Class 8.

Date
Page
Staller

Sub : Mathematics.

1st Term Syllabus :

1. Rational Numbers – 15 marks.

2. Exponents. – 10 marks.

6. Algebraic Expressions and Identities – 13 marks.

9. Application of Pereentage – 12 marks.

12. Understanding Quadrilaterals – 10 marks

15. Area of Polygons. – 12 marks.

18. Introduction to Graphs. – 8 marks.

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Chapter 1 - Rational Numbers

Exercise 1·4.

1.

(i) 7 - 3.

Sol^n 4.

(ii) 8 - (-3).

Sol^n 8 + 3.

= 11

(iii) - 7 - 5.

Sol^n - 12.

(v) (-27) - (-33).

Sol^n - 27 + 33

= 6.

(vii) $\frac{3}{7} - \frac{2}{7}$.

Sol^n $\frac{3-2}{7}$

$= \frac{1}{7}$

(ix) $\frac{-40}{111} - \left(\frac{-60}{111}\right)$.

Sol^n $\frac{-40}{111} + \frac{60}{111}$.

$= \frac{-40+60}{111}$

$= \frac{20}{111}$

(xi) $+\frac{70}{89} - \left(\frac{-19}{89}\right)$.

Sol^n $+\frac{70}{89} + \frac{19}{89}$.

$= \frac{+70+19}{89}$

$= \frac{\cancel{89}^{1}}{\cancel{89}_{1}} = 1.$

$$\left\{\begin{array}{l} - \times - = + \\ + \times + = + \\ - \times + = - \\ + \times - = - \end{array}\right\}$$

2.

(1) False
(ii) False
(iii) True
(iv) True
(v) True
(vi) False.

{* Refer the PROPERTIES OF SUBTRACTION in the text on Pg. 15.

3

(i) $-\frac{6}{9} - \left(\frac{-2}{7}\right)$.

Sol^n $-\frac{6}{9} + \frac{2}{7}$

$$= \frac{\frac{-6}{\cancel{9}_1} \times \cancel{63}^{7} + \frac{2}{\cancel{7}_1} \times \cancel{63}^{9}}{63}$$

$$= \frac{-42 + 18}{63}$$

$$= \frac{-24}{63}$$

$$= \frac{-8}{21}$$

$$\begin{array}{r|l} 9 & 9,\ 7 \\ \hline 7 & 1,\ 7 \\ \hline & 1,\ 1 \end{array}$$

lcm of 9 & 7
= 9 × 7
= 63.

(ii) $\frac{7}{24} - \frac{11}{16}$.

$$\begin{array}{r|l} 8 & 24,\ 16 \\ \hline & 3,\ 2 \end{array}$$

lcm of 24 & 16
= 8 × 3 × 2
= 48.

Sol^n $$\frac{\frac{7}{\cancel{24}_1} \times \cancel{48}^{2} - \frac{11}{\cancel{16}_1} \times \cancel{48}^{3}}{48}$$

$$= \frac{14 - 33}{48}$$

{* Subtract & keeping the sign of the greater no.}

$$\begin{array}{r} 33 \\ -\ 14 \\ \hline 19 \end{array}$$

$$= \frac{-19}{48}$$

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4.

(i) $\frac{3}{7} + \frac{5}{9} - \left(\frac{-2}{3}\right)$.

$$\begin{array}{r|l} 3 & 7,\ 9,\ 3 \\ \hline & 7,\ 3,\ 1 \end{array}$$

lcm of 7, 9, 3
$= 3 \times 7 \times 3$
$= 63$.

Sol:ⁿ $\frac{3}{7} + \frac{5}{9} + \frac{2}{3}$.

$$= \frac{\frac{3}{\cancel{7}_1} \times \overset{9}{\cancel{63}} + \frac{5}{\cancel{9}_1} \times \overset{7}{\cancel{63}} + \frac{2}{\cancel{3}_1} \times \overset{21}{\cancel{63}}}{63}$$

$$= \frac{27 + 35 + 42}{63}$$

$$\begin{array}{r} \scriptstyle{①} \\ 27 \\ 35 \\ 42 \\ \hline 104 \end{array}$$

$$= \frac{104}{63}$$

$$\begin{array}{r|l} & 1 \\ 63 & 104 \\ & -63 \\ \hline & 41 \end{array}$$

(or) $1\frac{41}{63}$.

(ii) $-\frac{1}{6} + \left(\frac{-2}{3}\right) - \frac{1}{3}$

$$\begin{array}{r|l} 3 & 6,\ 3,\ 3 \\ \hline & 2,\ 1,\ 1 \end{array}$$

lcm of 6, 3 & 3.
$= 3 \times 2$
$= 6$

Sol:ⁿ $-\frac{1}{6} - \frac{2}{3} - \frac{1}{3}$.

$$= \frac{-\frac{1}{\cancel{6}_1} \times \overset{1}{\cancel{6}} - \frac{2}{\cancel{3}_1} \times \overset{2}{\cancel{6}} - \frac{1}{\cancel{3}_1} \times \overset{2}{\cancel{6}}}{6}$$

$$= \frac{-1 - 4 - 2}{6}$$

$$\begin{array}{r|l} & 1 \\ 6 & 7 \\ & -6 \\ \hline & 1 \end{array}$$

$$= \frac{-7}{6}$$

(or) $-1\frac{1}{6}$.

Exercise 1.5.

1.

(i) $\frac{4}{15}$ by $\frac{3}{8}$

Sol.ⁿ $\frac{\overset{1}{\cancel{4}}}{5} \times \frac{3}{\cancel{8}_{2}}$

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

$= \frac{3}{10}$

(iii) $-\frac{5}{7}$ by $\frac{14}{15}$.

Sol.ⁿ $-\frac{\overset{1}{\cancel{5}}}{\cancel{7}_{1}} \times \frac{\cancel{14}^{2}}{\cancel{5}_{1}}$

$= \frac{-1 \times 2}{1 \times 1}$

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

$= -2$.

(v) $\frac{13}{40} \times \frac{-25}{39}$.

Sol.ⁿ $\frac{\overset{1}{\cancel{13}}}{\underset{8}{\cancel{40}}} \times \frac{-\cancel{25}^{5}}{\cancel{39}_{3}}$

$= \frac{1 \times -5}{8 \times 3}$

$= \frac{-5}{24}$.

* Fractions closed By multiplication can be reduced to its lowest terms.

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2.

(i) $\left(-\frac{8}{5} \times \frac{3}{4}\right) + \left(\frac{7}{8} \times \frac{-16}{25}\right)$.

Solⁿ: $\left(-\frac{\overset{2}{\cancel{8}}}{5} \times \frac{3}{\underset{1}{\cancel{4}}}\right) + \left(\frac{7}{\underset{1}{\cancel{8}}} \times \frac{\overset{2}{\cancel{-16}}}{25}\right)$.

$= \left(\frac{-2 \times 3}{5 \times 1}\right) + \left(\frac{7 \times -2}{1 \times 25}\right)$.

$= \frac{-6}{5} + \left(\frac{-14}{25}\right)$

$$\begin{array}{r|l} 5 & 5,\ 25 \\ \hline & 1,\ 5 \end{array}$$

LCM of 5 & 25
$= 5 \times 5$
$= 25$.

$= \frac{-6}{5} - \frac{14}{25}$.

$= \dfrac{\frac{-6}{\underset{1}{\cancel{5}}} \times \overset{5}{\cancel{25}} - \frac{14}{\underset{1}{\cancel{25}}} \times \overset{1}{\cancel{25}}}{25}$

$$\begin{array}{r} 1 \\ 25\overline{)44} \\ -25 \\ \hline 19 \end{array}$$

$= \frac{-30 - 14}{25}$

$= \frac{-44}{25}$

(or) $-1\frac{19}{25}$.

(iii) $\left(-\frac{3}{4}\times\frac{8}{15}\right)-\left(\frac{2}{3}\times\frac{-3}{8}\right)-\left(-\frac{4}{7}\times\frac{-14}{15}\right)$

Sol^n $\left(-\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}}\times\frac{\overset{2}{\cancel{8}}}{\underset{5}{\cancel{15}}}\right)-\left(\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}}\times\frac{-\overset{1}{\cancel{3}}}{\underset{4}{\cancel{8}}}\right)-\left(-\frac{4}{\underset{1}{\cancel{7}}}\times\frac{-\overset{2}{\cancel{14}}}{15}\right)$.

$=\frac{-1\times 2}{1\times 5}-\left(\frac{1\times -1}{1\times 4}\right)-\left(\frac{-4\times -2}{1\times 15}\right)$

$=\frac{-2}{5}-\left(\frac{-1}{4}\right)-\frac{8}{15}$.

$$\begin{array}{r|l} 5 & 5,\ 4,\ 15 \\ \hline & 1,\ 4,\ 3. \end{array}$$

LCM of 5, 4 + 15
$= 5\times 4\times 3$
$= 60.$

$=\frac{-2}{5}+\frac{1}{4}-\frac{8}{15}$.

$=\dfrac{\frac{-2}{\underset{1}{\cancel{5}}}\times\overset{12}{\cancel{60}}+\frac{1}{\underset{1}{\cancel{4}}}\times\overset{15}{\cancel{60}}-\frac{8}{\underset{1}{\cancel{15}}}\times\overset{4}{\cancel{60}}}{60}$

$=\frac{-24+15-32}{60}$.

$=\frac{-56+15}{60}$

$=\frac{-41}{60}$.

* Adding up both the negative numbers, we get -56.

3.

Solⁿ: $L.H.S = \left(-\frac{5}{8} \times \frac{4}{15}\right) \times \frac{-3}{4}$

$= \left(-\frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{8}}} \times \frac{\overset{1}{\cancel{4}}}{\underset{3}{\cancel{15}}}\right) \times \frac{-3}{4}$

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

$= \frac{-1}{\cancel{6}_{2}} \times \frac{-\cancel{3}^{1}}{4}$

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

$= \frac{1}{8}$

$R.H.S = \frac{-5}{8} \times \left(\frac{4}{15} \times \frac{-3}{4}\right)$

$= \frac{-5}{8} \times \left(\frac{\overset{1}{\cancel{4}}}{\underset{5}{\cancel{15}}} \times \frac{-\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}}\right)$

$= \frac{-5}{8} \times \left(\frac{1 \times -1}{5 \times 1}\right)$

$= \frac{-\overset{1}{\cancel{5}}}{8} \times \frac{-1}{\cancel{5}_{1}}$

$= \frac{-1 \times -1}{8 \times 1}$

$= \frac{1}{8}$

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$$L.H.S = R.H.S = \frac{1}{8}.$$

Hence verified//.

4.
Sol^n $L.H.S = \frac{-2}{3}\left(\frac{4}{5} + \frac{-8}{15}\right)$

$$= \frac{-2}{3}\left(\frac{\frac{4}{\cancel{5}_1}\times\overset{3}{\cancel{15}} - \frac{8}{\cancel{15}_1}\times\overset{1}{\cancel{15}}}{15}\right)$$

$$= \frac{-2}{3}\left(\frac{12-8}{15}\right).$$

$$= \frac{-2}{3}\times\frac{4}{15}.$$

$$= \frac{-8}{45}.$$

$$R.H.S = \left(\frac{-2}{3}\times\frac{4}{5}\right) + \left(\frac{-2}{3}\times\frac{-8}{15}\right).$$

$$= \frac{-8}{15} + \frac{16}{45}.$$

$$= \frac{\frac{-8}{\cancel{15}_1}\times\overset{3}{\cancel{45}} + \frac{16}{\cancel{45}_1}\times\overset{1}{\cancel{45}}}{45}.$$

$$= \frac{-24+16}{45}.$$

$$= \frac{-8}{45}.$$

P.T.O.

$L \cdot HS = R \cdot H \cdot S = \frac{-8}{49}$.

hence verified //

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(i) Associative Property of Multiplication

(ii) Commutative Property of Multiplication.

(iii) Distributive Property of Multiplication over addition.

7

(i) $\frac{7}{20} \times \frac{6}{17} + \frac{11}{17} \times \frac{7}{20}$.

Solⁿ $\frac{7}{20} \times \left(\frac{6}{17} + \frac{11}{17}\right)$

$= \frac{7}{20} \times \left(\frac{6+11}{17}\right)$.

$= \frac{7}{20} \times \frac{\cancel{17}^{1}}{\cancel{17}_{1}}$

$= \frac{7}{20}$.

* we take out the common fraction. here $\frac{7}{20}$ and close the other two fractions by addition.

Exercise 1.6.

1.

(i) $\frac{12}{19} \div \frac{2}{3}$.

Sol.ⁿ $\frac{\cancel{12}^{\cancel{6}\,2}}{\cancel{9}\,\cancel{3}_1} \times \frac{\cancel{3}^{1}}{\cancel{2}_{1}}$

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

$= \frac{2}{1}$

$= 2.$

* When the sign is '÷' between two fractions, we change the sign into 'x' and write the reciprocal of the fraction that follow immediately

(iv) $\frac{18}{34} \div \frac{-9}{40}$.

Sol.ⁿ $\frac{\cancel{18}^{2}}{\cancel{34}_{17}} \times \frac{-\cancel{40}^{20}}{\cancel{9}_{1}}$

$= \frac{2 \times -20}{17 \times 1}$

$= \frac{-40}{17}$.

(v) $\frac{-6}{11} \div \frac{-18}{44}$.

Sol.ⁿ $\frac{-\cancel{6}^{2}}{\cancel{11}_{1}} \times \frac{-\cancel{44}^{\cancel{4}\,2}}{\cancel{18}\,\cancel{9}_{3}}$.

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

* Reduce the fraction to its lowest form.

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(x) $1\frac{7}{9} \div 1\frac{1}{3}$.

Sol.ⁿ $\frac{9\times1+7}{9} \div \frac{3\times1+1}{3}$.

$= \frac{16}{9} \div \frac{4}{3}$

$= \frac{\cancel{16}^{4}}{\cancel{9}_{3}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{1}}$

$= \frac{4\times1}{3\times1}$

$= \frac{4}{3}$.

or. $1\frac{1}{3}$ //

$$\begin{array}{r} 1 \\ 3\overline{)4} \\ -3 \\ \hline 1 \end{array}$$

2.

(i) $-4 \div \left(\frac{-2}{3}\right) \times \frac{3}{4}$.

Sol.ⁿ $-\cancel{4}^{1} \times \frac{-3}{2} \times \frac{3}{\cancel{4}_{1}}$

$= \frac{-1\times-3\times3}{2\times1}$

$= \frac{9}{2}$

or. $4\frac{1}{2}$.

* Fractions closed by multiplication can be reduced to its lowest terms.

$$\begin{array}{r} 4 \\ 2\overline{)9} \\ -8 \\ \hline 1 \end{array}$$

3.
Solⁿ Let the total no. of students in the school be x.

then,

No. of girls $= \frac{5}{8}$ of x

$= \frac{5}{8} \times x$

$= \frac{5x}{8}$

and No. of boys $= \frac{5x}{8} - 120$

$= \frac{\frac{5x}{\cancel{8}_1} \times \cancel{8}^1 - 120 \times 8}{8}$

$= \frac{5x - 960}{8}$

$$\begin{array}{r} \overset{①}{120} \\ \times 8 \\ \hline 960 \end{array}$$

We know,

No. of girls + No. of boys = total students

$\Rightarrow \frac{5x}{8} + \frac{5x - 960}{8} = x$

$\Rightarrow \frac{5x + 5x - 960}{8} = x$

$\Rightarrow \frac{10x - 960}{8} = x$

$\Rightarrow 10x - 960 = x \times 8$

$\Rightarrow 10x - 960 = 8x$

$\Rightarrow 10x - 8x = 960.$

$\Rightarrow 2x = 960.$

$\Rightarrow x = \frac{\overset{480}{\cancel{960}}}{\cancel{2}_1}$

$\Rightarrow x = 480.$

$\therefore$ total no. of students $= x$
$= 480.$

No. of girls $= \frac{5}{8}$ of x.

$= \frac{5}{\cancel{8}_1} \times \overset{60}{\cancel{480}}.$

$= \frac{5 \times 60}{1}$

$= \frac{300}{1}$

$= 300.$

And No. of boys $= 300 - 120.$
$= 180.$

4.
Solⁿ Given,
length of the garden $= 45\frac{1}{2}$ m.

$= \frac{2 \times 45 + 1}{2}$ m.

$= \frac{91}{2}$ m.

breadth of the garden $= 23\frac{1}{2}$ m.

$= \frac{2 \times 23 + 1}{2}$ m.

$= \frac{47}{2}$ m.

∴ length of barbed wire required to build a three layer fence around it = 3 × perimeter of garden

$= 3 \times \{2 \times (l + b)\}$.

$= 3 \times \{2 \times (\frac{91}{2} m + \frac{47}{2} m)\}$.

$= 3 \times \{2 \times (\frac{91 + 47}{2} m)\}$.

$= 3 \times \{\overset{1}{\cancel{2}} \times \frac{138}{\underset{1}{\cancel{2}}}\}$ m.

$= 3 \times 138$ m.

$$\begin{array}{r} ①② \\ 138 \\ \times 3 \\ \hline 414 \end{array}$$

$= 414$ m //

Exercise 1·7.

* There are two methods in finding one or more rational numbers between two rational numbers. To understand better, refer the examples and the two methods in the text on Pg. 23 & 24.

1.

(i) -5 and -6.

Sol.ⁿ A rational no. between -5 & -6 $= \frac{-5+(-6)}{2}$

$$= \frac{-5-6}{2}$$

$$= \frac{-11}{2}$$

or. -5.5

(ii) $\frac{-8}{11}$ and $\frac{-7}{11}$

Sol.ⁿ A rational no. between $\frac{-8}{11}$ & $\frac{-7}{11}$ $= \frac{\frac{-8}{11} + \frac{-7}{11}}{2}$

$$= \frac{\frac{-8+(-7)}{11}}{2}$$

$$= \frac{\frac{-8-7}{11}}{2}$$

$$= \frac{\frac{-15}{11}}{2}$$

$$= \frac{-15}{11} \times \frac{1}{2}$$

$$= \frac{-15}{22}$$

$\left\{ \right.$ * here $\frac{\frac{-15}{11}}{2}$ can also be written as $\frac{-15}{11} \div 2$.

$\therefore \frac{-15}{11} \div 2 = \frac{-15}{11} \times \frac{1}{2}$

$= \frac{-15}{22}$

2.
(i) $\frac{1}{8}$ and $\frac{1}{12}$.

Sol.ⁿ L.CM of 8 & 12 = 24.

$$\begin{array}{l|l} 4 & 8, 12 \\ \hline & 2, 3 \end{array}$$

LCM = 4 × 2 × 3
= 24.

$\therefore \frac{1}{8} = \frac{1 \times 3}{8 \times 3} = \frac{3}{24}$

and $\frac{1}{12} = \frac{1 \times 2}{12 \times 2} = \frac{2}{24}$

again, $\frac{1}{8} = \frac{3}{24} = \frac{3 \times 10}{24 \times 10} = \frac{30}{240}$.

and $\frac{1}{12} = \frac{2}{24} = \frac{2 \times 10}{24 \times 10} = \frac{20}{240}$.

$\therefore$ three rational no's Between $\frac{1}{8}$ and $\frac{1}{12}$

are $\frac{21}{240}$, $\frac{22}{240}$, $\frac{29}{240}$.

