Ex#8(A)

2. (i) $PQ = VW = \underline{3.5}$ cm
   (ii) $PT = \underline{VZ} = 2$ cm
   (iii) $QR = \underline{WX} = \underline{3.5}$ cm
   (iv) $TS = \underline{ZY} = \underline{2.1}$ cm
   (v) $SR = \underline{YX} = \underline{2}$ cm
   (vi) $\angle PQR = \underline{\angle VWX} = \underline{90^\circ}$

3. Since $EFGH \equiv LMNO$, then the corresponding vertices match.

$EF = LM$
$= 3.4$ cm

$GH = NO$
$= 2.4$ cm

$\angle FEH = \angle MLO$
$= 100^\circ$

$\angle FGH = \angle MNO$
$= 75^\circ$

$MN = FG$
$= 5$ cm

$OL = HE$
$= 3$ cm

$\angle LMN = \angle EFG$
$= 65^\circ$

$\angle NOL = \angle GHE$
$= 120^\circ$

4. (a) $\angle ACB = 180^\circ - 90^\circ - 36.9^\circ$ ($\angle$ sum of $\triangle ABC$)
$= 53.1^\circ$

$\angle PRQ = 180^\circ - 90^\circ - 36.9^\circ$ ($\angle$ sum of $\triangle PQR$)
$= 53.1^\circ$

$A \leftrightarrow P$ (since $\angle A = \angle P = 36.9^\circ$)
$B \leftrightarrow Q$ (since $\angle B = \angle Q = 90^\circ$)
$C \leftrightarrow R$ (since $\angle C = \angle R = 53.1^\circ$)
$\angle BAC = \angle QPR = 36.9^\circ$
$\angle ABC = \angle PQR = 90^\circ$
$\angle ACB = \angle PRQ = 53.1^\circ$
$AB = PQ = 4$ cm
$BC = QR = 3$ cm
$AC = PR = 5$ cm
$\therefore$ The two triangles have the same shape and size and so $\triangle ABC \equiv \triangle PQR$.

(b) $\angle EDF = 180^\circ - 80^\circ - 70^\circ$ ($\angle$ sum of $\triangle DEF$)
$= 30^\circ$

$\angle SUT = 180^\circ - 80^\circ - 30^\circ$ ($\angle$ sum of $\triangle STU$)
$= 70^\circ$

$D \leftrightarrow T$ (since $\angle D = \angle T = 30^\circ$)
$E \leftrightarrow S$ (since $\angle E = \angle B = 80^\circ$)
$F \leftrightarrow U$ (since $\angle F = \angle U = 70^\circ$)
$\angle EDF = \angle STU = 30^\circ$
$\angle DEF = \angle TSU = 80^\circ$
$\angle DFE = \angle SUT = 70^\circ$
$DE = TS = 18.8$ cm
$EF = QR = 3$ cm
$DF = TU = 19.7$ cm
$\therefore$ The two triangles have the same shape and size and so $\triangle DEF \equiv \triangle TSU$.

(c) $\angle LNM = 180° - 65° - 70°$ ($\angle$ sum of $\triangle LMN$)

$= 45°$

Q#4 $\angle XZY = 180° - 65° - 70°$ ($\angle$ sum of $\triangle XYZ$)

$= 45°$

$L \leftrightarrow X$ (since $\angle L = \angle X = 65°$)

$M \leftrightarrow Y$ (since $\angle M = \angle Y = 70°$)

$N \leftrightarrow Z$ (since $\angle N = \angle Z = 45°$)

$MN = 4 \neq 5.13 = YZ$

$\therefore$ Since the corresponding sides are not equal, $\triangle LMN$ is not congruent to $\triangle XYZ$.

5. **(i)** Since $\triangle ABK \equiv \triangle ACK$, then the corresponding vertices match.

$\angle ABK = \angle ACK$

$= 62°$

$\angle BAK = 180° - 90° - 62°$ ($\angle$ sum of $\triangle ABK$)

$= 28°$

$\angle CAK = \angle BAK$

$= 28°$

$\therefore \angle BAC = \angle BAK + \angle CAK$

$= 28° + 28°$

$= 56°$

(ii) Length of CK = length of BK

$= 8$ cm

$\therefore$ Length of BC = length of BK + length of CK

$= 8 + 8$

$= 16$ cm

6. **(i)** Since $\triangle ABC \equiv \triangle DEC$, then the corresponding vertices match.

