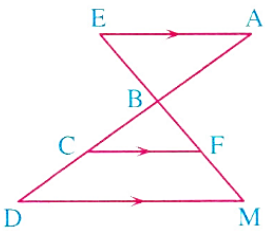
Talis' theorem

Choose the correct answer

In the opposite figure :

AB : BC : CD = EB : BF : FM



(a) AE : FC : MD

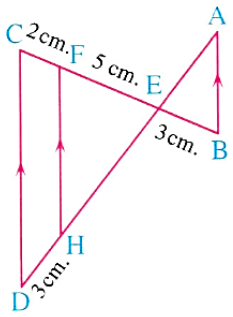
(b) EB : BF : FM

(c) EB : BC : CD

(d) EB : EF : EM

Choose the correct answer

In the opposite figure :



AH = ... cm.

(a) 6 (b) 7.5

(c) 10 (d) 12

$$\frac{AH}{HD} = \frac{BF}{FC} \Rightarrow \frac{AH}{3} = \frac{8}{2}$$

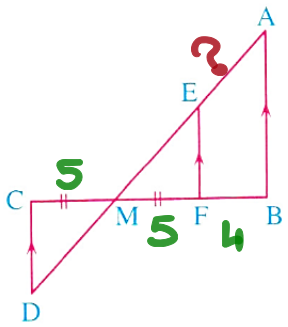
$$AH = \frac{8 \times 3}{2} = 12 \text{ cm}$$

Choose the correct answer

In the opposite figure :

If DA = 21 cm. , MC = 5 cm. , FB = 4 cm.

, then AE = ... cm.



(a) 3 (b) 5

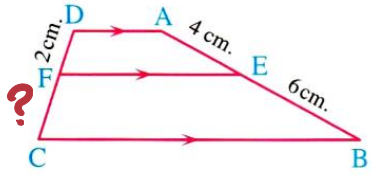
(c) 6 (d) 4

$$\frac{AE}{AD} = \frac{FB}{BC} \Rightarrow \frac{AE}{21} = \frac{4}{14}$$

$$AE = \frac{2 \times 21}{7} = 6$$

Choose the correct answer

In the opposite figure :



If $\overline{AD} // \overline{EF} // \overline{BC}$, AE = 4 cm.

, EB = 6 cm. , DF = 2 cm.

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

(a) 2 (b) 3 (c) 4 (d) 5

$$\frac{DF}{FC} = \frac{AE}{EB} \Rightarrow \frac{2}{FC} = \frac{4}{6}$$

$$FC = \frac{2 \times 6}{4} = 3$$

Choose the correct answer

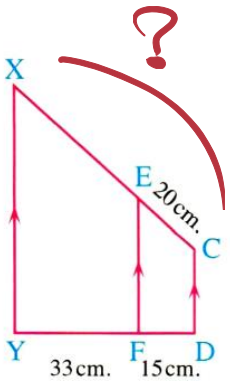
In the opposite figure :

$\overline{CD} // \overline{EF} // \overline{XY}$, CE = 20 cm.

, DF = 15 cm. , FY = 33 cm.

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

(a) 48 (b) 64 (c) 44 (d) 21



$$\frac{CE}{CX} = \frac{DF}{DY} \Rightarrow \frac{20}{CX} = \frac{15}{48}$$

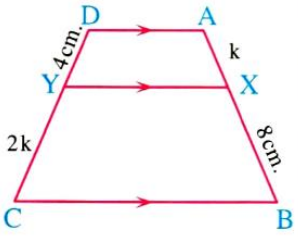
$$\frac{20}{CX} = \frac{5}{16} \Rightarrow CX = \frac{20 \times 16}{5} = 64$$

Choose the correct answer

In the opposite figure :

If $\overline{AD} // \overline{XY} // \overline{BC}$, then

AX = ... cm.



(a) $\frac{3}{8}$ (b) 4 (c) 16 (d) 32

$\frac{AX}{XB} = \frac{DY}{YC} \Rightarrow \frac{k}{8} = \frac{4}{2k}$

$2k^2 = 32 \Rightarrow k^2 = 16$

$k = 4$ $k = -4$ (rej.)

$AX = 4$

Choose the correct answer

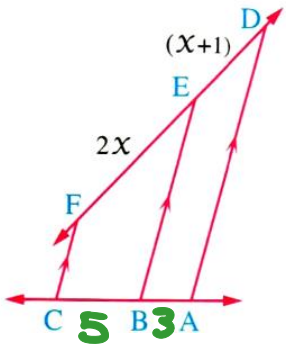
In the opposite figure :

If $\overline{AD} // \overline{BE} // \overline{CF}$, AB = 3 cm.