$\left\{ \right.$ * Any between $\frac{20}{240}$ and $\frac{30}{240}$. $\left. \right\}$

(iii) $\frac{2}{13}$ and $\frac{3}{11}$.

$$\begin{array}{r|l} 13 & 13, 11 \\ \hline & 1, 11 \end{array}$$

LCM = 13 × 11
= 143.

Sol.^{n} L.C.M of 13 & 11 = 143.

$$\therefore \frac{2}{13} = \frac{2 \times 11}{13 \times 11} = \frac{22}{143}.$$

$$\begin{array}{r} 13 \\ \times 11 \\ \hline 13 \\ 13 \\ \hline 143 \end{array}$$

$$\text{and } \frac{3}{11} = \frac{3 \times 13}{11 \times 13} = \frac{39}{143}$$

∴ three rational numbers between $\frac{2}{13}$ and $\frac{3}{11}$ are $\frac{23}{143}, \frac{35}{143}, \frac{38}{143}$.

(vi) $\frac{7}{10}$ and $\frac{9}{11}$.

$$\begin{array}{r|l} 10 & 10, 11 \\ \hline & 1, 11 \end{array}$$

LCM = 10 × 11
= 110.

Sol.^{n} L.C.M. of 10 & 11 = 110.

$$\therefore \frac{7}{10} = \frac{7 \times 11}{10 \times 11} = \frac{77}{110}.$$

$$\text{and } \frac{9}{11} = \frac{9 \times 10}{11 \times 10} = \frac{90}{110}.$$

∴ three rational numbers between $\frac{7}{10}$ and $\frac{9}{11}$ are $\frac{78}{110}, \frac{79}{110}, \frac{80}{110}$.

3.

(ii) $\frac{-16}{21}$ and $\frac{18}{25}$.

$$\begin{array}{r|l} 21 & 21, 25 \\ \hline & 1, 25. \end{array}$$

lcm = 21 × 25
= 525.

Sol^n. L.C.M of 21 & 25 = 525.

$$\therefore \frac{-16}{21} = \frac{-16 \times 25}{21 \times 25} = \frac{-400}{525}.$$

$$\begin{array}{r} 21 \\ \times 25 \\ \hline 105 \\ +42 \\ \hline 525 \end{array}$$

$$\text{and } \frac{18}{25} = \frac{18 \times 21}{25 \times 21} = \frac{378}{525}.$$

$$\begin{array}{r} ③ \\ -16 \\ \times 25. \\ \hline ①80 \\ 32 \quad ① \\ \hline -400 \end{array}$$

∴ five rational numbers between

$\frac{-16}{21}$ and $\frac{18}{25}$ are $-\frac{399}{525}$, $-\frac{398}{525}$,

$-\frac{397}{525}$, $\frac{370}{525}$, $\frac{376}{525}$

$$\begin{array}{r} 18 \\ \times 21 \\ \hline 18 \\ 36 \\ \hline 378 \end{array}$$

* Kindly refer the examples in the text for better understanding.

Chapter 2 - Exponents.

Exercise 2.1.

1.

(i) $\left(\frac{3}{5}\right)^3$.

* Negative sign multiplied 'odd' no. of times results in negative sign.

* Negative sign multiplied 'even' no. of times result in positive sign.

Sol^n: $\frac{3}{5} \times \frac{3}{5} \times \frac{3}{5}.$

$= \frac{27}{125}.$

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

Sol^n: $\frac{3}{10} \times \frac{3}{10} \times \frac{3}{10} \times \frac{3}{10}$

$= \frac{81}{1000}.$

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

Sol^n: $\frac{-4}{5} \times \frac{-4}{5}.$

$= \frac{16}{25}.$

(viii) $(-6)^3$

Sol^n: $-6 \times -6 \times -6.$

$=-216.$

2.

(i) 32.

Sol^n $32 = 2 \times 2 \times 2 \times 2 \times 2.$

$= (2)^5.$

2	32.
2	16.
2	8.
2	4.
	2.

(ii) $\frac{-27}{125}.$

* To write a number in exponential form, find the prime factors of the no.

Sol^n $-27 = -3 \times -3 \times -3.$

$125 = 5 \times 5 \times 5.$

$\therefore \frac{-27}{125} = \frac{-3 \times -3 \times -3}{5 \times 5 \times 5}$

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

5	125.
5	25.
	5.

3	27
3	9.
	3.

(vii) $\frac{a^4}{b^4}$

Sol^n $a^4 = a^2 \times a^2$

$b^4 = b^2 \times b^2.$

$\therefore \frac{a^4}{b^4} = \left(\frac{a^2}{b^2}\right)^2$

(ix) $x^3y^3.$

Sol^n $(xy)^3.$

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(x) $\frac{a^6 b^6 c^6}{x^2 y^2 z^2}$.

Sol^n $a^6 b^6 c^6 = (a^3)^2 \times (b^3)^2 \times (c^3)^2$.

$x^2 y^2 z^2 = (xyz)^2$.

$\therefore \frac{a^6 b^6 c^6}{x^2 y^2 z^2} = \left(\frac{a^3 b^3 c^3}{xyz}\right)^2$

(xi) $a^3 b^3$

Sol^n $a^3 b^3 = \frac{1}{a^3 b^3}$.

3(i) 3^2

Sol^n $3^2 = \left(\frac{1}{3}\right)^2$

(iii) $\left(\frac{-7}{8}\right)^6$.

Sol^n $\left(\frac{-7}{8}\right)^6 = \left(\frac{-8}{7}\right)^6$.

(vi) 3^{-3}.

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

(vii) $\left(\frac{-2}{3}\right)^{-3}$.

Sol^n $\left(\frac{-2}{3}\right)^{-3} = \left(\frac{-3}{2}\right)^{-3}$.

4.

*

(i) $\left(\frac{1}{3}\right)^{3}$.

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

$= 3 \times 3 \times 3$.

$= 27$

(ii) $\left(\frac{-2}{5}\right)^{2}$

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

$= \frac{-5}{2} \times \frac{-5}{2}$.

$= \frac{25}{4}$.

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

*

Solⁿ $\left(\frac{7}{2}\right)^{-2} = \left(\frac{2}{7}\right)^{2}$ → because $\left(\frac{x}{y}\right)^{-m} = \left(\frac{y}{x}\right)^{m}$.

then, $\left(\frac{2}{7}\right)^{2} = \left(\frac{7}{2}\right)^{2}$ → reciprocal of $\left(\frac{2}{7}\right)^{2}$

$= \frac{7}{2} \times \frac{7}{2}$.

$= \frac{49}{4}$.

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

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

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

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

$= \frac{-27}{64}$

Exercise 2.2

* For better understanding of solving questions in this exercise, refer the text on LAWS OF EXPONENTS and the examples given on pg. 31-33.

LAWS OF EXPONENTS :

① $x^{a} \times x^{b} = x^{a+b}$

② $x^{a} \div x^{b} = x^{a-b}$

③ $(x^{a})^{b} = x^{a \times b}$

④ $x^{a} \times y^{a} = (x \times y)^{a}$

⑤ $x^{a} \div y^{a} = \left(\frac{x}{y}\right)^{a}$

* Also $x^{0} = 1$ (always).

1.

(i) $\left(\frac{4}{5}\right)^5 \times \left(\frac{4}{5}\right)^4.$

Solⁿ $\left(\frac{4}{5}\right)^{5+4.}$ $\Big\{\longrightarrow$ applying law of exponents. no. 1.

$= \left(\frac{4}{5}\right)^{9.}$

(iii) $\left(\frac{-2}{3}\right)^7 \times \left(\frac{-2}{3}\right)^{-4.}$

Solⁿ $\left(\frac{-2}{3}\right)^{7+(-4)}.$

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

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

(iv) $\left(\frac{7}{8}\right)^{-3} \times \left(\frac{7}{8}\right)^{-3}.$

Solⁿ $\left(\frac{7}{8}\right)^{-3+(-3)}$

$= \left(\frac{7}{8}\right)^{-3-3.}$

$= \left(\frac{7}{8}\right)^{-6.}$

(v) $\left(\frac{3}{7}\right)^{6} \div \left(\frac{3}{7}\right)^{5}.$

Solⁿ: $\left(\frac{3}{7}\right)^{6-5}.$ $\Big\{\longrightarrow$ * Applying law of exponents no. 2.

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

(vi) $\left(\frac{-3}{4}\right)^{-3} \div \left(\frac{-3}{4}\right)^{-3}.$

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

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

$= \left(\frac{-3}{4}\right)^{0}.$

(ix) $\left[\left(\frac{3}{2}\right)^{2}\right]^{7}.$

Solⁿ: $\left(\frac{3}{2}\right)^{2\times 7}.$ $\Big\{\longrightarrow$ * Applying law of exponents no. 3.

$= \left(\frac{3}{2}\right)^{14}.$

(x) $\left[\left(\frac{5}{6}\right)^{3}\right]^{-2}.$

Solⁿ: $\left(\frac{5}{6}\right)^{3\times -2}.$

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

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2.
(i) $\left(\frac{3}{8}\right)^3 \times \left(\frac{4}{9}\right)^3$.

Sol^n: $\frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{8}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{8}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{8}}} \times \frac{\overset{1}{\cancel{4}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{1}{\cancel{4}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{1}{\cancel{4}}}{\underset{3}{\cancel{9}}}$.

* Fractions closed by multiplication can be reduced to their lowest form.

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

$= \frac{1}{216}$.

(iii) $\left(\frac{6}{25}\right)^3 \times \left(\frac{5}{3}\right)^3 \div \left(\frac{2}{5}\right)^3$.

Sol^n: $\frac{\overset{2}{\cancel{6}}}{\underset{5}{\cancel{25}}} \times \frac{\overset{2}{\cancel{6}}}{\underset{5}{\cancel{25}}} \times \frac{\overset{2}{\cancel{6}}}{\underset{5}{\cancel{25}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{3}}} \div \left(\frac{2}{5}\right)^3$.

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

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

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

$= \left(\frac{2}{5}\right)^0$.

$= 1$.

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

{ * here $\frac{1}{3}$ can be written as $\left(\frac{1}{3}\right)^{1}$
ie., $\frac{1}{3} = \left(\frac{1}{3}\right)^{1}$

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

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

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

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

$= 1.$

(vi)

3.

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

Sol^{n} $\left(\frac{1}{2} \times \frac{1}{3}\right)^{2} \times \left(\frac{-8}{3}\right)^{1}$

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

$= \frac{1}{\cancel{6}_{3}} \times \frac{1}{\cancel{6}_{3}} \times \frac{\cancel{-8}\,\cancel{4}\,2}{3}$

$= \frac{-2}{27}$

(ii) $\left(4^{-1} \times 3^{-1}\right) \div 12^{-1} =$

Sol^{n} $\left(\frac{1}{4} \times \frac{1}{3}\right) \div \frac{1}{12}$

$= \frac{1}{12} \div \frac{1}{12}$

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

$= \left(\frac{1}{12}\right)^{0}$

$= 1$

(iii) $(2^5 \div 2^8) \div 2^{-7}$

Sol^n $(2^{5-8}) \div 2^{-7}.$

$= 2^{-3} \div 2^{-7}$

$= 2^{-3-(-7)}$

$= 2^{-3+7}.$

$= 2^{4}.$

$= 2 \times 2 \times 2 \times 2.$

$= 16.$

4.

(i) $\left(\frac{4}{5}\right)^{3} \times \left(\frac{4}{5}\right)^{-6} = \left(\frac{4}{5}\right)^{2n-1}$

Sol^n $\left(\frac{4}{5}\right)^{3+(-6)} = \left(\frac{4}{5}\right)^{2n-1}$

$\Rightarrow \left(\frac{4}{5}\right)^{3-6} = \left(\frac{4}{5}\right)^{2n-1}$

$\Rightarrow \cancel{\left(\frac{4}{5}\right)}^{-3} = \cancel{\left(\frac{4}{5}\right)}^{2n-1}$

$\Rightarrow -3 = 2n-1$

$\Rightarrow -3+1 = 2n.$

$\Rightarrow 2 = 2n.$

$\Rightarrow \frac{\cancel{2}^{1}}{\cancel{2}_{1}} = n.$

$\Rightarrow 1 = n.$

$\therefore n = 1.$

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5.

(i) $\left(\frac{4}{5}\right)^{2n-1}$.

Sol^n: $\left(\frac{5}{4}\right)^{2n-1}$.

(ii) $\left(\frac{2}{5}\right)^{3} \times \left(\frac{5}{4}\right)^{2}$

Sol^n: $\frac{2}{5} \times \frac{\cancel{2}^{1}}{\cancel{5}_{1}} \times \frac{\cancel{2}^{1}}{\cancel{5}_{1}} \times \frac{\cancel{5}^{1}}{\cancel{4}_{2}} \times \frac{\cancel{5}^{1}}{\cancel{4}_{2}}$.

$= \frac{2 \times 1 \times 1 \times 1 \times 1}{5 \times 1 \times 1 \times 2 \times 2}$.

$= \frac{\cancel{2}^{1}}{\cancel{20}_{10}}$.

then $\frac{1}{10} = \frac{10}{1}$ (reciprocal of $\frac{1}{10} = \frac{10}{1}$).

$= 10$.

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6.

(i) $\left(\frac{2}{3}\right)^{2}$.

Solⁿ $\left(\frac{3}{2}\right)^{-2}$

(ii) $\left(2^{-3}\right)^{2}$

Solⁿ $(2)^{-3 \times 2}$.

$= 2^{-6}$.

(iii) $5^{2} \times 5^{3}$.

Solⁿ 5^{2+3}.

$= 5^{5}$

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

(iv) $\left[\left(-\frac{2}{5}\right)^{-1}\right]^{-2}$

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

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

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

7.

(i) $5^{10} \div 5^{8} = \left(\frac{1}{5}\right)^{n}$.

Solⁿ $(5)^{10-8} = \left(\frac{1}{5}\right)^{n}$.

$\Rightarrow (5)^{2} = \left(\frac{1}{5}\right)^{n}$

$\Rightarrow \left(\cancel{\frac{1}{5}}\right)^{-2} = \left(\cancel{\frac{1}{5}}\right)^{n}$.

$\Rightarrow -2 = n$.

$\therefore n = -2$.

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

Solⁿ $\left(-\frac{2}{3}\right)^{4-3} = \left(\frac{-3}{2}\right)^{n}$.

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

$\Rightarrow \left(-\cancel{\frac{3}{2}}\right)^{-1} = \left(-\cancel{\frac{3}{2}}\right)^{n}$.

$\Rightarrow -1 = n$

$\therefore n = -1$.

(iii) $(-5)^4 \div (-5)^2 = 5^n$.

Sol^n: $(-5)^{4-2} = (-5)^n$. $\Rightarrow \dfrac{\cancel{-}5^4}{\cancel{-}5^2} = 5^n$

$\Rightarrow (-5)^2 = 5^n$.

$5^{4-2} = 5^n$

$5^2 = 5^n$

$\Rightarrow n = 2$ //

$n = 2$ //

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8.

(i) $(a^8 \times a^{-5})^0$.

Sol^n 1.

(ii) $(b^2)^4 \times b^0$.

Sol^n $b^{2 \times 4} \times 1$

$= b^8 \times 1$

$= b^8$.

(iii) $-\dfrac{a^{-3} b^{10} c^8 \times bc^8}{(b^{-10} \times c^6)^4}$.

Sol^n $-\dfrac{\left(\frac{1}{a}\right)^3 \times b^{10} \times c^8 \times b \times c^8}{\left\{\left(\frac{1}{b}\right)^{10} \times c^6\right\}^4}$

$= -\dfrac{\left(a^{-3} \times b^{10+1} \times c^{8+8}\right)}{b^{-40} \times c^{24}}$

$= -\dfrac{\left(a^{-3} \times b^{11} \times c^{16}\right)}{b^{-40} \times c^{24}}$

$= -\left(a^{-3} \times b^{11-(-40)} \times c^{16-24}\right)$

$= -\left(a^{-3} b^{51} c^{8}\right) = -\left(\dfrac{b^{51} c^{8}}{a^3}\right)$

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Exercise 2.3.

* When a number is expressed with one whole number and the remaining part as exponents of 10, then the number is said to be in standard form. ie., $m \times 10^n$ and m is a number between 1.0 and 10.0.

→ Refer examples on pg. 35 in the text.

1.

Solⁿ Distance of the star away from the sun = 14, 96, 00, 000 Km
= 1496×10^5 Km.
= $1.496 \times 10^3 \times 10^5$ Km.
= 1.496×10^8 Km.

3.

Solⁿ Diameter of Milky way = 1, 00, 000 light yrs.
= 1×10^5 light yrs.

5.

Solⁿ Given distance = 3, 84, 400 Km.
= 3844×10^2 Km.
= $3.844 \times 10^3 \times 10^2$ Km
= 3.844×10^5 Km.

9.

Solⁿ Distance of Pluto from the sun = 5, 91, 30, 00, 000 K
= 5913×10^6 Km.
= $5.913 \times 10^3 \times 10^6$ Km
= 5.913×10^9 Km.

12.
Sol^n Thickness of human hair $= 0.005$ cm to 0.001c

$= \frac{5}{1000}$ cm to $\frac{1}{1000}$ cm

$= 5^{-3}$ cm to 1^{-3} cm

13. 0.0000067.

Sol^n $6.7 \times \frac{1}{1000000}$.

$= 6.7 \times 10^{-6}$.

14. 0.000172.

Sol^n $1.72 \times \frac{1}{10000}$.

$= 1.72 \times 10^{-4}$.

16. 0.00000000561

Sol^n $5.61 \times \frac{1}{1000000000}$

$= 5.6 \times 10^{-9}$

19. 0.000000504.

Sol^n $5.04 \times \frac{1}{10000000}$

$= 5.04 \times 10^{-7}$.

20. 0.012.

Sol^n $1.2 \times \frac{1}{100}$

$= 1.2 \times 10^{-2}$.

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Ch - 6. Algebriac Expressions + Identities.

* Refer text book pg. 71 - 73 for better understanding of algebriac expressions, Coefficient, like and unlike terms, different types of algebriac expressions, variables and degree of a polynomial.

Exercise 6.1.

1. (i) $x^2 + 7x + 12$.
→ Polynomial

(ii) $x^{\frac{2}{3}} + x^3$.
→ Not a polynomial

(iii) y^3
→ Not a polynomial

(iv) 5.
→ Not a polynomial

(v) $4x^{-3} - x^2 + x + 3$.
→ Not a polynomial

(vi) $4x - y - 1$
→ Not a polynomial

(vii) $7x^2y^{\frac{1}{2}} - 5xy$.
→ Not a polynomial

(viii) $x^2 + 4x^3 - x + 1$
→ Polynomial.

(ix) $\frac{5}{x} + x + 3$.

→ Not a polynomial

(x) $x^2y^2 + y^2z^2 + z^2x^2$

→ Polynomial

(xi) $3x^2 - \frac{1}{y}$.

→ Not a polynomial

(xii) $x^{\frac{2}{3}}y - 4x^3y^{\frac{2}{3}}$

→ Not a polynomial

(xiii) $x^2 + \sqrt[3]{x} - 9$.

→ Not a polynomial

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3.

(i) $3x$

Solⁿ 1.

(ii) $5x^2 + 3x + 4$.

Solⁿ 2.

(iii) $3x + 5y$

Solⁿ 1.

