + 5a + 6$

$= a^2 + 6a + 1a + 6$

$= a(a + 6) + 1(a + 6)$

$= (a + 1)(a + 6)$

Self Assessment-10

1. i) $3ab - 7b^2$

$= b(3a - 7b)$

ii) $a(x - y) - bc(x - y)$

$= (x - y)(a - bc)$

2. i) $ax + by - ay - bx$

$= ax - bx + by - ay$

$= x(a - b) - y(b + a)$

$(x - y)(a - b)$

ii) $bc + b^2 c^2 - b^3 c^5 - b^4 c^6$

$= bc(1 + bc) - b^3 c^5 (1 + bc)$

$= (1 + bc)(bc - b^3 c^5)$ **Ans.**

3. i) HCF $= 4x^2$

ii) HCF $= 3(a - b)$

4. i) $196x^2 - 225y^2$

$= (14x)^2 - (15y)^2$

$= (14x + 15y)(14x - 15y)$

ii) $0.49 - 0.81x^2$

$= (0.7)^2 + (0.9x)^2$

$= (0.7 + 0.9x)(0.7 - 0.9x)$

5. i) $(0.09)^2 - (0.01)^2$

$= (0.09 + 0.01)(0.09 - 0.01)$

$= 0.1 \times 0.08$

$= 0.008$

ii) 736×664

6. to 13 take answers from the baek of book.

Chapter-11 Linear Equationstion

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
What an equation is?	To understand variables and constants. To identify an equation.	Show different equations on the black board like 2x + 3 = 5, 5y = 10, $\frac{2}{x}=\frac{3}{5}$ etc. and explain that if two algebraic expressions which contains at least one variable, have equal values we can write them by putting an equal sign between them.	$3x^5 + 2xyz + 3$ is an equation or an expression?
Solution of an equation.	To understand the method of finding the solution of an equation which is known as 'solving'	Meaning of solution. The value of the variable for which LHS=RHS Explain the method of transposing the terms from one side to the other side. Le when we transpose a term the operation will be changed. + to – , × to ÷, – to +, ÷ to × $x + 3 = 5 \rightarrow x = 5 - 3 = 2$ $y - 5 = 10 \rightarrow y = 10 + 5 = 15$ $3x = 21 \rightarrow x = \frac{21}{3} = 7$ $\frac{z}{2} = 5 \rightarrow z = 5 \times 2 = 10$	Solve: $2(x - 3) = 5 (x + 4)$
More equations and applications of simple equations in daily problems.	To solve an equation containing different operations together. To make an equation from daily life situation and solve it.	Consider the equation $2(3x + 5) = 28$ $3x + 5 = \frac{28}{2} = 14$ $3x = 14 - 5 = 9 \rightarrow x = \frac{9}{3} = 3$ One-fourth of a number is 3 more than 7 find the number $\frac{1}{4}x = 3 + 7 \rightarrow \frac{1}{4}x = 10 \rightarrow x = 10 \times 4 = 40$	Sahil is 6 years older than her yrenger sister. After 10 years the sun of that ages will be 50 years. What is there present ages.

Linear Inequalities	The students will be able to solve linear Inequalities	Explain to the students the difference between equation and inequality. Explain the method of solving linear in equality. The method by balancing and also charging of sign when divided or multiplied by a negative solve.	What is the solution set of $3x + 2 \geq 14$, *xfw*.

Exercise 11.1

1. i) $2a - 7 = 19$

or$_1$ $2a = 19 + 7$

or$_1$ $2a = 26$

or $a = 13$

ii) $1 - 4x = 7$

or$_1$ $1 - 7 = 4x$

or$_1$ $-6 = 4x$

or$_1$ $x = \frac{-6}{4} = -1\frac{1}{2}$

iii) $5k = 20$

$k = 4$

iv) $-3 + y = 8$

or$_1$ $y = 8 + 3$

$y = 11$

v) $10_z + 5 = -90$

or $10_z = -90 - 5$

or $10_z = -95$

or $z = -\frac{95}{10} = \frac{-19}{2}$

vi) $\frac{x+1}{3} = 4x - 1$

or $\frac{1}{3} + 1 = 4x - x$

or $\frac{1+3}{3} = 3x$

or $\frac{4}{3\times 3} = x$

or$_1$ $x = \frac{4}{9}$

vii) $\frac{-2x}{7} = -9 + x$

or$_1$ $\frac{-2x}{7} - x = -9$

viii) $\frac{x}{3} + 5 = 29 + \frac{x}{2}$

or$_1$ $\frac{x}{3} - \frac{x}{2} = 29 - 5$

or$_1$ $\quad \dfrac{-2x-7x}{7} = -9$

or $\quad \dfrac{-9x}{7} = -9$

or $\quad n = 7$

2. i) $\quad \dfrac{x+5}{x-9} = 2$

or$_1$ $\quad x + 5 = 2\,(x - 9)$

or$_1$ $\quad x + 5 = 2x - 18$

or$_1$ $\quad 5 + 18 = 2x - x$

or$_1$ $\quad 23 = x$

or $\quad x = 23$

iii) $\quad 2x + 5 = 9x - 2$

or $\quad 5 + 2 = 9x - 2x$

or $\quad 7 = 7x$

or$_1$ $\quad x = 1$

3 i) $\quad \dfrac{5x}{9} = \dfrac{2x+21}{3}$

or$_1$ $\quad \dfrac{5x}{3} = 2x + 21$

or$_1$ $\quad 5x = 6x + 63$

or $\quad -63 = 6x - 5x$

or $\quad x = -63$

or$_1$ $\quad \dfrac{2x-3x}{6} = 24$

or $\quad -x = 24 \times 6$

or $\quad n = -144$

ii) $\quad \dfrac{3y}{7} = 26 + \dfrac{24}{9}$

or$_1$ $\quad \dfrac{3y}{7} = \dfrac{2y}{9} = 26$

or$_1$ $\quad \dfrac{27y-14y}{63} = 26$

or$_1$ $\quad 13y = 26 \times 63$

or $\quad y = \dfrac{26\times 63}{13}$

$\quad y = 126$

iv) $\quad \dfrac{x}{9} = \dfrac{2x-3}{5}$

or$_1$ $\quad 5x = 9\,(2x - 3)$

or$_1$ $\quad 5x = 18x - 27$

or$_1$ $\quad 27 = 18x - 5x$

or1 $\quad 27 = 13x$

or1 $\quad x = 2\dfrac{1}{13}$

ii) $\quad \dfrac{x}{9} = \dfrac{2x-3}{5}$

or$_1$ $\quad 2 + 9 = 7x + x$

or$_1$ $\quad 11 = 8x$

or$_1$ $\quad x = \dfrac{11}{8} = 1\dfrac{3}{8}$

iii) $\frac{x}{3} = \frac{x}{6} - 1$

or$_1$ $\frac{x}{3} = \frac{x}{6} = -1$

or $\frac{4x-2x}{12} = 1$

or $2x = 12$

or $x = 6$

iv) $2\left(\frac{x-9}{11}\right) = 5x$

or$_1$ $2x - 18 = 55x$

or$_1$ $-18 = 55x - 2x$

or$_1$ $-18 = 8x$

or$_1$ $x = \frac{-18}{53}$

v) $7(x-3) = 2x - 1$

or$_1$ $7x - 21 = 2x - 1$

or$_1$ $7x - 2x = -1 + 21$

or$_1$ $5x = 20$

$x = 4$

vi) $4(x-5) = (6x-8)3$

or$_1$ $4x - 20 = 18x - 24$

or$_1$ $-20 + 24 = 18x - 4x$

or$_1$ $4 = 14x$

or $x\ \frac{4}{14} = \frac{2}{7}$

vii) $\frac{2x+1}{7} = \frac{3x}{14} + 20$

or$_1$ $\frac{2x+1}{7} - \frac{3x}{14} = 20$

or$_1$ $\frac{4x+2-3x}{14} = 20$

or $x + 2 = 20 \times 14$

or $x + 2 = 250$

or $x = 250 - 2$

or $x = 278$

viii) $2y\frac{+1}{3} = 7y\frac{+1}{6}$

or$_1$ $7y - 2y = \frac{1}{3} - \frac{1}{6}$

or $5y = \frac{6-1}{6}$

or $y = \frac{1}{30}$

4. i) $2x - 9 = 14$

or$_1$ $2x = 14 + 9$

or$_1$ $2x = 23$

or$_1$ $x = \frac{23}{2} = 11\frac{1}{2}$

ii) $\frac{-x}{3} = -4(x-11)$

or$_1$ $\frac{-x}{3} = -4x - 44$

or $-x = -12x + 132$

or $-x + 12x = 132$

or $11x = 132$

or $x = 12$

iii) $x - 8 = 11x + 2$

or$_1$ $-8 - 2 = 11x - x$

or$_1$ $-10 = 10x$

or$_1$ $x = -1$

iv) $\frac{24}{5} = \frac{y-1}{-10}$

or $2y = \frac{y-1}{-2}$

or $-4y = y - 1$

or $-3y = -1$

or $y = \frac{-1}{3}$

5. i) $\frac{3x+1}{5} = \frac{2x+9}{3}$

or$_1$ $3(3x + 1) = 5(2x - 9)$

or$_1$ $9x + 3 = 10x - 45$

or $3 + 45 = 10x - 9x$

or $x = 48$

ii) $\frac{x}{7} - \frac{1}{2} = \frac{3x}{11} + \frac{1}{4}$

or$_1$ $\frac{2x-7}{14} = \frac{12x+11}{44}$

or$_1$ $\frac{2x-7}{7} = \frac{12x+11}{22}$

or $22(2x - 7) = 7(12x + 11)$

or$_1$ $44x - 154 = 84x + 77$

or$_1$ $-154 - 77 = 84x - 44x$

or$_1$ $-231 = 40x$

or $x = \frac{-231}{40}$

$= -5\frac{31}{40}$

iii) $2x + 5 = 3(x - 7)$

or$_1$ $2x + 5 = 3x - 21$

or$_1$ $5 + 21 = 3x - 2x$

or $x = 26$

iv) $\frac{x+1}{5} + \frac{1}{3} = \frac{x-7}{30}$

or $\frac{3x+3+5}{15} = \frac{x-7}{30}$

or $3x + 8 = \frac{x-7}{2}$

or $6x + 16 = x - 7$

or $5x = -7 - 16$

or$_1$ $x = \frac{-23}{5} = -4\frac{3}{5}$

6. i) $\dfrac{x+1}{2(x-4)} = \dfrac{5}{8}$

or$_1$ $8(x+1) = 10x - 40$

or $8x + 8 = 10x - 40$

or$_1$ $8 + 40 = 2x$

or $48 = 2x$

or $x = \dfrac{48}{2} = 24$

ii) $\dfrac{5x+6}{3x-2} = 2$

or$_1$ $5x + 6 = 2(3x - 2)$

or$_1$ $5x + 6 = 6x - 4$

or$_1$ $6 + 4 = 6x - 5x$

or $x = 10$

iii) $\dfrac{30+4}{2-6a} = \dfrac{3}{10}$

or$_1$ $30a + 40 = -6 + 18a$

or $30a - 18a = -6 - 40$

or$_1$ $12a = -46$

or $a = \dfrac{-46}{12} = \dfrac{-23}{6} = -3\dfrac{5}{6}$

iv) $\dfrac{7y+8}{y+4} = \dfrac{29}{7}$

or$_1$ $7(y+8) = 29(y+4)$

or$_1$ $49y + 56 = 29y + 116$

or$_1$ $20y = 60$

or $y = 3$

v) $\dfrac{2x}{3} + 1 = \dfrac{7x}{15} + 3$

or$_1$ $\dfrac{2x}{3} - \dfrac{7x}{15} = 3 - 1$

or $\dfrac{10x - 7x}{15} = 2$

or $3x = 30$

or$_1$ $x = 10$

vi) $2P\dfrac{+5}{3} = \dfrac{26}{3} - P$

$$\text{or}_1 \qquad 2P + 2P = \frac{26}{3} - \frac{5}{3}$$

$$\text{or} \qquad 3P = \frac{21}{3}$$

$$\text{or} \qquad 3P = 7$$

$$\text{or} \qquad P = \frac{7}{3} = 2\frac{1}{3}$$ **Ans.**

Exercise 11.2

1. Let number be x, other numbers is $5x$.

ATP, $x + 5x = 96$

or_1 $6x = 96$

or1 $x = \frac{96}{6} = 16$

$\therefore$ The number are 16 and $5 \times 16 = 80$

2. Let the consecutive numbers be $x, x + 1, x + 2$

ATP,

$x + x + 1 + x + 2 = 123$

or_1 $3x + 3 = 123$

or_1 $3x = 120$

or_1 $x = \frac{120}{3} = 40$

The numbers are 40, 41, 42

3. Let the consecutive even numbers be $x, x + 2, x + 4$

ATP,

$x + x + 2 + x + 4 = 36$

or_1 $3x + 6 = 36$

or $3x = 30$

or_1 $x = 10$ Daughters

$x, x + 2, x + 4$

$\therefore$ The comsecutive numbers are 10, 12, 14

4. Let katy's age be x. Daughters = $37 - x$

ATP $x - (37 - x) = 27$

or $x - 37 + x = 27$

or$_1$ $2x - 27 + 37$

or$_1$ $2x = 64$

or$_1$ $x = 32$

..... age = 32 years, Daughter's age

$= 37 - 32$

$= 5$years

Ans: 32 and 5 years.

