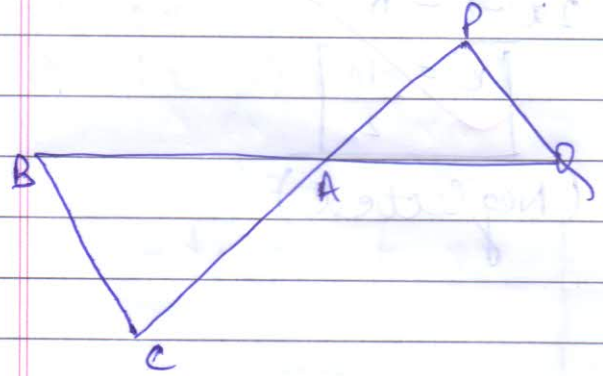
Exercise 7.5

Q.1



$\triangle ACB \sim \triangle APQ$

$BC = 8\ cm$, $PQ = 4\ cm$

$BA = 6.5\ cm$, $AP = 2.8\ cm$

} given

As $\Delta ACB \sim \Delta APQ$,

$\therefore \frac{AB}{AQ} = \frac{AC}{AP} = \frac{BC}{PQ}$ (CPST)

$\Rightarrow \frac{6.5}{AQ} = \frac{AC}{2.8} = \frac{8}{4}$

$\Rightarrow \frac{6.5}{AQ} = \frac{8}{4}$

$\Rightarrow AQ = \frac{6.5 \times 4}{8_2}$

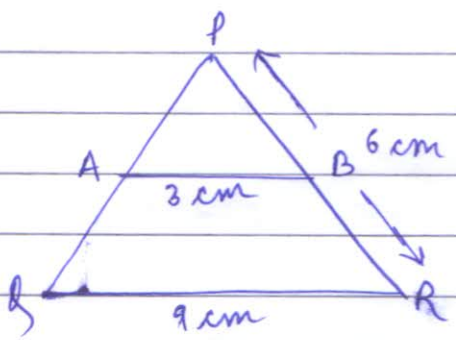
$\Rightarrow \boxed{AQ = 3.25 \text{ cm}}$

$\Rightarrow \frac{AC}{2.8} = \frac{8}{4}$

$\Rightarrow AC = \frac{2.8 \times 2.8}{4}$

$\Rightarrow \boxed{AC = 5.6 \text{ cm}}$

Q-2



AB || QR (Given)

AB = 3 cm
QR = 9 cm
PR = 6 cm
} Given

In ΔPAB & ΔPQR

$\angle P = \angle P$ (Common)

$\angle PAB = \angle PQR$ (corresponding $\angle$s)

$\Delta PAB \sim \Delta PQR$ (AA similarity)

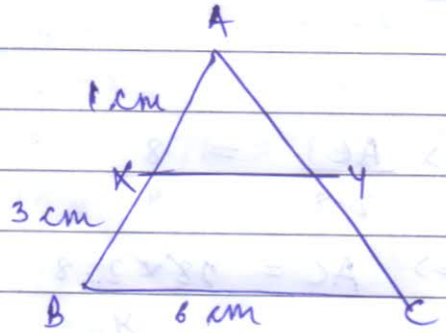
$\therefore \frac{PB}{PR} = \frac{AB}{QR}$ (CPST)

$\Rightarrow \frac{PB}{6} = \frac{3}{9}$

$\Rightarrow PB = \frac{1 \times 6_2}{3}$

$\Rightarrow \boxed{PB = 2 \text{ cm}}$

Q.3



$XY \parallel BC$
$AX = 1 \text{ cm}$
$XB = 3 \text{ cm}$
$BC = 6 \text{ cm}$
} given

$AB = AX + XB$
$= 1 + 3 = 4 \text{ cm}$

In ΔAXY & ΔABC
$\angle A = \angle A$ (Common)
$\angle AXY = \angle ABC$ (Corresponding $\angle$s)
$\therefore \Delta AXY \sim \Delta ABC$ (AA Similarity)

$\therefore \frac{AX}{AB} = \frac{XY}{BC}$ (CPST)