(v) $7x^3 + 8x^2y - 9xy^2$

Solⁿ 3.

(iv) $5xy + 3$.

Solⁿ 2.

(vi) $\frac{3}{5}x^4 + xy$.

Solⁿ 4.

(vii) $x^6 + x^4y^2 + xy^4 + y^3$.

Solⁿ 6.

* Refer text book DEGREE OF POLYNOMIAL pg. 72 to understand better.

4.

(i) $6x^2 + 4x^3 - 7x^4 + 3x + 4$.

Solⁿ: $-7x^4 + 4x^3 + 6x^2 + 3x + 4$.

(v) $3x^2 + 4x + 5x^3 - 7$.

Solⁿ: $5x^3 + 3x^2 + 4x - 7$.

(iv) $6 + 4x - 5x^2 + x^3$.

Solⁿ: $x^3 - 5x^2 + 4x + 6$.

Exercise 6.2.

* When adding polynomials, arrange like terms together then we add them up.

eg: $2x + 20x^2 - y^2 + 4x + 3x^2$.

$\Rightarrow 2x + 4x + 20x^2 + 3x^2 - y^2$

$\Rightarrow 6x + 23x^2 - y^2$

* When solving like terms with unlike signs we always subtract and keep the sign of the greater number.

eg: $\rightarrow 2x - 18x$

$= -16x$.

(or).

$\rightarrow 25y - 2y$.

$= 23y$.

* when like terms have like ~~sig~~ signs, always add and keep the sign of the greater no.

eg: $-2x - 13x$

$= -15x$.

1.

(i) $4x^2 + 5x + 6$; $x^2 + 1$; $5x^3 + 4x + 3$.

Sol^n $4x^2 + 5x + 6 + x^2 + 1 + 5x^3 + 4x + 3$.

$= 4x^2 + x^2 + 5x + 4x + 5x^3 + 6 + 1 + 3$.

$= 5x^2 + 9x + 5x^3 + 10$

$= 5x^3 + 5x^2 + 9x + 10$.

* While adding polynomials, we add all the like terms and in the last step we arrange the terms according to the descending order of their degrees.

(iii) $3a + 2b$; $6a + 9b$.

Sol^n $3a + 2b + 6a + 9b$.

$= 3a + 6a + 2b + 9b$.

$= 9a + 11b$.

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(v) $x^2 - 6xy + y^2$; $-x^2 - 6xy + y^2$; $x^2 - 6xy - y^2$.

Solⁿ $x^2 - 6xy + y^2 - x^2 - 6xy + y^2 + x^2 - 6xy - y^2$.

$= \cancel{x^2} - \cancel{x^2} + x^2 - 6xy - 6xy - 6xy + y^2 + \cancel{y^2} - \cancel{y^2}$

$= x^2 - 18xy + y^2$

$= x^2 + y^2 - 18xy$.

* Here like terms with unlike signs can be cut off. i.e, $\cancel{x^2} - \cancel{x^2}$

(vii) $2 - x - x^2$; $x^2 + x + 3$; $4x^2 + 5x + 7$.

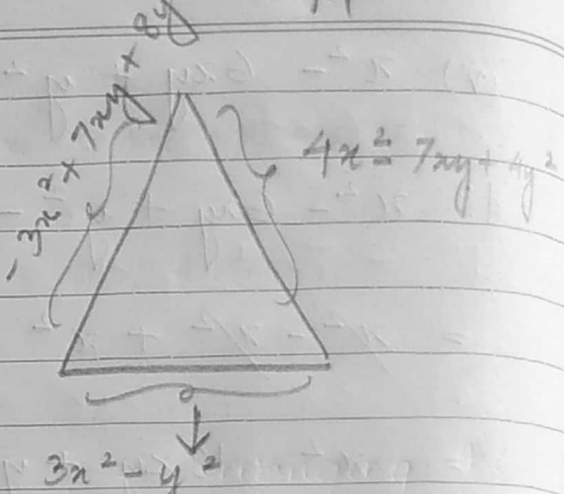
Solⁿ $2 - x - x^2 + x^2 + x + 3 + 4x^2 + 5x + 7$.

$= 2 + 3 + 7 - \cancel{x} + \cancel{x} + 5x - \cancel{x^2} + \cancel{x^2} + 4x^2$

$= 12 + 5x + 4x^2$

$= 4x^2 + 5x + 12$

2.



Solⁿ We know,

Perimeter of a triangle
= Sum of three sides.

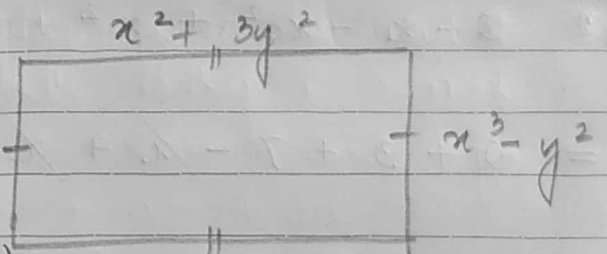
∴ Perimeter of the given triangle $= 3x^2 - y^2 + -3x^2 + 7xy + 8y^2 + 4x^2 - 7xy + 4y^2$

$= 3x^2 - y^2 - 3x^2 + 7xy + 8y^2 + 4x^2 - 7xy + 4y^2$

$= \cancel{3x^2} - \cancel{3x^2} + 4x^2 - y^2 + 8y^2 + 4y^2 + \cancel{7xy} - \cancel{7xy}$

$= 4x^2 + 11y^2.$

3.



Solⁿ We know,

Perimeter of a rectangle $= 2 \times (l + b)$.

∴ Perimeter of the given rectangle $= 2 \times (x^2 + 3y^2 + x^3 - y^2)$.

$= 2(x^2 + 3y^2 - y^2 + x^3)$.

$= 2(x^2 + 2y^2 + x^3)$.

$= 2x^2 + 4y^2 + 2x^3$.

$= 2x^3 + 2x^2 + 4y^2$.

Exercise 6.3.

* When subtracting a polynomial from another, all the signs of the terms in the second polynomial will be changed. ie, negative to positive and positive to negative.

eg: $(3x + 10x^2) - (2x - 10x^2)$.

Sol: $3x + 10x^2 - 2x + 10x^2$

$= 3x - 2x + 10x^2 + 10x^2$

$= x + 20x^2$ //.

1.

(i)

$$\begin{array}{rr} -3x & -4x \\ \underset{(+)}{-}9x & \underset{(+)}{-}7x. \\ \hline 6x & +3x \end{array}$$

(ii)

$$\begin{array}{rrr} 9a & +8b & -9c \\ \underset{(-)}{}3a & & \underset{(+)}{-}4c \\ \hline 6a & +8b & -5c \end{array}$$

2.

Sol:

$$\begin{array}{rrrr} x^4 & +3x^2 & -4x & +4. \\ & \underset{(-)}{+}4x^2 & \underset{(-)}{+}3x & \underset{(+)}{-}7. \\ \hline x^4 & -x^2 & -7x & +11 \end{array}$$

3.

Sol:

$$\begin{array}{rrr} 7x^2 & -5x & +70. \\ \underset{(-)}{}5x^2 & \underset{(+)}{-}4x & \underset{(-)}{+}30 \\ \hline 2x^2 & -x & +40. \end{array}$$

* Arrange like terms in the same column.

* When like terms have unlike signs, always subtract & keep the sign of the greater number

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5.

Sol:^{n}

$$\begin{array}{l}
3x^2 - 4x^3 + 3x + 7 \\
x^2 - x^3 - x + 1 \\
(-) \quad (+) \quad (+) \quad (-) \\
\hline
2x^2 - 3x^3 + 4x + 6.
\end{array}$$

(or).

$-3x^3 + 2x^2 + 4 + 6.$

{ * arranging the terms according to descending order of the degrees

7.

Sol:^{n}

$$(8x^2 - 9y^2) - (3x^2 - 2y^2)$$

$$\begin{array}{l}
8x^2 - 9y^2 \\
3x^2 - 2y^2 \\
(-) \quad (+) \\
\hline
5x^2 - 7y^2
\end{array}$$

$\therefore$ $8x^2 - 9y^2$ is larger than $3x^2 - 2y^2$ by $5x^2 - 7y^2$.

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8.
Sol^n Cost of shirt = ₹ $(5x + 20)$
Cost of belt = ₹ $(2x - 10)$

$\therefore$ Total money spent = $(5x + 20) + (2x - 10)$
= $5x + 20 + 2x - 10$.
= $5x + 2x + 20 - 10$
= ₹$(7x + 10)$

9.
Sol^n Cost of bread = ₹ $(7x + 9)$
Cost of butter = ₹ $(3x - 5)$

Total expenditure = ₹ $(7x + 9)$ + ₹ $(3x - 5)$
= ₹ $(7x + 9 + 3x - 5)$
= ₹ $(7x + 3x + 9 - 5)$
= ₹ $(10x + 4)$

Money she will get back = ₹ 100 − ₹ $(10x + 4)$
= ₹$(100 - 4 - 10x)$.
= ₹$(96 - 10x)$
= ₹$(-10x + 96)$.

(or)

$$\begin{array}{r} 100. \\ 10x + 4. \\ \scriptstyle(-)\quad\ \ (-) \\ \hline -10x + 96. \end{array}$$

10.

Sol.ⁿ Required expression $= (3x^2 + 4x + 1) - (2x^2 - 4x + 35)$

$$\begin{array}{r} 3x^2 + 4x + 1 \\ 2x^2 - 4x + 35 \\ (-) \quad (+) \quad (-) \\ \hline x^2 + 8x - 34 \end{array}$$

$\therefore$ $x^2 + 8x - 34$ must be taken away from $3x^2 + 4x + 1$ to get $2x^2 - 4x + 35$.

Exercise 6.4.

* Multiplying of algebriac expressions involve multiplying of coefficients and Variables.

eg: $2x^2 \times 5x$
$= 2 \times 5 \times x^2 \times x$
$= 10x^3$.

1

(i) $x \times x \times x$
$= x^3$.

(ii) $(-x) \times (-x)$
$= x^2$

(vi) $2a^2b^3 \times 4a^3b^2$
$= 2 \times 4 \times a^2 \times a^3 \times b^3 \times b^2$
$= 8a^5b^5$ //

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2.

(i) $3x^2y \times 5x$

Solⁿ $3 \times 5 \times x^2 \times x \times y.$

$= 15x^3y.$

(ii) $(\sqrt{3x}) \cdot (\sqrt{3x})$.

Solⁿ $\sqrt{3} \times \sqrt{3} \times x \times x$

$= 3x^2$

(iv) $(ab)(4a^2b)(5ab^2)$

Solⁿ $1 \times 4 \times 5 \times a \times a^2 \times a \times b \times b \times b^2$

$= 20a^4b^4.$

(vi) $(7xy^{10})(xy)$.

Solⁿ $7 \times 1 \times x \times x \times y^{10} \times y.$

$= 7x^2y^{11}$

(vii) $\left(\frac{1}{3}x^3y\right)\left(\frac{1}{8}xy\right)$

Solⁿ $\frac{1}{3} \times \frac{1}{8} \times x^3 \times x \times y \times y.$

$= \frac{1}{24}x^4y^2.$

(x) $(25xy)(-5zy)$

Solⁿ $25 \times -5 \times x \times x \times y \times y.$

$= -125x^2y^2$ //

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3.

(i) $a(a-b)$.

* multiply 'a' with both the terms in the bracket ie, $(a-b)$

Solⁿ $a \times a - a \times b$.

$= a^2 - ab$.

(iii) $5(x^2-y^2)$.

Solⁿ $5 \times x^2 - 5 \times y^2$

$5x^2 - 5y^2$.

(v) $3ab(a^2b - ab^2)$.

Solⁿ $3ab \times a^2b - 3ab \times ab^2$.

$= 3 \times 1 \times a \times a^2 \times b \times b - 3 \times 1 \times a \times a \times b \times b^2$.

$= 3a^3b^2 - 3a^2b^3$ //.

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4(i) $(y+2)(y-4)$.

Sol^n $y \times y - y \times 4 + 2 \times y - 2 \times 4$.

$= y^2 - 4y + 2y - 8$

$= y^2 - 2y - 8$

(or.)

(ii) $(y+2)\ (y-4)$.

Sol^n $y \times (y-4) + 2(y-4)$

$y^2 - 4y + 2y - 8$.

$y^2 - 2y - 8$.

(iii) $(x^2+5)\ (x^2+10)$.

Sol^n $x^2 \times (x^2+10) + 5(x^2+10)$.

$= x^4 + 10x^2 + 5x^2 + 50$.

$= x^4 + 15x^2 + 50$.

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(v) $(2x^2y - 3y)(3xy - x)$.

Solⁿ $2x^2y \times (3xy - x) - 3y(3xy - x)$.

$= 6x^3y^2 - 2x^3y - 9xy^2 + 3xy$.

5.

(i) $(5 - 2d - d^2)(3 - 2d)$.

Solⁿ $5 \times (3-2d) - 2d \times (3-2d) - d^2 \times (3-2d)$.

$= 15 - 10d - 6d + 4d^2 - 3d^2 + 2d^3$.

$= 15 - 16d + d^2 + 2d^3$.

$= 2d^3 + d^2 - 16d + 15$.

(iv) $(a^2b^2 - 2ab + 4)(a + 2)$

Solⁿ $a^2b^2 \times (a + 2) - 2ab \times (a+2) + 4 \times (a+2)$.

$= a^3b^2 + 2a^2b^2 - 2a^2b - 4ab + 4a + 8$.

$= a^3b^2 - 2a^2b + 4a + 2a^2b^2 - 4ab + 8$.

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(vii) $(3x + 4y + 5z)(4x + 3y + 4z)$

Sol^n $3x \times (4x + 3y + 4z) + 4y \times (4x + 3y + 4z) + 5z \times (4x + 3y + 4z)$

$= 12x^2 + 9xy + 12xz + 16xy + 12y^2 + 16yz + 20xz + 15yz + 20z^2$

$= 12x^2 + 9xy + 16xy + 12xz + 20xz + 12y^2 + 16yz + 15yz + 20z^2.$

$= 12x^2 + 25xy + 32xz + 12y^2 + 31yz + 20z^2.$

$= 12x^2 + 12y^2 + 20z^2 + 31yz + 32xz.$

(ix) $(1 - 4x)(1 + x + x^2)$

Sol^n $1 \times (1 + x + x^2) - 4x \times (1 + x + x^2).$

$= 1 + x + x^2 - 4x - 4x^2 - 4x^3.$

$= 1 + x - 4x + x^2 - 4x^2 - 4x^3.$

$= 1 - 3x - 3x^2 - 4x^3.$

$= -4x^3 - 3x^2 - 3x + 1.$

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Exercise 6.5.

* We can apply the 2nd law of exponent here. ie, $p^{100} \div p^{2}$
$= p^{100-2}$

1

(i) $\frac{p^{100}}{p^{2}}$

Sol.ⁿ p^{100-2}.

$= p^{98}$.

(iii) $\frac{x^{20}y^{5}}{x^{4}y^{3}}$.

Sol.ⁿ $x^{20-4}y^{5-3}$.

$= x^{16}y^{2}$.

(v) $\frac{49a^{2}b^{6}c^{8}}{7a^{2}b^{2}c^{2}}$.

Sol.ⁿ $\frac{\overset{7}{\cancel{49}}}{\underset{1}{\cancel{7}}}a^{2-2}b^{6-2}c^{8-2}$.

$= 7b^{4}c^{6}$.

(vi) $\frac{-6^{3}}{-6^{3}}$.

Sol.ⁿ $\frac{+\cancel{6^{3}}^{1}}{+\cancel{6^{3}}_{1}}$

$= 1$.

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2.

(i) $\frac{8x + 8y}{8}$.

Sol.^{n} $\frac{\overset{1}{\cancel{8}}x}{\underset{1}{\cancel{8}}} + \frac{\overset{1}{\cancel{8}}y}{\underset{1}{\cancel{8}}}$

$= \frac{x + y}{1}$

$= x + y$.

(iii) $100x - 60y$.

Sol.^{n} $\frac{\overset{25}{\cancel{100}}x}{-\underset{1}{\cancel{4}}} - \frac{\overset{15}{\cancel{60}}y}{\underset{1}{\cancel{4}}}$

$= \frac{25x - 15y}{-1}$.

$= -(25x - 15y)$.

$= -25x + 15y$

(iv) $\frac{-6y^2 - 24z^2}{6}$.

Sol.^{n} $\frac{-\overset{1}{\cancel{6}}y^2}{\underset{1}{\cancel{6}}} - \frac{\overset{4}{\cancel{24}}z^2}{\underset{1}{\cancel{6}}}$

$= \frac{-y^2 - 4z^2}{1}$

$= -y^2 - 4z^2$.

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(vii) $(36q^5 + 48q^9) \div (-12q^3)$

Sol^n $\dfrac{\overset{3}{\cancel{36}}q^5}{-\underset{1}{\cancel{12}}q^3} + \dfrac{\overset{4}{\cancel{48}}q^9}{-\underset{1}{\cancel{12}}q^3}$

$= \dfrac{3q^{5-3} + 4q^{9-3}}{-1}$

$= \dfrac{3q^2 + 4q^6}{-1}$

$= -(3q^2 + 4q^6)$

$= -3q^2 - 4q^6$

(ix) $\dfrac{-81a^9b^{14} + 27a^5b^3}{9a^3b^2}$

Sol^n $\dfrac{-\overset{9}{\cancel{81}}a^9b^{14}}{\underset{1}{\cancel{9}}a^3b^2} + \dfrac{\overset{3}{\cancel{27}}a^5b^3}{\underset{1}{\cancel{9}}a^3b^2}$

$= \dfrac{-9a^{9-3}b^{14-2} + 3a^{5-3}b^{3-2}}{1}$

$= -9a^6b^{12} + 3a^2b$

(xii) $(34y^3z^2 + 51y^5z^3) \div 17y^2z^2$.

Sol^n $\dfrac{\overset{2}{\cancel{34}}y^3z^2}{\underset{1}{\cancel{17}}y^2z^2} + \dfrac{\overset{3}{\cancel{51}}y^5z^3}{\underset{1}{\cancel{17}}y^2z^2}$

$$= \frac{2y^{3-2}z^{2-2} + 3y^{5-2}z^{3-2}}{1}$$

$$= 2y + 3y^3z.$$

3.

Sol^n Cost of $5x$ Books $= ₹\,(10x^2 + 20x)$.

$\therefore$ Cost of 1 book $= \dfrac{₹\,(10x^2 + 20x)}{5x}$

$$= ₹\left(\frac{\overset{2}{\cancel{10}}x^2}{\underset{1}{\cancel{5}}x} + \frac{\overset{4}{\cancel{20}}x}{\underset{1}{\cancel{5}}x}\right)$$

$$= ₹\left(\frac{2x^{2-1} + 4x^{1-1}}{1}\right)$$

$$= ₹\,(2x + 4).$$

4.

Sol^n: Area of the rectangular field $= 21x^2 - 7x$.

One of its sides $= 7x$.

$\therefore$ the other side $= \dfrac{21x^2 - 7x}{7x}$.

$= \dfrac{\overset{3}{\cancel{21}}x^2}{\underset{1}{\cancel{7}}x} - \dfrac{\cancel{7x}^{1}}{\cancel{7x}.1}$

$= \dfrac{3x^{2-1} - 1}{1}$

$= 3x - 1$

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Exercise 6.6.

