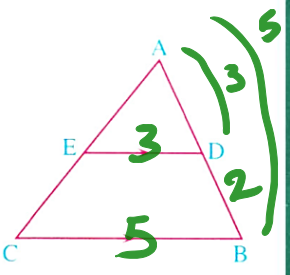
Exercise

Parallel lines and proportional parts

Choose the correct answer

In the opposite figure :



First : If $\frac{AD}{DB} = \frac{5}{3}$, then $\frac{AB}{BD} = \ldots\ldots$ $\frac{8}{3}$

(a) $\frac{3}{5}$ (b) $\frac{8}{3}$ (c) $\frac{3}{8}$ (d) $\frac{5}{8}$

Second : If $\frac{AE}{AC} = \frac{4}{7}$, then $\frac{CE}{EA} = \ldots\ldots\ldots$

(a) $\frac{7}{4}$ (b) $\frac{4}{3}$ (c) $\frac{2}{5}$ (d) $\frac{3}{4}$

Third : If $\frac{DE}{BC} = \frac{3}{5}$, then $\frac{AD}{DB} = \ldots\ldots\ldots$ $\frac{3}{2} = 1.5$

(a) $\frac{5}{3}$ (b) 1.5 (c) $\frac{2}{3}$ (d) $\frac{3}{4}$

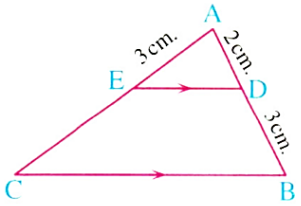
Choose the correct answer

In the opposite figure :

If $\overline{DE} \parallel \overline{BC}$, AD = 2 cm.

and AE = DB = 3 cm.

, then the length of $\overline{EC}$ = ... cm.



(a) 3 (b) 4 (c) 5 (d) 4.5

$$\frac{AE}{EC} = \frac{AD}{DB} \Rightarrow \frac{3}{EC} = \frac{2}{3}$$

$$EC = \frac{3 \times 3}{2} = \frac{9}{2} = 4.5 \text{ m}$$

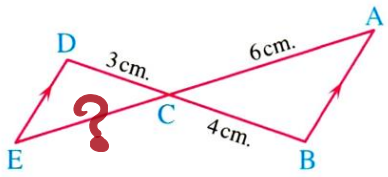
Choose the correct answer

In the opposite figure :

$\overline{AB} \parallel \overline{DE}$, $\overline{AE} \cap \overline{BD} = \{C\}$

, AC = 6 cm. , BC = 4 cm. and CD = 3 cm.

, then the length of $\overline{CE}$ = ... cm.



(a) 5 (b) 4 (c) 4.5 (d) 3.5

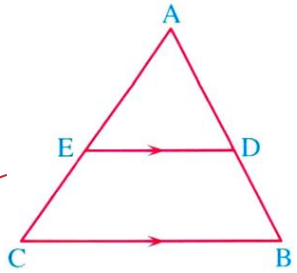
$$\frac{AC}{CE} = \frac{BC}{CD} \Rightarrow \frac{6}{CE} = \frac{4}{3}$$

$$CE = \frac{3 \times 6}{4} = 4.5$$

Choose the correct answer

In the opposite figure :

All the following statements are true except .....



(a) $\frac{AD}{DB} = \frac{AE}{EC}$ ✓

(b) $\frac{AD}{DB} = \frac{DE}{BC}$ ✗

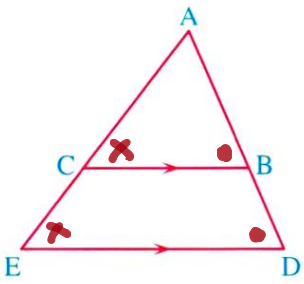
(c) $\frac{AD}{AB} = \frac{AE}{AC}$ ✓

(d) $\frac{AB}{BD} = \frac{AC}{EC}$ ✓

Choose the correct answer

In the opposite figure :

If $\overline{BC} \parallel \overline{DE}$, then .....