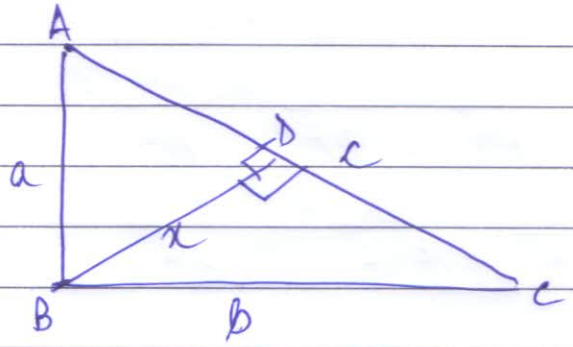
$\Rightarrow \frac{1}{4} = \frac{XY}{6}$

$\Rightarrow XY = \frac{1 \times 6_3}{4_2}$

$\Rightarrow \boxed{XY = 1.5 \text{ cm}}$

classmate
Date
Page

Q-4



Given – • $\angle B$ is right $\angle$
• $BD \perp AC$

To prove – $ab = cx$

Proof – Area of $\Delta = \frac{1}{2} \times b \times h$

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

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

$= \frac{ab}{2}$ — (1)

Also, area of $\Delta = \frac{1}{2} \times AC \times BD$

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

$= \frac{cx}{2}$ — (2)

From (1) & (2)

$\frac{ab}{2} = \frac{cx}{2}$

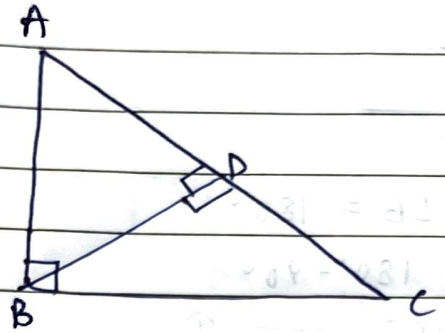
$\therefore \boxed{ab = cx}$

Hence, proved

30/11/2020

Ch-7
Exercise 7.5

Q.6



Given – • $\angle ABC = 90°$
• $AB = 5.7\,cm$, $BD = 3.8\,cm$, $CD = 5.4\,cm$, $BD \perp AC$

To find – BC

Solution – In $\triangle ABD$ & $\triangle BDC$,

$BD = BD$ (Common)

$\angle BDA = \angle BDC$ } $BD \perp AC$

$AD = DC$ }

$\therefore \triangle ABD \sim \triangle BDC$ (SAS similarity)

$$\therefore \frac{AB}{BC} = \frac{AD}{BD} = \frac{BD}{CD} \quad (CPST)$$

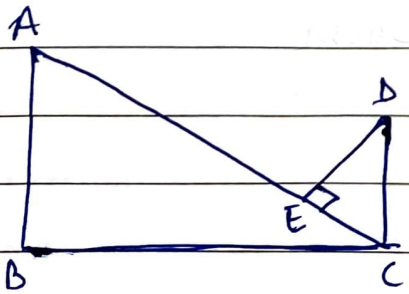
$$\Rightarrow \frac{AB}{BC} = \frac{BD}{CD}$$

$$\Rightarrow \frac{5.7}{BC} = \frac{3.8}{5.4}$$

$$\Rightarrow BC = \frac{5.7 \times 5.4}{3.8}$$

$$\Rightarrow BC = \boxed{8.1\ cm}$$

Q.8



Given - • $AB \perp BC$
• $DC \perp BC$
• $DE \perp AC$

To prove - $\triangle CED \sim \triangle ABC$

Proof - $AB \perp BC$

$\therefore \angle B = 90°$

$\therefore \angle A + \angle ACB + \angle B = 180°$

$\angle A + \angle ACB = 180° - 90°$

$\angle A + \angle ACB = 90°$ —— (1)

$DC \perp BC$

$\therefore \angle DCB = 90°$

$\therefore \angle ACB + \angle DCA = 90°$ —— (2)

From (1) & (2)

$\angle A = \angle DCA$ —— (3)

In $\triangle CED$ & $\triangle ABC$,

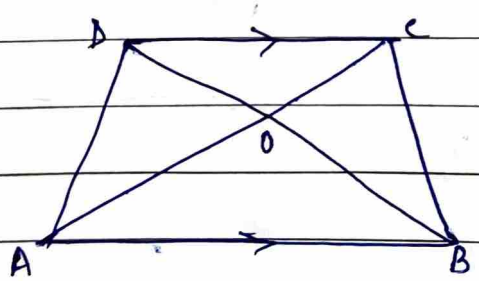
$\angle E = \angle B$ (90° each)

$\angle DCA = \angle A$ (From (3))

$\therefore \boxed{\triangle CED \sim \triangle ABC}$ (AA similarity)

Hence, proved.

