

coaching center

Plane  
geometry

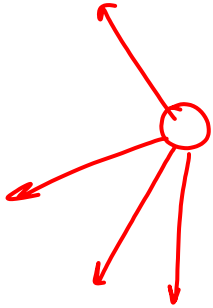
1. Lines & angles
2. Triangles
3. Quadrilaterals
4. Polygons
5. Circles
6. Misc. theorems


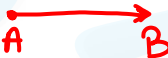

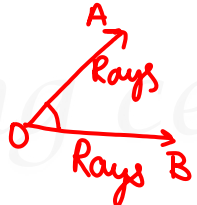
# Lines & Angles

(रेखा एवं कोण)

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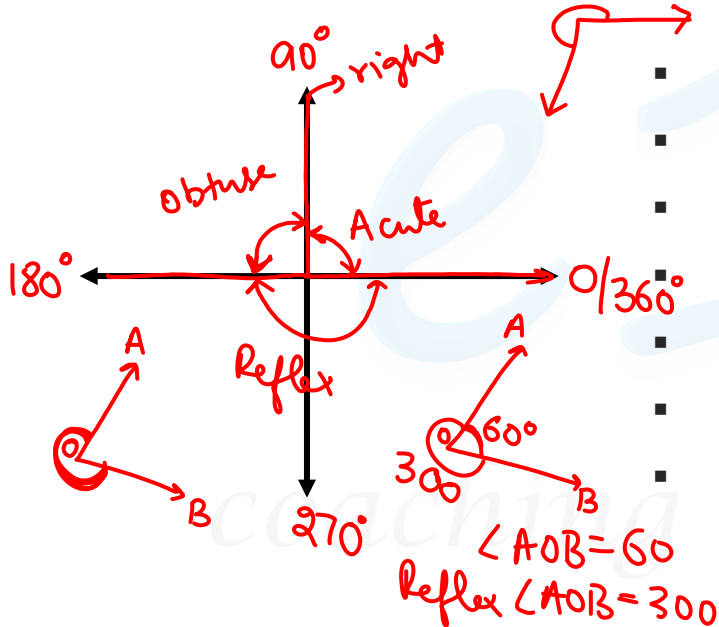
# Basic terminology:



- Point (बिंदु) • | a circle with zero radius/a dimension less figure  
↓  
विमाहीन
- Line (रेखा)  $\longleftrightarrow$  1D
- Plane (समतल)  2D
- Ray (किरण) 
- Line segment (रेखा खंड) 
- Angle (कोण) <sup>part</sup> 

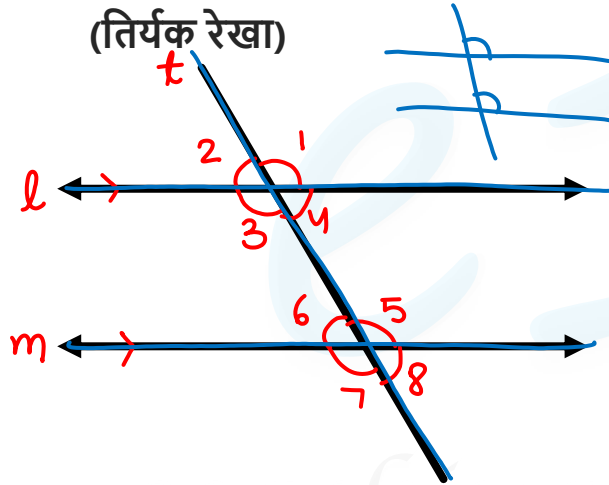


# Types of angles (कोणों के प्रकार):



- Zero Angle (शून्य कोण)  $0^\circ$
- Acute Angle (न्यून कोण)  $0 < \theta < 90^\circ$
- Right Angle (सम कोण)  $= 90^\circ$
- Obtuse Angle (अधिक कोण)  $90 < \theta < 180$
- Straight angle (सरल / ऋजु कोण)  $= 180$
- Reflex angle (वृहत् कोण)
- Complete angle (पूर्ण कोण)

# Angles in parallel lines (समानांतर रेखाओं में कोण):



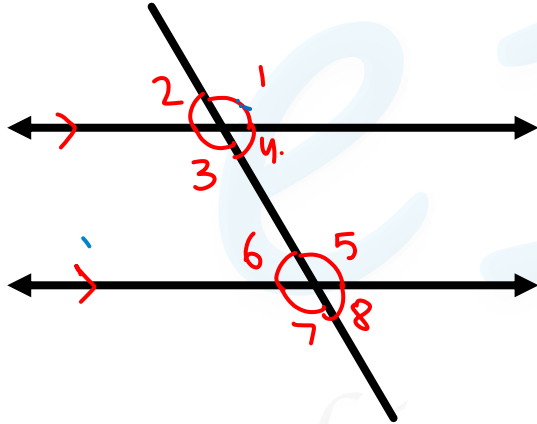
Corresponding angles:  
संगत कोण

$\angle 1$  &  $\angle 5$   
 $\angle 2$  &  $\angle 6$   
 $\angle 3$  &  $\angle 7$   
 $\angle 4$  &  $\angle 8$