1

(i) $(x^2 + 7x + 10) \div (x + 5)$

$(x+5) \times x$
$= x^2 + 5x.$

Sol.ⁿ

$x + 2$

$x+5. \;\big)\; \cancel{x^2} + 7x + 10.$

$\cancel{x^2} + 5x \downarrow$

$(-) \quad (-)$

$\cancel{2x} + \cancel{10}.$

$\cancel{2x} + \cancel{10}.$

$(-) \quad (-)$

$\times\times.$

$(x+5) \times 2$
$= 2x + 10.$

$\therefore (x^2 + 7x + 10) \div (x+5) = x + 2.$

(ii) $(a^2 - 13a + 30) \div (a - 10).$

Sol.ⁿ

$a - 3$

$a-10 \;\big)\; \cancel{a^2} - 13a + 30.$

$\cancel{a^2} - 10a.$

$(-) \quad (+)$

$- \cancel{3}a + \cancel{30}.$

$- \cancel{3}a + \cancel{30}.$

$(+) \quad (-)$

$\times\times$

$(a-10) \times a$
$= a^2 - 10a$

$(a-10) \times -3$
$= -3a + 30.$

$\therefore (a^2 - 13a + 30) \div (a - 10) = a - 3.$

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

$(p-3) \times p$
$= p^2 - 3p$

$(p-3) \times 2$

Solⁿ

$$
\begin{array}{r|l}
 & p + 2 \\
\hline
p - 3. & \cancel{p^2} - p - 6 \\
 & \cancel{p^2} - 3p \\
 & \overset{(-)}{} \quad \overset{(+)}{} \\
\hline
 & \cancel{2p} - \cancel{6} \\
 & \cancel{2p} - \cancel{6} \\
 & \overset{(-)}{} \quad \overset{(+)}{} \\
\hline
 & \times \times
\end{array}
$$

$\therefore \frac{p^2 - p - 6}{p - 3} = p + 2.$

(vii) $\frac{y^2 - 90y + 2000}{y - 50}$

Solⁿ

$$
\begin{array}{r|l}
 & y + 40 \\
\hline
y - 50 & \cancel{y^2} - 90y + 2000 \\
 & \cancel{y^2} - 50y \\
 & \overset{(-)}{} \quad \overset{(+)}{} \\
\hline
 & \cancel{40y} + \cancel{2000} \\
 & \cancel{40y} + \cancel{2000} \\
 & \overset{(-)}{} \quad \overset{(-)}{} \\
\hline
 & \times \times
\end{array}
$$

$(y - 50) \times y$
$= y^2 - 50y$

$(y - 50) \times 40$
$= 40y - 2000$

$\therefore \frac{y^2 - 90y + 2000}{y - 50} = y + 40.$

2.

(i) $(-49a^2 - 14a) \div 7a$.

Sol.^{n} $\dfrac{-\overset{7}{\cancel{49}}a^2}{\underset{1}{\cancel{7}}a} - \dfrac{\overset{2}{\cancel{14}}\cancel{a}}{\underset{1}{\cancel{7}}\cancel{a}}$

$= \dfrac{-7a^{2-1} - 2}{1}$

$= -7a - 2.$

(iii) $\dfrac{-30a^6 - 6a^3}{-6a^3}$

Sol.^{n} $\dfrac{\cancel{-}\overset{5}{\cancel{30}}a^6}{\cancel{-}\underset{1}{\cancel{6}}a^3} - \dfrac{\cancel{6}a^3\ ^{1}}{-\cancel{6}a^3\ _{1}}$

$= \dfrac{5a^{6-3} + 1}{1}$

$= 5a^3 + 1$ //

3.

(i) $(6x^2 - 7x - 5) \div (2x + 1)$

P.T.O.

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Sol^n

$$
\begin{array}{r|l}
 & 3x - 5 \\
\hline
2x+1 & \cancel{6x^2} - 7x - 5 \\
 & \cancel{6x^2} + 3x \ \downarrow \\
 & (-) \quad (-) \\
\hline
 & -\cancel{10x} - \cancel{5} \\
 & -\cancel{10x} - \cancel{5} \\
 & \quad (+) \quad (+) \\
\hline
 & \times \ \times
\end{array}
$$

$(2x+1) \times 3x$
$= 6x^2 + 3x$

$(2x+1) \times -5$
$= -10x - 5$

$\therefore \ (6x^2 - 7x - 5) \div (2x+1) = 3x - 5$

(iii) $\dfrac{9x^2 + 6x + 1}{3x + 1}$

Sol^n

$$
\begin{array}{r|l}
 & 3x + 1 \\
\hline
3x+1 & \cancel{9x^2} + 6x + 1 \\
 & \cancel{9x^2} + 3x \ \downarrow \\
 & (-) \quad (-) \\
\hline
 & \cancel{3x} + \cancel{1} \\
 & \cancel{3x} + \cancel{1} \\
 & \quad (-) \quad (-) \\
\hline
 & \times \times
\end{array}
$$

$\therefore \ \dfrac{9x^2 + 6x + 1}{3x + 1} = 3x + 1$

5.

Solⁿ: Area of the field = $(a^2 - 19a + 90)$ sq units

Length of the field = $(a - 9)$ units

∴ Width of the field = $\frac{a^2 - 19a + 90}{a - 9}$

= $(a - 10)$ units

* $(a - 9) \times a$
$= a^2 - 9a$

* $(a - 9) \times -10$
$= -10a + 90$

$$\begin{array}{r|l} & a - 10 \\ \hline a - 9 & \cancel{a^2} - 19a + 90 \\ & \cancel{a^2} - 9a \quad \downarrow \\ & (-) \quad (+) \\ \hline & -\cancel{10a} + \cancel{90} \\ & -\cancel{10a} + \cancel{90} \\ & (+) \quad (-) \\ \hline & \times\times \end{array}$$

6

(i) $\frac{a^2 + 8a - 9}{a - 7}$

* $(a - 7) \times a$
$= a^2 - 7a$

* $(a - 7) \times 15$
$= 15a - 105$

Solⁿ:

$$\begin{array}{r|l} & a + 15 \\ \hline a - 7 & \cancel{a^2} + 8a - 9 \\ & \cancel{a^2} - 7a \\ & (-) \quad (+) \\ \hline & \cancel{15a} - 9 \\ & \cancel{15a} - 105 \\ & (-) \quad (+) \\ \hline & 96 \end{array}$$

∴ Quotient = $a + 15$
Remainder = 96

(iii) $\dfrac{3p^3 - 7}{p - 1}$

Sol.^{n}

$$
\begin{array}{r|l}
 & 3p^2 + 3p + 3 \\ \hline
p - 1 & \cancel{3p^3} - 7 \\
 & \underset{(-)}{\cancel{3p^3}} \underset{(+)}{-} 3p^2 \\ \hline
 & \quad \cancel{3p^2} - 7 \\
 & \quad \underset{(-)}{\cancel{3p^2}} \underset{(+)}{-} 3p \\ \hline
 & \qquad \cancel{3p} - 7 \\
 & \qquad \underset{(-)}{\cancel{3p}} \underset{(+)}{\cancel{-3}} \\ \hline
 & \qquad\quad -4
\end{array}
$$

$\therefore$ Quotient $= 3p^2 + 3p + 3$.

Remainder $= -4$.

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Exercise 6.7.

1.

(i) $(x + c)(x + d)$

* Polynomials can be also simplified by using identities

Solⁿ $x^2 + x(c + d) + c \times d$.

$= x^2 + x(c + d) + cd$.

(iii) $(x + 2)(x + 3)$.

Solⁿ $x^2 + x(2 + 3) + 2 \times 3$.

$= x^2 + x \times 5 + 6$.

$= x^2 + 5x + 6$.

(v) $(x + 7)(x - 5)$.

Solⁿ $x^2 + x\{7 + (-5)\} + 7 \times -5$

$= x^2 + x\{7 - 5\} + (-35)$.

$= x^2 + x \times 2 - 35$.

$= x^2 + 2x - 35$.

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(vii) $(x-8)(x-2)$.

Solⁿ $x^2 + x\{(-8)+(-2)\} + (-8)\times(-2)$.

$= x^2 + x\{(-8)-2\} + 16$

$= x^2 + x \times -10 + 16$.

$= x^2 - 10x + 16$.

2.

(i) $(x+c)^2$

Solⁿ $x^2 + 2xc + c^2$

(ii) $(p+q)^2$

Solⁿ $p^2 + 2pq + q^2$.

(v) $(x+3y)^2$

Solⁿ $x^2 + 2(x \times 3y) + (3y)^2$.

$= x^2 + 6xy + 9y^2$.

(vi) $(3x+2y)^2$

Solⁿ $(3x)^2 + 2\times(3x \; 2y) + (2y)^2$.

$= 9x^2 + 2\times(6xy) + 4y^2.$

$= 9x^2 + 12xy + 4y^2.$

(viii) $\left(\frac{3x}{4} + 1\right)^2.$

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

$= \frac{9x^2}{16} + 2\times\frac{3x}{4} + 1^2.$

$= \frac{9x^2}{16} + \frac{\overset{3}{\cancel{6}}x}{\underset{2}{\cancel{4}}} + 1$

$= \frac{9x^2}{16} + \frac{3x}{2} + 1.$

(xi) $(2x^2y + 3xy^2)^2.$

Solⁿ $(2x^2y)^2 + 2\times\{2x^2y\times 3xy^2\} + (3xy^2)^2.$

$= 4x^4y^2 + 2\times 6x^3y^3 + 9x^2y^4.$

$= 4x^4y^2 + 12x^3y^3 + 9x^2y^4.$

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3.

(i) $(x - b)^2$.

Solⁿ $x^2 - 2bx + b^2$.

(iii) $(3x - 5y)^2$.

Solⁿ $(3x)^2 - 2 \times (3x \times 5y) + (5y)^2$.

$= 9x^2 - 2 \times 15xy + 25y^2$

$= 9x^2 - 30xy + 25y^2$.

(vi) $\left(x - \frac{1}{x}\right)^2$.

Solⁿ $x^2 - 2 \times \left(\cancel{x} \times \frac{1}{\cancel{x}}\right) + \left(\frac{1}{x}\right)^2$.

$x^2 - 2 + \frac{1}{x^2}$.

(viii) 47^2.

Solⁿ $(50 - 3)^2 = (50)^2 - 2 \times 50 \times 3 + (3)^2$.

$= 2500 - 300 + 9$.

$= 2209$.

$$\begin{array}{r} 2509 \\ 300 \\ \hline 2209 \end{array}$$

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4.

(i) $(x+p)(x-p)$.

Sol^n $x^2 - p^2$

(ii) $(a+3)(a-3)$

Sol^n $a^2 - 3^2$

$= a^2 - 9$.

(vi) $(3x - 4y)(3x + 4y)$

Sol^n $(3x)^2 - (4y)^2$.

$= 9x^2 - 16y^2$.

(vii) $(x^2 + y^2)(x^2 - y^2)$

Sol^n $(x^2)^2 - (y^2)^2$.

$= x^4 - y^4$.

(viii) 390×410.

Sol^n $(400 - 10)(400 + 10)$.

$= 400^2 - 10^2$.

$= 160000 - 100$

$= 159900$.

$$\begin{array}{r} 160000 \\ -100 \\ \hline 159900 \end{array}$$

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(ix) $\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$.

Solⁿ $x^2 - \left(\frac{1}{x}\right)^2$.

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

5.

(i) 12×18.

Solⁿ $12 \times 18 = (10+2)(10+8)$

$= 10^2 + 10(2+8) + 2 \times 8$.

$= 100 + 10 \times 10 + 16$.

$= 100 + 100 + 16$.

$= 216$.

(iii) 95×102.

Solⁿ $95 \times 102 = (100-5)(100+2)$

$= 100^2 + 100 \times (-5+2) + (-5 \times 2)$

$= 10000 + 100 \times -3 + (-10)$.

$= 10000 - 300 - 10$.

$= 9690$.

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Exercise 6.8

* An unconditional equation is called an identity. It is an equation that is true for all values of x.

There are 9 identities.

→ $(x+a)(x+b) = x^2 + x(a+b) + ab$.

→ $(a+b)^2 = a^2 + 2ab + b^2$.

→ $(a-b)^2 = a^2 - 2ab + b^2$

→ $(a+b)(a-b) = a^2 - b^2$.

→ $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 = a^3 + b^3 + 3ab \times (a+b)$

→ $a^3 + b^3 = (a+b)^3 - 3ab(a+b)$.

→ $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3 = a^3 - b^3 - 3ab \times (a-b)$

→ $a^3 - b^3 = (a-b)^3 + 3ab(a-b)$.

→ $(a+b+c)^3 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$.

1.

(i) $(2x+y)^3$.

Solⁿ $(2x)^3 + 3 \times (2x)^2 \times y + 3 \times 2x \times y^2 + y^3$.

$= 8x^3 + 3 \times 4x^2 \times y + 6xy^2 + y^3$.

$= 8x^3 + 12x^2y + 6xy^2 + y^3$.

{ Using the identity $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.

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(iii) $(3x - 2y)^3$.

Sol.^{n} $(3x)^3 - 3\times(3x)^2\times 2y + 3\times 3x\times(2y)^2 - (2y)^3$.

$= 27x^3 - 3\times 9x^2\times 2y + 3\times 3x\times 4y^2 - 8y^3$

$= 27x^3 - 54x^2y + 36xy^2 - 8y^3$.

(v) $(x - 2y)^3$.

Sol.^{n} $x^3 - 3\times(x)^2\times 2y + 3\times x\times(2y)^2 - (2y)^3$.

$= x^3 - 3\times x^2\times 2y + 3\times x\times 4y^2 - 8y^3$.

$= x^3 - 6x^2y + 12xy^2 - 8y^3$.

2.

(i) $x^3 + y^3$ if $x + y = 3$ and $x + y = 2$.

Sol.^{n} We know,

$x^3 + y^3 = (x+y)^3 - 3xy(x+y)$.

$= (3)^3 - 3\times 2\times 3$.

$= 27 - 18$

$= 9$.

** Applying the identity $a^3 + b^3 = (a+b)^3 - 3ab\times(a+b)$.

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(iii) $27x^3 - 64y^3$ if $3x - 4y = 0$ and $xy = 12$.

Sol^n here,

$27x^3$ can be written as $(3x)^3$. and

$64y^3$ " " " " $(4y)^3$.

$\therefore 27x^3 - 64y^3 = (3x)^3 - (4y)^3$.

$= (3x - 4y)^3 + 3 \times 3x \times 4y \times (3x - 4y)$

$= 0^3 + 36xy \times 0$.

$= 0 + 36 \times 12 \times 0$.

$= 0 + 0$.

$= 0$.

3.

(i) $(3a + b)^3 + (3a - b)^3$.

Sol^n $\{(3a)^3 + 3 \times (3a)^2 \times b + 3 \times 3a \times b^2 + b^3\} + \{(3a)^3 - 3 \times (3a)^2 \times b + 3 \times 3a \times b^2 - b^3\}$.

$= \{27a^3 + 3 \times 9a^2 \times b + 9ab^2 + b^3\} + \{27a^3 - 3 \times 9a^2b + 9ab^2 - b^3\}$.

$= 27a^3 + \cancel{27a^2b} + 9ab^2 + \cancel{b^3} + 27a^3 - \cancel{27a^2b} + 9ab^2 - \cancel{b^3}$.

$= 54a^3 + 18ab^2$.

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(iii) $(2x-y)^3 - (2x+y)^3$

Sol^n $\{(2x)^3 - 3\times(2x)^2\times y + 3\times 2x\times y^2 + y^3\} - \{(2x)^3 + 3\times(2x)^2\times y + 3\times 2x\times y^2 + y^3\}$.

$= \{8x^3 - 3\times 4x^2\times y + 6xy^2 - y^3\} - \{8x^3 + 3\times 4x^2\times y + 6xy^2 + y^3\}$.

$= \{8x^3 - 12x^2y + 6xy^2 - y^3\} - \{8x^3 + 12x^2y + 6xy^2 + y^3\}$.

$= \cancel{8x^3} - 12x^2y + \cancel{6xy^2} - y^3 - \cancel{8x^3} - 12x^2y - \cancel{6xy^2} - y^3$

$= -24x^2y - 2y^3$ //

4.

(i) $(102)^3$.

Sol^n $(100+2)^3$.

$= (100)^3 + 3\times(100)^2\times 2 + 3\times 100\times(2)^2 + 2^3$.

$= 1000000 + 3\times 10000\times 2 + 3\times 100\times 4 + 8$.

$= 1000000 + 60000 + 1200 + 8$.

$= 1061208$.

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(iv) $(99)^3$.

Solⁿ $(100-1)^3$.

$= (100)^3 - 3 \times (100)^2 \times 1 + 3 \times 100 \times 1^2 - 1^3$.

$= 1000000 - 3 \times 10000 + 300 - 1$

$= 1000000 - 30000 + 300 - 1$

$= 970299$.

5.

(i) $(a-b+c)^2$

Solⁿ $a^2 + b^2 + c^2 - 2ab + 2bc - 2ac$.

(ii) $(a-b-c)^2$.

Solⁿ $a^2 + b^2 + c^2 - 2ab + 2bc - 2ac$.

(iii) $(5x + y + 2z)^2$

Solⁿ $(5x)^2 + (y)^2 + (2z)^2 + 2 \times 5x \times y + 2 \times y \times 2z + 2 \times 5x \times 2z$

$= 25x^2 + y^2 + 4z^2 + 10xy + 4yz + 20xz$.

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(v) $(5a + b - 3c)^2$

Sol^n $(5a)^2 + (b)^2 + (3c)^2 - 2 \times 5a \times b + 2 \times b \times 3c - 2 \times 5a \times 3c$

$= 25a^2 + b^2 + 9c^2 - 10ab + 6bc - 30ac$.

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Chapter - 9. Applications of Percentages.

Formula :

* Percentage increase = $\frac{\text{increase in amount}}{\text{Original amount}} \times 100\,\%$.

* Percentage decrease = $\frac{\text{decrease in amount}}{\text{Original amount}} \times 100\,\%$.

Exercise 9·1 ..

1.

(i)

Solⁿ: Previous year bus fare = ₹ 50.
Current " " " = ₹ 60.
Increase in bus fare = ₹(60 - 50)
= ₹ 10.

∴ Percentage increase = $\frac{₹\cancel{10}^{1}}{\cancel{50}_{\cancel{5}_{1}}} \times \cancel{100}^{20}\,\%$.

= 20 %.

(ii)

Solⁿ: Previous year telephone charge = ₹ 2.

Current " " " = ₹ 1·50.
Decrease in charge = ₹(2 - 1·50).
= ₹ 0·50.

$$\begin{array}{r} 2\cdot 00 \\ -\;1\cdot 50 \\ \hline \cdot 50 \end{array}$$

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$\therefore$ Percentage decrease $= \dfrac{0.50}{2} \times 100\,\%$

$= \dfrac{50}{2}\,\%$

$= 25\,\%.$

(viii)
Sol.^{n} Previous year saving = ₹ 80,000.
Current " " = ₹ 1,00,000

Increase in saving = ₹ (1,00,000 − 80,000).
= ₹ 20,000.

$\therefore$ Percentage increase $= \dfrac{\overset{1}{\cancel{20000}}}{\underset{4}{\cancel{80000}}} \times \overset{25}{\cancel{100}}\,\%$.