Q.9



Given - • ABCD is a trapezium
• $AB \parallel DC$

To prove - $\frac{OA}{OC} = \frac{OB}{OD}$

Proof – In $\triangle AOB$ & $\triangle COD$,

$\angle AOB = \angle COD$ (Vertically opp. $\angle$s)

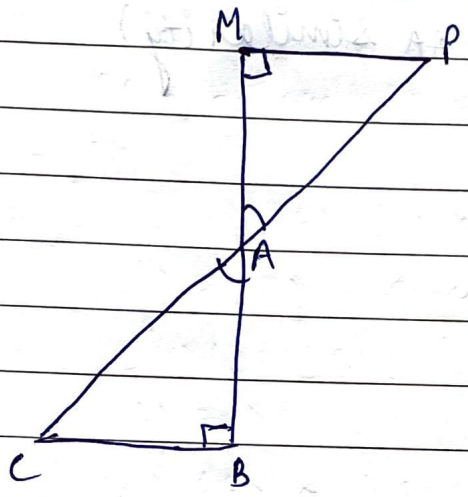
$\angle OAB = \angle OCD$ (Alternate $\angle$s, $AB \parallel DC$)

$\therefore \triangle AOB \sim \triangle COD$ (AA similarity)

$$\therefore \boxed{\frac{OA}{OC} = \frac{OB}{OD}} \quad \text{(CPST)}$$

Hence, proved

Q.10



Given – • $\triangle ABC$ & $\triangle AMP$ are right $\triangle$.

• $\angle B, \angle M = 90°$

• $\angle MAP = \angle BAC$

To prove – (i) $\triangle ABC \sim \triangle AMP$

(ii) $\frac{CA}{PA} = \frac{BC}{MP}$

Proof – (i) In $\triangle ABC$ & $\triangle AMP$

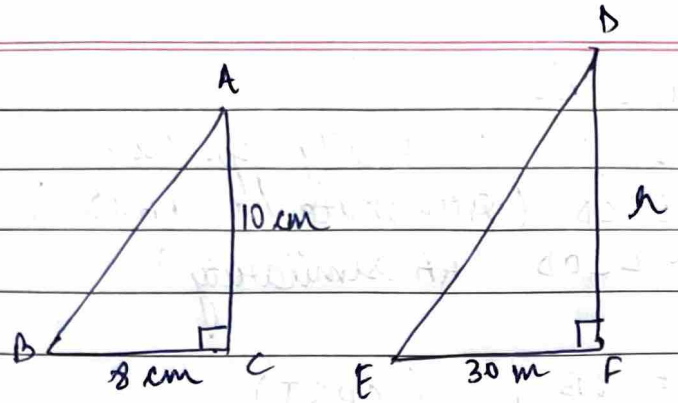
$\angle B = \angle M$ (90° each)

$\angle MAP = \angle BAC$ (Given)

$$\therefore \boxed{\triangle ABC \sim \triangle AMP} \quad \text{(AA similarity)}$$

(ii) $\boxed{\frac{CA}{PA} = \frac{BC}{MP}}$ (CPST, $\triangle ABC \sim \triangle AMP$)

Q. 11



In $\triangle ABC$ & $\triangle DEF$,

$\angle C = \angle F$ (90° each)

$\angle B = \angle E$ (Sunlight ∠)

$\therefore \triangle ABC \sim \triangle DEF$ (AA similarity)