If lines are  
|| then  
CA's are  
equal &  
Vice-versa

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# Angles in parallel lines (समानांतर रेखाओं में कोण):



Alternate angles:  
एकांतर कोण

Interior (अंतः) ( $\angle 3, \angle 4, \angle 5, \angle 6$ )

Alt Int  $\angle$ 's

$\angle 4$  &  $\angle 6$

$\angle 3$  &  $\angle 5$

} equal

Exterior (बाह्य) ( $\angle 1, \angle 2, \angle 7, \angle 8$ )

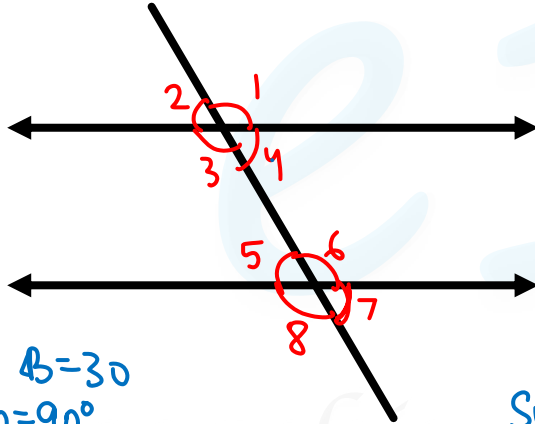
Alt Ext.  $\angle$ 's

$\angle 1$  &  $\angle 7$

$\angle 2$  &  $\angle 8$

} equal

# Angles in parallel lines (समानांतर रेखाओं में कोण):



## Angles on same side:

Interior (अंतः) on the same side  
 $\angle 4$  &  $\angle 6$   
 $\angle 3$  &  $\angle 5$  } Supplementary

Exterior (बाह्य) on the same  
 $\angle 1$  &  $\angle 7$   
 $\angle 2$  &  $\angle 8$  } संपूरक