, BC = 5 cm. , DE = $(x + 1)$ cm.

, EF = 2 x cm. , then x = ... cm.

(a) 3 (b) 4 (c) 5 (d) 8



$$\frac{FE}{ED} = \frac{CB}{BA} \Rightarrow \frac{2x}{x+1} \times \frac{5}{3}$$

$$6x = 5x + 5$$

$$6x - 5x = 5$$

$$\boxed{x = 5}$$

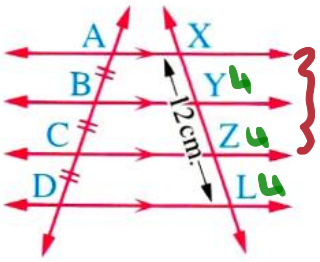
Choose the correct answer

In the opposite figure :

If AB = BC = CD ,

XL = 12 cm. , then XZ = ...

(a) 4 cm. (b) YL (c) AC (d) BC



XZ = 4 + 4 = 8

Choose the correct answer

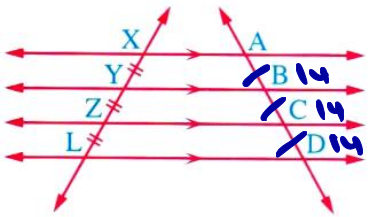
In the opposite figure :

If BD = 14 cm.

, AC = ... cm.

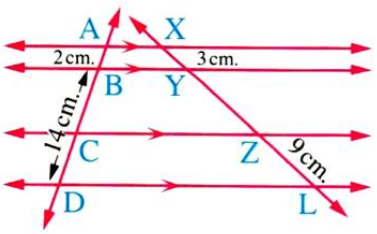
14 + 14 = 28

(a) 7 (b) 14 (c) 21 (d) 28



Choose the correct answer

In the opposite figure :



CD = ... cm.

(a) 12 (b) 6 (c) 14 (d) 5

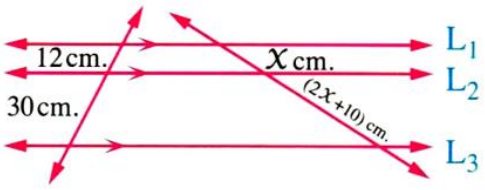
$$\frac{CD}{BA} = \frac{LZ}{YX} \Rightarrow \frac{CD}{2} = \frac{9}{3}$$

$$CD = \frac{2 \times 9}{3} = 6$$

Choose the correct answer

In the opposite figure :

x = ... cm.



(a) 10 (b) 20

(c) 15 (d) 8

$$\frac{x}{2x+10} = \frac{12}{30}$$

$$\frac{x}{2x+10} \times \frac{2}{5}$$

$$5x = 4x + 20$$

$$5x - 4x = 20 \Rightarrow \boxed{x = 20}$$

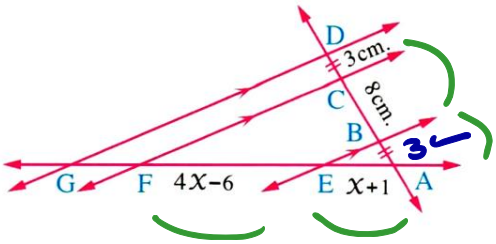
Choose the correct answer

In the opposite figure :

x = ...

(a) 2 (b) 3.5

(c) 5 (d) 6.5



$$\frac{AE}{EF} = \frac{AB}{BC} \Rightarrow \frac{x+1}{4x-6} = \frac{3}{8}$$

$$3(4x-6) = 8(x+1)$$

$$12x - 18 = 8x + 8$$

$$12x - 8x = 8 + 18$$

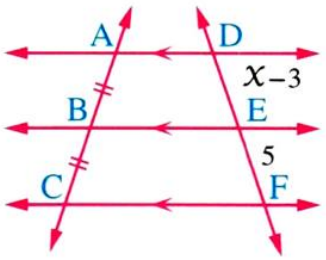
$$4x = 26$$

$$\therefore x = \frac{26}{4} = \frac{13}{2} = 6.5$$

Choose the correct answer

In the opposite figure :

$x =$ .....



(a) 3 (b) 5

(c) 8 (d) 2

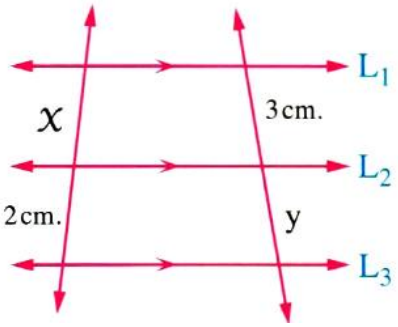
$x - 3 = 5$

$x = 8$

Choose the correct answer

In the opposite figure :

If $x > 2$, then .....