$= 25\,\%.$

(x)
Sol.^{n} Increase in charges of dry cleaning
= ₹(200 − 150)
= ₹ 50.

$\therefore$ Percentage increase $= \dfrac{\overset{1}{\cancel{50}}}{\underset{3}{\cancel{150}}} \times 100\,\%$.

$= 33\frac{1}{3}\,\%.$

$$\begin{array}{r|l} & 33 \\ \hline 3 & 100 \\ & -9 \\ \hline & 10 \\ & 9 \\ \hline & 1 \end{array}$$

2
Sd.^{n} Past Population = 12, 00, 000

$$\text{Present Population} = 12,00,000 + \frac{\overset{3}{\cancel{15}}}{\underset{\underset{1}{\cancel{2}}}{\cancel{100}}} \times \overset{60000}{\cancel{12,00,000}}.$$

$$= 12,00,000 + 180000$$
$$= 13,80,000.$$

Let last year's crop be x.
Present year crop = 90,000 kg.
∵ present year crop is 25% more than last year. ie., $\frac{25x}{100}$.
We can say,

$$x + \frac{25x}{100} = 90000.$$

$$\Rightarrow \frac{x \times 100 + \frac{25x}{\cancel{100}_{1}} \times \cancel{100}^{1}}{100} = 90000.$$

$$\Rightarrow \frac{100x + 25x}{100} = 90000$$

$$\Rightarrow \frac{125x}{100} = 90000.$$

$$\Rightarrow 125x = 90000 \times 100.$$

$$\Rightarrow x = \frac{\overset{18000}{\cancel{90000}} \times \overset{\overset{4.}{\cancel{20}}}{\cancel{100}}}{\underset{\underset{\underset{1}{\cancel{5}}}{\cancel{25}}}{\cancel{125}}}$$

$\Rightarrow x = 18000 \times 4.$
$= 72000.$

$\therefore$ Previous years crops or amount of apples = 72000 kg.

Exercise 9.2.

** when S.P is greater than C.P, there is Profit.
$\therefore$ Profit = SP − C.P.

** when C.P is greater than S.P, there is loss.
$\therefore$ loss = C.P − SP.

NOTE: Refer text pg. 117 for formulas to find out Profit %, loss %, how to find C.P when S.P and profit % or loss % are given and also how to find S.P when C.P and profit % or loss % are given.

1.
(i)
Solⁿ C.P = ₹ 1,85,000.
S.P = ₹ 2,00,000.
here S.P > C.P, there is Profit
$\therefore$ Profit = S.P − C.P.
= ₹(2,00,000 − 1,85,000)
= ₹ 15000.

(vi)
Solⁿ C·P = ₹ 784.
S·P = ₹ 682.
here C·P > S·P, there is loss.
∴ loss = C·P − S·P.
= ₹ (784 − 682)
= ₹ 102.

2.
(i)
Solⁿ Given,
C·P = ₹ 7282.
Profit = ₹ 208.

∴ S·P = C·P + Profit
= ₹(7282 − 208).
= ₹ 7490.

Solⁿ
(ii) Given,
S·P = ₹ 572.
Profit = ₹ 72.

∴ C·P = S·P − Profit
= ₹(572 − 72)
= ₹ 500.

(iii)
Solⁿ Given,
C·P = ₹ 9684.
loss = ₹ 684.
∴ S·P = C·P − loss.

$= ₹ (9684 - 684)$

$= ₹ 9000.$

(vi)

Sol.ⁿ Given,

$S.P = ₹ 7894.$

$loss = ₹ 306.$

$\therefore C.P = SP + loss.$

$= ₹ (7894 + 306)$

$= ₹ 8200.$

3.

Sol.ⁿ C.P of the car = ₹ 4,46,000.

S.P of the car = ₹ 5,20,000.

here, S.P > C.P, there is profit

$\therefore Profit = S.P - C.P.$

$= ₹ (5,20,000 - 4,46,000)$

$= ₹ 74,000.$

5.

(i)

Sol.ⁿ Given,

$C.P = ₹ 320.$

$S.P = ₹ 384.$

here, S.P > C.P, there is profit

$\therefore Profit = S.P - C.P.$

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$= ₹\ 384 - 320.$

$= ₹\ 64.$

$\therefore$ Profit % $= \frac{\text{Profit}}{C \cdot P} \times 100\ \%$

$$= \frac{\overset{\overset{2}{\cancel{8}}}{\cancel{64}}}{\underset{\underset{1}{\cancel{4}}}{\cancel{32}\cancel{0}}} \times 10\cancel{0}\ \%$$

$= 20\%.$

(iii)

Solⁿ Given,

$C \cdot P = ₹\ 3400.$

$S \cdot P = ₹\ 3808.$

here $S \cdot P > C \cdot P$, there is profit

$\therefore$ Profit $= S \cdot P - C \cdot P.$

$= ₹\ (3808 - 3400)$

$= ₹\ 408.$

$\therefore$ Profit % $= \frac{\text{Profit}}{C \cdot P} \times 100\ \%$

$$= \frac{\overset{\overset{12}{\cancel{204}}}{\cancel{408}}}{\underset{\underset{1}{\cancel{17}}}{\cancel{34}\cancel{00}}} \times 1\cancel{00}\ \%$$

$= 12\%.$

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6.

(i)

Sol.ⁿ Given,

C·P = ₹ 3650.

S·P = ₹ 2920.

here C·P > S·P, there is loss.

∴ loss = C·P − S·P.

= ₹(3650 − 2920)

= ₹ 730.

∴ loss % = $\frac{\text{loss}}{C \cdot P} \times 100\%$.

$= \frac{\overset{10}{\cancel{730}}}{\underset{\underset{1}{\cancel{73}}}{\cancel{3650}}} \times \overset{2}{\cancel{100}}\ \%$

= 20 %.

(iv)

Sol.ⁿ Given,

C·P = ₹ 815.

loss = ₹ 163.

∴ S·P = C·P − loss.

= ₹(815 − 163)

= ₹ 652.

And, loss % = $\frac{\text{loss}}{C \cdot P} \times 100\%$.

$$= \frac{\overset{1}{\cancel{163}}}{\underset{\underset{1}{\cancel{163}}}{\cancel{815}}} \times \overset{20}{\cancel{100}} \%.$$

$$= 20\%.$$

7.
Solⁿ

S.P of bicycle = ₹ 819.
loss % = 9%.

$$\begin{array}{r} 91 \\ \times 9 \\ \hline 819 \end{array}$$

$$\text{C.P of bicycle} = \frac{100}{\underset{1}{\cancel{91}}} \times \overset{9}{\cancel{819}}.$$

$$= 100 \times 9$$

$$= ₹\ 900.$$

Required profit % = 5%.

$$\therefore SP = \frac{100 + 5}{100} \times 900$$

$$\begin{array}{r} \text{④} \\ 105 \\ \times 9 \\ \hline 945 \end{array}$$

$$= \frac{105}{\underset{1}{\cancel{100}}} \times \overset{9}{\cancel{900}}.$$

$$= ₹\ 945.$$

8.
Solⁿ

S.P = ₹ 1200.
Gain % = 20%

$$C.P = x + \left(\frac{\overset{1}{\cancel{20}}}{\underset{5}{\cancel{100}}}\right) \times x$$

$\Rightarrow 1200 = x + \frac{1}{5} \times x.$

$\Rightarrow 1200 = x + \frac{x}{5}.$

$\Rightarrow 1200 = \frac{5x + x}{5}.$

$\Rightarrow 1200 = \frac{6x}{5}.$

$\Rightarrow 1200 \times 5 = 6x.$

$\Rightarrow \frac{\overset{200}{\cancel{1200}} \times 5}{\cancel{6}_1} = x.$

$\Rightarrow x = 200 \times 5.$
$= ₹\,1000.$

$S.P = 1200.$
loss % $= 20\%$
$CP = y - \frac{\overset{1}{\cancel{20}}}{\underset{5}{\cancel{100}}} \times y = 1200.$

$\Rightarrow \frac{5y - y}{5} = 1200.$

$\Rightarrow \frac{4y}{5} = 1200.$

$\Rightarrow 4y = 1200 \times 5.$
$\Rightarrow y = \frac{\overset{300}{\cancel{1200}} \times 5}{\cancel{4}_1}$
$= ₹\,1500.$

Total $C.P = ₹\,1000 + ₹\,1500.$
$= ₹\,2500.$

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Total S.P = ₹ 1200 + ₹ 1200.

= ₹ 2400.

here, C.P > S.P, there is loss.

∴ loss = ₹ (2500 - 2400).

= ₹ 100.

∴ loss % = $\frac{\text{loss}}{\text{C.P}} \times 100$.

$= \frac{\cancel{100}}{\underset{1}{\cancel{2500}}} \times \overset{4}{\cancel{100}}$.

= 4%.

Exercise 9.3.

1.

Solⁿ

Cost of fertilizer = ₹ 8000

Transportation charge = ₹ 520.

Total C.P = ₹ (8000 + 520)

= ₹ 8520.

Profit = 20% of C.P.

$= \frac{2\cancel{0}}{1\cancel{00}} \times 852\cancel{0}$.

= ₹ 1704.

①
$$\begin{array}{r} 852 \\ \times 2 \\ \hline 1704 \end{array}$$

∴ Shopkeeper should sell the fertilizers to get a profit of 20% = ₹ (8520 + 1704)

= ₹ 10,224.

Cost of Computer = ₹ 60,000.
Depreciation % = 40%.

Cost of Computer after depreciation of 1 yr

$= ₹\ 60,000 - (40\% \text{ of } 60000).$

$= ₹\ 60,000 - \left(\frac{40}{1\cancel{0}\cancel{0}} \times 600\cancel{0}\cancel{0}\right)$

$= ₹\ 60,000 - 24,000.$

$= ₹\ 36,000$

Cost of Computer after depreciation of 2 yrs.

$= ₹\ 36000 - (40\% \text{ of } 36000).$

$= ₹\ 36000 - \left(\frac{40}{1\cancel{0}\cancel{0}} \times 360\cancel{0}\cancel{0}\right)$

$$\begin{array}{r} ② \\ 36 \\ \times 4 \\ \hline 14400 \end{array}$$

$= ₹\ 36000 - 14400.$

$= ₹\ 21,600.$

∴ Worth of computer after 2 yrs
= ₹ 21,600.

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☆

Exercise 9.4.

1.
(i)
Solⁿ Given,

$M \cdot P = ₹\ 2300$.

Discount rate = 20%.

$\therefore\ S \cdot P = MP \times \frac{100 - D\%}{100}$

$= ₹ 2300 \times \frac{100 - 20}{100}$

$= ₹\ 23\cancel{0}\cancel{0} \times \frac{80}{1\cancel{0}\cancel{0}}$

$= ₹\ 1840$.

$\therefore$ Discount $= M \cdot P - S \cdot P$

$= ₹(2300 - 1840)$

$= ₹\ 460$.

(iii)
Solⁿ Given,

$M \cdot P = ₹\ 3224$.

Discount rate $= 12\frac{1}{2}\%$

$= \frac{25}{2}\%$

$$\therefore \; S \cdot P = M \cdot P \times \frac{100 - D\%}{100}$$

$$= ₹\, 3224 \times \frac{100 - \frac{25}{2}}{100}$$

$$= ₹\, 3224 \times \frac{\frac{100 \times 2 - \frac{25}{\cancel{2}_1} \times \cancel{2}^1}{2}}{100}$$

$$= ₹\, 3224 \times \frac{\frac{200 - 25}{2}}{100}$$

$$= ₹\, 3224 \times \frac{\frac{175}{2}}{100}$$

$$= ₹\, \overset{403}{\overset{\cancel{806}}{\cancel{3224}}} \times \frac{\overset{7}{\overset{\cancel{35}}{\cancel{175}}}}{\underset{1}{\cancel{2}}} \times \frac{1}{\underset{\underset{1}{\cancel{4}}}{\underset{\cancel{20}}{\cancel{100}}}}$$

$$= ₹\, 2821$$

$$\therefore \; \text{Discount} = M \cdot P - S \cdot P$$

$$= ₹\, (3224 - 2821)$$

$$= ₹\, 403.$$

2.

(i)

Solⁿ Given,

$M \cdot P = ₹\ 140.$

$S \cdot P = ₹\ 105.$

$\therefore$ Discount $= M \cdot P - S \cdot P.$

$= ₹\ (140 - 105)$

$= ₹\ 35.$

$$\text{Discount rate} = \frac{\text{Discount}}{MP} \times 100\ \%$$

$$= \frac{\overset{5}{\cancel{35}}}{\underset{\cancel{2}_1}{\cancel{140}}} \times \overset{5}{\cancel{100}}\ \%.$$

$= 25\%.$

(iv)

Solⁿ Given,

$M \cdot P = ₹\ 14,500.$

$S \cdot P = ₹\ 13,775.$

$\therefore$ Discount $= M \cdot P - S \cdot P.$

$= ₹(14,500 - 13,775)$

$= ₹\ 725.$

$$\begin{array}{r} 14500 \\ -13775 \\ \hline 725 \end{array}$$

$\text{Discount rate} = \frac{\text{Discount}}{M \cdot P} \times 100\%$

$$= \frac{\overset{\overset{5}{\cancel{145}}}{\cancel{725}}}{\underset{\underset{1}{\cancel{29}}}{\cancel{14,500}}} \times 1\cancel{00}\%$$

$= 5\%$

3.
(i)
Sol.ⁿ Given,
$S \cdot P = ₹\ 9000.$

$\text{Discount rate} = 10\%.$

$\therefore M \cdot P = \frac{100 \times S \cdot P}{100 - D\%}$

$$= \frac{100 \times 9000}{100 - 10}$$

$$= \frac{\overset{10000}{\cancel{900000}}}{\underset{1}{\cancel{90}}}$$

= ₹ 10, 000.

3.
(i)

Solⁿ M.P = ₹ 1000.

First discount = 10%.

$= ₹ \frac{\overset{10}{\cancel{1000}} \times 10}{\underset{1}{\cancel{100}}}$

= ₹ 100.

SP after the first discount = ₹(1000 − 100)
= ₹ 900.

Second discount = 20% of 900.

$= \frac{20}{\underset{1}{\cancel{100}}} \times \cancel{900}\ 9.$

= ₹ 180.

∴ SP after the second discount
= ₹(900 − 180)
= ₹ 720.

(iv)

Solⁿ M.P = ₹ 375.

First discount = 10%.

$= \frac{\overset{1}{\cancel{10}}}{\underset{10}{\cancel{100}}} \times 375$

= ₹ 37.5

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S.P after the first discount = ₹ (375 − 37.5)

= ₹ 337.5

Second discount = 20% of 337.5.

$= \frac{20}{100} \times 337.5.$

$= \frac{6750}{100}$

= 67.5.

∴ S.P after the second discount

= ₹(337.5 − 67.5)

= ₹ 270.

5
(i)
Solⁿ S.P = ₹ 1440.

Let the MP be ₹ 100.

First discount = 10%.

∴ SP = 100 − 10

= ₹ 90.

Second discount = 20% of ₹ 90.

$= \frac{2\cancel{0}}{1\cancel{0}\cancel{0}} \times 9\cancel{0}.$

= ₹ 18.

S.P after the second discount = ₹ (90 − 18)

= ₹ 72

If SP is ₹ 72, MP = ₹100

If SP is ₹ 1440, MP = $\frac{100}{\cancel{72}_{\cancel{36}\,\cancel{18}\,1}} \times \overset{\overset{\overset{20}{\cancel{360}}}{\cancel{720}}}{\cancel{1440}}$.

= ₹ 2000.

6.
Sol^n C.P of goods = ₹ 550

M.P = ₹ 550 + $\left(\frac{550 \times 20}{100}\right)$

= ₹ 550 + $\left(\frac{110\cancel{00}}{1\cancel{00}}\right)$

= ₹ 550 + 110.

= ₹ 660.

Discount = 20% of 660.

= $\frac{2\cancel{0}}{10\cancel{0}} \times 66\cancel{0}$.

= ₹ 132.

∴ SP = ₹(660 − 132)
= ₹ 528.

Here, CP > SP, there is loss.

∴ Loss = C.P − S.P

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$= ₹\ 550 - ₹\ 528.$

$= ₹\ 22.$

$\therefore$ loss Percent $= \frac{\text{loss}}{C.P} \times 100\%.$

$$= \frac{\overset{2}{\cancel{22}}}{\underset{\cancel{5},}{\cancel{550}}} \times \overset{2}{\cancel{100}}\ \%.$$

$= 4\%.$

Exercise 9.5.

1.

Sol: Value of the items $= ₹(38000 + 8000).$

$= ₹\ 46000.$

Sales tax rate $= 7\%$

$\therefore$ Sales tax $= 7\%$ of $46000.$

$$= \frac{7}{1\cancel{00}} \times 460\cancel{00}$$

$= ₹\ 3220$

$\therefore$ Bill amount $= ₹(46000 + 3220)$

$= ₹\ 49,220.$

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3.

Sol.ⁿ Let the actual sale price of the refrigerator be x.

Sales tax rate = 9%.

Sales tax = ₹ 1170 (given).

$\Rightarrow$ 9% of x = ₹ 1170.

$$\Rightarrow \frac{9}{100} \times x = ₹\ 1170.$$

$$\Rightarrow \frac{9x}{100} = ₹\ 1170.$$

$$\Rightarrow 9x = ₹\ 1170 \times 100.$$

$$\Rightarrow x = ₹\ \frac{\overset{130}{\cancel{1170}} \times 100}{\cancel{9}_{1}}$$

$$= ₹\ 13000.$$

∴ Actual sale price = x

= ₹ 13000.

*

5.

Sol:ⁿ S.P including VAT = ₹ 19610.

VAT = 6%.

Let the original price of the cooking range = x.

$\Rightarrow \quad x + \frac{6}{100} \times x = ₹\ 19610.$

$\Rightarrow \quad x + \frac{6x}{100} = ₹\ 19610.$

$\Rightarrow \quad \frac{100x + 6x}{100} = ₹\ 19610.$

$\Rightarrow \quad \frac{106x}{100} = ₹\ 19610.$

$\Rightarrow \quad 106x = ₹\ 19610 \times 100.$

$\Rightarrow \quad x = ₹\ \frac{\overset{370}{\cancel{19610}} \times \overset{50}{\cancel{100}}}{\underset{\underset{1}{\cancel{53}}}{\cancel{106}}}.$

$= ₹\ 18500.$

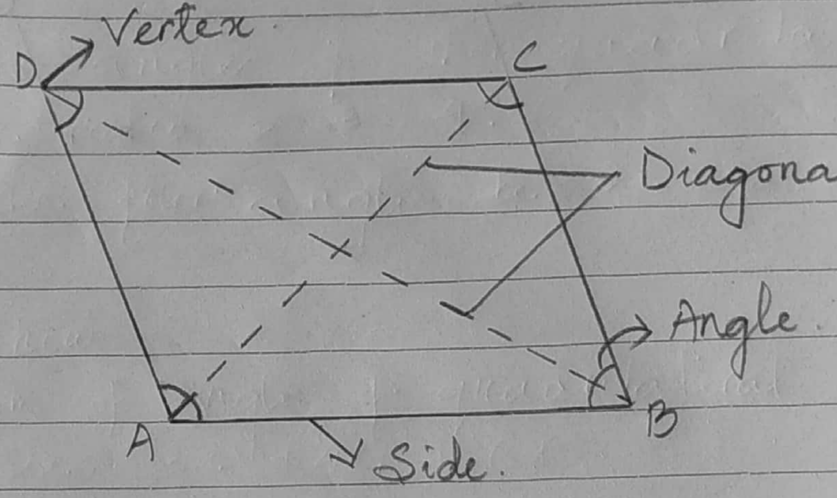
$$\begin{array}{r} ③ \\ 37 \\ \times 5 \\ \hline 18500 \end{array}$$

∴ Original cost of the cooking range = x

= ₹ 18500.