$A = 60$   $B = 30$   
 $Sum = 90^\circ$

Complementary  
पूरक / कोटि पूरक

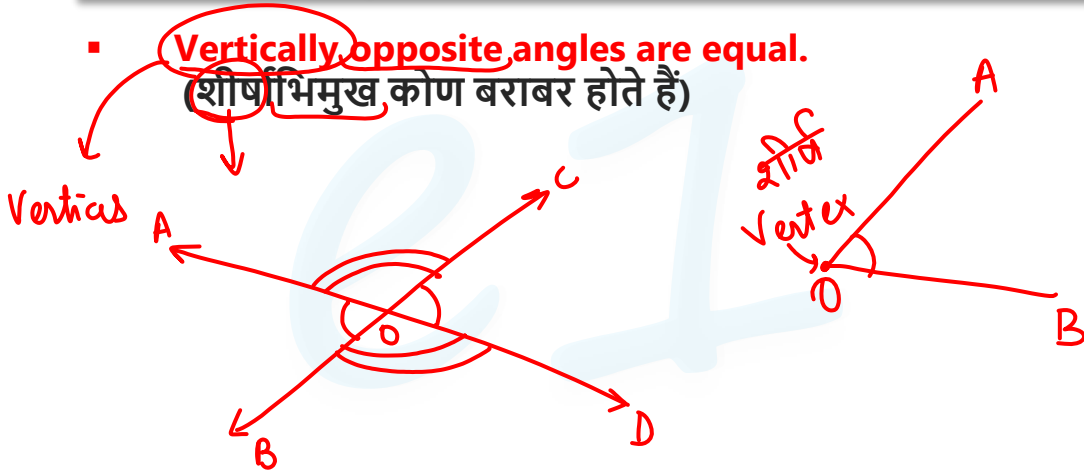
$Sum = 180^\circ$

Supplementary  
सम्पूरक



## Some basic points:

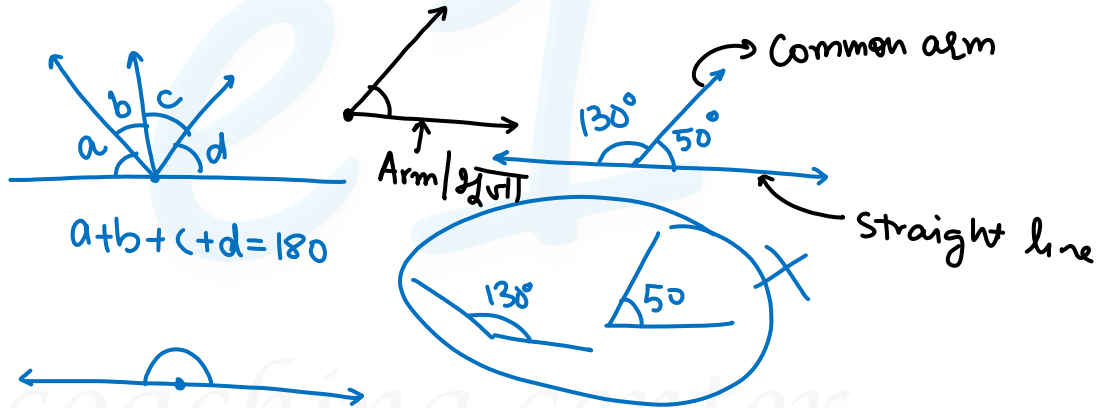
- Vertically opposite angles are equal.  
(शीर्षाभिमुख कोण बराबर होते हैं)



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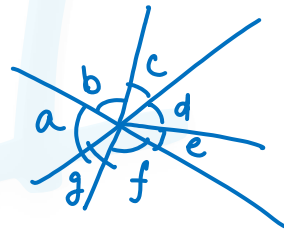
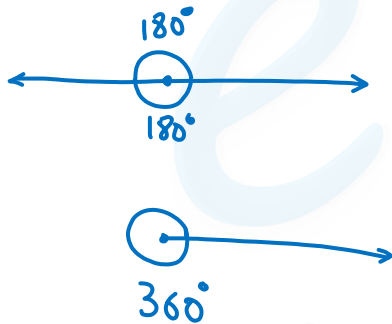
## Some basic points:

- Sum of angles on a line is  $180^\circ$ . (Linear pair)  $\rightarrow$  two  $\angle$ 's  
(एक रेखा पर बने कोणों का योग  $180^\circ$  होता है), (रैखिक युग्म)



## Some basic points:

- **Sum of angles around a point is  $360^\circ$ .**  
(एक बिंदु के बाहर बने सभी कोणों का  $360^\circ$  योग होता है)



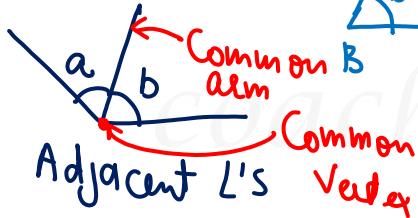
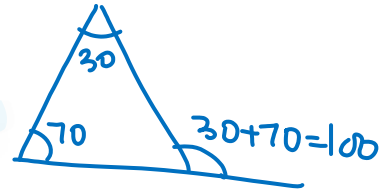
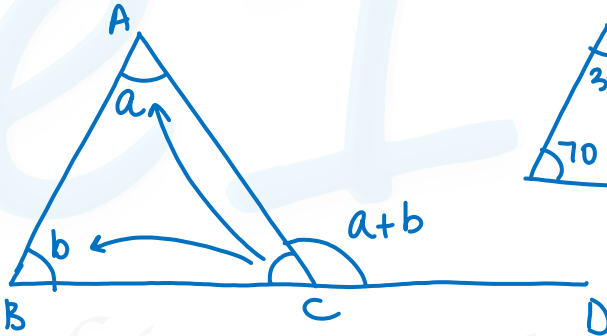
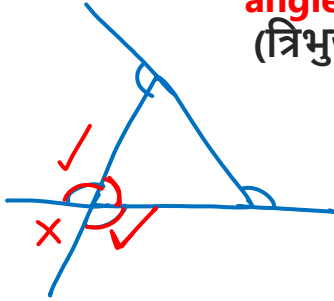
$$a + b + c + d + e + f + g = 360^\circ$$

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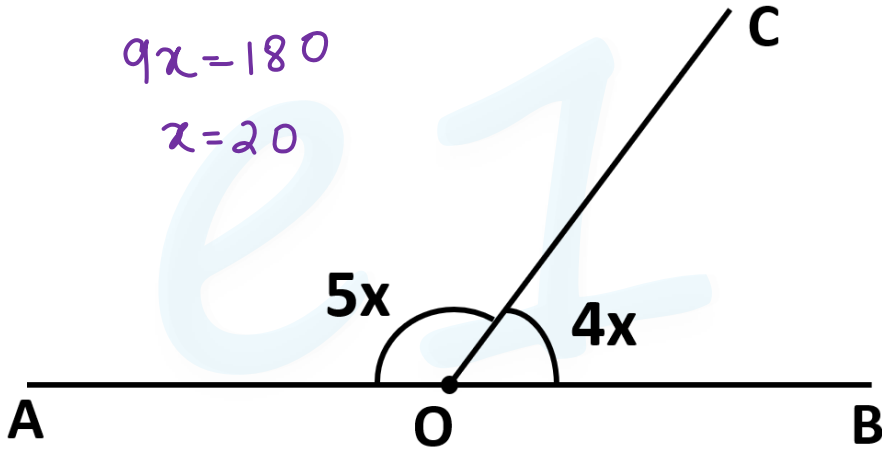
## Some basic points:

- Exterior angle of a triangle is equal to sum of interior opposite angles.

