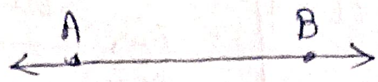
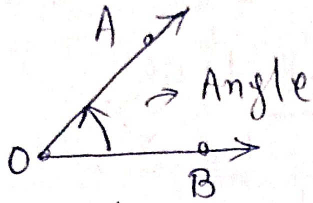
Lines and Angles

Lines-



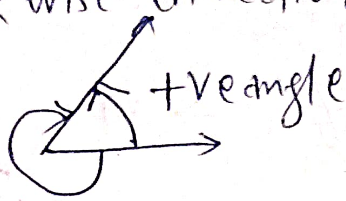
- No end point.

Angle:



$\vec{OA}$ = Ray
$\vec{OB}$ = Ray

⇒ Positive Angle = Anticlock wise direction



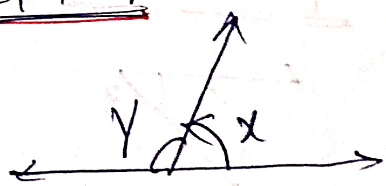
Negative Angle
⇓
→ clockwise direction -ve Angle

Important Angle

① Complementary Angle - Sum of two angle = 90°
② Supplementary Angle = Sum of two angle = 180°.

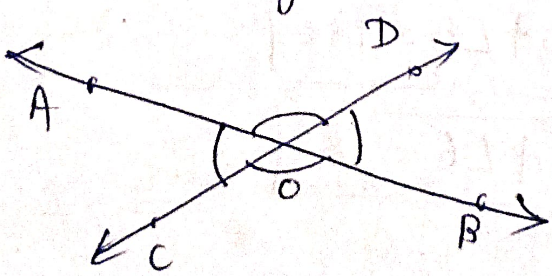
Some Results on Angle Relation

1. Linear pair:-



$\boxed{x+y=180^\circ}$ from linear pair.

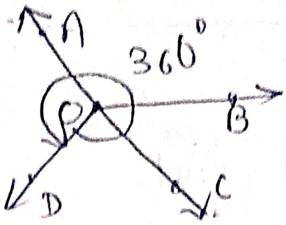
2. vertically opposite Angle:- two lines intersect then the vertically opposite angles are equal.



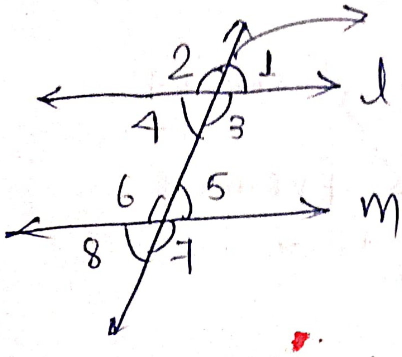
* $\boxed{\angle AOD = \angle BOC}$
* $\boxed{\angle AOC = \angle BOD}$

3. Sum of all angles around a point is 360°.

$$\boxed{\angle AOB + \angle BOC + \angle COD + \angle AOD = 360^\circ}$$



Parallel Lines



Transversal.

l || m (Because perpendicular Distance betⁿ them are same)

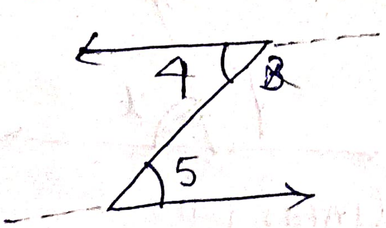
following Results, when a transversal cuts two parallel lines.

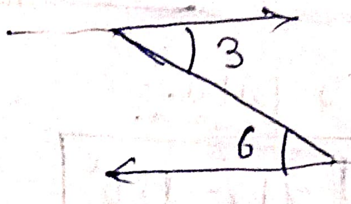
1. pairs of corresponding Angles are Equal.

$\angle 1 = \angle 5$, $\angle 3 = \angle 7$

$\angle 2 = \angle 6$, $\angle 4 = \angle 8$

2. pairs of Alternate Interior angles





$\boxed{\angle 4 = \angle 5}$, $\boxed{\angle 3 = \angle 6}$

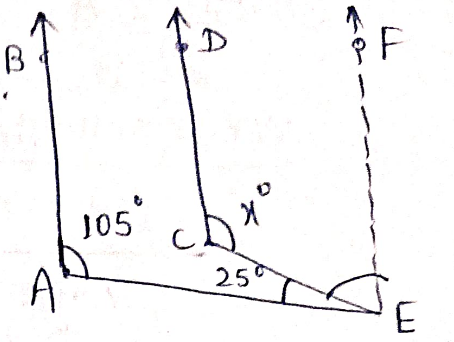
3. Sum of co-Interior angle = 180°

$$\boxed{\angle 3 + \angle 5 = 180^\circ}$$

$$\boxed{\angle 4 + \angle 6 = 180}$$

Question Based on above Concept

1. In the given figure, $AB \parallel CD$, $\angle EAB = 105^\circ$, $\angle AFC = 25^\circ$ and $\angle ECD = x^\circ$, find the value of x.