5. Let the width be 'x' m, length = $(x + 30)$ m.

ATP, $2(x + x + 30) = 1200$

or$_1$ $2x + 30 = 600$

or$_1$ $2x = 600 - 30$

or$_1$ $2x = 570$

or$_1$ $x = 285$m

length $= 285 + 30$

$= 315$m

Ans: l = 315m breadth = 285m.

6. Let the units digit b 'x'

tens' digit $= (12 - x)$

old number $= 10(12 - x) + x$

$= 120 - 10x + x$

$= 120 - 9x$

reversed number $= 10x + 12 - x$

$= 9x + 12$

ATP, $9x + 12 - (120 - 9x) = 18$

or$_1$ $9x + 12 - 120 + 9x = 18$

or$_1$ $18x = 18 + 108$

or$_1$ $18x = 126$

$x = 7$

units digit = 7 ten's digit = $12 - 7 = 5$

$\therefore$ The number is 57

7. Let the numerator be x

denominator = $x + 8$

ATP, $\frac{x+17}{x+8-1} = 2$

or1 $\quad \dfrac{x+17}{x+7} = 2$

or $\quad x + 17 = 2x + 14$

or$_1$ $\quad 17 - 14 = x$

or$_1$ $\quad x = 3$

Numerator = 3, Denominator = 3 + 8 = 11

$\therefore$ $\quad$ Number $= \dfrac{3}{11}$

8. Let one smaller nmuber be x the other number = $40 - x$

ATP, $\quad (40 - x + 8) = 3\,(x + 8)$

or$_1$ $\quad 48 - x = 3x + 24$

or$_1$ $\quad 48 - 24 = 3x = x$

or$_1$ $\quad 24 = 4x$

or$_1$ $\quad x = 6$

smaller nmuber = 6 other number = 40 – 6 = 34.

Ans: 6 and 34.

9. Let Ravi's age be x years , sumit = $(90 - x)$ years.

5 years age: Ravi = $(x - 5)$ years

Sumit $= 90 - x - 5$

$= (85 - x)$ years

ATP, $\quad x - 5 = 3\,(85 - x)$

or$_1$ $\quad x - 5 = 255 - 3x$

or$_1$ $\quad x + 3x = 255 + 5$

or$_1$ $\quad 4x = 260$

$x = 65$

Ravi = 65 years Sumit = 90 – 65 = 25 years.

10. Let the consecutive multiple be x, $x + 7$, $x + 14$

$x + x + 7 + x + 14 = 357$

or$_1$ $\quad 3x + 21 = 357$

or$_1$ $\quad 3x = 357 - 21$

or$_1$ $\quad 3x = 336$

or$_1$ $\quad x = 112$

The smallest multiple is 112.

11. Let the no of ₹5 coins be x.

no of ₹2 coins be $3x$

no or ₹1 coins be $160 - (x + 3x)$

$= 160 - 4x$

ATP, $5x \ldots (3x) + 160 - 4x = ₹300$

or$_1$ $5x + 6x\ 160 - 4x = 300$

or$_1$ $7x = 300 - 160$

or $x = \frac{140}{7} = 20$

₹5 coin = 20; ₹2 coins = $3 \times 20 = 60$;$16 - 4\ (20)$

$= 160 - 80$

$= 80$

Ans: 20, 60, 80

12. Let the daughters age be x years

man's age = $9x$.

In 9 years

Daughter = $x + 9$

Man = $9x + 9$

ATP,

$9x + 9 = 3\ (x + 9)$

or$_1$ $9x + 9 = 3x + 27$

or$_1$ $9x - 3x = 27 - 9$

or$_1$ $6x = 18$

or$_1$ $x = 3.$

Daughter's age = 3 years man's age = $9x = 9 \times 3 = 27$ years

13. Lenghe = x breadth = $2x - 8$

ATP, $20 = 2\ (x + 2x - 8)$

or$_1$ $10 = 3x - 8$

or$_1$ $10 + 8 = 3x$

or $x = \frac{18}{3}$

$x = 6.$

$2x - 8$

length = 6m Breadth = $12 - 8 = 4$m

14. Let the denominator be x, numerator = $x - 7$ $\quad \frac{x-7+1}{x-3} \quad \frac{-1}{2}$

or $2(x - 7 + 1) = x - 3$

or$_1$ $2x - 12 = x - 3$

or$_1$ $x = -3 + 12$

or$_1$ $x = 9$

numerator $9 - 7 = 2$

..... = $\frac{2}{9}$ **(Ans.)**

15. Let the units digit be x

lins digit be $9 - x$.

Original no $= 10(9 - x) + x$

$= 90 - 10x + x$

$= 90 - 9x$

Revised no $= 10x + 9 - x$

$= 9x + 9$

$9x + 9 = 90 - 9x + 9$

or$_1$ $9x + 9x = 90 + 9 - 9$

or$_1$ $18x = 90$

$x = \frac{90}{18} = 5$ Original number = $90 - 9x$

$= 90 - (5)$

$= 90 - 45$

$= 45$

Exercise 11.3

1. all par's Take answers from back of tent book.

2. i) $-2 - 60 > -26$

or$_1$ $-2\ 60 + 2 > -26 + 2$ (+ 2 on both sides)

or $-60 > -24$

or $\frac{-6a}{-6} > \frac{-24}{-6}$ (dividing by – 6 on both sides)

or $a < 4$

take number line from back of book

ii) $12 + 4x < 32$

or$_1$ $12 + 4x - 12 < 32 - 12$ (– 12 on both sides)

or $4x < 20$

or $\frac{4x}{4} < \frac{20}{4}$ (dividing by 4 on both sides)

or$_1$ $x < 20$

take number line from back of tent book.

iii) $-8 < -16$

or $\frac{-8y}{-8} < \frac{-16}{-8}$ (dividing be – 8 on both sides)

or1 $y > 2$

take number line from back of book

iv) $-2-(-6b) \geq, 24$

or$_1$ $-2b + 6b \geq, 24$

or$_1$ $46 \geq 24$

or $b \geq 6$ (ividing by 4 on both sides)

take number line

v) $-4(-11 + x) > 28$

or$_1$ $44 - 4x > 28$

or$_1$ $44 - 4x - 44 > 28 - 44$ (– 44 on both sides)

or $-4x > 16$

or $\frac{-4x}{-4} < \frac{16}{-4}$ (dividing by – 4 on both sides)

or $x < -4$

take number line from back of book.

vi) $-3 - 8 > 13$

or$_1$ $-3 - 8 + 8 > 13 + 8$ (+ 8 on both sides)

or$_1$ $-3y > 21$

or$_1$ $\frac{-3y}{-3} < \frac{21}{-3}$ (dividing by – 3 ib both sides)

or$_1$ $y < -7$

take number line from back of bood.

vii) $-4(a + 1) > 20$

or$_1$ $-4a - 4 > 20$

or$_1$ $4a - 4 + 4 > 20 + 4$ (+ 4 on both sides)

or$_1$ $4a > 16$

or$_1$ $\frac{-49}{-4} < \frac{16}{-4}$ (dividing by – 4)

or $a < -4$

take number line from back of book.

viii) $-9x + 7x \leq 18$

or$_1$ $-2x \leq 18$

or$_1$ $\frac{-2x}{-2} \ \frac{18}{-2}$ (dividing by – 2 on both sides)

or $x \leq -9$

take number line from back of the book.

Self Assessment-11

1. i) $x + 9$

or$_1$ $x = -20 - 9$

$x = -29$

ii) $\frac{x}{3} + \frac{x}{5} = 10$

or$_1$ $\frac{5x + 3x}{15} = 10$

or$_1$ $8x = 150$

or$_1$ $x = \frac{150}{8} = \frac{75}{4} = 18\frac{3}{4}$

iii) $3x + 4 = 2x - 8$

or$_1$ $3x - 2x = -8 - 4$

or$_1$ $x = -12$

iv) $\frac{2x+1}{3x-4} = \frac{-2}{3}$

or$_1$ $3(2x + 1) = -2(3x - 4)$

or$_1$ $6x + 3 = -6x + 8$

or$_1$ $6x + 6x = 8 - 3$

or$_1$ $12x = 5$

or$_1$ $x = \frac{5}{12}$

2. breadth $= x$ length $= x + 4$

ATP,

$60 = 2(l + b)$

or$_1$ $\frac{60}{3} = x + x + 4$

or$_1$ $20 = 2x + 4$

or$_1$ $20 - 4 = 2x$

or$_1$ $16 = 2x$

or$_1$ $x = 8$

breadth = 8cm. length = 8 + 4 = 12cm.

3. Let the consective no's be $x, x + 1, x + 2$

ATP,

$x + x + 1 + x + 2 = 186$

or$_1$ $3x + 3 = 186$

or $3x = 183$

or$_1$ $x = 61$

Numbers are: 61, 62, 63

4. i) $2 - 6x > 20$

or $2 - 6x - 2 > 20 - 2$ (– 2 on both sides)

or$_1$ $-6x > 18$

or $\frac{-6x}{-6} > \frac{18}{-6}$ (dividing by – 6 on both sides)

or $x < -3$

take number line from back of book pg 292.

ii) $-3 - 8 \leq 13$

or$_1$ $-3y - 8 + 8 \leq 13 + 8$ (+ 8 on both sides)

or$_1$ $-3y \leq 21$

or $\frac{-3y}{-3} \geq \frac{21}{-3}$ (dividing by – 3 on both sides)

or$_1$ $y \geq -7$

take number line from back of book pg 292

5. Let the smaller digit be x.

biggi digit be $9 - x$

$9 - x - x = 5$

or $9 - 2x = 5$

or $9 - 5 = 2x$

or $4 = 2x$

or $x = 2$

Number is 72 or 27

Q.6, Q7, Q8, Q9, Q10 take answers prom the back

11. $\frac{4x}{7} = 8$

or $x = \frac{8 \times 7}{4}$

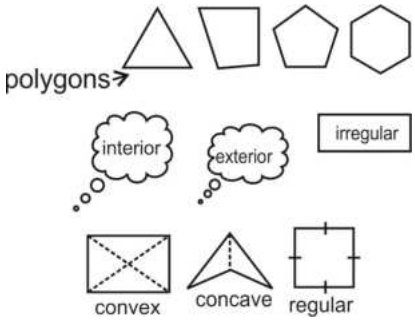
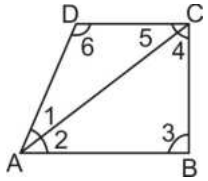
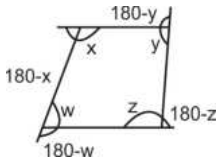
$x = 14$.