(त्रिभुज का बाह्य कोण अंतःअभिमुख कोणों के योग के बराबर होता है)



1. Find  $x$ .

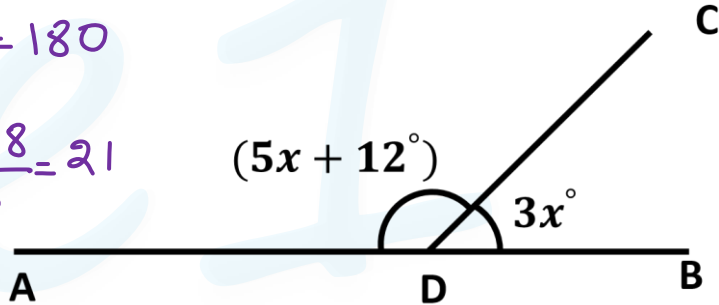


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2. Find  $x$ .

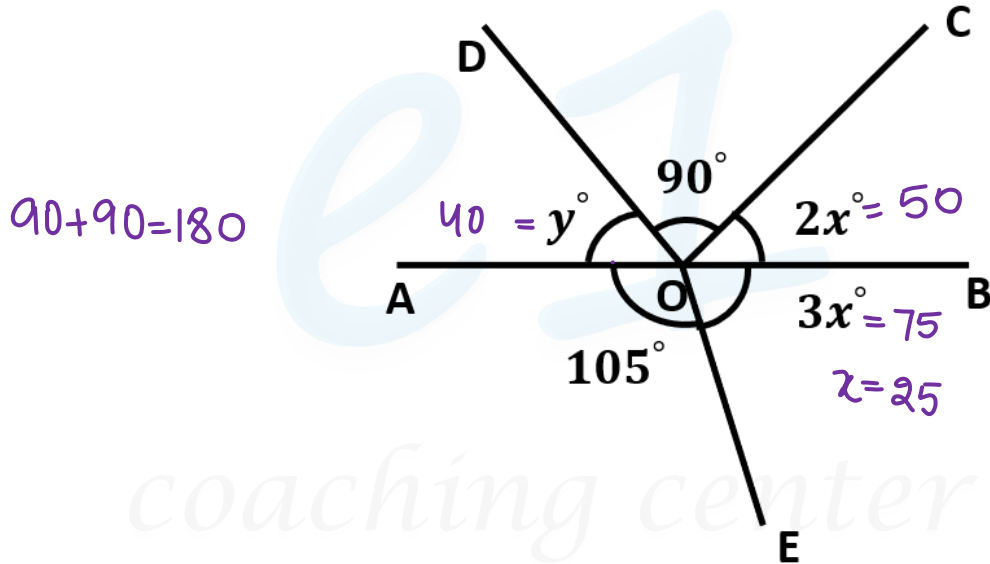
$$8x + 12 = 180$$

$$x = \frac{168}{8} = 21$$



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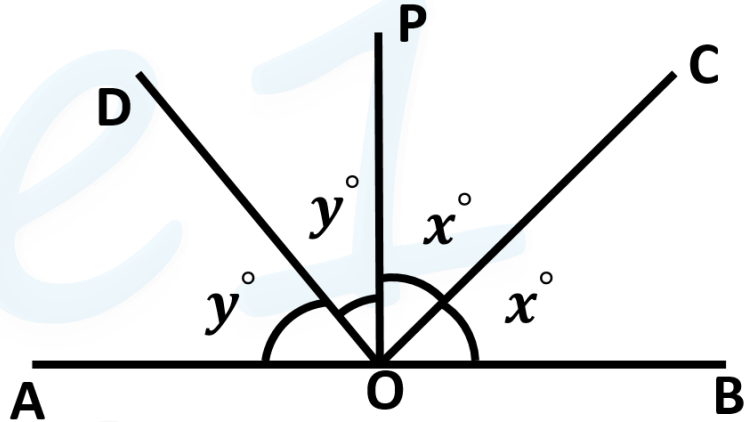
3. Find  $y$ .  $AOB$  is a straight line