Chapter 12. Understanding Quadrilaterals.

→ A Quadrilateral is a closed figure formed by



- * Four sides.
- * Four angles.
- * Four vertices.
- * Two diagonals.

Remember: Sum of the angles of a quadrilateral is equal to 360°.

Exercise 12·1.

1(i)

Solⁿ: We know,

Sum of the angles of a quadrilaterals = 360°

Here,

$\angle A + \angle B + \angle C + \angle D$

$= 60° + 90° + 126° + 54°$

$= 360°$

$\because \angle A + \angle B + \angle C + \angle D \neq 360°$, the measurements of Quadrilateral ABCD is incorrect.

(iii)

Solⁿ: We know,

Sum of the angles of a quadrilateral = 360°

Here,

$\angle M + \angle N + \angle O + \angle P$

$= 110° + 105° + 90° + 100°$

$= 405°$

$\because \angle M + \angle N + \angle O + \angle P \neq 360°$, the measurements of Quadrilateral MNOP is incorrect.

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2.

(i)

Solⁿ $\because$ the angles of the quadrilateral are in the ratio $2 : 3 : 4 : 6$

Let the four angles be $2x$, $3x$, $4x$ & $6x$.

we know,

Sum of angles of quadrilateral $= 360^{\circ}$

$\Rightarrow \quad 2x + 3x + 4x + 6x = 360^{\circ}$

$\Rightarrow \quad 15x = 360^{\circ}$

$\Rightarrow \quad x = \frac{360^{\circ}}{\underset{1}{\cancel{\underset{\cancel{3}}{15}}}} \overset{24}{\cancel{72}}$

$= 24^{\circ}$

$\therefore$ the measure of the four angles are :

$2x = 2 \times 24^{\circ}$

$= 48^{\circ}$

$3x = 3 \times 24^{\circ}$

$= 62^{\circ}$

$4x = 4 \times 24^{\circ}$

$= 96^{\circ}$

$6x = 6 \times 24^{\circ}$

$= 144^{\circ}$

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3.

Sol.ⁿ Let the measure of the two equal angles be x.

We know,

Sum of the angles of the quadrilateral $= 360°$

$\Rightarrow \quad 172° + x + x = 360°$

$\Rightarrow \quad 172° + 2x = 360°$

$\Rightarrow \quad 2x = 360° - 172°$

$\Rightarrow \quad 2x = 188°$

$\Rightarrow \quad x = \frac{\cancel{188}^{\,94}}{\cancel{2}_{\,1}}$

$= 94°$.

$\therefore$ the measure of the two equal angles

$= x$

$= 94°$.

4.

(i)

Sol.ⁿ We know,

$70° + 140° + 80° + x° = 360°$

$\Rightarrow \quad 290° + x° = 360°$

$\Rightarrow \quad x° = 360° - 290°$

$= 70°$

(iv)

Sol.ⁿ We know,

$60° + 120° + 100° + x = 360°$

$\Rightarrow \quad 280° + x° = 360°$

$\Rightarrow \quad x° = 360° - 280°$

$= 80°$

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(v)

Sol.^{n} We know,

$$x^\circ + 90^\circ + 50^\circ = 180^\circ$$
$$\Rightarrow x^\circ + 140^\circ = 180^\circ$$
$$\Rightarrow x^\circ = 180^\circ - 140^\circ$$
$$= 40^\circ.$$

{ * Sum of the angles of a triangle = 180°

and,

$$y^\circ + 75^\circ + 30^\circ = 180^\circ$$
$$\Rightarrow y^\circ + 105^\circ = 180^\circ$$
$$\Rightarrow y^\circ = 180^\circ - 105^\circ$$
$$= 75^\circ$$

Exercise 12.2.

* The opposite sides of a parallelogram are parallel and equal.

* In a parallelogram, opposite angles are also equal.

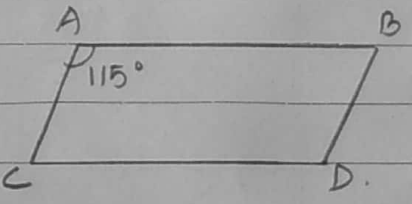
* The diagonals of a parallelogram bisect each other.

Q1.

(i) Yes.
(ii) Yes.
(iii) Yes.
(iv) Yes.
(v) Yes.
(vi) Yes.
(vii) Yes.
(viii) Yes.
(ix) No.
(x) Yes.

3.

Solⁿ Given,
ABCD is a parallelogram.
and $\angle A = 115°$.



$\therefore \angle A = \angle D = 115°$ (Opposite angles of a ||gm are always equal)

P.T.O.

$$\begin{array}{r} 180 \\ -115 \\ \hline 65 \end{array}$$

we know.

Adjacent angles of a ||gm = 180°

$\Rightarrow \angle C + \angle D = 180^\circ$

$\Rightarrow \angle C + 115^\circ = 180^\circ$

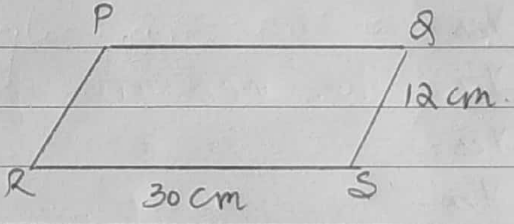
$\Rightarrow \angle C = 180^\circ - 115^\circ$

$= 65^\circ$

$\therefore \angle C = 65^\circ$

and $\angle D = 115^\circ$.

4.
Solⁿ



Given,
PQRS is a ||gm.
QS = 12 cm
and RS = 30 cm.

$\therefore$ measure of PQ = RS = 30 cm (Opposite sides of a ||gm are always equal)

and measure of PR = QS = 12 cm (Opposite sides of a ||gm are always equal).

5.

Sol.ⁿ Given,

MNOP is a ||gm.

and PN = 32 cm

OM = 24 cm.

we know,

Diagonals of a ||gm bisect each other.

$$\therefore PS = \frac{PN}{2}$$

$$= \frac{\cancel{32}^{16}}{\cancel{2}_{1}} cm$$

$$= 16 cm.$$

$$\text{and} \quad OS = \frac{OM}{2}.$$

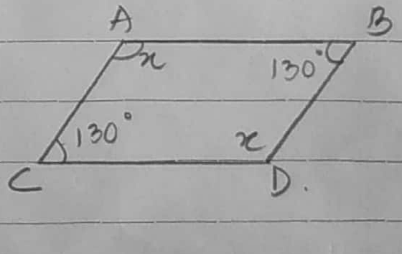
$$= \frac{\cancel{24}^{12}}{\cancel{2}_{1}} cm$$

$$= 12 cm.$$

6.

Sol.ⁿ Let ABCD be the ||gm and $\angle C = 130°$ ~~at~~

Let the two opposite angles $\angle A$ & $\angle D$ be x.



we know,

Sum of the angles of ABCD = 360°

$\Rightarrow \angle A + \angle B + \angle C + \angle D = 360°$

$$\Rightarrow x + 130^\circ + 130^\circ + x = 360^\circ$$

$$\Rightarrow 2x + 260^\circ = 360^\circ$$

$$\Rightarrow 2x = 360^\circ - 260^\circ$$

$$\Rightarrow 2x = 100^\circ$$

$$\Rightarrow x = \frac{\cancel{100^\circ}^{50^\circ}}{\cancel{2}_{1}}$$

$$= 50^\circ$$

$\therefore$ the other angles are 50°, 130° & 50°

7.
Sol.ⁿ Rectangle.

8.
Sol:ⁿ

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Exercise 12.3.

1.

Sol.ⁿ Given,

Adjacent sides DA and AB of the ||gm
= 3 cm

then, the measurements of its opposite sides CB and DC = 3cm

∴ the figure is a square.

2.

Sol.ⁿ Square.

4. In rhombus ABCD,
Solⁿ: AC = AB.

But AB = BC [AB and BC are the sides of the rhombus].

∴ In △ABC is an equilateral.

$\angle B = \angle D = 60^\circ$ [In equilateral △ all are angles are equal.]

∴ $\angle BAD = \angle DAC + \angle BAC$

$= 60^\circ + 60^\circ$

$\angle BAD = 120^\circ$

5.
(i) Yes.
(ii) Yes.
(iii) Yes.
(iv) Yes.
(v) Yes.
(vi) Yes.

7.
(i)
Solⁿ: Given,

Perimeter of a square = 72 m.
⇒ 4 x side = 72 m.
⇒ side = $\frac{\cancel{72}^{18} m}{\cancel{4}_1}$

= 18 m.

$\therefore$ the measure of its sides = 18 m.

And area of the square = side × side

= 18 m × 18 m

= 324 m^2.

(ii)
Solⁿ

Given,

One of the sides = 20 m.

Perimeter of the rectangle = 64 m

$\Rightarrow$ $2 \times (l + b) = 64$ m.

$\Rightarrow$ $2 \times (20m + b) = 64$ m.

$\Rightarrow$ 40 m $+ 2b = 64$ m

$\Rightarrow$ $2b = 64m - 40$ m.

$\Rightarrow$ $2b = 24$ m.

$\Rightarrow$ $b = \frac{\overset{12}{\cancel{24}} m}{\underset{1}{\cancel{2}}}$

$= 12$ m.

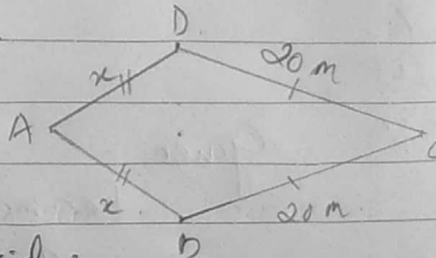
$\therefore$ Area of the rectangle = $l \times b$

$= 20$ m $\times 12$ m

$= 240$ m^2.

(iii)
Solⁿ

Let ABCD be the theatre and one of its given sides be DC = 20 m.



then BC = DC = 20 m (opposite sides are equal)

And let the other opposite sides be x.

Given,

Perimeter of the theatre $= 100$ m.

$\Rightarrow AB + BC + CD + AD = 100$ m.

$\Rightarrow x + 20m + 20m + x = 100$ m.

$\Rightarrow 2x + 40$ m $= 100$ m.

$\Rightarrow 2x = 100$ m $- 40$ m.

$\Rightarrow 2x = 60$ m.

$\Rightarrow x = \frac{\cancel{60}^{30} m}{\cancel{2}_{1}}$

$= 30$ m.

$\therefore$ lengths of other sides $= x$

$= 30$ m.

(iv)

Sol.ⁿ Given,

length of one side of a rhombus $= 20$ m.

$\therefore$ Perimeter of the Rhombus $= 4 \times$ side

$= 4 \times 20$ m

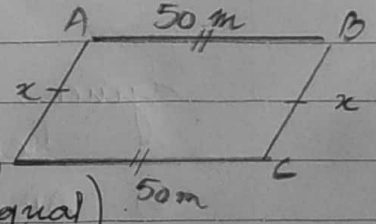
$= 80$ m.

(v)

Sol.ⁿ Let ABCD be the parallelogram.

and let one of its sides be

AB = 50 m.



then, DC = AB = 50 m (opposite sides are equal)

let the measure of the other side, AD and BC = x.

Given,

Perimeter of the field = 160 m.

$\Rightarrow$ AB + BC + CD + AD = 160 m.

$\Rightarrow$ 50 m + x + 50 m + x = 160 m.

$\Rightarrow$ 100 m + $2x$ = 160 m.

$\Rightarrow$ $2x$ = 160 m − 100 m.

$\Rightarrow$ $2x$ = 60 m.

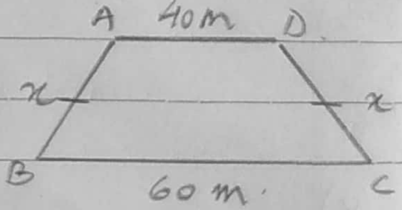
$\Rightarrow$ $x = \frac{\cancel{60}^{30} m}{\cancel{2}_{1}}$

= 30 m.

$\therefore$ the measures of the other sides = x
= 30 m.

(vi)
Solⁿ Length of the other diagonal = 2 × 70 cm
= 140 cm.

(vii)
Solⁿ Let ABCD be the isosceles trapezium. and the two parallel sides be AD = 40 m and BC = 60 m.



Let the other two equal sides. AB and DC be x.

Given,

Perimeter of the trapezium = 160 m

$\Rightarrow$ AB + BC + CD + AD = 160 m.

$\Rightarrow$ x + 60 m + x + 40 m = 160 m.

$\Rightarrow$ $2x$ + 100 m.

$\Rightarrow 2x = 160\text{ m} - 100\text{ m}.$

$\Rightarrow 2x = 60\text{ m}.$

$\Rightarrow x = \frac{\cancel{60}^{30}}{\cancel{2}_{1}}\text{ m}.$

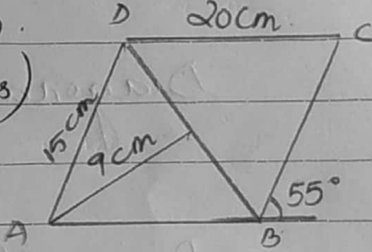
$= 30\text{ m}.$

$\therefore$ the length of the other two sides $= x$

$= 30\text{ m}.$

8.

(i). Here, ABCD is a Parallelogram.



here, $\angle D = \angle B$. (opposite angles)

$\therefore \angle B = 180° - 55°$

$= 125°.$

$\therefore \angle D = 125°.$

m $\overline{AB}$ = m $\overline{DC}$ = 20 cm (opposite sides of ||gm)

we know,

$\angle A + \angle B + \angle C + \angle D = 360°$

$\Rightarrow x + 125° + x + 125° = 360°$

$\Rightarrow 2x + 250° = 360°$

$\Rightarrow 2x = 360° - 250°$

$\Rightarrow 2x = 110°$

$\Rightarrow x = \frac{\cancel{110}^{55}°}{\cancel{2}_{1}}$

$= 55°$

$\therefore \angle A = \angle C = 55°$

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m $\overline{BC}$ = m $\overline{AD}$ = 15 cm.

Diagonal AC = 2 × 9 cm
= 18 cm.

Perimeter = AB + BC + CD + AD.
= 20 cm + 15 cm + 20 cm + 15 cm.
= 60 cm.

(iii)

Here, ABCD is a Rhombus.

Diagonal AC = 2 × 6 m
= 12 m.

Diagonal BD = 2 × 8 m
= 16 m

∠z = 90°

Perimeter = 4 × 10 m
= 40 m.

$$\angle BAD = \frac{360^\circ - 160^\circ}{2}$$

$$= \frac{200^\circ}{2}$$

$$= 100^\circ$$

∠ABC = 80° (opposite angles are equal).

Chapter 15. Area of Polygons.

Polygon ? A simple closed curve that is made up of line segments.

* Refer the formulas on pg. 187.

Exercise 15.1.

1.
(i)
Solⁿ Here,

$l = 36\ m$

$b = 24\ m.$

$\therefore$ Area of the rectangle $= l \times b$

$= 36\ m \times 24\ m$

$= 864\ m^2.$

(or)

864 sq. m.

2.
Solⁿ Here,

side $= 30\ m$

$\therefore$ Area of the square $=$ side $\times$ side

$= 30\ m \times 30\ m$

$= 900\ m^2$

(or)

900 sq. m.

3.
Solⁿ Given.

length of the rectangle = 32 m.

Area of the rectangle = 512 sq. m.

$\Rightarrow$ $l \times b = 512$ Sq. m.

$\Rightarrow$ $32\,m \times b = 512$ Sq. m.

$$\Rightarrow b = \frac{\overset{\cancel{64}\ 16}{512}\ \cancel{sq}.m}{\underset{\underset{1}{\cancel{4}}}{\cancel{32}}\ \cancel{m}}$$

$= 16$ m.

∴ width of the rectangle = 16 m.

5.
Solⁿ Given.

Area of a square piece of land = 1225 Sq. m

$\Rightarrow$ side × side = 1225 sq. m.

$\Rightarrow$ $(\text{side})^2 = 1225$ sq. m.

$\Rightarrow$ side $= \sqrt{1225\ \text{sq. m}}$.

$\Rightarrow$ side $= \sqrt{35m \times 35m}$

$$\Rightarrow \text{Side} = \cancel{\sqrt{}}\,(35\,m)^{\cancel{2}}$$

$$= 35\,m.$$

$$\begin{array}{r|l} & 35 \\ \hline 3 & \overline{12}\,\overline{25} \\ & -9 \downarrow \\ \hline 65 & 325. \\ & -325 \\ \hline & \times\times\times \end{array}$$

∴ length of its side = 35 m.

②

$$\begin{array}{r} 65 \\ \times 5 \\ \hline 325 \end{array}$$

6.

Sol^n: ∵ the length and breadth are in the ratio 3 : 4, let the length be 3x & the breadth be 4x.

Given,

Area of the rectangular field = 6912 sq. cm.

$$\Rightarrow l \times b = 6912\ sq.\,cm.$$

$$\Rightarrow 3x \times 4x = 6912\ sq.\,cm.$$

$$\Rightarrow 12x^2 = 6912\ sq.\,cm.$$

$$\Rightarrow x^2 = \frac{\overset{\overset{576.}{\cancel{3456}}}{\cancel{6912}}\ sq.\,cm}{\underset{\underset{1}{\cancel{6}}}{\cancel{12}}.}$$

$$\Rightarrow x^2 = 576\ sq.\,cm.$$

$$\Rightarrow x = \sqrt{576\ sq.\,cm}$$

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$x = \sqrt{24\text{ cm} \times 24\text{ cm}}$

$= \sqrt{(24\text{ cm})^2}$

$= 24$ cm.

24
2 | 576
-4
44 | 176.
-176
xx

①
44
×4
176

$\therefore$ length $= 3x$

$= 3 \times 24$ cm

$= 72$ cm.

breadth $= 4x$

$= 4 \times 24$ cm

$= 96$ cm.

7.
Sol^n Given-

length of the floor = 10 m.
breadth " " " = 7 m

Area of the floor $= l \times b$

$= 10\text{m} \times 7\text{m}$

$= 70$ sq. m.

Side of the square tile = 0.5 m.

Area of the square tile $= s \times s$

$= 0.5\text{m} \times 0.5\text{m}$

$= 0.25$ sq. m.

$\therefore$ No of tiles required $= \dfrac{\text{Area of the floor}}{\text{Area of the tile}}$

☆

$$= \frac{70 \text{ sq.m}}{0.25 \text{ sq.m}}$$

$$= \frac{70 \times 100 \text{ sq.m}}{0.25 \times 100 \text{ sq.m}}$$

$$= \frac{\overset{\overset{280}{\cancel{1400}}}{\cancel{7000}} \ \cancel{\text{sq.m}}}{\underset{\underset{1}{\cancel{5}}}{\cancel{25}} \ \cancel{\text{sq.m}}}$$

$= 280.$

∴ No. of tiles required = 280.