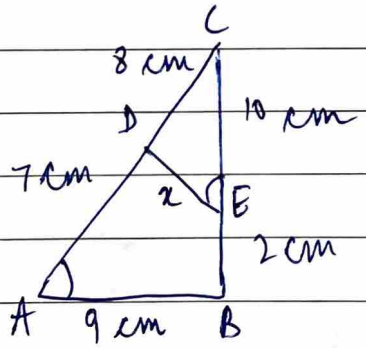
$$\therefore \frac{AC}{DF} = \frac{BC}{EF}$$

$$\Rightarrow \frac{10}{h} = \frac{8}{30}$$

$$\Rightarrow h = \frac{\cancel{10}^{5} \times \cancel{30}^{15}}{\cancel{8}_{4}\cancel{}_{2}}$$

$$\Rightarrow \boxed{h = 37.5 \text{ m}}$$

Q. 12



In $\triangle ABC$

$\angle A = \angle CED$ (given)

$AB = 9$ cm, $BE = 2$ cm, $EC = 10$ cm, $AD = 7$ cm

$DC = 8$ cm (given

$BC = BE + EC$

$= 2 + 10 = 12\ cm$

$AC = AD + DC = 7 + 8$

$= 15\ cm$

In $\triangle CAB$ & $\triangle CED$

$\angle A = \angle CED$ (Given)

$\angle C = \angle C$ (Common)

$\therefore \boxed{\triangle CAB \sim \triangle CED}$ (AA similarity)

Hence, proved

$$\frac{AC}{EC} = \frac{BC}{DC} = \frac{AB}{DE} \quad (CPST)$$

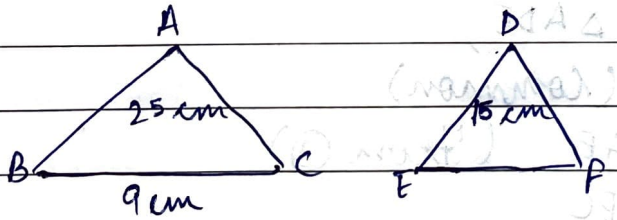
$$\Rightarrow \frac{AC}{EC} = \frac{AB}{DC}$$

$$\Rightarrow \frac{15}{10} = \frac{9}{x}$$

$$\Rightarrow x = \frac{9 \times 10}{15} = \frac{906}{15}$$

$$\Rightarrow \boxed{x = 6\ cm}$$

Q. 13



$\triangle ABC \sim \triangle DEF$ (Given)

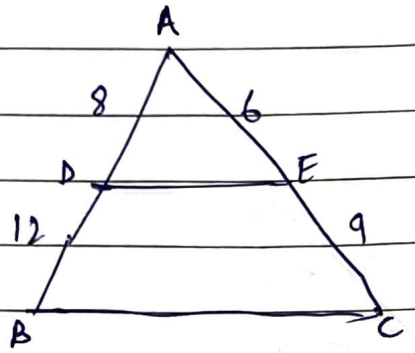
$$\frac{\text{Perimeter of } \triangle ABC}{\text{Perimeter of } \triangle DEF} = \frac{BC}{EF}$$

$$\Rightarrow \frac{25}{15} = \frac{9}{EF}$$

$$\Rightarrow EF = \frac{9 \times 15}{25} = \frac{135}{25} = 27$$

$\Rightarrow$ $\boxed{EF = 5.4\ cm}$

Q.15



In $\triangle ABC$

$AD = 8\ cm$, $DB = 12\ cm$, $AE = 6\ cm$, $EC = 9\ cm$ (given)

To prove - $BC = \frac{5}{2} DE$

Proof - In $\triangle ABC$,

$$\frac{AD}{DB} = \frac{8}{12} = \frac{2}{3} \quad \text{---} (1)$$

$$\frac{AE}{EC} = \frac{6}{9} = \frac{2}{3} \quad \text{---} (2)$$

From (1) & (2)

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \text{---} (3)$$

$\therefore$ $DE \parallel BC$ (Converse of BPT)

In $\triangle ABC$ & $\triangle ADE$,

$\angle A = \angle A$ (common)

$\frac{AD}{DB} = \frac{AE}{EC}$ (From (3))

$\therefore$ $\triangle ABC \sim \triangle ADE$ (SAS similarity)

$\therefore$ $\frac{AD}{AB} = \frac{DE}{BC}$ (CPST)