(a) the shape DBCE is a cyclic quadrilateral ✗

(b) $\Delta ABC \sim \Delta ADE$ ✓

(c) $AB \times AD = AC \times AE$ ✗

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

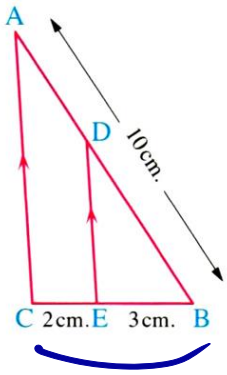
(d) $\frac{AB}{BD} = \frac{BC}{DE}$ ✗

Choose the correct answer

In the opposite figure :

If $\overline{DE} \parallel \overline{AC}$, BE = 3 cm. , EC = 2 cm.

, then AD = ... cm.



(a) 6 (b) 4

(c) 5 (d) 7

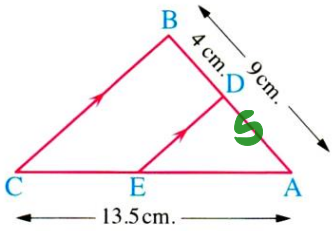
$$\frac{AD}{AB} = \frac{CE}{CB} \Rightarrow \frac{AD}{10} = \frac{2}{5}$$

$$AD = \frac{2 \times 10}{5} = 4$$

Choose the correct answer

In the opposite figure :

$\overline{DE} \parallel \overline{BC}$, then AE = ... cm.



(a) 4 cm.

(b) 5 cm.

(c) 6 cm.

(d) 7.5 cm.

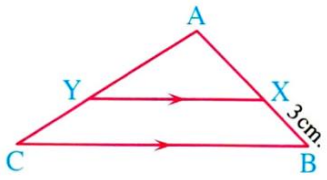
$$\frac{AE}{AC} = \frac{AD}{AB} \Rightarrow \frac{AE}{13.5} = \frac{5}{9}$$

$$AE = \frac{5 \times 13.5}{9} = 7.5 \text{ cm}$$

Choose the correct answer

In the opposite figure :

If $\overline{XY} \parallel \overline{BC}$, $\frac{AX + AY}{AB + AC} = \frac{3}{5}$, then AX = ... cm.



(a) 3 (b) 6 (c) 4.5 (d) 4

$$\frac{AX}{AB} = \frac{AY}{AC} = \frac{AX + AY}{AB + AC} = \frac{3}{5}$$

$$\frac{AX}{AX + 3} = \frac{3}{5}$$

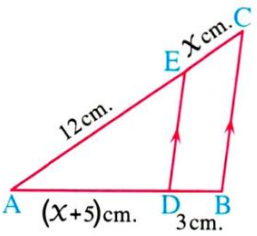
$$5AX = 3AX + 9$$

$$2AX = 9 \Rightarrow AX = \frac{9}{2} = 4.5$$

Choose the correct answer

In the opposite figure :

$\overline{DE} // \overline{BC}$, then $x =$ .....



(a) 4

(b) 9

(c) 12

(d) 3

$$\frac{AD}{DB} = \frac{AE}{EC} \Rightarrow \frac{x+5}{3} = \frac{12}{x}$$

$$x(x+5) = 36$$

$$x^2 + 5x - 36 = 0$$

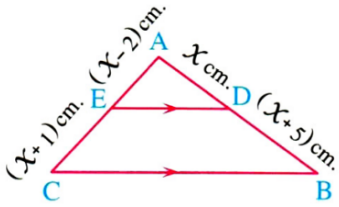
$x = 4$

$x = -9$ refused.

Choose the correct answer

In the opposite figure :

If $\overline{DE} \parallel \overline{BC}$, then $x =$ ..... cm.