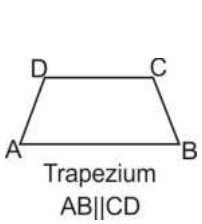
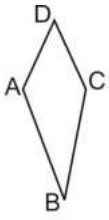
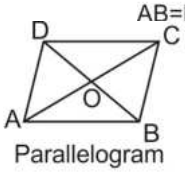
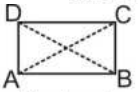
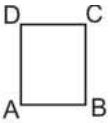
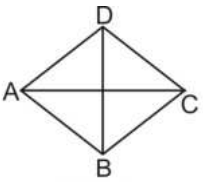
Ans: option (a)

12. **Ans:** option (c)

13. **Ans:** option (b)

Chapter-12 Understanding Quadrilaterals

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction of polygons, classification of polygons, diagonals, convex and concave polygons & Regular and irregular polygons	To identify polygons, diagonals, interior and exterior regions, difference between convex and concave polygons, difference between regular and irregular polygons.	Explain the different types of polygons and its types.  Discuss the names of types of polygons based on sides.	State true/false. 1. A square is a conven polygon 2. A polygon with seven sides is called octagon.
Angle sum property	To understand the angle sum of a quadrilateral is 360° and the interior angle sum of a polygon of n sides is (n-2) 180°	 < A + B + < C + < D = 360° (Prove by using the angle sum property of triangles)	Find the measure of each interior angle of a regular octagon.
Exterior angle sum of polygons	To understand the sum of all exterior angles of a polygons is 360°	 180–x + 180–y +180–z + 180–w = 720 (x + y + z + w) = 720 – 360 For a regular polygon, each exterior angle $\frac{360}{n}$ and if the angle is given each side = $\frac{360}{\theta}$ Do different types of sums based on this property.	Find the number of sides of a regular polygon whose exterior angle is 72°.

Kinds of quadrilaterals	To identify the different kinds of quadrilaterals and their properties	Show the different kinds of quadrilaterals on the board and explain their properties.  Trapezium AB||CD  Kite AB=BC & AD=CD  Parallelogram AB||CD and AD||BC AB=CD and AD=BC <A=<C, <B=<D and the diagonals bisect each other at O  Rectangle It is a parallelogram with each angle is 90 and bothe the diagonals are equal  Square it is a parallelogram with all sides equal and each angle 90  Rhombus It is a parallelogram with all siren equal and its diagonal are ptrpardigvlsr to each other Demonstrate the problems by using the different properties of the quadrilaterals. Do the exercise questions	The opposite angles of a parallelogram are $(2x + 5)°$ and $(7x – 20)°$. Find the measure of all four angles

Exercise 12.1

Q.1. to 5 take all answers from

1. i) $n = 6$

Sum or interior angle = $(n - 2) \times 180$

$= 4 \times 180$

$=$

ii) $n = 3$

Sum or in angles $= (n - 2) \times 180$

$= (3 - 2) \times 180$

$=$ **180 (Ans)**

iii) $n = 10$

Sum or interior angles $= (n - 2) \times 180$

$= (10 - 2) \times 180$

$= 8 \times 180$

$=$

iv) n = 35

Sum of interior angles = $(n - 2) \times 180$

$= 33 \times 190$

2. i) Sum of interior angle = 540

$(n - 2) \times 180 + 540$

$$n - 2 = \frac{540}{180}$$

$n - 2 = 3$

$n = 5$ **(Ans)**

ii) $2520 = (n - 2) \times 180$

or $$\frac{2520}{180} = n - 2$$

or$_1$ $14 = n - 2$

or $n = 16$ **(Ans)**

iii) $720 = (n - 2) \times 180$

or$_1$ $$\frac{720}{180} = n - 2$$

or $4 = n - 2$

or $n = 4 + 2 = 6$ **(Ans)**

iv) $7380 = (n - 2) \times 180$

or $$\frac{7380}{180} = n - 2$$

or$_1$ $41 + 2 = n$

or $n = 43$ **(Ans)**

3. i) Each exterior angle = $\frac{360}{x}$

$$= \frac{360}{6}$$

$= 60°$ **(Ans)**

ii) $n = 8$

Each exterior angle = $$\frac{360}{8}$$

$= 45°$ **(Ans)**

iii) $n = 10$

Each exterior angle = $\frac{360}{10} = 36°$ **(Ans)**

iv) $n = 24$

Each exterior angle = $\frac{360}{24} = 15°$ **(Ans)**

4. Let the common ratio be x.

$\therefore$ $2x + 3x + 8x + 5x = 360$

or$_1$ $18x = 360$

or $x = 20$

The angles are $2x$; $3x$, $8x$, $5x$

$= 2 \times 20 = 3 \times 20 = 8 \times 20 = 5 \times 20$

$= 40° = 60° = 160° = 100°$

5. Let the equal angle be x

$\therefore$ ATP,

$x + x + x + 2 + 2 + 2x = (n - 2) \times 180°$

where $n = 6$.

$9x = 4 \times 180$

$x = \frac{4 \times 180}{9}$

$x = 80$

The angles are 80°, 80°, 80°, 160°, 160°, 160°

6.

7. pentagon interior angle $= \frac{(n-2) \times 180}{n}$

$= \frac{3 \times 180}{5}$

$= 3 \times 36$

$= 108°$

Each exterior angle $= \frac{360}{5}$

$= 72°$

8. i) exterior angle $= \frac{360}{x}$

$n = \frac{360}{exterior\ angle}$

$= \frac{360}{90}$

$n = 4$

ii) $n = \frac{360}{72}$

$n = 5$

iii) exterion angle $= \frac{360}{x}$

or $n = \frac{360}{exterior\ angle}$

$= \frac{360}{15}$

$n = 24$

iv) $n = \frac{360}{10}$

$= 36$ sides

9. i) $120 + 50 + x + 2x + 110 + x = (n - 2) \times 180$ here $n = 6$ sides

or$_1$ $280 + 4x = (6 - 2) \times 180$

or$_1$ $280 + 4x = 4 \times 180$

or$_1$ $4x = 720 - 280$

or$_1$ $4x = 440$

or$_1$ $x = \frac{440}{4} = 110°$

$\therefore$ The angles are 110, 110 and $2x = 2 \times 110$

$= 220$

ii) no of sides (n) = 5

$\therefore$ $90 + x + 3x + 110 + 90 = (n - 2) \times 180°$

$290 + 4x = 540$

or$_1$ $4x = 540 - 290$

$4x = 250$

$x = 62.5$

Ans: 62.5 and 187.5°

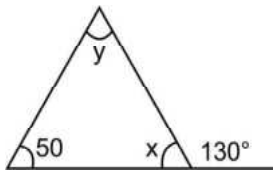
iii) $x = 180 - 130$

$x = 50$

$\therefore$ $y + 50 + 50 = 180$

or$_1$ $y = 180 - 100$

$y = 80°$ **Ans.**



iv) $n = 5$

$x + 1 + 20 + 80 + 50 + 100 = (n - 2)\ 180$

or$_1$ $350 + x = 5 - 2 \times 180$

or$_1$ $350 + x = 3 \times 180$

or$_1$ $x = 540 - 350$

or$_1$ $x = 190$

10. x

11. Exterior angle = 20°

$$\frac{360}{n} = 20°$$

or $n = \frac{360}{20}$

n = 18 sides

Sum of interior angle = (n – 2) × 180

= 18 – 2 × 180

= 16 × 180

= 2880°

Exercise 12.2

1. $100 + 120 + x + x = 360$

or$_1$ $2x = 360 - 220$

$2x = 140$

or $x = 70°$ **(Ans)**

2. Let the common rati bo x

$3x + 5x + 4x + 6x = 360°$

or$_1$ $18x = 360°$

or$_1$ $x = \frac{360}{18}$

$x = 20°$

The angles are: $3x$, $5x$, $4x$, $6x$

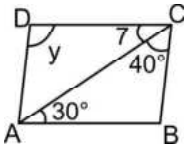
$= 3 \times 20 = 5 \times 20 = 4 \times 20 = 6 \times 20$

$=60° = 100° = 80° = 120°$

3. In a opposite sides are parellel.

$\therefore$ $x = 30$ (alternate angles)

In Δ ABC



LB = 180 – (40 + 30)

= 180 – 70

LB = 110°

$\therefore$ y = LB (opp angles of a are equal)

$y = 110°$

4. i) $y = 120°$ (angles)

$y + x = 180$ (angles)

$x = 180 - 120s$

$x = 60°$

$x + z = 180°$ (angle)

$z = 180 - 60$

$z = 120°$

ii) $x = 180 - (30 + 50)$

$= 180 - 80$

$x = 100°$

$y = 50°$ (altenats angle)

$z = 180 - (y + x)$

$= 180 - (100 + 50)$

$z = 30°$

5. angle of the quadricalenal = 180 – (60 + 70)

= 180 – 130

= 50

or$_1$ $x + x + 50 + 30 = 360$

or$_1$ $2x = 360 - 80$

or$_1$ $2x = 280$

or$_1$ $x = 140°$

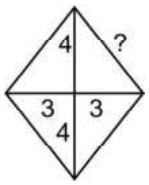
6. $70 + 70 + 70 + x = 360$

or$_1$ $210 + x = 360$

or $x = 360 - 210$

$x = 150°$

7. side of rhombus = $\sqrt{4^2 + 3^2}$



$= \sqrt{16+9}$

$= \sqrt{25}$

= 5

$\therefore$ Side or rhomus = 5cm

8. opposite angle of a are equal

$2x + 5 = 7x - 20$

or$_1$ $5 + 20 = 7x - 2x$

$25 = 5x$

or$_1$ $x = 5$

angle $= 2x + 5$

$= 2 \times 5 + 5$

$= 15°$

other angle $= 180 - 15$

$= 165°$

Self Assessment-12

1. $2x + 3x + 4x + x = 360$

or $10x = 360$

or $x = 36$

angles $= 2 \times 36 , 3 \times 36, 4 \times 36 , 36$

$= 72° , 108° , 144, 36$ **(Ans.)**

2. $x + x + x + 120 = 360°$

or$_1$ $3x = 240$

or $x = \frac{240}{3} = 80°$ **(Ans)**

3. i) Sum of interior angle $= (n - 2) \times 180$

$= 6 - 2 \times 180$

$= 4 \times 180$

$= 720$

ii) $n = 10$

Sum or interior angle $= (n - 2)\ 180$

$= 8 \times 180$

$= 1440°$ (Ans)

iii) $n = 4$

Sum of interior angles $= (n - 2)\ 180$

$= 2 \times 180$

$= 360°$

iv) $n = 7$

Sum $= (7 - 2) \times 180$

$= 5 \times 180$

$= 900°$

4. i) Each rtior angle $= 168°$

$\frac{(n-2)\times 180}{n} = 168°$

or$_1$ $180n - 360 = 168n$

or$_1$ $180n - 168n = 360$

or$_1$ $12n = 360$

or $n = \frac{360}{12} = 30$

$n = 30$ sides. **(Ans)**

ii) $\frac{(n-2)\times 180}{n} = 150$

or$_1$ $180n - 150n = 360$

or $30n = 360$

or $n = \frac{360}{30}$

$n = 12$ sides **(Ans)**

iii) $\frac{n-2\times 180}{n} = 90$

or$_1$ $180n - 90n = 360$

or $90n = 360$

or $n = 4$ **(Ans)**

iv) $\frac{(n-2)\times 180}{n} = 135$

or$_1$ $180n - 135n = 360$

or $45n = 360$

or $n = \frac{360}{45}$

$n = 8$ (Ans)

5. Side = $\sqrt{4^2+3^2}$

$= \sqrt{16+9}$

$= \sqrt{25} = 5$

$\therefore$ Side of rhombus = 5cm.

6. Square

Ans: option (b)

7. adjacent angles

Ans: option (a)

8. 360°

Ans: option (c)

9. concave

Ans: option (a)

10. 1

Ans: option (b)

11. henagon sides = 6

Sum of interion angle = (n – 2) × 180

= 4 × 180

= 720°

Ans: option (c)

12. 0

Ans: option (c)

13. no of sides = $\frac{360}{45}$

= 8

Ans: option (c)

1. Answers from the back of tent book
2. Answers from the back of tent book
3. Answers from the back of tent book
4. radius = 1. cm

diameler = 2 × v

= 2 × 1.1

= 2.2 cm

5. diameter = 39 cm

radius = $\frac{diametr}{2}$

$= \frac{39}{2}$

= 19.5 cm

7. Longest chord of a cirde = diameter

Diameter = 2 × r

= 2 × 7

= 14 cm.

Chapter-14 Circle

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of circle and terms associated with circles. Diameter, circumference chord, secant, are, sector and segment Interior and exterior, con centric circle and tangent	The students will be clear with the concept of circle and terms related to circle	Using diagrams explain the different terms. Ask the students to prepare cut-out and diagrams of different terms as project work.	Find the length of the longest chard of circle haw radius 7cm.
Theorems on circle 1. The angle in a same circle is a right angle 2. The radius of circle is perpendicular to the tangent of the circle at the paint of contact	The students will be clear with the two theorems the two theorems on circle	Using diagram explain both theorems sums based on these theorems to be done	Find the length of the tangent drawn to the a circle of radius 5cm from a point 13 cm away from the centre

Exercise 14.1

1.

2.

3.