$\Rightarrow$ $\frac{AD}{AD + DB} = \frac{DE}{BC}$

$$\Rightarrow \frac{8}{8+12} = \frac{DE}{BC}$$

$$\Rightarrow \frac{8}{20} = \frac{DE}{BC}$$

$$\Rightarrow \frac{DE}{BC} = \frac{2}{5}$$

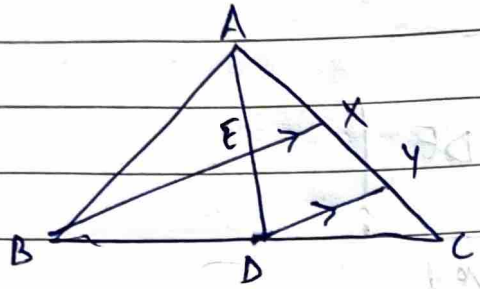
$$\Rightarrow \boxed{BC = \frac{5}{2} DE}$$

Hence, proved

7/12/2020

Ch-7
Triangles
Exercise 7.5

Q.16



Given – • D is the midpoint of BC
• E is the midpoint of AD
• BE is joined and produced to meet AC at X.

To prove – BE : EX = 3 : 1

Const. – Draw DY ∥ BX

Proof – In ΔADY
DY ∥ EX & E is the midpoint of AD
∴ X is the midpoint of AY
∴ AX = XY
∴ EX = 1/2 DY —— (1)

Similarly, in ΔBCX,
D is the midpoint of BC & DY ∥ BX
∴ Y is the midpoint of XC ~~——(2)~~
∴ DY = 1/2 BX —— (2)

EX = 1/2 DY
⇒ EX = 1/2 (1/2 BX) (From (2))
∴ EX = 1/4 BX

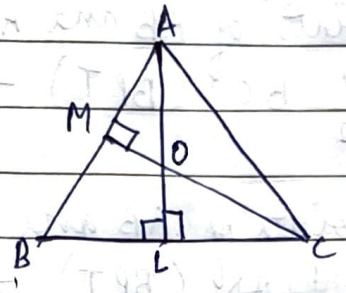
BE = BX − EX = BX − 1/4 BX
∴ BE = 3/4 BX

$\therefore$ BE : EX = $\frac{3}{4}$ BX : $\frac{1}{4}$ BX

= $\boxed{3:1}$

Hence, proved.

Q.18



Given - • AL ⊥ BC
• CM ⊥ AB
• AL & CM intersect at O.

To prove - (i) $\triangle OMA \sim \triangle OLC$

(ii) $\frac{OA}{OC} = \frac{OM}{OL}$

Proof - (i) In $\triangle OMA$ & $\triangle OLC$

$\angle AOM = \angle COL$ (Vertically opp $\angle$s)

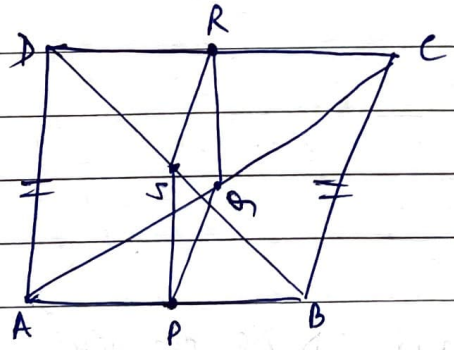
$\angle M = \angle L$ (90° each)

$\therefore \triangle OMA \sim \triangle OLC$ (AA similarity)

(ii) $\therefore \boxed{\frac{OA}{OC} = \frac{OM}{OL}}$ (CPST)

Hence, proved

Q.19



Given - • ABCD is a quadrilateral
• P, Q, R, S are midpoints of sides AB, AC, CD & AD.
• PQ, QR, RR, SP are joined.