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$$\cancel{2x + 2y = 180}^{90}$$

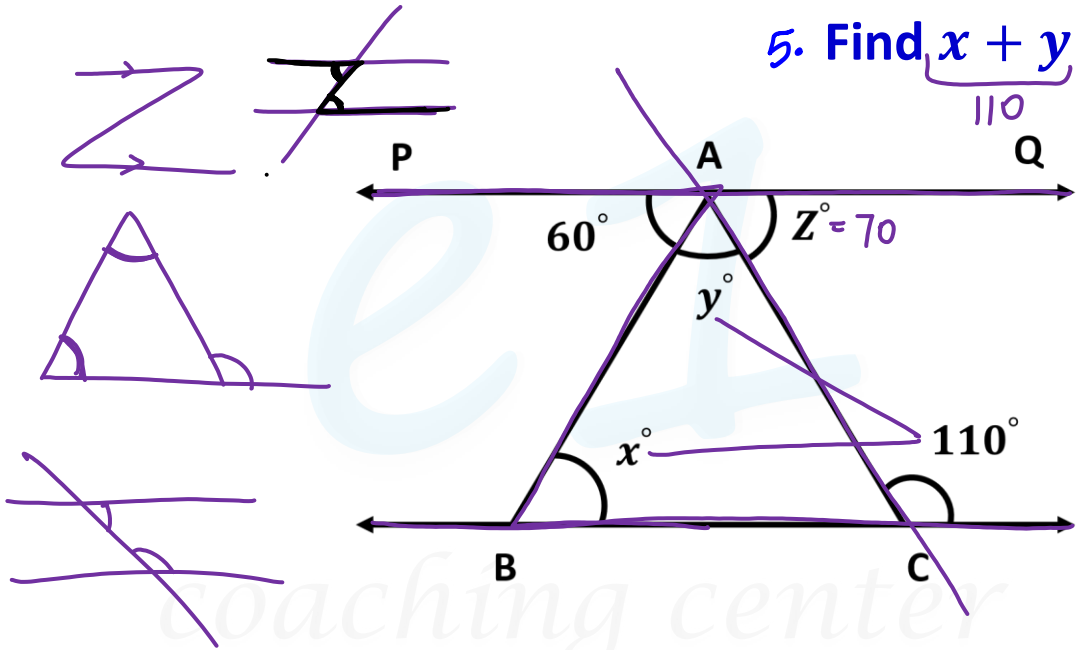
4. Find  $\angle COD$ . = 90  
AOB straight line



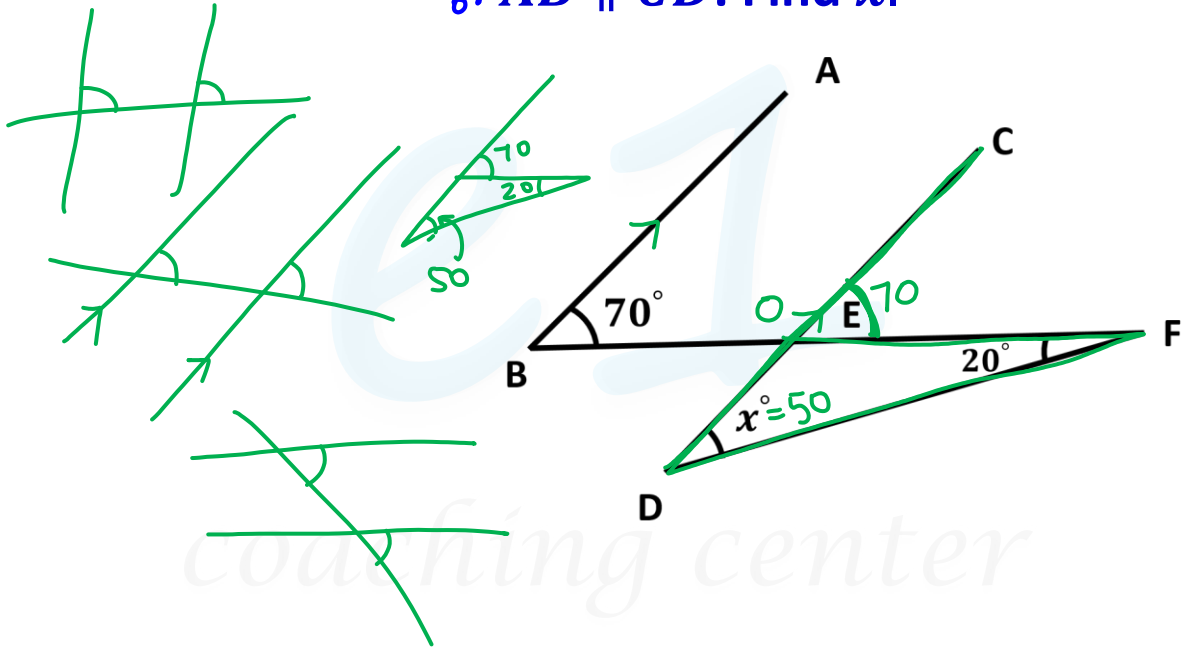
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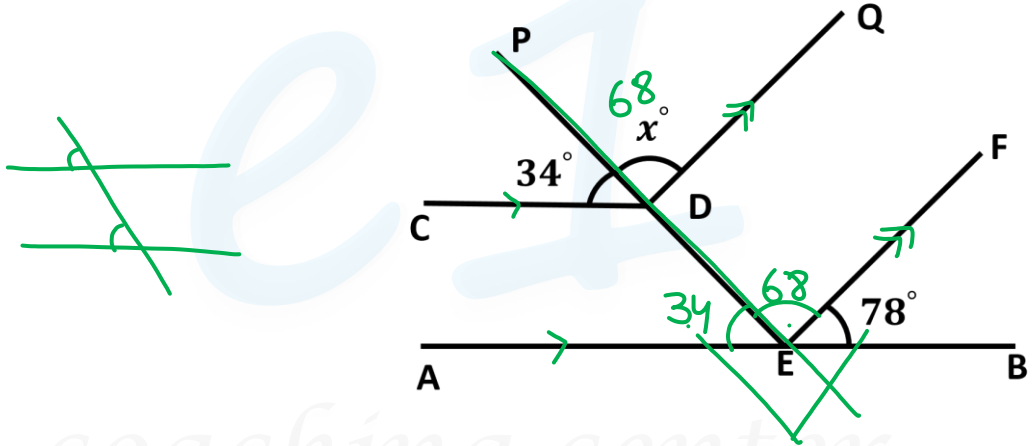
5. Find  $x + y - z = 40$