4. Radius = 1.1 cm

$\therefore$ diameter $= 2 \times r$

$= 2 \times 1.1$

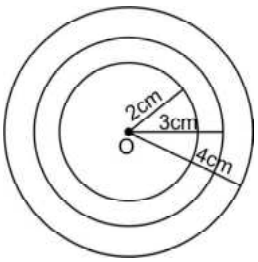
$= 2.2$ cm

5. diameter = 39 cm

$$\text{radius} = \frac{\text{diameter}}{2}$$

$$= \frac{39}{9}$$

$= 19.5$ cm

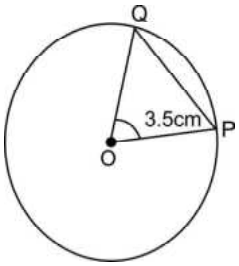
6. 

7. Longest chord of a circle = Diameter

$\therefore$ Diameter $= 2 \times r$

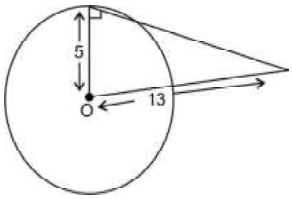
$= 2 \times 7$

$= 14$

8. 

PQ = _____cm.

9. $\angle OPQ = 90°$



$\therefore \quad 13^2 = 5^2 + P^2$

$169 - 25 = P^2$

or, $144 = P^2$

or, $P = \sqrt{144} = 12$cm.

10. i) $x = 180 - (90 + 60)$

$= 180 - 150$

$= 30°$

ii) $x = 40°$ (alleviate angles).

$y = 180° - (90 + x)$

$= 180 - (90 + 40)$

$= 180 - 130$

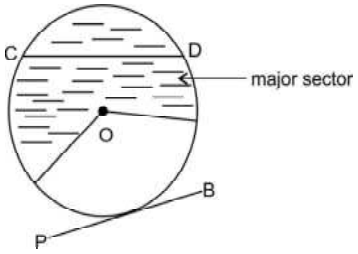
$= 50°$

iii) $x = 180 - (90 + 52)$

$= 180 - 142$

$= 38°$

11.



Self Asessment-14

1.

2.

3.

4.

5.

6.

7.

8.

9

10. PQ = 20 cm, PR = 16m, QR = ?

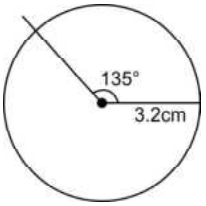
$\angle Q = 90°$

$\therefore \quad 20^2 = 10^2 + QR^2$

$400 - 256 = QR^2$

$QR = \sqrt{144} = 12$ cm

11.



12. $x = 180 - (90 + 22)$

$= 180 - 112$

$x = 68°$ (Ans)

$y = 180 - 68°$

$y = 112°$ (Ans)

Chapter-15 Symmetry

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
• Concept of symmetry, • Symmetrical figures, figures with one more line symmetry and than one line of symmetry • Symmetry of figures like triangle, square, parallogen rectangle etc. • Symmetry of Letters of English alphabet. • Concept of vertical and horizontal line of symmetry	The students will be clear with the concept of symmetry. They will be able to identify the lines of symmetry of various figures and letters of English alphabet.	Activity of symmetrical figures formation using cut out from double fold can be done. Show the students different cut outs of symmetrical figures and fold them to show the line of symmetry.	 The above figure has how many line of symmetry? Horizontal/Vertical line of symmetry?
• Rotational symmetry and order of rotational symmetry.	The students will be able to identify wtr/her figure for rotational symmetry and order of rotational symmetry	Use cut outs of figures have rotational symmetry and explain the children about order of rotational symmetry Eg.  Explain that since H was rotated 2 times to bring it to original form the order is 2.	What is the order of rotational symmetry of scalene triangle.

Exercise 15.1

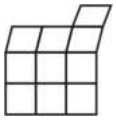
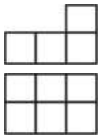
Take all answers from of tent book.

Sey Assessment-15

1.8 less of symmetry posseble in a xagalar octagon

Take all answers from bact of text book.

Chapter-16 Representing 2D in 3D

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of some common 2-D figures and solid figures concept of faces, vertices, edges, Regular and irregular polyhedrons	The students will familiar with the terms and polyhedrons.	Model of various polyhedrons can be shown to the students. Let the students count the no of faces, edges and vertices and make a note.	How many farce, edges and vertices does a triangular prim have
Euler's formula	The students will be able to verify Euler's formula for any regular polyhedron	Show a model of a triangular prism. Ask the students to make a note of the count of faces, edges and vertices. Explain and prove F + V = E + 2	Can a polyhedron have 11 faces, 16 vertices and 27 edges.
Drawing an oblique and isometric sketch and different views of 3D shapes.	Students will be able to draw sketches and identify various views of 3-D shape.	Show and give an isometric paper to the students. Ask the students to draw an isometric sketch of a cube. Show to the students any model and ask them to draw the front, side and top view	The top view of  is i) ii) 

Exercise 16.1

1. Euler's rele relation is F + V = E + 2
   where F is no of face
   V is no of vertices
   E is no of edges

2. 3. take answer from back of text book.

4.

5. i) **Cube**

   no. of faces = F = 6
   no. of vertices = V = 8
   no. of edges = E = 12
   F = V = 6 + 8 = 14
   and E + 2 = 12 + 2 = 14
   ∴ F + v = E + 2 (verified)

   ii) Prism (triaigular)
   F = 5, V = 6, E = 9
   F + V = E + 2
   5 + 6 = 9 + 2
   11 = 11
   ∴ F + V = E + 2 (∴ verified)

   iii) Rectangular Pyramid.

F = 5, V = 5, E = 8
F + V = E + 2
5 + 5 = 8 + 2
10 = 10
∴ F + V = E + 2 (verified)

6. i) F = 11, V = 12, E = 13
F + V = E + 2
11 + 12 = 13 + 2
23 = 15
∴ polyhe dron cannot be possible

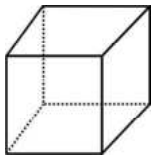
ii) F = 9, V = 11, E = 21
F + v = E + 2
9 + 11 = 21 + 3
20 = 23
∴ Not possible

7. F + V = E + 2
7 + 8 = E + 2
15 – 2 = E
∴ E = 13
13 edges **(Ans)**

8. Take the anewer from the tue back.
F + V = E + 2
using eulees formula calculate the value of unknow data

Exercise 16.1

1. take answers from the back of text book
2. Side = 4 units



3.
5. Take answers from the back of text book.

Self Assessment-16

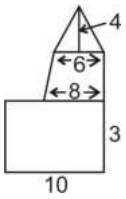
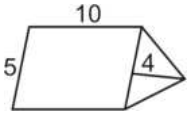
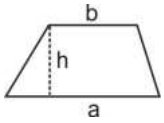
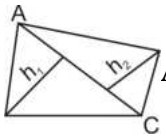
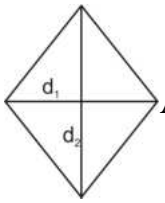
1. Polyhedrons are solids with only polygonal pace eq. cube, prism
2.
3.
4. i) **Tetrahedron**
F = 4, v = 4, E = 6
F + V = E + 2
4 + 4 = 6 + 2
8 = 8 (verified)

ii) Cube
F = 6, V = 8, E = 12
F + V = E + 2
6 + 8 = 12 + 2
14 = 14 (verified)

5. F = 4, V = 6, E = 8
F + V = E + 2
4 + 6 = 8 + 2
10 = 10
∴ Yes it is possible

6, 7, 8, 9, 10, 11, 12 take answers from back text book.

Chapter-17 Perimeter and Area

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Area and perimeter of rectangle, square, circle, parallelogram and triangle.	The students will be aware of the formulas for the area and perimeter of various figures and will be able to calculate area and perimeter of such figure	Recollect the formulae of all basic figures and practice problems related to it. Ask the students to cut out the given figure using coloured paper.  The students are required to calculate area and perimeter of the above figure and submit as assignment	 Calculate area of the given figure
Area of Trapezium, Area of quadrilateral Area of rhombus and area of polygons (combination of rectangle, triangle etc)	The students will be able to identify the given shape as trapezium, rhombus etc and know the formula to calculate area and apply it.	 Area of trapezium $=\frac{1}{2}(a+b)\times h$  Area of quadrilateral $=\frac{1}{2}AC\times(h_1+h_2)$  Area of rhombus $=\frac{1}{2}\times d_1\times d_2$ Using diagrams explain the formulae. Lab Activity on pg 219 can be done. Sums from text book to be done as practice.	The base of a 11lgm is thrice its height. If is area is 768 cm^2. Find the base and the height.

Exercise 17.2

1. i) Area of triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 6 \times 10$

$= 30\text{cm}^2$

ii) Area of triangle $= \frac{1}{2} \times 8.4 \times 12.8$

$= 26.88\text{cm}^2$

iii) Area of triangle $= \frac{1}{2} \times 0.8 \times 4.8$

$= 0.96\text{cm}^2$

2. i) $70 = \frac{1}{2} \times 5 \times h$

$h = \frac{70 \times 2}{5}$

$h = 28\text{cm}$

ii) $108 = \frac{1}{2} \times 6.6 \times b$

or, $b = \frac{108 \times 2}{6.6}$

$b = 32.72\text{cm}$

iii) $64 - 8 = \frac{1}{2} \times b \times 32.4$

or, $b = \frac{64 - 8 \times 32}{32.4}$

$b = 4\text{cm}$.

3. According to pythogras Pythagoras theorem

$(6.5)^2 = (5.2)^2 + h^2$

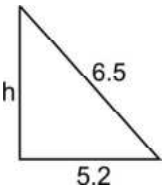
or $(6.5)^2 - (5.2)^2 = h^2$

or $h = \sqrt{(6.5 + 5.2)(6.5 - 5.2)}$

$= \sqrt{11.7 \times 1.3}$

$= \sqrt{15.21}$

$h = 3.9$ cm.



Area $= \frac{1}{2} \times 5.2 \times 3.9$

$= 10.14\text{ cm}^2$

4. $b = 3x$, $h = 5x$

Area $= \frac{1}{2} \times b \times h$

$10.8 = \frac{1}{2} \times 3x \times 5x$

$\frac{10.8 \times 2}{15} = x^2$

$\Rightarrow \sqrt{1.44} = x$

or, $x = 1.2$

$b = 3 \times 1.2 h = 5 \times 1.5$

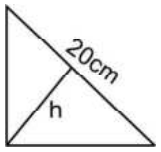
$= 3.6\text{ cm} = 6\text{ cm}$

5. $h = \sqrt{12^2 + 16^2}$

$= 144 + 256.$

$h = 400$

$h = 20\text{ cm}$



Area $= \frac{1}{2} \times 12 \times 16$

$= 96\text{ cm}^2$

New $96 = \frac{1}{2} \times 20 \times h$

(considering base as 20cm)

$\frac{96 \times 2}{20} = h$

$h = 9.6$ cm.

6. i) side of the square $= \sqrt{8^2 + 6^2}$

$= 64 + 36$

$= 100$

$= 10$ cm.

Area of shaded region = Area of square – Area of triangle

or, $10 \times 10 - \frac{1}{2} \times 8 \times 6$

or, $100 - 24$

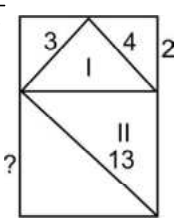
$= 76\text{ cm}^2$

ii) Side of rectangle $= \sqrt{3^2 + 4^2}$

$= \sqrt{9 + 16}$

$= \sqrt{25}$

$= 5$ cm.



Side of bigger rectangle = $\sqrt{13^2 - 5^2}$

$= \sqrt{169 - 25}$

$= \sqrt{144}$

$= 12$

Area of shaded region = Area of rectangle – Area of ΔI – Area ΔII

$= (12 + 2) \times 5 - \frac{1}{2} \times 3 \times 4 - \frac{1}{2} \times 5 \times 12$

$= 14 \times 5 - 6 - 30$

$= 34 cm^2$

Exercise 17.3

1. i) Area of llegm 11 lgm = $b \times h$.

$= 14 \times 10.4$

$= 145.6 cm^2$

ii) Area of 11 lgm = b × h.