8.
Solⁿ: length of the hall = 5m.
breadth " " " = 6m.
height " " " = 7m.

∴ total area of the room $= 2 \times (l \times h + b \times h)$
$= 2 \times (5m \times 7m + 6m \times 7m)$
$= 2 \times (35m^2 + 42m^2)$
$= 2 \times 77 m^2$
$= 154$ sq.m.

Area of the door $= 1m \times 0.5m$
$= 0.5 m^2$.

∴ Area of the four walls = Area of room − Area of door.

$= 154 \text{ sq.m} - 0.5 \text{ sq.m.}$

$= 153.5 \text{ sq.m.}$

$\therefore$ Cost of painting the walls @ ₹ 90 per sq. m = ₹ 90×153.5.

= ₹ 13,815.

$$\begin{array}{r} ④③④ \\ 1535 \\ \times 9 \\ \hline 13815.0 \end{array}$$

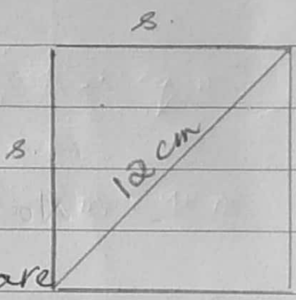
9.

(i)

Solⁿ Given

$d = 12$ cm.

let s be the side of the square



By Pythagoras theorem,

$d^2 = s^2 + s^2$.

$\Rightarrow d^2 = 2s^2$.

$\Rightarrow \frac{d^2}{2} = s^2$

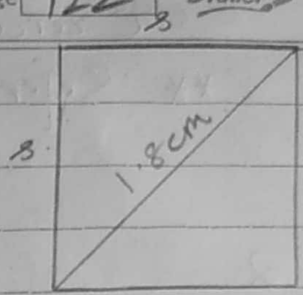
$\Rightarrow \frac{(12 \text{ cm})^2}{2} = s^2$.

$$\begin{array}{r} 12 \\ \times 12 \\ \hline 24 \\ +12 \\ \hline 144. \end{array}$$

$\Rightarrow \frac{\overset{72}{\cancel{144}} \text{ cm}^2}{\underset{1}{\cancel{2}}} = s^2$.

{ here, $s^2 =$ Area of the square.

$\Rightarrow \therefore s^2 = 72 \text{ cm}^2$.



(iii) 0.18 dm.

Solⁿ here,

$$d = 0.18 \text{ dm}.$$
$$= 0.18 \times 10 \text{ cm}.$$
$$= 1.8 \text{ cm}.$$

let s be the side of the square.

By Pythagoras theorem,

$$d^2 = s^2 + s^2.$$

$$\Rightarrow d^2 = 2s^2.$$

$$\Rightarrow \frac{d^2}{2} = s^2.$$

$$\begin{array}{r} ⑦ \\ 18 \\ \times 9 \\ \hline 1.62 \end{array}$$

$$\Rightarrow \frac{\overset{0.9}{\cancel{1.8}} \text{ cm} \times 1.8 \text{ cm}}{\underset{1}{\cancel{2}}} = s^2.$$

$$\Rightarrow 1.62 \text{ cm}^2 = s^2.$$

$$\therefore s^2 = 1.62 \text{ cm}^2.$$

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Exercise 15.2.

** Refer the formulas on pg. 191

2.

Sol.ⁿ Given

Area of the square field = 9025 sq. m.

$\Rightarrow s \times s = 9025$ sq. m.

$\Rightarrow s^2 = 9025$ sq. m.

$\Rightarrow s = \sqrt{9025 \text{ sq. m}}$

$= \sqrt{95m \times 95m}$

$= \sqrt{(95m)^2}$

$= 95m$

$\therefore$ side of the square = 95 m.

$$\begin{array}{r|l} & 95 \\ \hline 9 & \overline{90}\,\overline{25} \\ & -81 \downarrow \\ \hline 185 & 925 \\ & -925 \\ \hline & \text{xxx} \end{array}$$

④②
$$\begin{array}{r} 185 \\ \times 5 \\ \hline 925 \end{array}$$

3.
Solⁿ here,

$l = 12.5\ m.$

$b = 8\ m.$

$\overset{2\,4}{125}$
$\times 8$
100.0

Area of the carpet $= l \times b.$

$= 12.5\ m \times 8m$

$= 100$ sq. m.

5
Solⁿ Given,

base $= 3.6$ cm.

height $= 2$ cm.

$\therefore$ Area of the parallelogram $= b \times h.$

$= 3.6\ cm \times 2\ cm.$

$= 7.2$ sq. cm.

$\overset{1}{36}$
$\times 2$
7.2

6
(ii)
Solⁿ $b = 43\ m.$

$h = ?$

Area $= 215$ sq. m.

$\therefore$ height$(h) = \dfrac{\text{Area}}{b}$

$$= \frac{\overset{5}{\cancel{215}}\ \cancel{sq}.m}{\underset{1}{\cancel{43}}\ \cancel{m}}$$

$$\begin{array}{r} \overset{1}{4}3 \\ \times 5 \\ \hline 215 \end{array}$$

$= 5m.$

(iv)
Solⁿ

$b = 3x$

$h = 2x.$

$\text{Area} = 216\ sq.\ m.$

$\Rightarrow b \times h = 216\ sq.m.$

$\Rightarrow 3x \times 2x = 216\ sq.m.$

$\Rightarrow 6x^2 = 216\ sq.m.$

$$\Rightarrow x^2 = \frac{\overset{36}{\cancel{216}}}{\underset{1}{\cancel{6}}.}\ sq.m$$

$\Rightarrow x^2 = 36\ sq.m.$

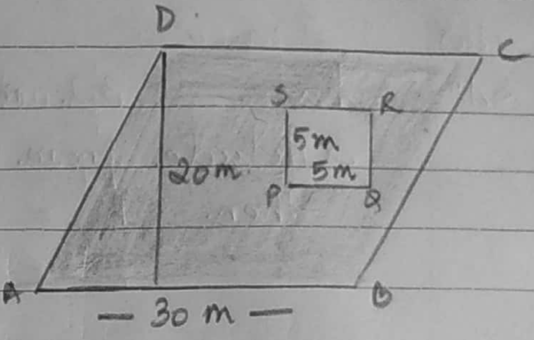
$\Rightarrow x = \sqrt{36\ sq.m}$

$= \sqrt{6m \times 6m}$

$= \sqrt{(6m)^{\cancel{2}}}$

$= 6m.$

7
(i)



Sol^n here ABCD is a ||gm and PQRS is a square.

For ABCD,

$b = 30m$.

$h = 20m$.

$\therefore$ Area of ABCD $= b \times h$

$= 30m \times 20m$

$= 600$ sq. m.

For PQRS.

side $= 5m$.

$\therefore$ Area of PQRS $= s \times s$

$= 5m \times 5m$.

$= 25$ sq. m.

$$\begin{array}{r} 600 \\ -25 \\ \hline 575 \end{array}$$

$\therefore$ Area of the shaded region = Area of ABCD. − Area of PQRS.

$= 600$ sq.m $- 25$ sq. m.

$= 575$ sq. m.

8.

Sol^n Area of the right angled $\Delta = \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{\cancel{2}_1} \times 7m \times \overset{4}{\cancel{8}}m$

$= 28$ sq. m.

9.

(iii)

Sol.ⁿ base = 32 m.

altitude from the opposite vertex = 25 m.

then, $h = 25\ m \times 2.$

$= 50\ m$

$\therefore$ Area of the $\Delta = \frac{1}{2} \times b \times h.$

$= \frac{1}{\cancel{2}_{1}} \times \overset{16}{\cancel{32}}\ m \times 50\ m$

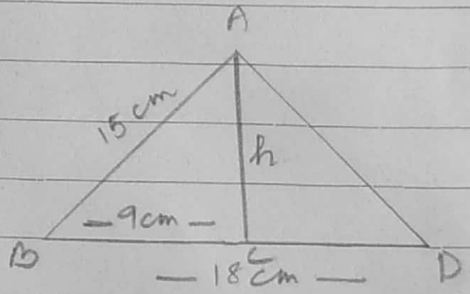
$= 800$ sq. m.

10.

Sol.ⁿ Here,

base = 18 cm.

$h = ?$



In Δ ABC, By Pythagoras theorem

$$(AB)^2 = (BC)^2 + (AC)^2$$

$$\Rightarrow (15\ cm)^2 = (9\ cm)^2 + h^2$$

$$\Rightarrow 225\ cm^2 = 81\ cm^2 + h^2$$

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$\Rightarrow 225\ cm^2 - 81\ cm^2 = h^2$

$\Rightarrow 144\ cm^2 = h^2$

$\Rightarrow \sqrt{144 cm^2} = h.$

$\Rightarrow \sqrt{12 cm \times 12\ cm} = h.$

$\Rightarrow \sqrt{(12 cm)^{\cancel{2}}} = h.$

$\therefore h = 12\ cm.$

$\therefore$ Area of the $\Delta = \frac{1}{2} \times b \times h.$

$= \frac{1}{\cancel{2}_1} \times \overset{9}{\cancel{18}} cm \times 12\ cm$

$= 108$ sq. cm.

11.
Solⁿ: here,

side(a) = 20 m.

$* \sqrt{3} = 1.73205080$

$\therefore$ Area of the equilateral $\Delta = \frac{\sqrt{3} a^2}{4}.$

$= \frac{\sqrt{3}}{4} \times (20 m)^2$

$= \frac{\sqrt{3}}{\cancel{4}_1} \times \overset{5}{\cancel{20}} m \times 20 m.$

$= \sqrt{3} \times 100\ m^2.$

$\approx 173.20.m^2$ (approx)

12.

Sol^n Area $= 12,692\ m^2$.

Perpendicular from one vertex to the opposite side $= 76\ m$.

$3\cancel{1}73 \quad 167$

$\cancel{6}346$

$\therefore$ length of this side $= \dfrac{\overset{\overset{167}{\cancel{6346}}}{\cancel{12,692}}\ m^{\cancel{2}}}{\underset{\underset{\cancel{19},}{\cancel{38}}}{\cancel{76}}\ \cancel{m}} \times 2$.

$= 167 m \times 2$

$= 334\ m$

Exercise 15.3.

(i)

Sol^n Area of the shaded region $= \dfrac{\sqrt{3}\, a^2}{4}$

$= \dfrac{\sqrt{3} \times (8\ cm)^2}{4}$

$= \dfrac{\sqrt{3} \times \overset{2}{\cancel{8}}cm \times 8cm}{\underset{1,}{\cancel{4}}}$

$= \sqrt{3} \times 16\ cm^2$.

$= 1.732 \times 16\ cm^2$

$= 27.712\ cm^2$.

$$\begin{array}{r} ④①① \\ 1732 \\ 16 \\ \hline ① \\ 10392 \\ 1732 \\ \hline 27.712 \end{array}$$

(ii)
Solⁿ For $\triangle ABC$,

$$\text{Area} = \frac{1}{2} \times b \times h.$$

$$= \frac{1}{\overset{}{\cancel{2}}_1} \times \overset{10}{\cancel{20}}\,m \times 8\,m.$$

$$= 10\ m^2$$

For rectangle,

$$\text{Area} = l \times b$$

$$= 5\,m \times 4\,m$$

$$= 20\ m^2$$

$\therefore$ Area of shaded region $= 80\,m^2 - 20\,m^2$
$= 60\ m^2.$

(iii)
Solⁿ For Parallelogram ABCD.

$$\text{Area} = \text{base} \times \text{height}$$

$$= 20\,m \times 15\,m.$$

$$= 300\ sq.m$$

For Triangle AEB.

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{\cancel{2}_1} \times \overset{10.}{\cancel{20}}\,m \times 15\,m$$

$$= 150\ sq.m$$

$\therefore$ Area of shaded region $= 300 \text{ sq m} - 150 \text{ sq.m}$

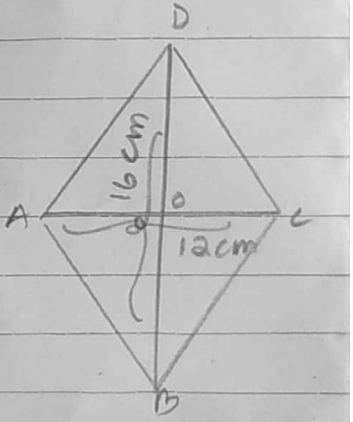
$= 150 \text{ sq. m}$.

2.

Sol^n: Area of the rhombus $= \frac{1}{2} \times$ product of diagonals.

$$= \frac{1}{\underset{1}{\cancel{2}}} \times \overset{6}{\cancel{12}}\text{cm} \times 16 \text{ cm}.$$

$$= 96 \text{ sq. cm}.$$



In $\triangle$ AOD, By Pythagoras theorem

$$AD^2 = (AO)^2 + (DO)^2$$

$$\Rightarrow AD^2 = \left(\frac{\overset{8}{\cancel{16}}\text{cm}}{\underset{1}{\cancel{2}}}\right)^2 + \left(\frac{\overset{6}{\cancel{12}}\text{cm}}{\underset{1}{\cancel{2}}}\right)^2$$

$$\Rightarrow AD^2 = (8\text{cm})^2 + (6\text{cm})^2$$

$$\Rightarrow AD^2 = 64 \text{ cm}^2 + 36 \text{ cm}^2$$

$$\Rightarrow AD^2 = 100 \text{ cm}^2$$

$$\Rightarrow AD = \sqrt{100\text{cm}^2}$$

$$= \sqrt{(10 \times 10)\text{cm}^2}$$

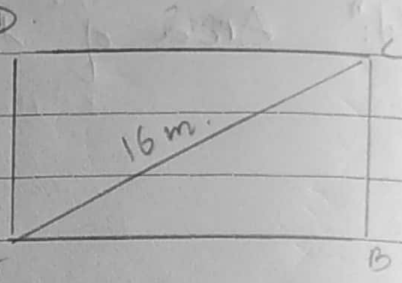
$$= \sqrt{(10 \text{ cm})^{\cancel{2}}}$$

$$= 10 \text{ cm}.$$

∴ length of the side of the rhombus
= 10 cm.

4.

Solⁿ Let ABCD be the quadrilateral and AC the diagonal.



∴ Area of the Quadrilateral

$= \frac{1}{2} \times$ diagonal $\times$ (sum of the offs - sets)

$= \frac{1}{2} \times 16\ m \times (6m + 8m)$

$= \frac{1}{\cancel{2}_1} \times \overset{8}{\cancel{16}}\ m \times 14\ m$

$= 112\ m^2$ //

6

Solⁿ Given.

$h = 20$ cm.
one parallel side = 36 cm.
other parallel side = 64 cm.

∴ Area of the trapezium $= \frac{1}{2} \times h \times$ sum of paralle
sides.

$= \frac{1}{\cancel{2}_1} \times \overset{10}{\cancel{20}}\ cm \times 36cm + 64\ cm$

$= 10\ cm \times 100\ cm$

$= 1000\ cm^2$.

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7.
(ii)
Solⁿ: Here, ABCD is a trapezium.

∴ Area of trapezium ABCD = $\frac{1}{2} \times h \times$ sum of parallel sides.

$= \frac{1}{\cancel{2}_1} \times \overset{6}{\cancel{12}} \times (40\,cm + 30\,cm)$.

$= 6$ ~~cm~~ $\times 70$ cm.

$= 420\ cm^2$.

let the other figure enclosed be CEB, it is a triangle.

∴ Area of △ CEB = $\frac{1}{2} \times$ base $\times$ height

$= \frac{1}{\cancel{2}_1} \times \overset{5}{\cancel{10}}\,cm \times 12\,cm$

$= 60\ cm^2$.

∴ Area of the shaded region = Area of ABCD − Area of CEB.

$= 420\ cm^2 - 60\ cm^2$

$= 360\ cm^2$

$$\begin{array}{r} 420 \\ -\ 60 \\ \hline 360 \end{array}$$

Scanned with CamScanner

8

Solⁿ If the measurements of a square are doubled, then the area of this square = increased by four times

10

Solⁿ If the base and altitude of a parallelogram are doubled, then the area of this parallelogram = increased by four times

Exercise 15.4.

2.

(i)

Solⁿ: Total area = Area of rectangle + Area of circle.

Here,

diameter of circle = 1.4 m.

then, radius = $\frac{1.4 m}{2}$

= 0.7 m.

$$\begin{array}{r} ① \\ 22 \\ \times 7 \\ \hline 154 \end{array}$$

∴ Area of the circle = πr^2.

$= \frac{22}{\cancel{7}_{1}} \times \overset{0.1}{\cancel{0.7}} m \times 0.7 m.$

= 1.54 m^2.

Also, for the rectangle:

l = 2 m

b = 1.4 m.

$$\begin{array}{r} 14 \\ \times 2 \\ \hline 2.8 \end{array}$$

∴ Area of the rectangle = l × b.

= 2 m × 1.4 m

= 2.8 m^2.

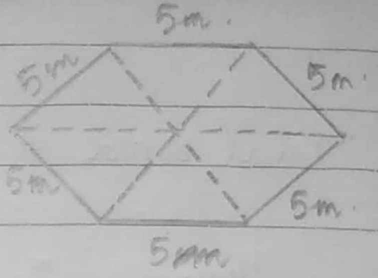
$$\begin{array}{r} ① \\ 2.80 \\ 1.54 \\ \hline 4.34 \end{array}$$

∴ Total area = 2.8 m^2 + 1.54 m^2

= 4.34 m^2.

(iii).

Sol^n Join the alternate vertices to get 6 equilateral Triangles with side = 5 m



∴ Total area of the fig. = 6 × Area of equilateral triangles.

$$= 6 \times \frac{\sqrt{3}\,a^2}{4}$$

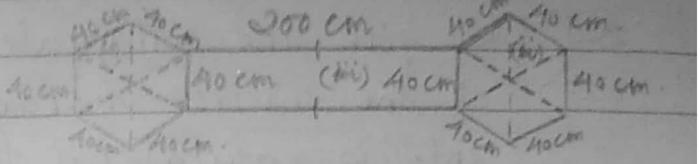
$$= \overset{3}{\cancel{6}} \times \frac{1.732 \times 5m \times 5m}{\underset{2}{\cancel{4}}}$$

= 64.95 sq. m.

③①①
1732
× 25
①①
①8660
+ 3464
43300
× 3
2) 129.900 (64.95
12↓
× 9
-8
19
-18
10
10
xx

(iv)

Solⁿ For fig (i) and fig (ii), we join the alternate vertices to get six equilateral triangles with side = 40 cm.



∴ Area of fig (i) and (ii) = 6 × area of equilateral △

$$= 6 \times \frac{\sqrt{3}a^2}{4}.$$

$$= 6 \times \frac{1.732 \times \overset{10.}{\cancel{40}} \text{ cm} \times 40 \text{ cm}}{\cancel{4}_1}$$

$= 4156.80 \text{ cm}^2.$

for fig (iii) we find area of rectangle.

$\Rightarrow l \times b.$

$= 200 \text{ cm} \times 40 \text{ cm}.$

$= 8000 \text{ cm}^2.$

∴ Total area of the fig = Area of fig (i) + area of fig (ii) + area of fig (iii).