To prove - PQRS is a rhombus

Proof - In $\triangle ABC$,
P and Q are midpoints of AB and AC
$\therefore PQ \parallel BC$ & $PQ = \frac{1}{2} BC$ (BPT) —— (1)

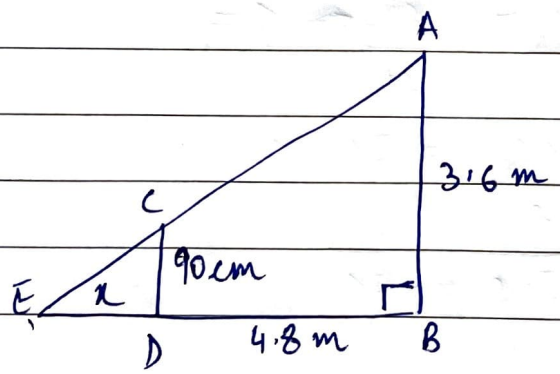
In $\triangle ABD$
P and S are midpoints of AB and BD
$\therefore PS \parallel AD$ & $PS = \frac{1}{2} AD$ (BPT) —— (2)

AS $AD = BC$
From (1) & (2)
$PQ = PS$ —— (3)

Similarly,
$QR = SR$ ($AD = BC$, $QR = \frac{1}{2} AD$, $SR = \frac{1}{2} BC$)
—— (4)

From (3) & (4),
$\therefore PQ = QR = RS = PS$
$\therefore$ PQRS is a rhombus.

Q.21



Let AB be the lamp post and CD be the girl.
AB = 3.6 cm, CD = 90 cm = 0.9 m

Distance covered in 4 sec = 1.2 m/s × 4 sec

= 4.8 m

BD = 4.8 m

Let the shadow of the girl be x.

In $\triangle AEB$ & $\triangle CED$,

CD ∥ AB (Perpendiculars on DB)

$\angle D = \angle B$ (90° each)

$\angle E = \angle E$ (Common)

$\therefore \triangle AEB \sim \triangle CED$ (AA similarity)

$\therefore \frac{DE}{BE} = \frac{CD}{AB}$ (CPST)

$\Rightarrow \frac{x}{4.8+x} = \frac{0.9}{3.6}$

$\Rightarrow 3.6x = 4.32 + 0.9x$

$\Rightarrow 3.6x - 0.9x = 4.32$

$\Rightarrow 2.7x = 4.32$

$\Rightarrow x = \frac{4.32}{2.7}$

$\Rightarrow \boxed{x = 1.6 \text{ m}}$

$\therefore$ Length of shadow = $\boxed{1.6 \text{ m}}$

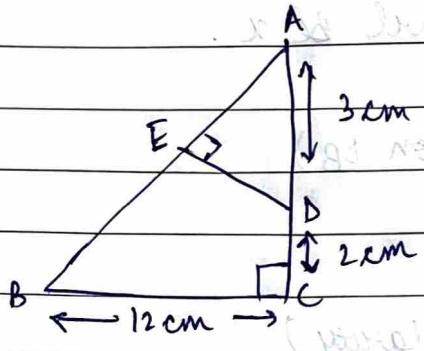
8/12/2020

classmate Date Page

Ch-7

Exercise 7.5

Q.23



Given – • ΔABC is right-angled
• $DE \perp AB$

To prove – $\Delta ABC \sim \Delta ADE$

To find – AE & DE

Proof & Sol – In ΔABC & ΔADE,

$\angle ACB = \angle AED$ (90° each)

$\angle BAC = \angle DAE$ (Common)

$\therefore \boxed{\Delta ABC \sim \Delta ADE}$ (AA criteria)

Hence, proved

$\therefore \frac{AB}{AD} = \frac{BC}{DE} = \frac{AC}{AE}$ (CPST)

$\Rightarrow \frac{13}{3} = \frac{12}{DE} = \frac{5}{AE}$

$AB = \sqrt{5^2 + 12^2}$

$AB = \sqrt{169}$

$AB = 13$ cm

$\Rightarrow \frac{13}{3} = \frac{12}{DE}$

$\Rightarrow DE = \frac{12 \times 3}{13}$

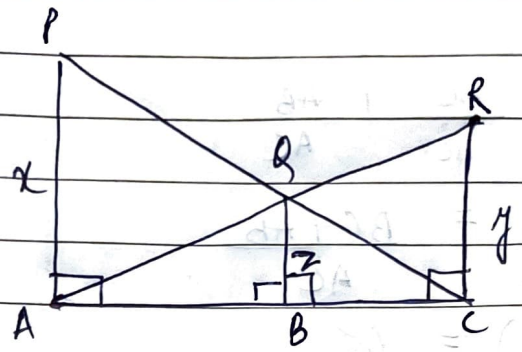
$\Rightarrow \boxed{DE = 2.76 \text{ cm}}$