(a) 2 (b) 3

(c) 4 (d) 5

$$\frac{x}{x+5} = \frac{x-2}{x+1}$$

$$x(x+1) = (x-2)(x+5)$$

$$x^2 + x = x^2 + 5x - 2x - 10$$

$$x = 3x - 10$$

$$x - 3x = -10$$

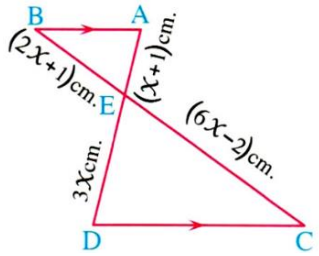
$$-2x = -10$$

$$x = 5$$

Choose the correct answer

In the opposite figure :

If $\overline{AB} // \overline{CD}$, then $x =$ .....



(a) 2

(b) 3

(c) 4.5

(d) 6

$$\frac{x+1}{3x} = \frac{2x+1}{6x-2}$$

$$(x+1)(6x-2) = 3x(2x+1)$$

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

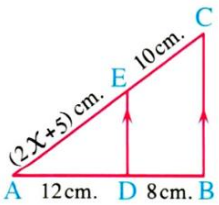
$$4x - 3x = 2$$

$$x = 2$$

Choose the correct answer

In the opposite figure :

If $\overline{DE} \parallel \overline{BC}$, then $x =$ .....



(a) 12 (b) 7

(c) 5 (d) 4

$$\frac{2x+5}{10} = \frac{12}{8}$$

$$2x+5 = 15 \Rightarrow 2x = 15-5$$

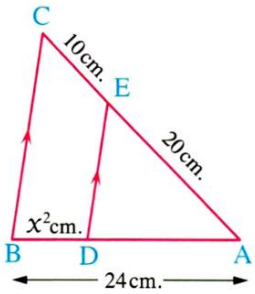
$$2x = 10$$

$$\therefore x = 5$$

Choose the correct answer

In the opposite figure :

If Δ ABC in which $\overline{DE} \parallel \overline{BC}$, then x = ...



(a) $2\sqrt{2}$

(b) ± 3

(c) 4

(d) $\pm 2\sqrt{2}$

$$\frac{BD}{24} = \frac{10}{30} \Rightarrow \frac{BD}{24} = \frac{1}{3}$$

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

$$x^2 = 8 \Rightarrow x = \pm\sqrt{8}$$

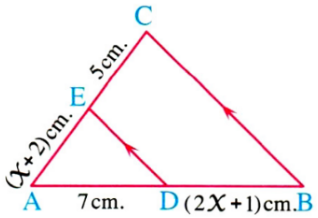
$$x = +2\sqrt{2} \qquad x = -2\sqrt{2}$$

$$x = \pm 2\sqrt{2}$$

Choose the correct answer

In the opposite figure :

If Δ ABC in which $\overline{DE}$ // $\overline{BC}$, then x = ...



(a) – 5.5 or 3

(b) – 5.5

(c) 3

(d) 2.5

$$\frac{x+2}{5} = \frac{7}{2x+1}$$

$$(x+2)(2x+1) = 35$$

$$2x^2 + 5x + 2 - 35 = 0$$

$$2x^2 + 5x - 33 = 0$$

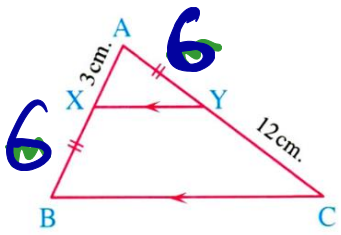
$x = 3$ $\quad$ $x = -5.5$ rej.

Choose the correct answer

In the opposite figure :

If $\overline{XY} \parallel \overline{BC}$, then

AC = ... cm.