$= 20 \times 15$

$= 300 cm^2$

2. i) Area of rhombus = $\frac{1}{2} \times d, \times d_2$

$= \frac{1}{2} \times 12 \times 16$

$= 96 cm^2$

ii) Area of rhombus = $\frac{1}{2} \times 13.8 \times 24.2$

$= 166.98 cm^2$

3. Area = $b \times h_1$ Area = $b \times h_2$

$480 = 16 \times h_1$ $480 = 20 \times h_2$

$h_1 = \frac{480}{16}$ or $h = \frac{480}{20}$

$h_1 = 30$ cm $h_2 = 24$ cm.

4. Area or rhombus = $24 = \frac{1}{2} \times d_1 \times d_2$

$24 \times 2 = 8 \times d_2$

or, $\frac{24 \times 2}{8} = d_2$

or $d_2 = 6$ cm.

5. Area of 11 gm = 25 × 14

= 350 cm **(Ans)**

$350 = b \times h$

$350 = 35 \times h$

$h = 10$ cm (Ans).

6. Area of trapezium = $\frac{1}{2}$ × (sum of parellel sides) × height

$= \frac{1}{2} \times (20 + 28) \times 11$

$= 24 \times 11$

$= 264 cm^2$

7. $320 = \frac{1}{2} (x + x - 14) \times 16$

$\frac{320 \times 2}{16} = (2x - 14)$

$40 = 2x - 14$

or, $54 = 2x$

or $x = 27$

Side are 27 and 13 cm.

8. $300 = \frac{1}{2} \times (x + x + 6) \times 30$

$300 = \frac{1}{2} \times (2x + 6)$

or $\frac{300 \times 2}{30} = 2x + 6i$

or, $20 = 2x + 6$

or $2x = 14$

$x = 7$ cm.

Sides are 7 cm and 13 cm

9. i) Area of quadric lateral = $\frac{1}{2} \times d \times (h_1 + h_2)$

$= \frac{1}{2} \times 25 \times (6 + 5)$

$= \frac{1}{2} \times 25 \times 11$

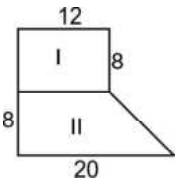
$= 137.5 cm^2$

ii) Area = $\frac{1}{2} \times 8.4 \times (2.4 + 1.5)$

$= 4.2 \times 3.9$

$= 16.38 cm^2$.

10. i) Area of figure
= Area of I + Area of II

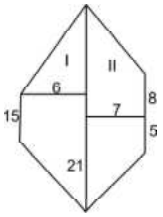


$= 12 \times 8 + \frac{1}{2}(12 + 20) \times 8$

$= 96 + 128$

$= 244 \text{ cm}^2$

ii) Area = Area of I + Area of II



$= \frac{1}{2} \times (15 + 21) \times 6 + \frac{1}{2}$

$(8 + 5 + 21) \times 7$

$= \frac{1}{2} \times 36 \times 6 + \frac{1}{2}(34) \times 7$

$= 108 + 119$

$= 227 \text{ cm}^2$

iii) Area = Area of Δ + Area of rectangle

$= \frac{1}{2} \times 6 \times$ .....

Exercise 17.4

1. i) $r = 28$ cm

Circumference $= 2 \times \frac{22}{7} \times 28$

$= 176$ cm

Area $= \pi r^2$

$= \frac{22}{7} \times 28 \times 28$

$= 2464 \text{ cm}^2$

ii) $r = 4.2$ cm

$= 2\pi r$

Circumference $= 2 \times \frac{22}{7} \times 4.2$

$= 26.4$ cm

Area $= \frac{22}{7} \times 4.2 \times 4.2$

$= 55.44 \text{ cm}^2$

2. i) $2\pi r = 264$

$r = \frac{264 \times 7}{2 \times 22}$

$= 42$ cm

ii) $\pi r^2 = 616$

$r^2 = \frac{616}{22} \times 7$

$r = \sqrt{196}$

$= 14$ cm

iii) $\pi r^2 = 38.5$

$r^2 = \frac{38.5}{22} \times 7$

$r = \sqrt{12.25}$

$= 3.5$ cm

iv) $2\pi r = 8.8$

$r = \frac{8.8 \times 7}{2 \times 22}$

$= 1.4$ cm

3. $r = \frac{5.6}{2} = 2.8$ cm

Distance covered in one revolution = circumference

Distance covered in 15 revolution = $15 \times 2\pi r$

$= 15 \times 2 \times \frac{22}{7} \times 2.8$

$= 264$ cm

4. Circumference $= \frac{4004}{490}$

$2\pi r = \frac{4004}{490}$

$2\pi = \frac{4004 \times 7}{490 \times 22}$

$d = 2.6$ m

5. d = 4.2

r $= \frac{4.2}{2} = 2.1$ m

No. of revolution $= \frac{Dist}{circumference}$

$= \frac{9900m \times 7}{2 \times 22 \times 2.1}$

$= 750$ revolution

6. Circumference of circle = perimeter of sqare

$2\pi r = 4 \times$ sede

or, $\frac{2 \times 22}{7} \times 4.2 = 4 \times$ side.

or $\text{side} = \frac{2 \times 22 \times 4.2}{7 \times 4}$

side = 6.6 cm.

Area = 6.6 × 6.6.

= 43.56 cm^2

7. Area os square = 784

side = $\sqrt{484}$

= 22 m.

Perimeter of sq = circumference of circle

$4 \times 22 = 2 \times \frac{22}{7} \times r$

or, $\frac{4 \times 22 \times 7}{2 \times 22} = r$

$r = 14.$

Area = πr^2

$= \frac{22}{7} \times 14 \times 14$

= 616 cm^2 **(Ans).**

8. $r_1 : r_2 = 6 : 7$

$\frac{\pi r_1^2}{\pi r_2^2} = \frac{\pi \times 6 \times 6}{\pi \times 7 \times 7}$

= 36 : 49

9. $2\pi r$ = 132 cm $\quad 2\pi r$ = 154

$r = \frac{132 \times 7}{2 \times 22}$ $\quad$ R = $\frac{154 \times 7}{2 \times 22}$

r = 21 cm $\quad$ R = 245

width of king = R – r

= 24.5 – 21

= 3.5 cm

$2\pi r$ = 484

r = 77 m

R = 77 + 1.75

= 78.75

10. Area of rwad = $\pi R^2 - \pi r^2$

$= \pi (R^2 - r^2)$

$= \frac{22}{7} (78.75^2 - 77^2)$

$= \frac{22}{7} \times (78.75 + 77)(78.75 - 77)$

$= \frac{22}{7} \times 155.75 \times 1.75$

= 856.625 m^2

11. i) Area of shaded region = $\pi (R^2 - r^2)$

$= \frac{22}{7} (42 - 1.12)$

$= \frac{22}{7} \times (16 - 1.21)$

$= \frac{22}{7} \times 14.79$

$= \frac{325.38}{7}$ = 46.48 m^2

redius = $\frac{\sqrt{12^2 + 5^2}}{2}$

$= \frac{\sqrt{144 + 245}}{2}$

$= \frac{169}{2}$

$= \frac{169}{2}$ cm

ii) Area of shaded rigon = Area of seni circle – Area of triangle

$= \frac{\pi r^2}{2} - \frac{1}{2} \times b \times h$

$= \frac{1}{2} \pi \frac{22 \times 13 \times 13}{7 \times 2 \times 2} - \frac{1}{2} \times 5 \times 12$

= 66.39 – 30

= 36.39 cm^2

Self Assessment 17

1. Diagonal = $\sqrt{2a}$

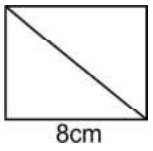
$= \sqrt{2 \times 8}$

$= 8\sqrt{2}$

Perimeter $= 4 \times$ sisde

$= 4 \times 8\sqrt{2}$

$= 32\sqrt{2}$



2. Perimeter $= 0.48$m Area $= (0.12)^2$

$4 \times 5 = 0.48$ $= 0.0144$ m^2

$5 = \frac{0.48}{4}$

Side $= 0.12$ m

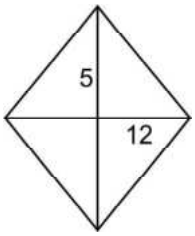
3. Area of rhombus $= \frac{1}{2} \times$ product of diagonal

$120 = \frac{1}{2} \times 5x \times 12x$

$\frac{120 \times 2}{5 \times 12} = x^2$

$x = \sqrt{4}$

$x = 2$



$d_1 = 5 \times 2$ $d_2 = 12 \times 2$

$= 10$ cm $= 24$ cm.

side $= \sqrt{5^2 + 12^2}$

$= \sqrt{25 + 144}$

$= \sqrt{169}$

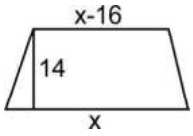
$= 13$ (Ans)

4. Area $= \frac{1}{2} \times (x - 16 + x) \times 14$

$\frac{2 \times 182}{14} = 2x - 16$

or, $6 + 16 = 2x$

or $\frac{42}{2} = x$



$x = 24$

longer side $= 24$ cm shorter sides

$= 24 - 16$

$= 8$ cm

5. Area of square = area of rhombus

$6.5 \times 6.5 = \frac{1}{2} \times d_1 \times 7.8$

or $\frac{6.5 \times 6.5 \times 2}{7.8} = d_{1C}$

or $d_1 = 10.83$

6. $5.6 = b \times 7$

or $b = \frac{5.6}{7} = 0.8$ cm.

Ans: option (a)

7. Area $= \frac{1}{2} \times$ sum of 11 sides $\times$ height

$=$ mean of side $\times$ height

$= 15 \times 6$

$= 90$

Ans: option (b)

8. to 13 take answere from the back of text book.

Chapter-18 Volume and Surface Area

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Surface area of cuboids and cube	The students will be clear with the concept of total surface area and lateral surface area	Take a waste small size cartoon or card board box. Cut out all the faces. Explain to the children that total surface area is sum of area of all faces and lateral surface area is area of four walls. Explain TSA = 2 ($lb + lh + bh$) 4 walls = $2(l + b)h$	Take match box. Calculate the total area of paper required to cover the box.
Volume of cube and cuboid.	The students will be able to calculate the volume of cube and cuboid.	Explain the concept and formulae sums based on area and volume to done in class.	The sides of a cube is doubled. By how many times will its volume increase?
Surface area and volume of a cylinder.	The students will be able to understand the formula for finding total surface area = $2\pi r\ (r + h)$ and Volume = $\pi r^2 h$. = base area × height	Take a rectangular sheet and roll it to form a cylinder. Explain the length of the rectangle = circumference of circle formed and breadth = height cylinder. Explain the derivations of surface area and volume. Practice ample sums	The length of o cylindrical water tank is 17m. Find the quantity of water (in litres) that can be stored in the tank of its radius is 1.5m.

Exercise 18.1

1. i) side = 6.5 cm
   total surface area = $6a^2$
   $= 6 \times 6.5 \times 6.5$
   $= 235.5\ cm^2$ **(Ans)**

ii) side = 1.05 cm
TSA = $6a^2$
$= 6 \times 1.05 \times 1.05$
$= 6.615\ cm^2$ **(Ans)**

iii) side = 18 cm
TSA = 6a2

$= 6 \times 18 \times 18$

$= 1944 \text{ cm}^2$ **(Ans)**

iv) side $= 1.1$ m

TSA $= 6a^2$

$= 6 \times 1.1 \times 1.1$

$= 7.26 \text{ m}^2$ (Ans)

2. i) $l = 15$ cm, $b = 8$ cm, $h = 9$ cm

TSA $= 2 (sb + bh + bl)$

$= 2 (15 \times 8 + 8 \times 9 + 9 \times 15)$

$= 2 ( )$

$=$

ii) $l = 1.5$ m , $b = 8$ cm, $h = 10$ m

TSA $= 2 (lb + bh + hl)$

$= 2 (1.5 \times 8 + 8 \times 10 + 10 \times 1.5)$

$=$

iii) $l = 0.8$m , $b = 0.5$m , $h = 1.2$m

TSA $= 2 (lb + bh + hl)$

$=$

iv) $l = 2.8$m, $b = 3.5$m, h $= 1.8$m.

TSA $= 2 (lb + bh + hl)$

$= 2 (2.8 \times 3.5 + 3.5 \times 1.8 + 2.8 \times 2.8$

$=$

$=$

3. Total surface area $= 2400 \text{ cm}^2$

$\therefore \quad 6a^2 = 2400$

or, $\quad a^2 = \frac{2400}{6}$

$a = \sqrt{400}$

$a = 20$ cm **(Ans)**

4. Volurea $= 105 \text{ cm}^3$

or, $\quad l \times b \times h = 105$

or, $\quad 7 \times 5 \times h = 105$

$h = \frac{105}{7 \times 5}$

$h = 3$ cm.