$\angle BAC = \angle EDC$

$= 34°$

$\therefore \angle ABC = 180° - 71° - 34°$

$= 75°$

(ii) Length of CD = length of CA

$= 6.9$ cm

$\therefore$ Length of BD = length of BC + length of CD

$= 4 + 6.9$

$= 10.9$ cm

7. **(i)** Since $\triangle ABK \equiv \triangle ACH$, then the corresponding vertices match.

$\angle AHC = \angle AKB$

$= 180° - 90°$ (adj. $\angle$s on a str. line)

$= 90°$

Length of AH = length of AK

$\therefore \triangle AHK$ is an isosceles triangle.

Let $\angle AHK$ be $x°$.

$\angle AKH = \angle AHK$ (base $\angle$s of isos. $\triangle AHK$)

$= x$

$\angle CHK = 90° - x°$

$\angle CKH = 90° - x°$

$\therefore \triangle CHK$ is an isosceles triangle.

Let the length of CH be n cm.

Length of $CK = n$ cm (isos. $\triangle$)

Length of BK = length of CH

$= n$ cm

$n + n = 12$

$2n = 12$

$n = 6$

$\therefore$ The length of CH is 6 cm.

(ii) $\angle BAC$

$= 180° - 58° - 58°$ ($\angle$ sum of $\triangle ABC$) (base $\angle$s of isos. $\triangle ABC$)

$= 64°$

$\triangle ACH = \angle ABK$

$= 58°$

$\angle CAH = 180° - 90° - 58°$ ($\angle$ sum of $\triangle ACH$)

$= 32°$

$\therefore \angle BAH = \angle BAC + \angle CAH$

$= 64° + 32°$

$= 96°$

Exercise 8B

1. (a) Since $\triangle ABC$ is similar to $\triangle PQR$, then all the corresponding angles are equal.

$$\begin{aligned} x^\circ &= \angle PQR \\ &= \angle ABC \\ &= 90^\circ \end{aligned}$$

$$\begin{aligned} y^\circ &= \angle ACB \\ &= \angle PRQ \\ &= 35^\circ \end{aligned}$$

$$\begin{aligned} z^\circ &= \angle QPR \\ &= 180^\circ - 90^\circ - 35^\circ \quad (\angle \text{ sum of } \triangle PQR) \\ &= 55^\circ \end{aligned}$$

$\therefore x = 90, y = 35, z = 55$

(b) Since $\triangle ABC$ is similar to $\triangle PQR$, then all the corresponding angles are equal.

$$\begin{aligned} x^\circ &= \angle PRQ \\ &= \angle ACB \\ &= 28^\circ \end{aligned}$$

$$\begin{aligned} y^\circ &= \angle BAC \\ &= \angle QPR \\ &= 180^\circ - 118^\circ - 28^\circ \quad (\angle \text{ sum of } \triangle PQR) \\ &= 34^\circ \end{aligned}$$

$\therefore x = 28, y = 34$

#1

(c) Since $\triangle ABC$ is similar to $\triangle PQR$, then all the ratios of the corresponding sides are equal.

$$\frac{QR}{BC} = \frac{PQ}{AB}$$
$$\frac{x}{12} = \frac{6}{10}$$
$$x = \frac{6}{10} \times 12$$
$$= 7.2$$
$$\frac{PR}{AC} = \frac{PQ}{AB}$$
$$\frac{y}{18} = \frac{6}{10}$$
$$y = \frac{6}{10} \times 18$$
$$= 10.8$$
$$\therefore x = 7.2, y = 10.8$$

(d) Since $\triangle ABC$ is similar to $\triangle PQR$, then all the ratios of the corresponding sides are equal.