(a) 15 (b) 16

(c) 18 (d) 20

$$\frac{m}{12} = \frac{3}{m} \Rightarrow m^2 = 36$$

$$m = \pm\sqrt{36} = \pm 6$$

$AY = XB = 6$ ——— $AC = 6 + 12 = 18$

Choose the correct answer

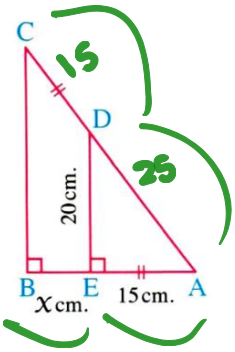
In the opposite figure :

If $\overline{DE} \parallel \overline{BC}$, then

x = ...

(a) 15 (b) 25

(c) 24 (d) 9



In $\triangle AED$:

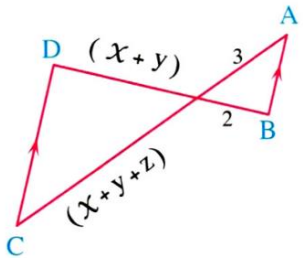
$AD = \sqrt{(20)^2 + (15)^2} = 25$ cm

$\frac{15}{x} = \frac{25}{15} \Rightarrow x = \frac{15 \times 15}{25} = 9$ cm

Choose the correct answer

In the opposite figure :

If $\overline{AB} // \overline{CD}$, then z = ...



(a) $\frac{x-y}{2}$

(b) $\frac{x+y}{2}$

(c) $5x + 5y$

(d) $\frac{x+y}{5}$

$$\frac{3}{x+y+z} = \frac{2}{x+y}$$

$$3x + 3y = 2x + 2y + 2z$$

$$x + y = 2z \Rightarrow z = \frac{x+y}{2}$$

Choose the correct answer

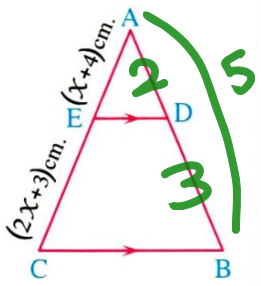
In the opposite figure :

$\overline{ED} // \overline{BC}$, AD : AB = 2 : 5

, then x = ...

(a) 8 (b) 6

(c) 4 (d) 2



$$\frac{x+4}{2x+3} = \frac{2}{3}$$

$$2(2x+3) = 3(x+4)$$

$$4x+6 = 3x+12$$

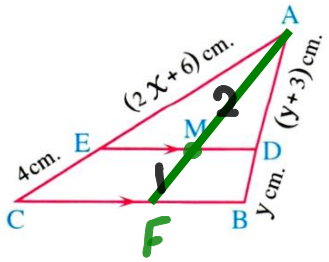
$$4x-3x = 12-6$$

$$x = 6$$

Choose the correct answer

In the opposite figure :

If M is the point of intersection of medians of Δ ABC , then $2x + y =$ ... cm.



(a) 2

(b) 3

(c) 4

(d) 5

$\frac{y+3}{y} = \frac{2}{1}$

$2y = y + 3$

$y = 3$

$\frac{2x+6}{4} = \frac{2}{1}$

$2x + 6 = 8$

$2x = 2$

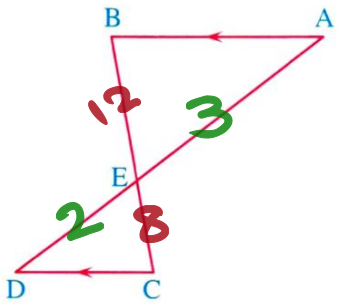
Choose the correct answer

In the opposite figure :

If $\overline{AB} // \overline{CD}$, $2AE = 3ED$ ⇒ $\frac{AE}{ED} = \frac{3}{2}$

, $BE - CE = 4$ cm.

, then BC = ... cm.



(a) 18 (b) 20

(c) 24 (d) 25

$\frac{AE}{ED} = \frac{BE}{EC} = \frac{3}{2}$

$\therefore BE = 3m = 12$ $EC = 2m = 8$

$BE - CE = 4$

$3m - 2m = 4$

$m = 4$

$BC = 12 + 8 = 20$

Another sol.