(a) $y = 3$

(b) $y > 3$

(c) $y < 3$

(d) $y \leq 3$

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

$y < 3$

Choose the correct answer

In the opposite figure :

If the given lengths in cm.

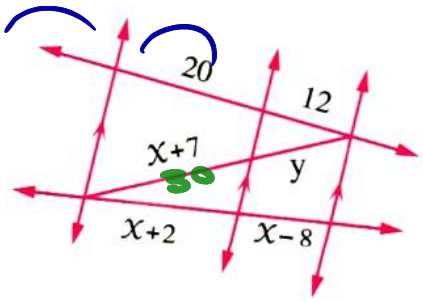
, then $x + y$ = ... cm.

(a) 23 $23+18 = 41$

(b) 18

(c) 41

(d) 51



$\frac{x+2}{x-8} = \frac{20}{12} = \frac{5}{3}$

$5(x-8) = 3(x+2)$

$5x - 40 = 3x + 6$

$5x - 3x = 6 + 40$

$2x = 46$

$x = 23$

$\frac{30}{y} = \frac{20}{12}$

$\frac{30}{y} = \frac{5}{3}$

$y = \frac{30 \times 3}{5}$

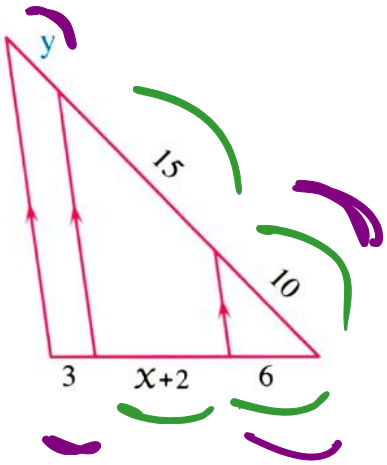
$y = 18$

Choose the correct answer

In the opposite figure :

If the given lengths in cm.

, then $x + y$ = ... cm.



(a) 5 ~~7 5~~

(b) 7

(c) 11

(d) 12

$$\frac{6}{x+2} = \frac{10}{15}$$

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

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

$$x+2 = 9$$

$$x = 7$$

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

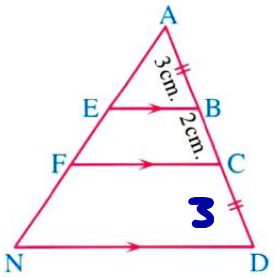
$$y = \frac{3 \times 10}{6}$$

$$y = 5$$

Choose the correct answer

In the opposite figure :

$\frac{BE}{DN}$ = ...



(a) $\frac{3}{8}$ (b) $\frac{3}{4}$

(c) $\frac{3}{5}$ (d) $\frac{3}{2}$

$\Delta ABE \sim \Delta ADN$

$\frac{AB}{AD} = \frac{BE}{DN} \Rightarrow \frac{3}{8} = \frac{BE}{DN}$

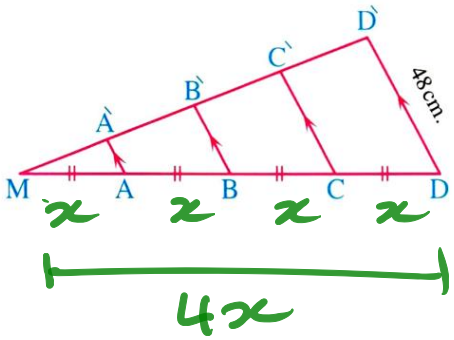
Choose the correct answer

In the opposite figure :

$AA\grave{}$ = ... cm.

(a) 4 (b) 8

(c) 12 (d) 16



$\Delta MAA\grave{} \sim \Delta MDD\grave{}$

$\therefore \frac{MA}{MD} = \frac{AA\grave{}}{DD\grave{}} \Rightarrow \frac{1x}{4x} = \frac{AA\grave{}}{48}$

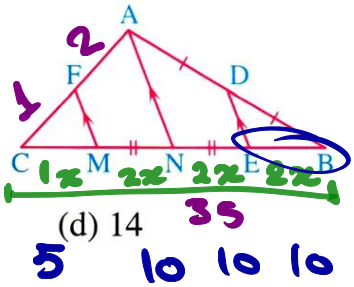
$AA\grave{} = \frac{1 \times 48}{4} = 12$

Choose the correct answer

In the opposite figure :

If BC = 35 cm. , $\frac{CF}{FA} = \frac{1}{2}$

, then BE = ... cm.