$$\frac{AC}{PR} = \frac{AB}{PQ}$$
$$\frac{x}{8} = \frac{12}{10}$$
$$x = \frac{12}{10} \times 8$$
$$= 9.6$$
$$\frac{QR}{BC} = \frac{PQ}{AB}$$
$$\frac{y}{7} = \frac{10}{12}$$
$$y = \frac{10}{12} \times 7$$
$$= 5\frac{5}{6}$$
$$\therefore x = 9.6, y = 5\frac{5}{6}$$

2. (a) $\angle B = \dfrac{180° - 40°}{2}$ ($\angle$ sum of $\triangle ABC$)(base $\angle$s of isos. $\triangle ABC$)

$= 70°$

$\angle C = 70°$ (base $\angle$s of isos. $\triangle ABC$)

$\triangle R = 50°$ (base $\angle$s of isos. $\triangle PQR$)

$\triangle P = 180° - 50° - 50°$ ($\angle$ sum of $\triangle PQR$)

$= 80°$

$\angle A = 40° \neq 80° = \angle P$

$\angle B = 70° \neq 50° = \angle Q$

$\angle C = 70° \neq 50° = \angle R$

Since all the corresponding angles are not equal, then $\triangle ABC$ is not similar to $\triangle PQR$.

(b) $\dfrac{DE}{ST} = \dfrac{3.3}{2.4} = 1.375$

$\dfrac{EF}{TU} = \dfrac{5.7}{3.8} = 1.5$

$\dfrac{DF}{SU} = \dfrac{5.4}{3.6} = 1.5$

Since not all the ratios of the corresponding sides are equal, $\triangle DEF$ is not similar to $\triangle STU$.

3. (a) Since $ABCD$ is similar to $PQRS$, then all the corresponding angles are equal.

$x° = \angle QPS$

$= \angle BAD$

$= 95°$

$y° = \angle QRS$

$= \angle BCD$

$= 360° - 95° - 105° - 108°$ ($\angle$ sum of quad.)

$= 52°$

Since $ABCD$ is similar to $PQRS$, then all the ratios of the corresponding sides are equal.

$$\frac{PQ}{AB} = \frac{QR}{BC}$$
$$\frac{z}{8} = \frac{7.2}{12}$$
$$z = \frac{7.2}{12} \times 8$$
$$= 4.8$$
$$\therefore x = 95, y = 52, z = 4.8$$

(b) Since $ABCD$ is similar to $PQRS$, then all the corresponding angles are equal.

$x° = \angle ADC$

$= \angle PSR$

$= 180° - 100°$ (int. $\angle$s, $PQ \parallel SR$)

$= 80°$

Since $ABCD$ is similar to $PQRS$, then all the ratios of the corresponding sides are equal.

$$\frac{PS}{AD} = \frac{RS}{CD}$$
$$\frac{y}{14} = \frac{9}{12}$$
$$y = \frac{9}{12} \times 14$$
$$= 10.5$$
$$\therefore x = 80, y = 10.5$$

4. Since the two water bottles are similar, then all the ratios of the corresponding sides are equal.

$$\frac{x}{10} = \frac{8}{5}$$
$$x = \frac{8}{5} \times 10$$
$$= 16$$
$$\frac{y}{3} = \frac{5}{8}$$
$$y = \frac{5}{8} \times 3$$
$$= 1.875$$
$$\therefore x = 16, y = 1.875$$

EX#8(B)

5. Since the two toy houses are similar, then all the corresponding angles are equal and all the ratios of the corresponding sides are equal.

$x^\circ = 100^\circ$

$\frac{y}{180} = \frac{180}{120}$

$y = \frac{180}{120} \times 180$

$= 270$

$\frac{z}{150} = \frac{120}{180}$

$z = \frac{120}{180} \times 150$

$= 100$

$\therefore x = 100, y = 270, z = 100$

6. Let the height of the lamp be x m.

$\therefore \frac{x}{3} = \frac{10+6}{6}$

$x = \frac{16}{6} \times 3$

$= 8$

The height of the lamp is 8 m.

7. Since $\triangle ABC$ is similar to $\triangle ADE$, then all the corresponding angles are equal.

$x^\circ = \angle ADE$

$= \angle ABC$

$= 56^\circ$

Since $\triangle ABC$ is similar to $\triangle ADE$, then all the ratios of the corresponding sides are equal.