BE : EC : diff

3 : 2 : 1

: : 4

$BE = 12$

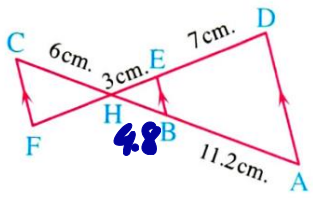
$EC = 8$

Choose the correct answer

In the opposite figure :

$\overline{AD} // \overline{BE} // \overline{FC}$

, then HF = ... cm.



(a) 3.6

(b) 4.8

(c) 6.3

(d) 3.75

$\overline{BE} // \overline{AD}$

$\frac{HB}{11.2} = \frac{3}{7}$

$HB = \frac{3 \times 11.2}{7}$

$HB = 4.8$

$\overline{FC} // \overline{BE}$

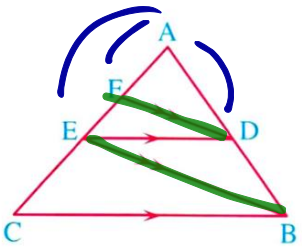
$\frac{HF}{3} = \frac{6}{4.8}$

$HF = \frac{3 \times 6}{4.8}$

$= 3.75$

Choose the correct answer

In the opposite figure :



If $\overline{DE} // \overline{BC}$, $\overline{DF} // \overline{BE}$

, then $AF \times AC =$ .....

(a) AE

(b) $(AE)^2$

(c) $(DE)^2$

(d) $FE \times EC$

$\because \overline{ED} // \overline{CB}$

$\therefore \frac{AE}{AC} = \frac{AD}{AB} \Rightarrow$ (I)

$\because \overline{FD} // \overline{EB}$

$\therefore \frac{AF}{AE} = \frac{AD}{AB} \Rightarrow$ (II)

$\therefore \frac{AE}{AC} = \frac{AF}{AE}$

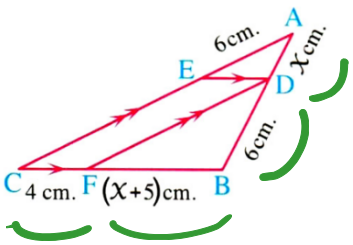
$AF \times AC = (AE)^2$

Choose the correct answer

In the opposite figure :

If $\overline{DE} // \overline{BC}$, and $\overline{DF} // \overline{AC}$, then

the length of $\overline{EC}$ = ... cm.



(a) 12

(b) 18

(c) 6

(d) 9

$\overline{DE} // \overline{BC}$

$\frac{x}{6} = \frac{6}{EC}$

$\frac{3}{6} = \frac{6}{EC}$

$EC = \frac{6 \times 6}{3} = 12$

$\overline{DF} // \overline{AC}$

$\frac{x+5}{4} = \frac{6}{x}$

$x^2 + 5x = 24$

$x^2 + 5x - 24 = 0$

$x = 3$

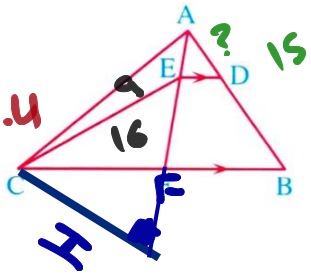
$x = -8$ rej.

Choose the correct answer

In the opposite figure :

$\overline{ED} \parallel \overline{FB}$, a (Δ AEC) = 9 cm^2 , a (Δ CFE) = 16 cm^2 , AB = 15 cm.

, then AD = ... cm.