$= 4156.80 \text{ cm}^2 + 4156 \text{ cm}^2 + 8000 \text{ cm}^2$

$= 16313.60 \text{ cm}^2$

(or)

$1.63136 \text{ m}^2.$

6×40
$= 240.$

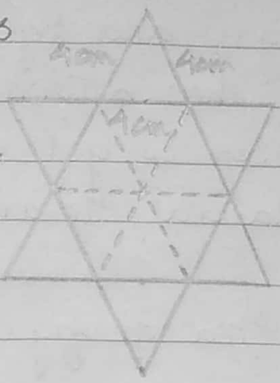
$$\begin{array}{r} ②① \\ 1732 \\ \times 24 \\ \hline ① \\ ①6928 \\ +3464 \\ \hline 415.680 \end{array}$$

and $415.680 \times 10.$
$= 4156.80$

$$\begin{array}{r} ①①① \\ 4156.80 \\ 4156.80 \\ 8000.00 \\ \hline 16313.60 \end{array}$$

(vi).

Solⁿ We join the alternate vertices of the interior hexagon into 6 equilateral triangles. Now the total no. of triangles is 12 with sides = 4 cm.



$\therefore$ total area of the fig = 12 × area of equilateral triangle.

$$= 12 \times \frac{\sqrt{3}\, a^2}{4}$$

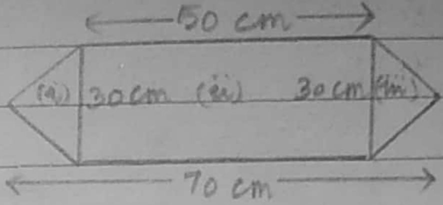
$$= \frac{12 \times 1\cdot 732 \times \cancel{4}^{1}cm \times 4cm}{\cancel{4}_1}$$

$$= 83.136\ cm^2.$$

$$\begin{array}{r} 12 \\ \times 4 \\ \hline 48 \end{array}$$

$$\begin{array}{r} ⑤②① \\ 1732 \\ \times 48 \\ ①②① \\ \hline 13856 \\ +6928 \\ \hline 83\cdot136 \end{array}$$

4.
(i).



Solⁿ For fig (i) and (iii), we find area of a △.

$\therefore$ Area of fig (i) + (iii) $= 2 \times \left\{ \frac{1}{2} \times \text{base} \times h \right\}$.

$= 2 \times \left\{ \frac{1}{\cancel{2}_1} \times \overset{15}{\cancel{30}} \text{ cm} \times 10 \text{ cm} \right\}$.

$= 2 \times 150 \text{ cm}^2$

$= 300 \text{ cm}^2$.

Area of fig (ii) $= l \times b$.

$= 50 \text{ cm} \times 30 \text{ cm}$.

$= 1500 \text{ cm}^2$.

$\therefore$ Total area of the fig = Area of fig (i) + (iii) + area of fig (ii).

$= 300 \text{ cm}^2 + 1500 \text{ cm}^2$

$= 1800 \text{ cm}^2$.

(or)

0.18 m^2.

* * * * *

Chapter 18. Introduction to Graphs. ①

Exercise 18.1.

1(i)

a) (4, 2)

Solⁿ B.

b) (1, 6)

Solⁿ G.

c) (5, 3).

Solⁿ C.

d) (2, 1)

Solⁿ A.

(ii)

(a) F

Solⁿ (3, 4)

(b) C

Solⁿ (5, 3).

(c) H.

Solⁿ (6, 0)

(d) I

Solⁿ (0, 4).

(e) D.

Solⁿ (6, 6).

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2.

Solⁿ: P (1, 1).
Q (2, −1)
R (2, 3).
S (3, 2).

* we always identify + write the x - cordinate followed by the y - cordinate.

3.

Solⁿ: P (−4, 3)
Q (−2, 5).
R (2, 5).
S. (4, 3).
T (2, 2).
U (−2, 0)
V (0, 3)
W (2, −2).

4
(i)

Solⁿ: x - coordinate is 0.

(ii)

Solⁿ: x - coordinate is 7.

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5.

(i)

Solⁿ: y- coordinate is 9.

(iii)

Solⁿ: y- coordinate is 0.

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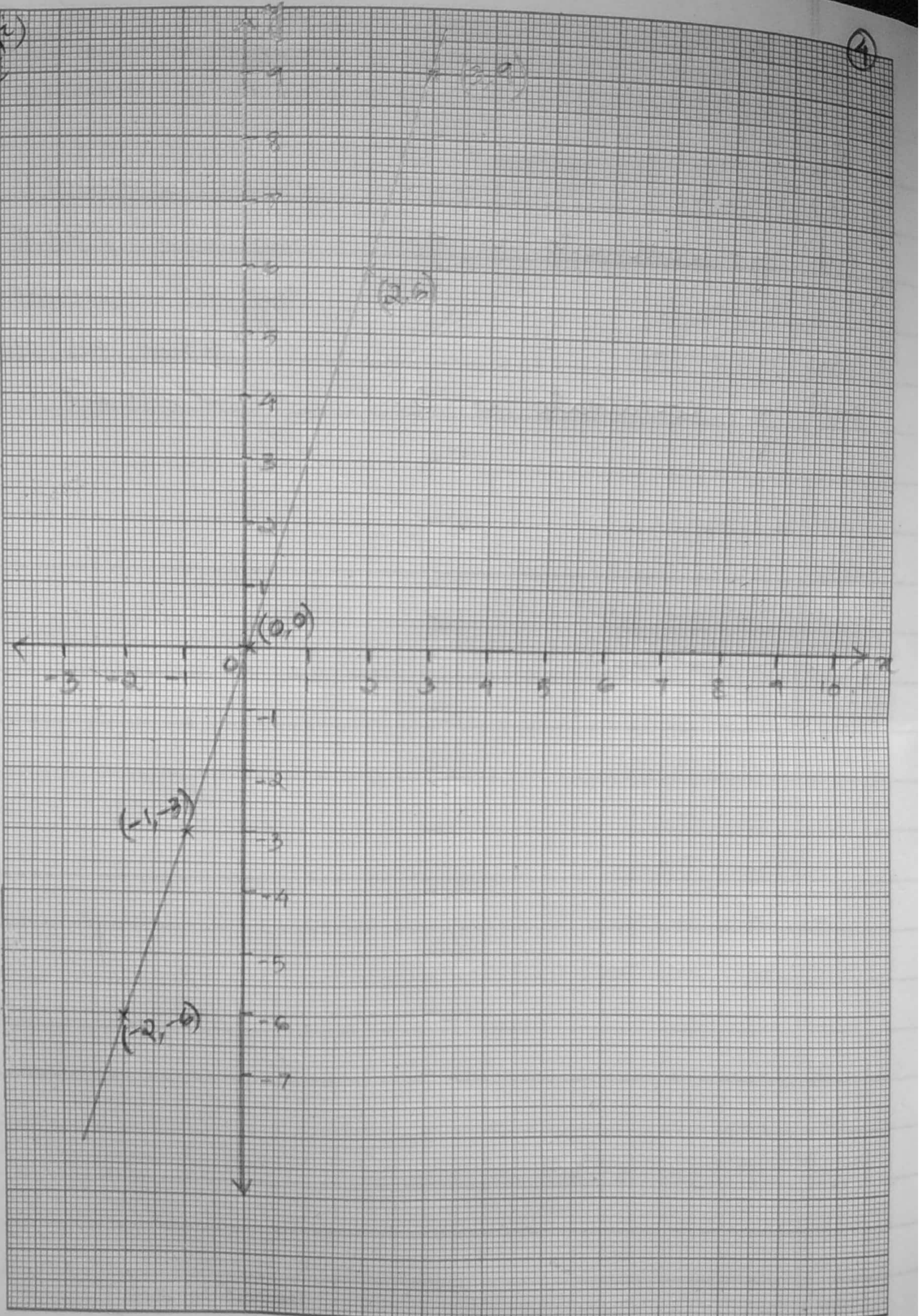
6(2)

8/8

④



(ii)
Sol? Yes, all the points in (i) lie on a straight line.

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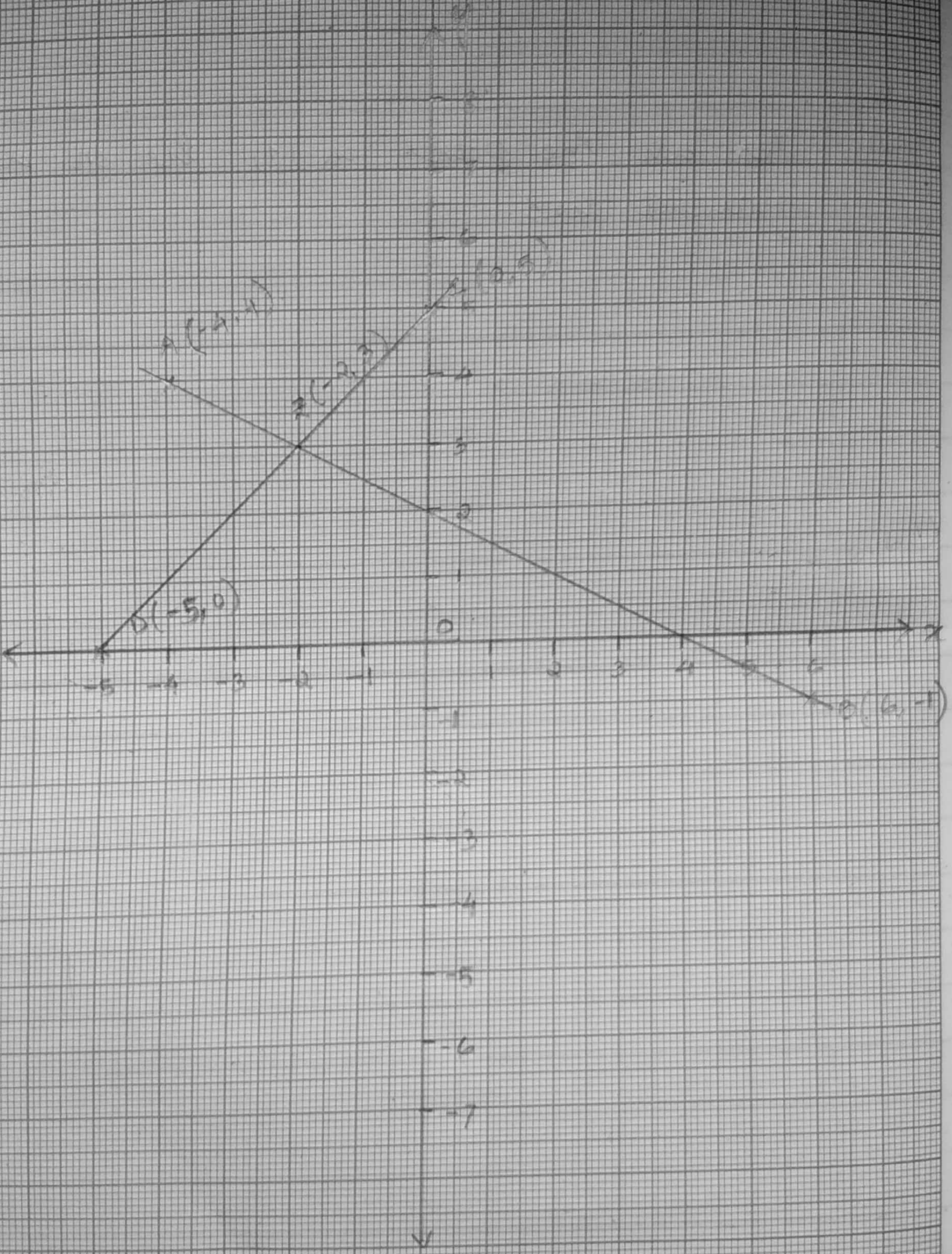
8(i)

Sol^n:

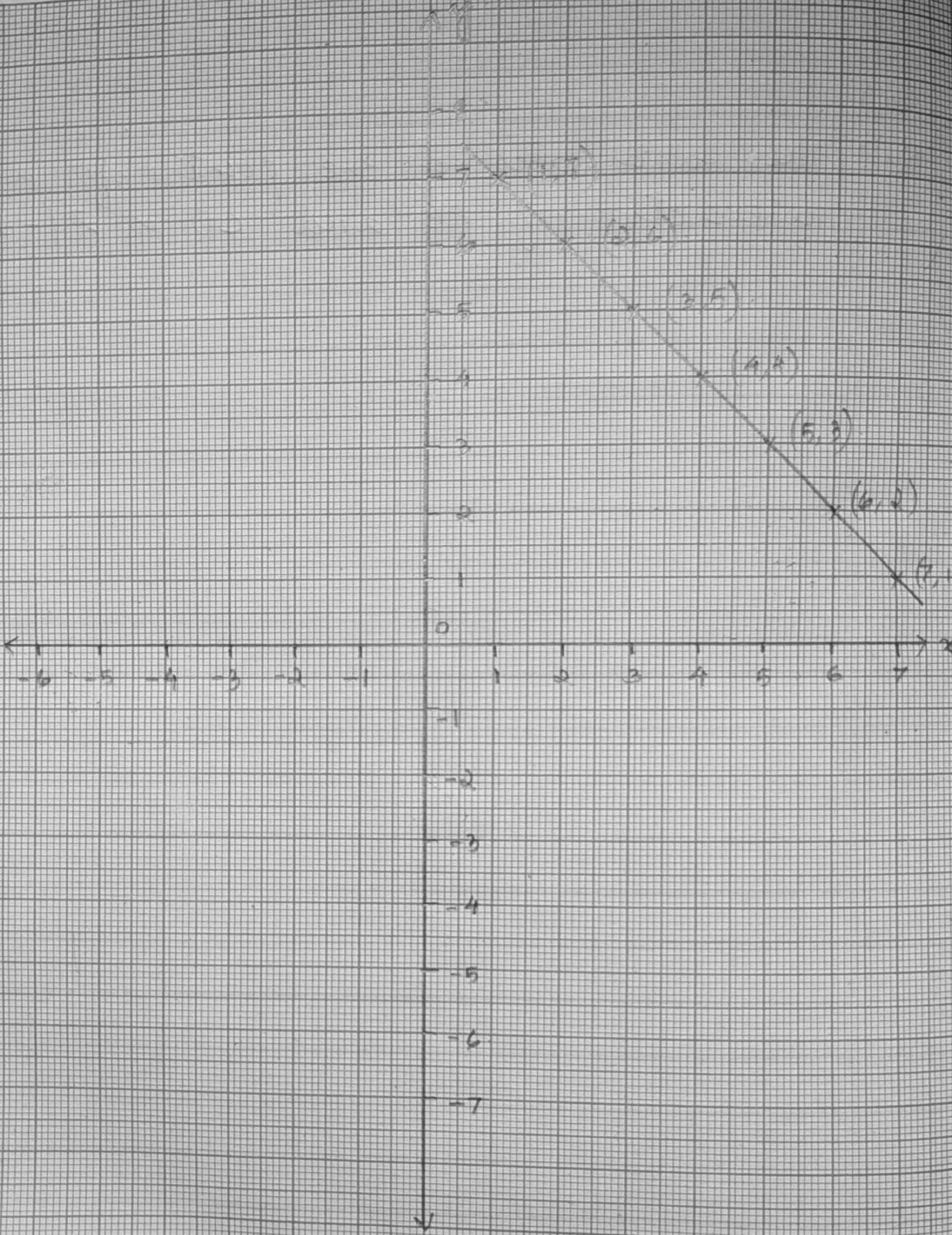


(iv)

Solⁿ: The coordinates of the point of intersection of AB and CD. is Z(−2, 3).

Q3

Sol:



Two points that will lie on this line if this line is extended are (6, 2) and (7, 1).

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Exercise 18.2.

1.

x	0	4	8.
$y = x+1$	1	5	9.

when, $x = 0$.

$$y = x + 1$$
$$= 0 + 1$$
$$= 1.$$

when $x = 4$.

$$y = x + 1$$
$$= 4 + 1$$
$$= 5.$$

when $x = 8$.

$$y = x + 1$$
$$= 8 + 1$$
$$= 9.$$

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x	0	4	7.
$y=2x-1$	-1	7	13

when $x = 0$

$$\begin{aligned} y &= 2x - 1 \\ &= 2 \times 0 - 1 \\ &= 0 - 1 \\ &= -1 \end{aligned}$$

when $x = 4.$

$$\begin{aligned} y &= 2x - 1 \\ &= 2 \times 4 - 1 \\ &= 8 - 1 \\ &= 7. \end{aligned}$$

when $x = 7.$

$$\begin{aligned} y &= 2x - 1 \\ &= 2 \times 7 - 1 \\ &= 14 - 1 \\ &= 13. \end{aligned}$$

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	Numbers	*Sum*	*Product*
(vii)	8, −3	$8-3=5$	$8\times-3=-24$
(viii)	11, −7	$11-7=4$	$11\times-7=-77$
(ix)	12, −2	$12-2=10$	$12\times-2=-24$
(x)	7, −2	$7-2=5$	$7\times-2=-14$
(xi)	−3, −5	$-3-5=-8$	$-3\times-5=-15$
(xii)	−8, 7	$-8+7=-1$	$-8\times7=-56$
(xiii)	−9, −7	$-9-7=-16$	$-9\times-7=-63$

	Numbers	*Sum*	*Product*
(xiv)	−12, −2	$-12-2=-20$	$-12\times-2=24$
(xv)	−15, −3	$-15-3=-18$	$-15\times-3=-45$
(xvi)	−18, −2		
(xvii)	33, −2		
(xviii)	−33, −3		
(xix)	−6, −2		
(xx)	−5, −7		

Given are the sum and product of two numbers. Find the two numbers.

	Sum	*Product*	*Number*	*Number*
(i)	17	72	8	9
(ii)	8	15	5	3
(iii)	11	30	6	5
(iv)	−15	56	−8	−7
(v)	−9	18	−6	−3
(vi)	−9	14	−7	−2
(vii)	−15	44	−11	−4
(viii)	2	−15	5	−3
(ix)	3	−40	8	−5
(x)	1	−72	9	−8

	Sum	*Product*	*Number*	*Number*
(xi)	−4	−21	−7	3
(xii)	−7	−30	−10	3
(xiii)	−11	−12	−12	1
(xiv)	−11	−26	−13	2
(xv)	−17	−60	−20	3
(xvi)	12	36		
(xvii)	−33	90		
(xviii)	89	−90		
(xix)	−15	36		
(xx)	2	−15		

Fill in the blanks.

		Middle term (sum of the numbers)	*Product*	*Numbers*	*Factors*
(i)	x^2-5x+6	−5	6	−2, −3	$(x-3)(x-2)$
(ii)	$y^2-11y+24$	−11	24	−3, −8	$(x-3)(x-8)$
(iii)	$x^2-9x+14$	−9	14	−7, −2	$(x-7)(x-2)$
(iv)	x^2+x-6	1	6	3, −2	$(x-3)(x-2)$
(v)	$y^2+12y+36$	12	36	6, 6	$(x+6)(x+6)$
(vi)	$x^2+5x-84$				
(vii)	$a^2+13a-14$				

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Exercise 7.4

1. Find the sum and the product of the following.

	Numbers	*Sum*	*Product*
(i)	3, 5	$3+5=8$	$3\times5=15$
(ii)	8, 9	$8+9=17$	$8\times9=72$
(iii)	9, 5	14	45

	Numbers	*Sum*	*Product*
(iv)	13, 3	16	39
(v)	–3, 5	$-3+5=2$	$-3\times5=-15$
(vi)	–7, 3	$-7+3=-4$	$-7\times3=-21$

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