$\frac{AD}{AB} = \frac{AE}{AC}$

$\frac{y+4}{4} = \frac{6+9}{6}$

$y + 4 = \frac{15}{6} \times 4$

$= 10$

$y = 6$

$\therefore x = 56, y = 6$

8. Since $\triangle PQR$ is similar to $\triangle BAR$, then all the corresponding angles are equal.

$\angle ABR = \angle QPR$

$= 60^\circ$

$x^\circ = \angle BAR$

$= 180^\circ - 60^\circ - 52^\circ$ ($\angle$ sum of $\triangle BAR$)

$= 68^\circ$

Since $\triangle PQR$ is similar to $\triangle BAR$, then all the ratios of the corresponding sides are equal.

$\frac{BR}{PR} = \frac{AB}{QP}$

$\frac{y}{14} = \frac{9}{12}$

$y = \frac{9}{12} \times 14$

$= 10.5$

$\therefore x = 60, y = 10.5$

9. **(i)** Since $\triangle TBP$ is similar to $\triangle TAQ$, then all the ratios of the corresponding sides are equal.

$\frac{x}{y} = \frac{AQ}{BP}$

$\frac{x}{y} = \frac{6}{2}$

$x = 3y$

$\therefore$ Length of $PA = x + y$

$= 3y + y$

$= 4y$ m

(ii) Since $\triangle PTM$ is similar to $\triangle PQA$, then all the ratios of the corresponding sides are equal.

$\frac{TM}{QA} = \frac{PM}{PA}$

$\frac{TM}{6} = \frac{y}{4y}$

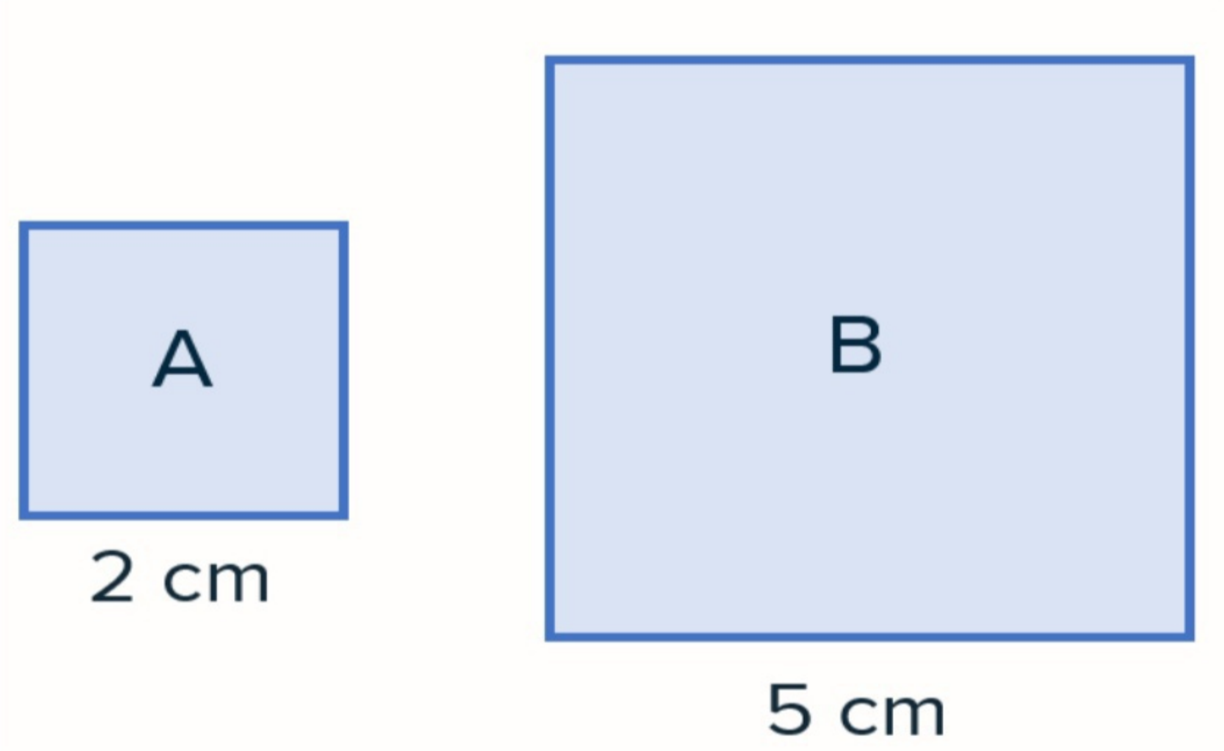
$\therefore TM = \frac{1}{4} \times 6$ (From **(i)**, $PA = 4y$)