(a) 9.6

(b) 5.4

(c) $8\frac{4}{7}$

(d) $6\frac{3}{7}$

$\frac{?AD}{AB} = \frac{AE}{AF}$

$\frac{AD}{15} = \frac{9}{25}$

$AD = \frac{9 \times 15}{25} = 5.4$

$\frac{a.of\ \Delta AEC}{a.of\ \Delta ACF} = \frac{\frac{1}{2} \times AE \times H}{\frac{1}{2} \times AF \times H} = \frac{9}{25}$

$\frac{AE}{AF} = \frac{9}{25}$

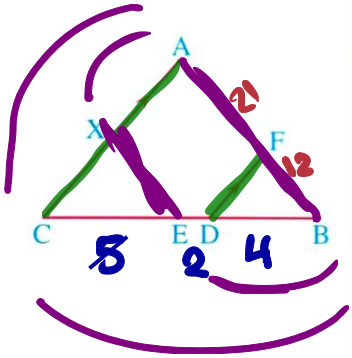
Choose the correct answer

In the opposite figure :

If $\overline{FD} // \overline{AC}$ and $\overline{XE} // \overline{AB}$

, BD : DE : EC = 4 : 2 : 5 , AB = AC = 33 cm.

, then AF + AX = ... cm.



(a) 21

(b) 33

(c) 39

(d) 42

$\frac{4}{11} = \frac{BF}{33}$

$BF = \frac{33 \times 4}{11} = 12$

$\frac{AX}{AC} = \frac{BE}{BC}$

$\frac{AX}{33} = \frac{6}{11}$

$AX = \frac{6 \times 33}{11} = 18$

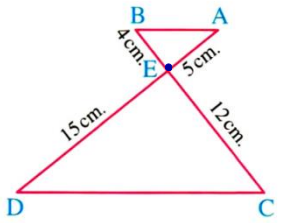
Answer the following questions

① **In the opposite figure :**

$\overline{AD} \cap \overline{BC} = \{E\}$, AE = 5 cm. ,

BE = 4 cm. , CE = 12 cm. and DE = 15 cm.

Prove that : $\overline{AB} // \overline{CD}$



$\because \frac{AE}{ED} = \frac{5}{15} = \frac{1}{3}$ → ①

$\because \frac{BE}{EC} = \frac{4}{12} = \frac{1}{3}$ → ②

From ① & ②

$\therefore \frac{AE}{ED} = \frac{BE}{EC}$ $\therefore \overline{AB} // \overline{CD}$

Answer the following questions

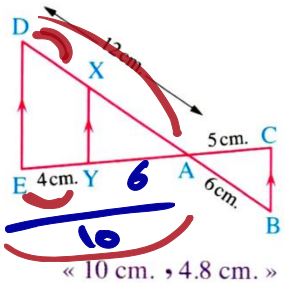
② **In the opposite figure :**

$\overline{CE} \cap \overline{BD} = \{A\}$, $X \in \overline{AD}$, $Y \in \overline{AE}$, where

$\overline{XY} // \overline{BC} // \overline{ED}$, if AB = 6 cm. , AC = 5 cm. ,

AD = 12 cm. and EY = 4 cm.

, find the length of each of : $\overline{AE}$, $\overline{DX}$



« 10 cm. , 4.8 cm. »

$\because \overline{BC} // \overline{ED}$

$\therefore \frac{BA}{AD} = \frac{CA}{AE}$

$\therefore \frac{6}{12} = \frac{5}{AE}$

$\therefore AE = \frac{5 \times 12}{6} = 10$ cm

$AE = 10$ cm → 1st. req.

$\therefore AY = 10 - 4 = 6$ cm

$\because \overline{XY} // \overline{DE}$

$\therefore \frac{DX}{DA} = \frac{EY}{EA}$

$\therefore \frac{DX}{12} = \frac{4}{10}$

$\therefore DX = \frac{12 \times 4}{10} = 4.8$ cm

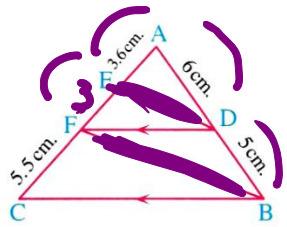
Answer the following questions

③ **In the opposite figure :**

If $\overline{DF} // \overline{BC}$, AD = 6 cm. ,

BD = 5 cm. , AE = 3.6 cm. and FC = 5.5 cm.

