Then $\frac{2}{4}=\frac{x}{9-x}$ (Let $x=AE$)

$4x=18-2x$

$6x=18\text{cm}$

$x=\frac{18}{6}\text{cm}$

$x=3\text{cm}$

Hence

$\boxed{x=3\text{cm}}$

(viii) It is given that $\frac{AD}{BD}=\frac{4}{5}$ and $EC = 2.5$ cm

We have to find AE.

So $\frac{AD}{DB}=\frac{AE}{CE}$ (by Thales theorem)

Then $\frac{4}{5}=\frac{AE}{2.5}$

$AE=\frac{4\times2.5}{5}=2$ cm

Hence

$\boxed{AE=2\text{cm}}$

(ix) It is given that $AD=x$, $DB=x-2$, $AE=x+2$ and $EC=x-1$.

We have to find the value of x.

So $\frac{AD}{DB}=\frac{AE}{CE}$ (by Thales theorem)

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

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

$$x^2-x-x^2+4=0$$

$$x=4$$

Hence

$\boxed{x=4\text{cm}}$

(x) It is given that $AD = 8x - 7$, $DB = 5x - 3$, $AE = 4x - 3$ and $EC = 3x - 1$.

We have to find the value of x.

So $\frac{AD}{DB}=\frac{AE}{CE}$ (by Thales theorem)

Then,

$$\frac{8x-7}{5x-3}=\frac{4x-3}{3x-1}$$

$$\Rightarrow (8x-7)(3x-1)=(5x-3)(4x-3)$$

$$\Rightarrow 24x^2-29x+7=20x^2-27x+9$$

$$\Rightarrow 4x^2-2x-2=0$$

$$\Rightarrow 2\left[2x^2-x-1\right]=0$$

$$\Rightarrow 2x^2-x-1=0$$

$$\Rightarrow 2x^2-2x+x-1=0$$

$$\Rightarrow 2x(x-1)+1(x-1)=0$$

$$\Rightarrow (x-1)(2x+1)=0$$

$$\Rightarrow x-1=0 \text{ or } 2x+1=0$$

$$\Rightarrow x=1 \text{ or } x=-\tfrac{1}{2} \text{ (rejected)}$$

Hence,

$\boxed{x=1\text{cm}}$

(xi) It is given that $AD = 4x - 3$, $BD = 3x - 1$, $AE = 8x - 7$ and $EC = 5x - 3$.

We have to find the value of x.

So $\frac{AD}{DB}=\frac{AE}{CE}$ (by Thales theorem)

Then $\frac{4x-3}{3x-1}=\frac{8x-7}{5x-3}$

$$(4x-3)(5x-3)=(3x-1)(8x-7)$$

$$4x(5x-3)-3(5x-3)=3x(8x-7)-1(8x-7)$$

$$20x^2-12x-15x+9=24x^2-21x-8x+7$$

$$20x^2-27x+9=24x^2-29x+7$$

Then

$$-4x^2+2x+2=0$$

$$4x^2-2x-2=0$$

$$4x^2-4x+2x-2=0$$

$$4x(x-1)+2(x-1)=0$$

$$(4x+2)(x-1)=0$$

$$x=1$$

Hence

$\boxed{x = 1\text{cm}}$

(xii) It is given that $AD = 2.5\text{cm}$, $AE = 3.75\text{cm}$ and $BD = 3\text{cm}$.

So $\frac{AD}{DB} = \frac{AE}{CE}$ (by Thales theorem)

Then $\frac{2.5}{3} = \frac{3.75}{CE}$

$$2.5CE = 3.75 \times 3$$

$$CE = \frac{3.75 \times 3}{2.5}$$

$$= \frac{11.25}{2.5}$$

$$= 4.50$$

Now

$$AC = 3.75\text{cm} + 4.50\text{cm}$$

$$= 8.25\text{cm}$$

********** END **********