$= 1.5$ m

When a **shape** is **enlarged**, the image is **similar** to the original **shape**. It is the **same shape** but a different size. These two **shapes** are **similar** as they are both rectangles but one is an **enlargement** of the other.

Example: A and B are mathematically similar shapes.

Find the scale factor from A to B.

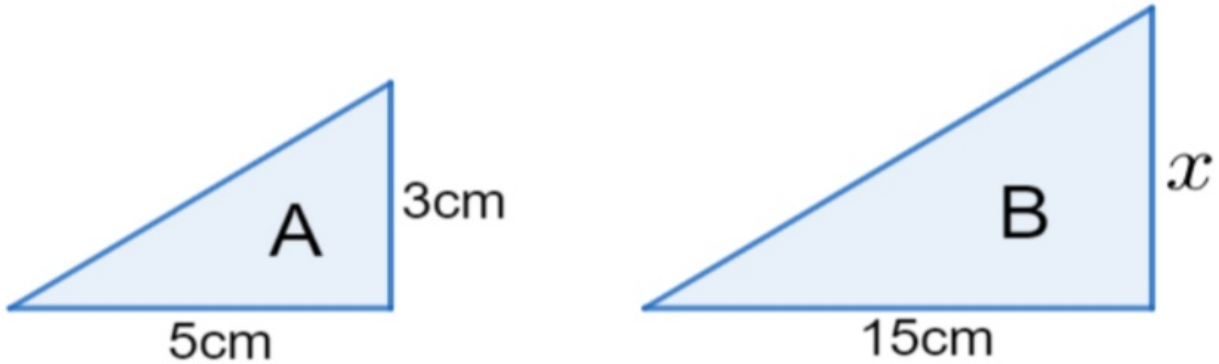


First we need to find two corresponding lengths.

We can see that the base of $A = 2$ and $B = 5$

To calculate the scale factor we divide the larger by the smaller:

$5 \div 2 = 2.5$ Scale factor



[2 marks]

Firstly, we must calculate the **scale factor.**

To do this we divide the base of shape B by the equivalent side length on shape A

$$\text{Scale factor} = 15 \div 5 = \mathbf{3}$$

Now we have that the scale factor is $\mathbf{3}$, all we need to do to find x is multiply $\mathbf{3}$ by the length of the corresponding side on the smaller shape. So we get X=3×3=9

Exercise 8C

1. $\triangle XYZ$ is similar to $\triangle X'Y'Z'$ under enlargement.

$$\frac{X'Y'}{XY} = \frac{Y'Z'}{YZ} = 2.5$$

$$\frac{X'Y'}{4} = 2.5 \quad \text{and} \quad \frac{8.75}{YZ} = 2.5$$

$\therefore X'Y' = 10$ cm and $YZ = 3.5$ cm

2. **(i)** $PQRS$ is similar to $P'Q'R'S'$ under enlargement.

$$k = \frac{P'Q'}{PQ}$$

$$= \frac{16}{8}$$

$$= 2$$

$\therefore k = 2$

(ii) $\frac{Q'R'}{QR} = \frac{S'R'}{SR} = 2$

$$\frac{Q'R'}{4} = 2 \quad \text{and} \quad \frac{14}{SR} = 2$$

$\therefore Q'R' = 8$ cm and $SR = 7$ cm

3. **(i)** By measuring the vertical width, which represents 28 km, we get 3.5 cm.

Hence, the scale is 3.5 cm : 28 km, which is 1 cm : 8 km.

(ii) By measuring x, we get 7 cm.