, then prove that : $\overline{DE} // \overline{BF}$



$\because \overline{DF} // \overline{BC}$

$\therefore \frac{AD}{DB} = \frac{AF}{FC}$

$\therefore \frac{6}{5} = \frac{AF}{5.5}$

$\therefore AF = \frac{6 \times 5.5}{5} = 6.6$ cm

$\because FE = 6.6 - 3.6 = 3$ cm

$\because \frac{AE}{EF} = \frac{3.6}{3} = \frac{6}{5}$ → (I)

$\because \frac{AD}{DB} = \frac{6}{5}$ → (II)

from (I) & (II)

$\therefore \frac{AE}{EF} = \frac{AD}{DB} = \frac{6}{5}$

$\therefore \overline{DE} // \overline{BF}$

R.T.P.

Answer the following questions

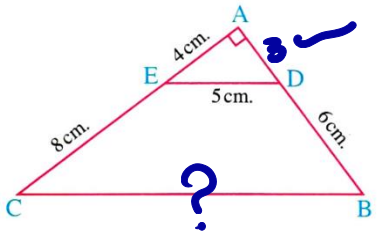
④ **In the opposite figure :**

ABC is a right-angled triangle at A

(1) Prove that : $\overline{DE} \parallel \overline{BC}$

(2) Find the length of : $\overline{BC}$

« 15 cm. »



In Δ AED

∵ m(∠EAD) = 90°

∴ AD = $\sqrt{(5)^2-(4)^2}$ = 3 cm

∵ $\frac{AE}{EC} = \frac{4}{8} = \frac{1}{2}$ → ①

∵ $\frac{AD}{DB} = \frac{3}{6} = \frac{1}{2}$ → ②

From ① & ②

∴ $\frac{AE}{EC} = \frac{AD}{DB} = \frac{1}{2}$

∴ $\overline{DE} \parallel \overline{BC}$

∵ $\overline{DE} \parallel \overline{BC}$

∴ Δ ADE ~ Δ ABC

∴ $\frac{AD}{AB} = \frac{DE}{BC}$

$\frac{3}{9} = \frac{5}{BC}$

∴ $BC = \frac{5 \times 9}{3}$

BC = 15 cm

R.T.P.

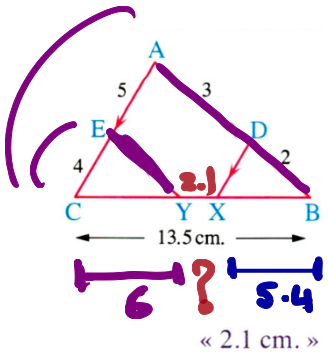
Answer the following questions

(5) In the opposite figure :

ABC is a triangle in which : $\overline{DX} \parallel \overline{AC}$, $\overline{EY} \parallel \overline{AB}$,

BC = 13.5 cm. , $\frac{AD}{DB} = \frac{3}{2}$, $EC = \frac{4}{5}$ AE

Find the length of : $\overline{XY}$



« 2.1 cm. »

$\because \overline{DX} \parallel \overline{AC}$

$\frac{BX}{BC} = \frac{BD}{BA}$

$\frac{BX}{13.5} = \frac{2}{5}$

$BX = \frac{2 \times 13.5}{5} = 5.4$

$\because \overline{EY} \parallel \overline{AB}$

$\therefore \frac{CY}{CB} = \frac{CE}{CA}$

$\therefore \frac{CY}{13.5} = \frac{4}{9}$

$CY = \frac{4 \times 13.5}{9} = 6$ cm

$\therefore XY = 13.5 - [5.4 + 6]$

$= 2.1$ cm