Construction - Draw $EF \parallel AB \parallel CD$

Given $CD \parallel EF$ & EC is transversal.

we know,

Sum of Co-Interior angle = 180°

$x^\circ + \angle CEF = 180^\circ$

$\therefore \angle CEF = 180^\circ - x^\circ$ —— (1)

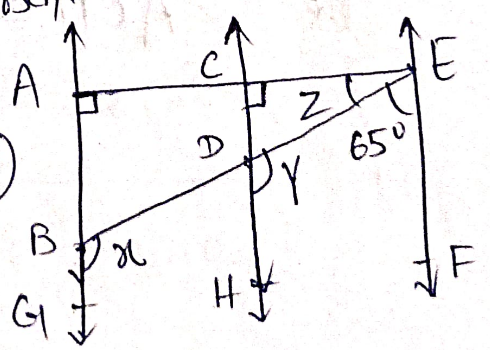
Now, $AB \parallel EF$ and AE is transversal.

sum of Co-Interior angle = 180° [$\because \angle AEF = 25^\circ + \angle CEF$]

$105^\circ + 25^\circ + \cancel{180^\circ} - x^\circ = \cancel{180^\circ}$

$\therefore x = 105^\circ + 25^\circ = 130^\circ$ Ans

2. In the given figure, $AB \parallel CD \parallel EF$, $\angle DBG = x$, $\angle EDH = Y$, $\angle AEB = Z$, $\angle EAB = 90^\circ$ and $\angle BEF = 65^\circ$, find the value of x, Y and Z.



Sol^n^

$AB \parallel CH$ & BD is transversal.

$x = Y$ (Corresponding Angle.) —(1)

$CH \parallel EF$ & ED is transversal.

$65^\circ + Y = 180^\circ$

$\therefore Y = 180^\circ - 65^\circ = 115^\circ$ Ans

$x = Y = 115^\circ$ Ans (from eq^n (1))

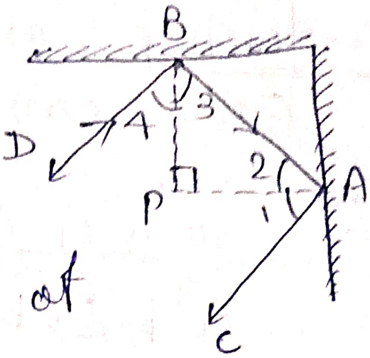
Now $CH \parallel EF$ & CE is transversal.

$90^\circ = Z + 65^\circ$ [Co-Interior angle]

$\therefore Z = 90^\circ - 65^\circ = 25^\circ$ Ans

Q. In the given figure, 'm' and 'n' are two plane mirrors perpendicular to each other. Show that incident ray CA is parallel to the reflected ray BD.

Given: AC = Reflected ray
BD: Incident ray.



We know that

laws of Reflection

Angle of Incidence = Angle of Reflection.

$\angle 3 = \angle 4$ — (1)

$\angle 1 = \angle 2$ — (2)

In $\triangle ABP$, sum of all angle = 180°

$\angle 2 + \angle 3 = 90^\circ$ — (3) $[\because \angle P = 90^\circ]$

$\therefore \angle 1 + \angle 2 + \angle 3 + \angle 4 = 90^\circ + 90^\circ = 180^\circ$

$\angle ABD + \angle CAB = 180^\circ$ [This is sum of co-interior angle]

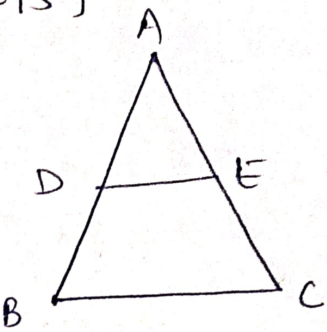
Here sum of co-interior angle = 180°

i.e. $AC \parallel BD$ proved.

question:- 4 In ΔABC, $DE \parallel BC$. If $AD = 4$ cm, $AB = 12$ cm and $AC = 24$ cm, find the value of AE. [CBSC-2015]

Soln: Given $DE \parallel BC$.

By Thale's theorm



$$\frac{AD}{BD} = \frac{AE}{CE}$$

$$\Rightarrow \frac{4}{AB-AD} = \frac{AE}{AC-AE}$$

$$\Rightarrow \frac{4}{12-4} = \frac{AE}{24-AE} \Rightarrow \frac{\cancel{4}^{1}}{\cancel{8}_{2}} = \frac{AE}{24-AE}$$

cross-multiplication

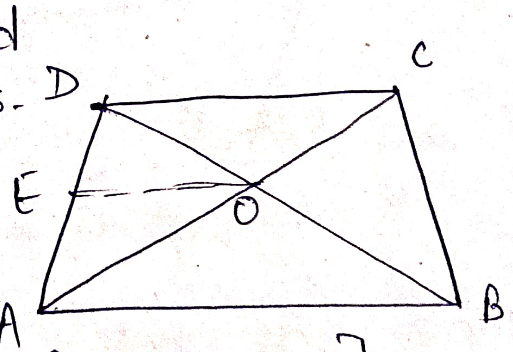
$$24 - AE = 2 \times AE$$

$$\Rightarrow 3AE = 24$$

$$\therefore AE = \frac{\cancel{24}^{8}}{\cancel{3}} = 8 \text{ cm Ans}$$

Question: ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at the point O. Prove that $\boxed{\frac{AO}{OC} = \frac{BO}{OD}}$ [CBSE-2011]

Given ABCD is a trapezium and AC & BD is diagonal intersect at O.



To proove - $\frac{AO}{OC} = \frac{BO}{OD}$

construction - Draw $OE \parallel AB$.

proofs In ΔADC, $EO \parallel DC$ [$CD \parallel AB \parallel OE$]

By Thales theorm $\frac{AO}{OC} = \frac{AE}{DE}$ (1)

In ΔDAB, $OE \parallel AB$, By BPT.

$$\frac{BO}{OD} = \frac{AE}{DE} \quad \text{——— (2)}$$

from (1) & (2)

$$\boxed{\frac{AO}{OC} = \frac{BO}{OD} \text{ proved}}$$