(a) 5 (b) 7 (c) 10 (d) 14

5 10 10 10

$1x + 2x + 2x + 2x = 35$

$7x = 35 \Rightarrow x = \frac{35}{7} = 5$

Choose the correct answer

In the opposite figure :

ABCD is a square of side length 6 cm.

, if AE = FE = FB

, then area of the shape XYFE = ... cm^2.

(a) 8 (b) 10

(c) 12 (d) 6

$\Delta AEX \sim \Delta ABC$

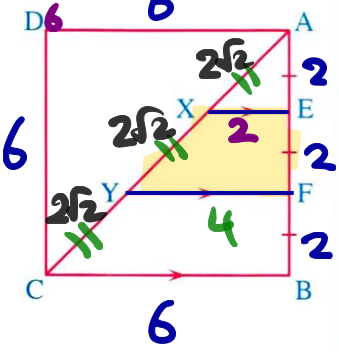
$\frac{AE}{AB} = \frac{EX}{BC} \Rightarrow \frac{2}{6} = \frac{EX}{6}$

$\therefore EX = 2$

$\Delta AFY \sim \Delta ABC$

$\frac{AF}{AB} = \frac{FY}{BC}$

$\frac{4}{6} = \frac{FY}{6} \Rightarrow FY = 4$



$AC = \sqrt{(6)^2 + (6)^2} = 6\sqrt{2}$ cm

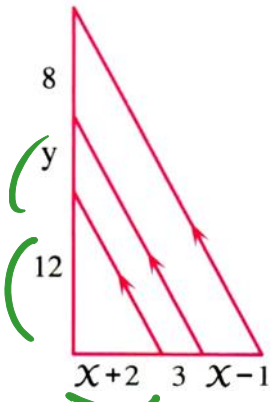
$\frac{1}{2}(b_1 + b_2) \times h$

$A.of\ XYFE = \frac{1}{2}[EX + FY] \times EF$

$= \frac{1}{2}[2 + 4] \times 2 = 6\ cm^2$

Choose the correct answer

In the opposite figure :



$(x , y) =$ (7, ...

(a) (5 , 7)

(b) (4 , 6)

(c) (7 , 4)

(d) (11 , 7)

$\frac{x+2}{x-1} = \frac{12}{8} = \frac{3}{2}$

$3x - 3 = 2x + 4$

$3x - 2x = 4 + 3$

$x = 7$

$\frac{9}{3} = \frac{12}{y}$

$y = \frac{3 \times 12}{9}$

$y = 4$

Talis' theorem

Answer the following questions

(1) In the opposite figure :

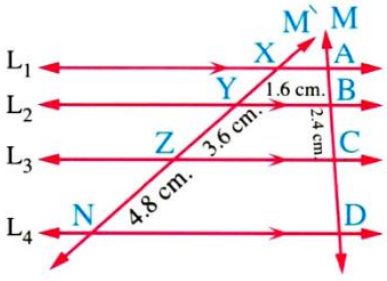
$L_1 // L_2 // L_3 // L_4$,

M , M̀ are two transversals.

If AB = 1.6 cm. , BC = 2.4 cm. ,

YZ = 3.6 cm. , ZN = 4.8 cm.

Calculate the length of each of : $\overline{XY}$ and $\overline{CD}$



« 2.4 cm. , 3.2 cm. »

$\because L_1 // L_2 // L_3 // L_4$

& M , M̀ are two trans.

$\therefore \frac{AB}{XY} = \frac{BC}{YZ} = \frac{CD}{ZN}$

$\frac{1.6}{XY} = \frac{2.4}{3.6} = \frac{CD}{4.8}$

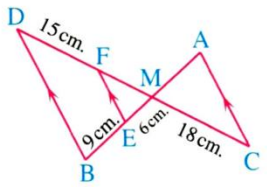
$XY = \frac{1.6 \times 3.6}{2.4} = 2.4$

$CD = \frac{2.4 \times 4.8}{3.6} = 3.2$

Answer the following questions

② **In the opposite figure :**

$\overline{AB} \cap \overline{CD} = \{M\}$, $E \in \overline{MB}$,
$F \in \overline{MD}$ and $\overline{AC} // \overline{FE} // \overline{DB}$



Find : (1) The length of $\overline{MF}$

(2) The length of $\overline{AM}$

« 10 cm. , 10.8 cm. »

$\because \overline{AC} // \overline{FE} // \overline{DB}$ & $\overline{AB}, \overline{CD}$ are two trans.