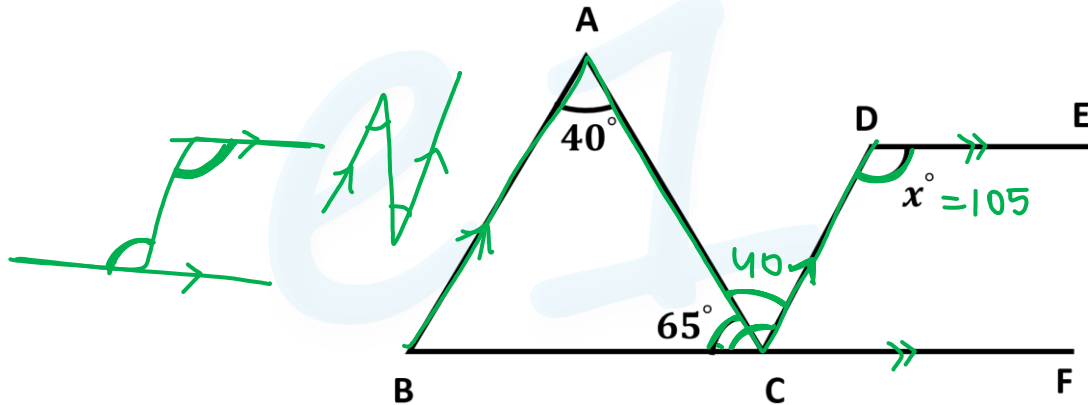
6.  $AB \parallel CD$ . Find  $x$ .



7.  $AB \parallel CD$  and  $EF \parallel DQ$ . Find  $x$ .

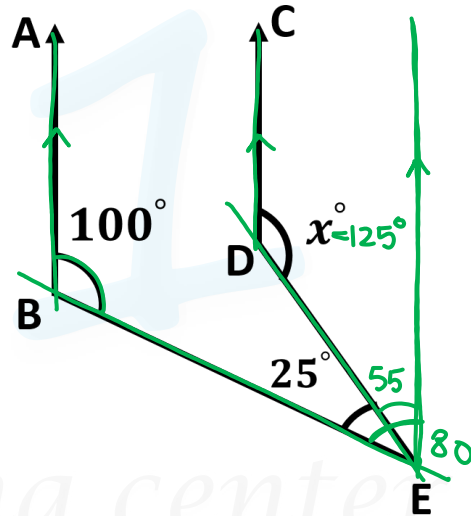
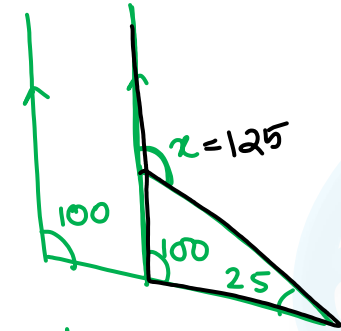


8.  $AB \parallel DC$  and  $DE \parallel BF$ . Find  $x$ .