$\Rightarrow \frac{13}{3} = \frac{5}{AE}$

$\Rightarrow AE = \frac{5 \times 3}{13}$

$\Rightarrow \boxed{AE = 1.15 \text{ cm}}$

Q.24



Given - • $PA \perp AC$
• $QB \perp AC$
• $RC \perp AC$
• $PA = x$, $QB = z$, $RC = y$

To prove - $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$

Proof - As $PA \perp AC$, $QB \perp AC$ & $RC \perp AC$,
$\therefore PA \parallel QB \parallel RC$

In $\triangle PAC$ & $\triangle QBC$,
$QB \parallel PA$
$\angle B = \angle A$ (90° each)
$\angle PCA = \angle QCB$ (common)
$\therefore \triangle PAC \sim \triangle QBC$ (AA similarity)

$\therefore \frac{QB}{PA} = \frac{BC}{AC}$ (CPST)

$\Rightarrow \frac{z}{x} = \frac{BC}{AC}$ ——— (1)

Similarly, $\triangle BAQ \sim \triangle CAR$

$\therefore \frac{QB}{RC} = \frac{AB}{AC}$

$\Rightarrow \frac{z}{y} = \frac{AB}{AC}$ ——— (2)

Adding ① & ②

$$\frac{z}{x} + \frac{z}{y} = \frac{BC}{AC} + \frac{AB}{AC}$$

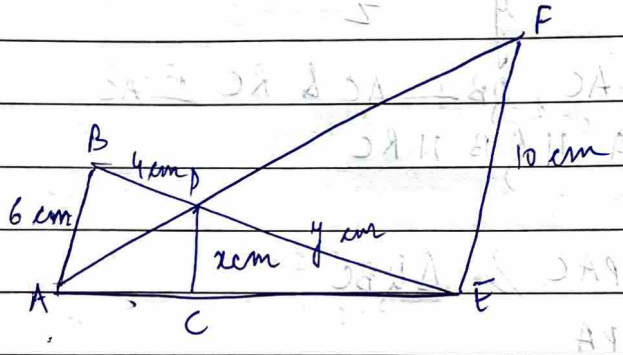
$$z\left(\frac{1}{x} + \frac{1}{y}\right) = \frac{BC+AB}{AC}$$

$$z\left(\frac{1}{x} + \frac{1}{y}\right) = \frac{AC}{AC}$$

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

Hence, proved

Q.25



Given - • AB || CD || EF

• AB = 6cm, EF = 10 cm, BD = 4 cm, CD = x cm & DE = y cm

To find - x & y

Solution - In ΔABE & ΔCDE,

CD || AB

∴ ∠EBA = ∠EDC (corresponding ∠s)

∠EAB = ∠ECD

∴ ΔABE ~ ΔCDE (AA similarity)

$$\therefore \frac{ED}{BE} = \frac{CD}{AB} \Rightarrow \frac{y}{y+4} = \frac{x}{6}$$

$$\Rightarrow 6y = xy + 4x \quad x = \frac{6y}{y+4} \quad \text{— ①}$$

In $\triangle ADB$ & $\triangle EDF$,

$AB \parallel EF$

$\angle ADB = \angle EDF$ (Vertically opp. angles)

$\angle B = \angle DEF$ (Alternate $\angle$s)

$\therefore \triangle ADB \sim \triangle EDF$ (AA similarity)

$$\therefore \frac{BD}{DE} = \frac{AB}{EF} \Rightarrow \frac{4}{y} = \frac{6}{10}$$

$$\Rightarrow y = \frac{4 \times 10}{6}^{5} = \frac{20}{3}$$

$$\Rightarrow \boxed{y = 6.67 \text{ cm}}$$

Putting value of y in (1)

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

$$\Rightarrow x = \frac{6(6.67)}{6.67+4}$$

$$\Rightarrow x = \frac{40.02}{10.67} 3.75$$

$$\Rightarrow \boxed{x = 3.75 \text{ cm}}$$