5. Area painted = total surface area

$= 2 (lb + hb + hl)$

$= 2 (4 \times 5 + 5 \times 6 + 6 \times 4)$

$= 2 (20 + 30 + 24)$

$= 2 (74)$

$= 148 \text{ cm}^2$

$\therefore$ Megha painted 148 cm^2

6. Total area to be painted = Area of 4 walls + Area of cectuq

$= 2 (l + b) h + l \times b$

$= 2 (25 + 12) \times 8 + (25 \times 12)$

$= 2 (37) \times 8 + 300$

$= 592 + 300$

$= 892 \text{ mc}^2$

Cost of painting $= 892 \times 15$

$=$ Rs. 13,380 **(Ans)**

7. $2 (l + b) = 280$ (given)

Area of 4 walls $= 2 (l + b) \times h$.

$= 280 \times 4$

$= 1120 \text{ m}^2$

Cost of painting $= 1120 \times 10$

(rate = Rs. 10)

$=$ Rs. 11,200 (Ans)

8. length of the wall $= 25 \times 6$

$= 1500$ cm.

sereadth = 6 cm and height = 10 cm.

volume $= l \times b \times h$

$= 1500 \times 6 \times 10$

$= 90000 \text{ cm}^3$

$= 0.09 \text{ cm}^3$

9. Volume of 1 match box $= 4 \times 3 \times 1.5$

$= 18$ cm3

Volume of vug vix $= 30 \times 30 \times 20$

$= 18000$ cm3

No of box $= \frac{18000}{18}$

$= 1000$ boxes (Ans)

10. Let the edqe be x m.

TSA $= 6x^2$

If edge is tripled. edge = 3x.

TSA $= 6 \times 3x \times 3x$

$= 54x^2$

$\therefore$ TSA gets increased by 9 times when edge is tripled.

Exercise 18.2

1. i) $r = 3.5$ cm , $h = 2.8$ cm

TSA = $2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times (3.5 + 2.8)$

$= 2 \times \frac{22}{7} \times 0.7$

TSA = 39.6 cm^2 **(Ans)**

volume = πr^{2h}

$= \frac{22}{7} \times 3.5 \times 3.5 \times 2.8$

= 107.8 cm^3 **(Ans)**

ii) r = 14 cm , h = 10 cm

TSA = $2\pi r\ (h + r)$

$= 2 \times \frac{22}{7} \times 14\ (14 + 10)$

$= 2 \times \frac{22}{7} \times 14 \times 14$

= 2112 cm^2

volume = πr^{2h}

$= \frac{22}{7} \times 14 \times 14 \times 10$

= 6160 cm^3

iii) r = 1.5 cm and h = 3.5 cm

TSA = $2\pi r = (h + r)$

$= 2 \times \frac{22}{7} \times 1.5 \times (1.5 \times 3.5)$

$= 2 \times \frac{22}{7} \times 1.5 \times 4.7$

= 44.31 cm^2 **(Ans)**

Volume = πr^{2h}

$= \frac{22}{7} \times 1.5 \times 1.5 \times 3.5$

= 24.75 cm^3 **(Ans)**

iv) r = 14 cm and h = 21 cm

TSA = $2\pi r\ (h + r)$

$= 2 \times \frac{22}{7} \times 14 \times (21 + 14)$

$= 2 \times \frac{22}{7} \times 14 \times 35$

= 3080 cm^2 **(Ans).**

Volume = πr^2h

$= \frac{22}{7} \times 14 \times 14 \times 21$

= 12936 cm^3

2. Volume = 550

$\pi r^{2h} = 550$

$\frac{22}{7} \times 5x \times 5x \times 7x = 550$

$x \times x \times x = \frac{550 \times 7}{22 \times 5 \times 7}$

or, $x^3 = \frac{550}{550}$

or $x = \sqrt[3]{1} = 1$

$\therefore$ radius = $5x = 5 \times 1 = 5$ cm

3. Capacity Copiah of tank = πr^{2h}

$= \frac{22}{7} \times 3.5 \times 3.5 \times 21$

= 808.5 cm3

$\therefore$ Capacity of tank is 808.5 cm^3

4. Volume = 1848 cm^3

d = 14 or $r = \frac{14}{2}$ = 7 cm.

$2\pi r^2 h = 1848$

or, $2 \times \frac{22}{7} \times 7 \times 7 \times h = 1848$

or, $h = \frac{1848 \times 7}{2 \times 22 \times 7 \times 7}$

h = 6 cm (Ans)

$\therefore$ The depth of the tank is 6 cm.

5. Capacity or the tank = volume = $2\pi r^2 h$

$= \frac{22}{7} \times 2.8 \times 2.8 \times 4.2$

= 103.49 cm^3

$\therefore$ The capacity of the tank is 103.49 cm^3

6. Volume of metallic road = volume of new cylinder.

$\pi r^2 h = \pi r^2 h$

$3.5 \times 3.5 \times 20 = 0.5 \times 0.5 \times h$

or, $\frac{3.5 \times 3.5 \times 20}{0.5 \times 0.5} = h$

or, $h = 980$ cm

7. Volume of earth dug $= \pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 12$

$= 1848$ cm^3

The volume of earth is laid on 6m × 3.5m rectangular plot

∴ Vol of earth dug = volume of raised rectangular plot.

$1848 = 6 \times 3.5 \times 4$

or, $h = \frac{1848}{6 \times 3.5} = 88$m **(Ans)**

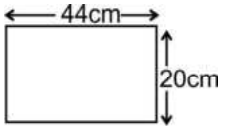
8. $\pi r^2 h = 0.385$ m^3 $\pi r^2 h = 2.2$ m^2

9. Length of paper = Circumference of the circle

$44 = 2\pi r$

$r = \frac{44 \times 7}{2 \times 22}$

$r = 7$ cm



∴ radius of cylinder = 7 cm and heigth = 20 cm.

Volume of cylinder $= \pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 20$

$= 3080$ cm^3

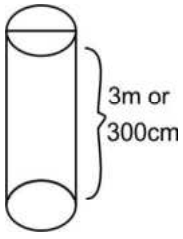
10. radius $= \frac{28}{2} = 14$ cm

Cured surface area $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 14 \times 3$

$= 44 \times 2 \times 300$

$= 26400$ cm^2 or 2.64 cm^2



Cost of painting $= 2.64 \times 35$

$=$ Rs. 92.40

Self Assessment-18

1. $r = 0.7$ cm

height $= 1.4$ cm

Volume $= \pi r^2 h$

$= \frac{22}{7} \times 0.7 \times 0.7 \times 1.4$

$= 2.156$ cm^3

TSA $= 2\pi r\ (h + r)$

$= 2 \times \frac{22}{7} \times 0.7\ (0.7 + 1.4)$

$= 2 \times \frac{22}{7} \times 0.7 \times 2.1$

$= 2 \times 22 \times 0.1 \times 2.1$

$= 9.24$ cm^2

2. Volume $= \pi\ (R^2 - r^2)$

$= \frac{22}{7}\ (14^2 - 11.2^2)\ h$

$= \frac{22}{7} \times (196 - 125.44) \times 20$

$= \frac{22}{7} \times 70.56 \times 20$

$= 22 \times 10.08 \times 20$

$= 4435.2$ cm^3

3. Area of base $= 45$ cm^2, $h = 3.5$ cm

$l \times b = 45$ cm^2 or $l = \frac{45}{b}$

Volume $= l \times b \times h$

TSA $= 2\ (lb \times bh \times hl)$

$= 45 \times 3.5$

$= 157.5$ cm^3

4. $a^3 = 294$

$6a^2 = \frac{294}{6}$

$a^2 = 49$

$a = 7$ cm.

Side $= 7$ cm

Volume $= 7 \times 7 \times 7$

$= 343$ cm^3

5. $l = 25$ cm $= 2.5$ dm , $b = 2\ dm$, $h = 1.5 dm$

TSA = area to be painted

$= 2 (2.5 \times 2 + 2 \times 1.5 + 1.5 \times 2.5)$

$= 2 (5 + 3 + 3.75)$

$= 2 \times 11.75$

$= 23.5 \text{ cm}^2$

Cost of painling @ ₹1.25 = 23.5×1.25

$= ₹ 29.375$

6. $\text{Vol} = 0.2 \times 0.2 \times 0.2$

$= 0.008 \text{ cm}^2$

Ans: option (d)

7. When side is increases 27 lines

Ans: option (d)

8. $\text{height} = \frac{h}{2}$

$\text{vol} = \pi r^2 h$

$= \pi r^2 \frac{h}{2}$

$\therefore$ Volume gets halued.

Ans: option (b)

9. 154 cm^2

Ans: option *a*.

10. $\text{TSA} = 2\pi r (h + r)$

$= 2 \times \frac{22}{7} \times 3.5 (7 + 0.5)$

$= 2 \times \frac{22}{7} \times 3.5 \times 10.5$

$= 231 \text{ cm}^2$

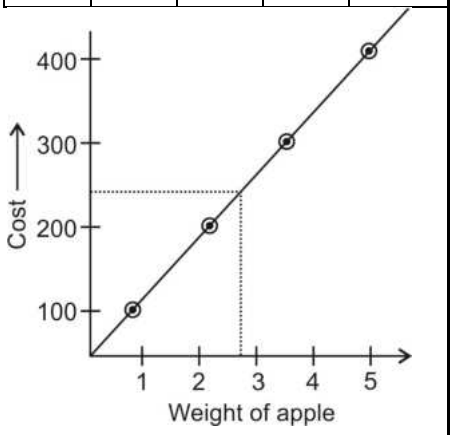
Ans: option (b)

11. **Ans:** option c

12. **Ans:** option (c)

13. **Ans** option (a)

Chapter-19 Introduction to Graphs

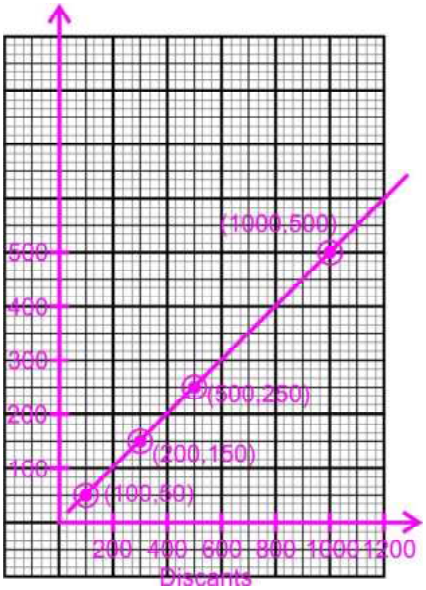
<table>
<tr><th>Topics</th><th>Learning Outcomes</th><th>Teaching Learning Activity</th><th>Questions on Hots</th></tr>
<tr>
<td>Concept of Carleton plane and quadrants</td>
<td>The students will be able to identify different quadrants and mark coordinates</td>
<td>Explain to the students various quadrants and origin.
Using graph paper or on board explain marking of points Explain that the horizontal distance of the point from the origin is x and vertical distance is y.
Practice marking of various points with the students.</td>
<td>Point A is a point in the third quadrant. Then the coordinates are
a) (x, y) b) $(-x, -y)$
c) $(-x, y)$ d) $(x, -y)$</td>
</tr>
<tr>
<td>Application of Graph.</td>
<td>The students will be able to plot graph based on relationship between two variables like speed and distance and inference from the graph.</td>
<td>Plot a graph and explain the process of plotting graph and inference from it.
For eg.
<table>
<tr><td>Wt of apple</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Cost</td><td>100</td><td>200</td><td>300</td><td>400</td></tr>
</table>


What will be the cost of 2.5 kg apples.
Ans. Rs. 250</td>
<td>Draw a graph for the following
<table>
<tr><td>x</td><td>0</td><td>1</td><td>-1</td><td>2</td></tr>
<tr><td>y</td><td>0</td><td>-4</td><td>4</td><td>-8</td></tr>
</table>
What will be the value of y if $x = 3$?</td>
</tr>
</table>

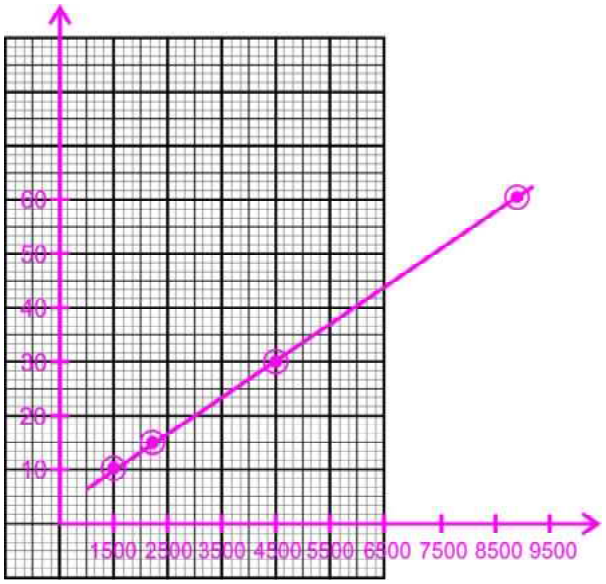
Surface area and volume of a cylinder.	The students will be able to understand the formula for finding total surface area = $2\pi r\,(r + h)$ and Volume = $\pi r^2 h$. = base area × height	Take a rectangular sheet and roll it to form a cylinder. Explain the length of the rectangle = circumference of circle formed and breadth = height cylinder. Explain the derivations of surface area and volume. Practice ample sums	The length of o cylindrical water tank is 17m. Find the quantity of water (in litres) that can be stored in the tank of its radius is 1.5m.