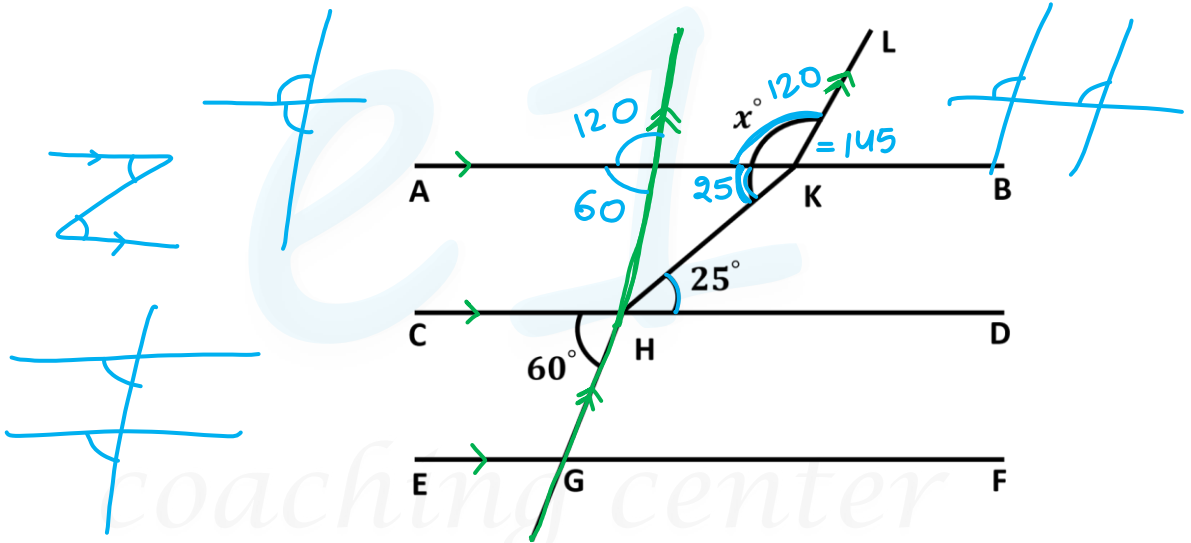


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9.  $AB \parallel CD$ . Find  $x$ .



10.  $AB \parallel CD \parallel EF$  and  $GH \parallel KL$ . Find  $x$ .



11. In the figure given above,  $AB$  is parallel to  $CD$ . If  $\angle DCE = x$  and  $\angle ABE = y$ , then what is  $\angle CEB$  equal to?

निम्न दी गई आकृति में  $AB$ ,  $CD$  के समान्तर हैं। अगर  $\angle DCE = x$  और  $\angle ABE = y$  है तो  $\angle CEB = ?$

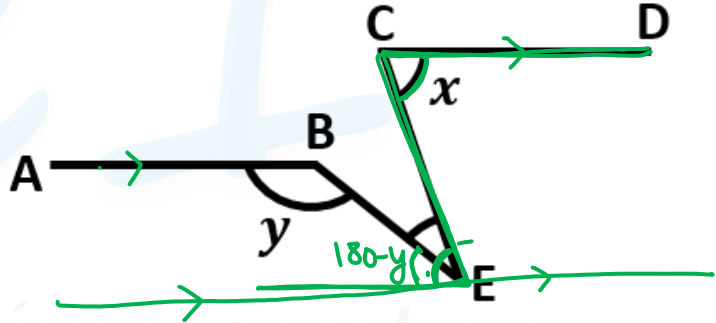
- a)  $y - x$     b)  $\frac{x+y}{2}$     c)  $x + y - \left(\frac{\pi}{2}\right)$     ~~d)  $x + y - \pi$~~

$$x = 180 - y + \angle CEB$$

$$x - 180 + y$$

$$= x + y - 180$$

$$180^\circ = \pi^c$$



12. Three straight lines X, Y and Z are parallel and the angles are as shown in the figure above. What is  $\angle AFB$  equal to:

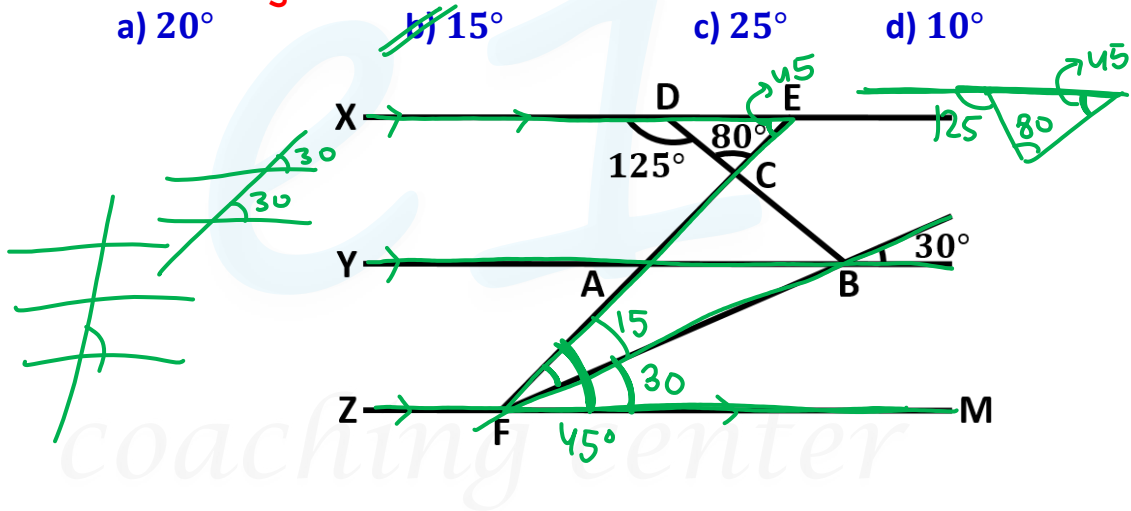
तीन सीधी रेखाएं X, Y और Z समान्तर हैं और सभी कोण आकृति में दिए गए के अनुसार हैं।  $\angle AFB = ?$

a)  $20^\circ$

b)  $15^\circ$

c)  $25^\circ$

d)  $10^\circ$





13. In a  $\triangle ABC$ , a line  $XY$  parallel to BC intersects  $AB$  at  $X$  and  $AC$  at  $Y$ . If  $BY$  bisects angle  $XYC$ , then  $m \angle CBY$  :  $m \angle CYB$  is:

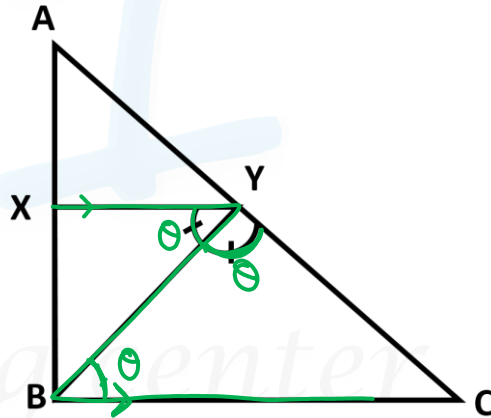
एक त्रिभुज  $\triangle ABC$  में, रेखा  $XY$  रेखा  $BC$  के समानांतर है तथा रेखा  $BY$  कोण  $XYC$  को द्विभाजित करती है, तो  $m \angle CBY$  :  $m \angle CYB$  बताओ।

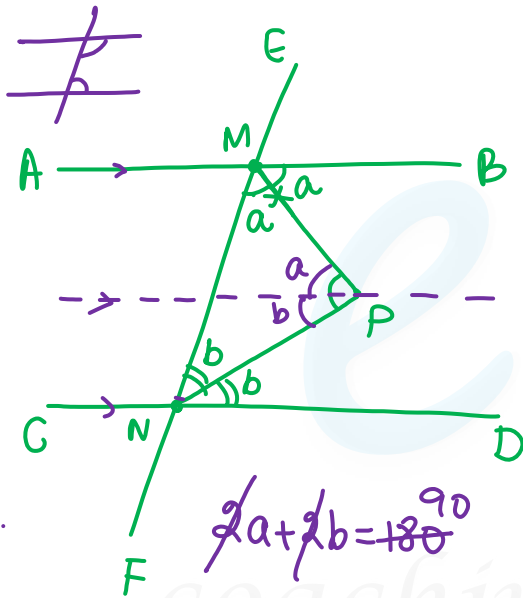
a) 5 : 4

b) 4 : 5

c) 1 : 1

d) 6 : 5





14. Two parallel lines AB and CD are intersected by a transversal EF at M and N respectively. The lines MP and NP are the bisectors of interior angles  $\angle BMN$  and  $\angle DNM$  on the same side of the transversal. Then  $\angle MPN$  is equal to :

AB और CD, दो समानांतर रेखाएं एक EF नामक प्रतिछेदी द्वारा M और N पर काटी गयीं। MP और NP रेखाएं कोण BMN और कोण DNM को द्विभाजित करती हैं। तो कोण MPN का मान बताओ।

- a)  $60^\circ$       ~~b)  $90^\circ$~~   
 c)  $45^\circ$       d)  $120^\circ$