Actual distance between the East and West of Singapore

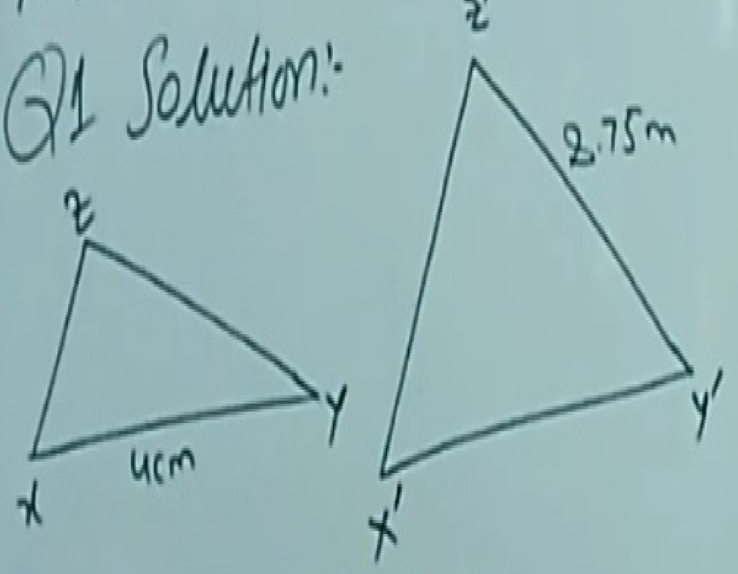
$= 7 \times 8$

$= 56$ km

Subject: Math Book D2 Class VIII

Topic:- Ex 8C

Q1 Solution:-



Find length X'Y' and YZ

$$\frac{X'Y'}{XY} = 2.5 \text{ (scale factor)}$$

$$\frac{X'Y'}{4} = 2.5\text{cm}$$

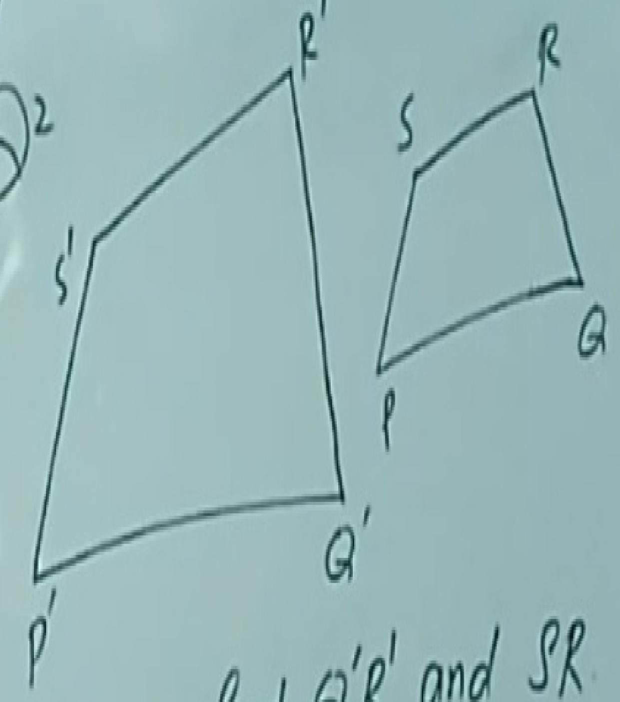
$$X'Y' = 2.5 \times 4 = 10\text{cm}$$

$$\frac{Z'Y'}{ZY} = 2.5$$

$$\frac{8.75}{ZY} = 2.5 \Rightarrow \frac{8.75}{2.5}\text{cm} = YZ$$

$$\Rightarrow YZ = 3.5\text{cm}$$

Q2



Solution. find Q'R' and SR

$$\frac{Q'R'}{QR} = 2 \text{ (scale factor)}$$

$$\frac{Q'R'}{4} = 2\text{cm} \Rightarrow Q'R' = 2 \times 4\text{cm}$$

$$\Rightarrow Q'R' = 8\text{cm}$$

$$\frac{S'R'}{SR} = 2 \text{ (Scale factor)}$$

$$\frac{14}{SR} = 2\text{cm}$$

$$\frac{14}{2}\text{cm} = SR \Rightarrow SR = 7\text{cm}$$