Exercise 19.1

1.
2.
3.
4. take answere from the back
5.
6.
7.

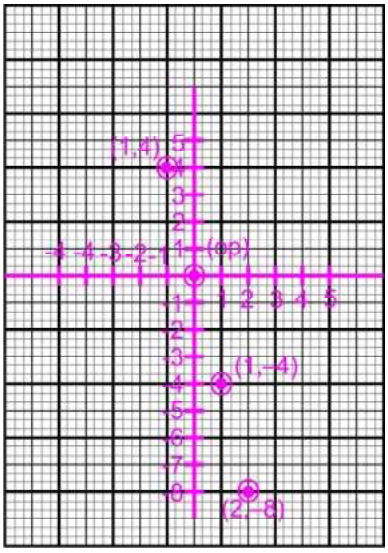


8.



Self Assessment-19

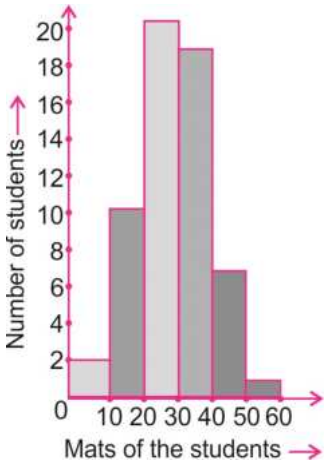
1. x anis option (a)
2.

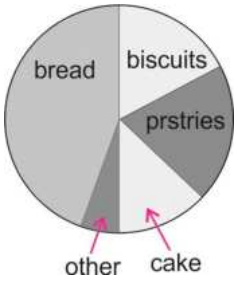
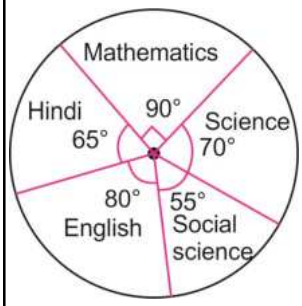


Q. 3. take answers from th back of text book.

Chapter-20 Data Handling

<table>
<tr><th>Topics</th><th>Learning Outcomes</th><th>Teaching Learning Activity</th><th>Questions on Hots</th></tr>
<tr><td>Introduction Bar Graph, double bar graphs etc.</td><td>To be able to recollect the ideas about bar graphs, double bar graphs, tally marks etc.</td><td>Give the definition of data and a raw data. Then explain how a raw data can be organized using tally marks, which is called frequency distribution table Consider the list of favorite subjects of a group of students.
Art, Maths, science, English, Maths, Art, English, Maths, English, Art, science, Art, Science, Science, Maths, Art, English, Art, Science, Maths, Science, Art.
<table><tr><th>Subject</th><th>Tally Maris</th><th>No of students</th></tr><tr><td>Art</td><td>𝍸 ||</td><td>7</td></tr><tr><td>Maths</td><td>𝍸</td><td>5</td></tr><tr><td>Science</td><td>𝍸 |</td><td>6</td></tr><tr><td>English</td><td>||||</td><td>4</td></tr></table></td><td>The number of wickets taken by a bowler in 25 matches are given
2,4,1,5,5,1,6,4,5,3, 2,3,0,2,6,1,3,5,0,0, 2,3,3,3, 1
Prepare a frequency distribution table and a bar graph</td></tr>
<tr><td>Grouping Data</td><td>To understand the concept of class intervals, class limits, size of the class and how to make grouped frequency table for a given data</td><td>Explain the class intervals and class limits by using examples
In the class 10-20, 10 is called lower limit and 20 is called the upper limit. The difference 20-10 = 10 is called the class with of size of the class.
If the lower limit is included and the upper limit is excluded the classes are called continuous classes.
Consider the marks obtained by 60 students in Maths out of 50.
21,10,30,22,33,5,37,12,25,42,15,39,26,32,18,27,28,19,29,35,31,24,36,18,20,38,22,34,16,24,10,27,39,28,49,29,3</td><td>Collect data about the weights of your classmates and prepare a frequency distribution table and histogram.</td></tr>
</table>

		2,23,31,21,34,22,23,36,24,36,33,47,48,50,39,20,7,16,36,45,47,30,22,17. **Groups** | **Tally Marks** | **Frequency** 0-10 | || | 2 10-20 | 𝍸 𝍸 | 10 20-30 | 𝍸 𝍸 𝍸 𝍸 | | 21 30-40 | 𝍸 𝍸 𝍸 𝍸 | 19 40-50 | 𝍸 || | 7 50-60 | | | 1 Total | 60	
Histogram	To understand how to draw the histogram for a given data And what is the difference between the bar graph and histogram.	To draw the histogram take class limits along x-axis and frequencies along y-axis. On each class draw a bar whose height is proportional to the frequency. For the above grouped frequency distribution table draw the histogram. 	
Circle Graph or pie chart	To be able to draw a pie chart for a given data.	Draw a circle of suitable radius. For each data draw the corresponding sector whose angle is given by $\frac{frequancy}{local freq}\times 360$ Consider sales in a shop bread: 320, cake 80, pastries 160, biscuits: 120, others: 40. Corresponding angles are 160°, 60°, 80°, 40° and 20°	The pie chart shows marks scared by a student is mathematics, science, social science, English and Hindi. If the total marks obtained by the

		 Explain the method of drawing pie-chart	student was 540, in which subject did the student score 105? 
Probability	Concept of probability and terms related to probability. The students will be able calculate the probability	Explain the terms random experiment outcomes and equally likely outcomes. Probability is the ratio of $= \frac{no\ of\ outcome\ s\ favourable}{total\ no\ of\ outcomes}$ Take a bag contains 2 red balls and 3 balls and 3 white balls. Take out a ball and explain the probability.	A letter is choosen from the word 'MAGNET'. What is the probability that it is a consonant.

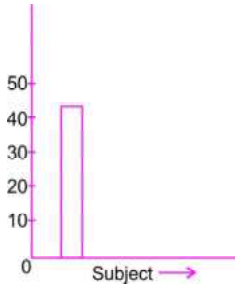
Exercise 20.1

1. According or der : 130, 130, 15, 150, 150, 150, 150, 180, 180, 180, 180, 180, 200, 200, 200

x	Tally Marks	Frequency
130	II	2
150	IIII	5
180	IIII	5
200	III	3

take all answers of Exercise 20.1 from the back answers of the thext book

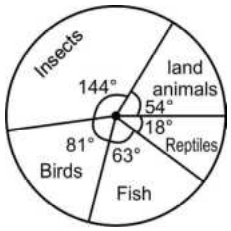
Exercise 20.2

1. 

Exercise 20.3

1. Total creatures 1000

Land Animals	150	$\frac{150}{1000}\times 360 = 54°$
Insects	400	$\frac{400}{1000}\times 360 = 144°$
Birds	225	$\frac{225}{1000}\times 360 = 81°$
Fish	175	$\frac{175}{1000}\times 360 = 63°$
Reptiles	50	$\frac{50}{1000}\times 360 = 18°$



2. School Bus 350 $\frac{350}{1260}\times 360 = 10°$

Private Bus 245 $\frac{245}{1260}\times 360 = 70°$

Bicycle 210 $\frac{210}{1260}\times 360 = 60°$

Rickshaw 175 $\frac{175}{1260}\times 360 = 50°$

on foot 280 $\frac{280}{1260}\times 360 = 80°$

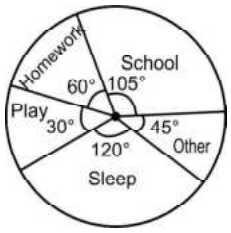
3. School 7 $\frac{7}{24}\times 360 = 105°$

Homework 4 $\frac{4}{24}\times 360 = 60°$

Play 2 $\frac{2}{24}\times 360 = 30°$

Sleep 8 $\frac{8}{24}\times 360 = 120°$

Other 3 $\frac{3}{24}\times 360 = 45°$

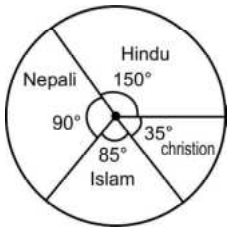


4. Hindu 450 $\frac{450}{1080}\times 360 = 150°$

Nepali 270 $\frac{270}{1080}\times 360 = 90°$

Islam 255 $\frac{255}{1080}\times 360 = 85°$

Christion 105 $\frac{105}{1080}\times 360 = 35°$

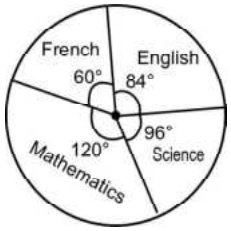


5. English 105 $\frac{105}{450}\times 360 = 84°$

French 75 $\frac{75}{450}\times 360 = 60°$

Mathcmatics 150 $\frac{150}{450}\times 360 = 120°$

Science 120 $\frac{120}{450}\times 360 = 96°$

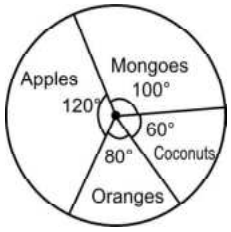


6. Mangoes 25 $\frac{25}{90}\times 360 = 100°$

Apples 30 $\frac{30}{90}\times 360 = 120°$

Oranges 20 $\frac{20}{90}\times 360 = 80°$

Cocconuts 15 $\frac{15}{90}\times 360 = 60°$



Exercise 20.4

1. i) possible favorable outcome is 2, 4,

$\therefore$ p (even no. less than 6) $= \frac{2}{6} = \frac{1}{3}$ **(Ans)**

ii) Favorable outcome = 1, 2, 3, 5

$\therefore$ p (prime no) $= \frac{4}{6} = \frac{1}{3}$ **(Ans)**

2. favorable outcomes = O, I, E

probability $= \frac{3}{6} = \frac{1}{2}$ **(Ans)**

3. i) p (red ball) $\frac{5}{10} = \frac{1}{2}$ **(Ans)**

ii) p (withe ball) $= \frac{2}{10} = \frac{1}{5}$ **(Ans)**

iii) p (not a black ball) $= \frac{7}{10}$ **(Ans)**

not a black = white + red balls.