$\therefore \frac{AM}{MC} = \frac{ME}{MF} = \frac{EB}{FD} \Rightarrow \boxed{\frac{AM}{18}} = \boxed{\frac{6}{MF}} = \frac{9}{15} = \boxed{\frac{3}{5}}$

$\therefore MF = \frac{6 \times 5}{3} = 10$ cm

$\therefore AM = \frac{3 \times 18}{5} = 10.8$ cm

Answer the following questions

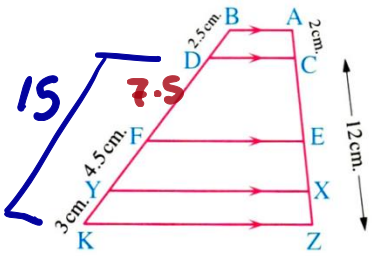
③ **In the opposite figure :**

$\overline{AB} // \overline{CD} // \overline{EF} // \overline{XY} // \overline{ZK}$,

AC = 2 cm. , BD = 2.5 cm. ,

FY = 4.5 cm. , FK = 7.5 cm. , CZ = 12 cm.

Find the length of each of : $\overline{EX}$, $\overline{XZ}$, $\overline{CE}$ and $\overline{DF}$



« 3.6 cm. , 2.4 cm. , 6 cm. , 7.5 cm. »

$\because \overline{AB} // \overline{CD} // \overline{EF} // \overline{XY} // \overline{ZK}$

& $\overline{AZ}$, $\overline{BK}$ are two trans

$\therefore \frac{AC}{CZ} = \frac{BD}{DK} \Rightarrow \frac{2}{12} = \frac{2.5}{DK}$

$DK = \frac{2.5 \times 12}{2} = 15$

$\therefore DF = 15 - [3 + 4.5] = 7.5$

$\frac{AC}{BD} = \frac{CE}{DF} = \frac{EX}{FY} = \frac{XZ}{YZ}$

$\frac{2}{2.5} = \frac{CE}{7.5} = \frac{EX}{4.5} = \frac{XZ}{3}$

$EX = \frac{4.5 \times 2}{2.5} = 3.6$

$XZ = \frac{2 \times 3}{2.5} = 2.4$

$CE = \frac{2 \times 7.5}{2.5} = 6$

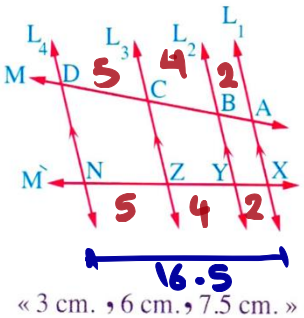
Answer the following questions

④ **In the opposite figure :**

$L_1 // L_2 // L_3 // L_4$ and M , M̀ are two transversals.

If $\frac{AB}{BC} = \frac{1}{2}$, $BC = \frac{4}{5}$ CD and XN = 16.5 cm.

Find the length of each of : $\overline{XY}$, $\overline{YZ}$ and $\overline{ZN}$



« 3 cm. , 6 cm. , 7.5 cm. »

∴ AB : BC : CD

1 : 2

4 : 5

4 : 8 : 10 ÷2

2 : 4 : 5

∴ XY : YZ : ZN = 2 : 4 : 5

XY : YZ : ZN : XN

2 : 4 : 5 : 11

? : ? : ? : 16.5

XY = 2m , YZ = 4m , ZN = 5m

XN = XY + YZ + ZN

2m + 4m + 5m = 16.5

11m = 16.5

∴ m = 1.5

XY = 2 (1.5) = 3

YZ = 4 (1.5) = 6

ZN = 5 (1.5) = 7.5

Answer the following questions

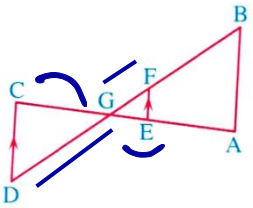
(5) **In the opposite figure :**

$\overline{EF} // \overline{CD}$, $\frac{AG}{GC} = \frac{DG}{GF}$

Prove that : $(GC)^2 = GA \times GE$

$GC \cdot GC = GA \times GE$

$\frac{AG}{GC} = \frac{GC}{GE}$



$\because \overline{EF} // \overline{CD}$

$\therefore \frac{FG}{GD} = \frac{EG}{GC} \Rightarrow \therefore \frac{DG}{GF} = \frac{GC}{EG}$ → (I)

$\therefore \frac{AG}{GC} = \frac{DG}{GF}$ → (II)

From I & II

$\therefore \frac{GC}{EG} \times \frac{AG}{GC}$

$\therefore (GC)^2 = GA \times GE$

R.T.P.