4. Possible outcomes = HHH, TTT, HTT, THT, TTH, THH, HTH, HHT

i) p (all tails) $= \frac{1}{8}$ **(Ans)**

ii) p (exactly 2 taile) $= \frac{3}{8}$ **(Ans)**

iii) p (no tail) $= \frac{1}{8}$ **(Ans)**

5. i) p (red card) $= \frac{26}{52} = \frac{1}{2}$ **(Ans)**

ii) P (spade) $= \frac{13}{52} = \frac{1}{4}$ **(Ans)**

iii) P (all card) $= \frac{4}{52} = \frac{1}{13}$ **(Ans)**

6. Total roans = 11 roans.

p (ail conditioned room) $= \frac{8}{11}$ = **(Ans)**

7. favorable outcomes = 2 + 6, 3 + 5, 4 + 4, 5 + 3, 6 + 2

p (sum of 8) $= \frac{5}{36}$ **Ans**

8. Consonants = Q, T, R

p (consonant) $= \frac{3}{7}$ **Ans**

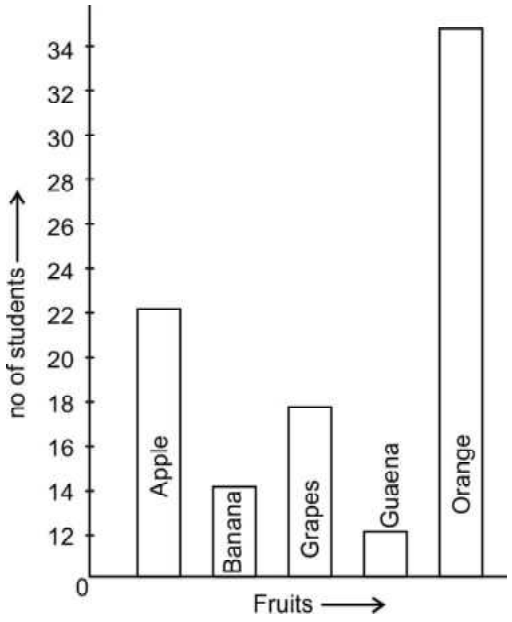
9. favorable outcomes = 5, 10, 15, 20, 25, 30, 35, 40

p (multiple of 5) $= \frac{8}{40} = \frac{1}{5}$ **Ans)**

10. favorable outcomes = 5 + 5, 6 + 4, 4 + 6

p (sum of 10) $= \frac{3}{36} = \frac{1}{12}$ **(Ans)**

Self Assessment-20

1. Option (d) – range.
2. range 4 – 1 = 3.
   Ans: option (c)
3. **Ans:** option (b)
4. Sector of angle $= \frac{20}{200} \times 360$
   $= 36°$
   Ans: option (d)
5. frequency of 82 is 2 (sice 82 ocurs 2 lines)
   Ans. option (c)
6. p (red/colute ball) $= \frac{6+4}{17} = \frac{10}{17}$
7. Answer for this no take from baek answer
8.


9.

Chapter-21 Sets

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Desorption of a set (Different forms)	The students will be able to form a set in different forms.	Give few examples of set formation Explain all 3 forms of set – Roster – Tabular – Set – builder Reversion of class 7 on forming sets. Sums from tent book to be done.	A = {$x : x = 2y + 5, y \epsilon n, 2 \leq y < 6$} Write down the element of set A.
Types of sets (Empty, finite, Infinite equal and equivalent)	The students will be able to identify various types of sets	Sums based on different types to be done. Help the students differentiate between equal and equivalent sets.	A = {x:x ϵ z, $2x + 4 = 0$} is it a frits set? B = {–2} is A equivalent to B? is it also equal?
Subsets, universal set and complement of a set.	Students will be able to form subsets and compliment of set.	Explain to the students, how that is a subset and proper subset. Symbol c is used for subset. Using examples calculate subset and compliment.	If U = {1,2,3….10} A = {1,3,5} B= {2,4,5,6,8} Find 1) A – B 2) ANB 3) B–A 4) B 2) write all possible subsets of {a,b,c}
Operations on sets and cardinality.	The students will be able to perform operations like union, intersection and deference on sets.	Explain all the 3 basic operations on sets and cardinality. Verification like (A∪B)' = A'∩B' to be done with the students using examples	If A= {letters of the word 'TEAM'} B={letters of the word 'MEET'} Verify n(A∩B) = n(A) + n(A∩ B)

Exercise 21.1

1. i) A.{ x : x is a letter befor in the english.}briuldsr for

∴ A = {

ii) B = {$x : x^2 =$; x E N} [set-.....]

∴ B = {5} [Raster form]

iii) C = {x EN: x is a prime number, $20 < 2 <$ 3 [Set builder form]

∴ C = {23, 29 } [Raster form]

iv) D = {$x : x = 3n, n$ E N } [Set-builder form,

∴ D = {3, 6 ,9, 12, ...} [Raster form]

v) E = {x E W : $x > 4$} [Set builder form]

∴ E = {0, 1, 2, 3,} [Raster form]

vi) F = { x : is a frime number which is a ..... of 30} [Set-builder form]

∴ F = {2, 3, 5,} Raster form]

vii) G = (x : x is a two=digit number such that the sum of its digits is 6}.

∴ G {15, 24, 33, 42, 51, 60} [Raster from]

viii) H = {Letters in the word 'TRIGONOM-ETRY']

[Descriptive form]

∴ H = {T, R, I, G, O, N, M, E, Y} [Raster form]

ix) I = {Letters in the word '..... '}

[Descriptive method]

∴ I = {P, r, e, t, y} Raster form]

2. i) A = [1, 2, 3, 4, 5, 6, } [Raster form]

∴ A = { $x : x$ E NL, $x < 7$ [Set- builder form]

ii) B = $\left\{1\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \ldots\ldots\right\}$ Raster form]

∴ B = $\{x \mid x = \frac{1}{n}, n \text{ EN } \}$ [Set-builder form]

iii) C = {0, 3, 6, 9, 12,.....} [Raster.....]

C = { x | x 3n 3EN} [Set - builder form]

iv) D = {1, 4, 9, 16, ... 1} [Raster form]

∴ D = {$x \mid x = n^2, n$ 6 N , ≤ 10}

[Set - builder form]

v) E = {2, 4, 6, 8, ...} [Raster form]

∴ E = {$x \mid x = 2n, n$ E N} [Set builder form]

vi) F = {5, 25, 125, 625} [Raster form]

∴ F = {$x : x = 5n$, $1 \leq^n \leq 4$, n E N}

3. i) A = {$x : x^2$

ii) 8 = { $x : x = 2n - 1$, $1 \leq n \leq 5$}

when,

$n = 1$, $x = (2 \times 1) - 1 = 1$

$n = 2$, $x = (2 \times 2) - 1 = 3$

$n = 3$, $x = (2 \times 3) - 1 = 5$

$n = 4$, $x = (2 \times 4) - 1 = 7$

$n = 5$, $x = (2 \times 5) - 1 = 9$

∴ Elements of set B = 1, 3, 5, 7, 9.

iii) C = {x : x is an integer, $-4 < x < 3$}

∴ Elements of set c = –3 , –2, –1, 0, 1, 2

iv) D = {x : x is a vowel in the word ' EQUATION'}

∴ Elements of set D = E, Q, U, A, T, I, O, N.

v) E = {x : x is a month of a year having 30 days}

∴ Elements of set E = April, fume September November.

vi) F = {x : x is a letter in the word 'MISSISSPPI.}

∴ F = {M, I, S, P}

∴ Element of set F = M, I, S, P.

4. i) {M, A, P, L, E} – {x : x is a letter of the word 'MAPLE'}.

ii) {6, – 6} = {$x : x^2 - 36 = 0$}

iii) {0} = {$x : x + 5 = 5$, x E Z}

iv) {1, 2, 5, 10} = {x : x is a natural number

and divisor of 10}

v) {A, H, I, R, S, T, N} – {x : x is letter of the world 'RAJASTHRS.

vi) {2, 5} = {x : x is a prime natural number and a divisor of 10}.

Exercise 21.2

1. i) { }

ii) Let A be the set of all even prime numbers

$\therefore$ A = {2}

$\therefore$ A is not an empty set

iii) B = {x : $7x - 3 = 11$, x *e* N}

$\therefore$ B = {2}

$\therefore$ B = is not an empty set.

iv) C = {even number beteen 6 and 10}

$\therefore$ C = {8}

$\therefore$ C is not an empty set.

v) D = {x : x is a point common to two parallel line}

$\therefore$ D = { }

$\therefore$ D = is an empty set.

2. i) infinite set

ii) B = {x : x E W. and $5x - 3 < 20$}

$\therefore$ B = {0, 1, 2, 3, 4}

$\therefore$ B is a finite set. **(Ans)**

iii) C = $\{x : x = \frac{3}{x}\ n \text{ E W and } 6 < n\ 15\}$

$\therefore$ C = $\left\{\frac{3}{7}, \frac{3}{8}, \frac{3}{9}, \frac{3}{10}, \frac{3}{11}, \frac{3}{12}, \frac{3}{13}, \frac{3}{14}\right\}$

$\therefore$ C is a finite set. **(Ans)**

iv) O = {x EN : $x < 300$}

$\therefore$ O = {1, 2, 3,..... 290}

$\therefore$ O = is a finite set. **(Ans)**

v) D = {x : x EZ and $x < 10$}

$\therefore$ D = {....., –2, –1, 0, 1, 2, 3, 4,5, 6, 7, 8, 9}

$\therefore$ D is an infinite set. **(Ans)**

3. i) A = {2, 4, 6, 8,}

B = }$2n$: $n \in$ N and $n < 5$}

$\therefore$ B = {2, 4, 6, 8}

$\therefore$ Elements of both A and set B are equal,

$\therefore$ A = B. **(Ans)**

$\therefore$ n (A) = n (B)

$\therefore$ A $\leftrightarrow$ B **(Ans)**

ii) M = { x : x is add natural number less than 8}

$\therefore$ M {1, 3, 5, 7}

$\therefore$ n (M) = 4

$\therefore$ N = { x : x is a tetter in the word girl}

$\therefore$ N = {9, i, r, l,}

$\therefore$ n (N) = 4

$\therefore$ n (M) = n (N)

$\therefore$ M $\leftrightarrow$ N **(Ans)**

iii) P = {x : x P + 2, P $\in$ N and P < 5}

$\therefore$ P = {3, 4, 5, 6}

$\therefore$ n (P) = 4

Q = {13, 14, 15, 16}

$\therefore$ n (P) = n (Q)

$\therefore$ P $\leftrightarrow$ Q **(Ans)**

iv) x = { Letters of the wor 'Roo'}

$\therefore$ x = {R, O, D}

$\therefore$ n (x) = 3

y = {Letters of the word 'DOOR'}

$\therefore$ y = {D, O, R}

$\therefore$ n (y) = 3

$\therefore$ Elements of set x and set y are .....

$\therefore$ $x = y$ (Ans)

$\therefore$ n (x) = n (y)

∴ $x \leftrightarrow y$ **(Ans)**

4. A = {x : x is a letter in the word 'reah'}

∴ A = {r, e, a, p}

B = {x : x is a letter in the word 'paper'}

∴ B = {p, a, e, r}

C = (x : x is a letter in the word 'rore'}

∴ C = {r, o, p, e}

∴ All elements of set A, set B and set C are not some,

∴ set A, set B and set C are not equal.

5. i) A = {x : $x \in$ N, $x < 12$}

∴ A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11}

∴ n (A) = 11 **(Ans)**

ii) B = {x : x is a letter in the word 'PICNIC'}

∴ B = {P, I, C, N}

∴ n (B) = 4 **(Ans)**

iii) C = {x : $x \in$ w, $5 < x < 8$}

∴ C = {6,7}

∴ n (C) = 3 **(Ans)**

iv) D = {x : $x \in$ N and $3 < x < 7$}

∴ D = {4, 5, 6}

∴ n (D) = 3 **(Ans)**

v) E = {p : p = w, $2p - 3 < 8$}

∴ E = {0, 1, 2, 3, 4, 5}

∴ n (E) = 6 **(Ans)**

vi) F = (x : x is a prime number, $1 < x < 36$

∴ F = {2, 3, 5, 7, 11, 13, 17, 19, 23, 29}

∴ n (F) = 10 **(Ans)**

6. i) A = {Dispur}

∴ A is a singleton set. **(Ans)**

ii) B = {x : $5x - 3 = 7$, $x \in$ N}

∴ B = {2}

∴ B is a singleton set. **(Ans)**

iii) C = {x : $x^2 = 25$, $x \in$ Z

∴ C = {5}

∴ C is a singleton set. **(Ans)**

iv) D = {prime numbers less than 2}

∴ D = { }

∴ D is an empty set, not a singleton set. **(Ans)**

Exercise 21.3

1. i) True

ii) False

iii) True

iv) True

v) false

2. B = {2, 4, 6}

C = {2, 4, 6, 8, ...}

D = {6}

∴ B = C ≤ C, D ≤ C,

∴ D ≤ B.

3. i) False

ii) True

iii)

iv) True

4. i) False

ii) True

iii)

iv) True

v) True

5. i) True

ii)

iii) False

iv) True

v) True

vi) False

6. i) {a), Φ

ii) {0}, {1}, {0,1}, Φ

iii) $\{a\}, \{b\}, \{c\}, \{a,b\}\ \{a,c\}\ \{b,c\}\ \{a,b,c\}$
Φ

iv) $\{1\}, \{-1\}, \{1, -1\}, \Phi$

v) $\{\Phi\}, \Phi$