2. Parallel lines and transversals

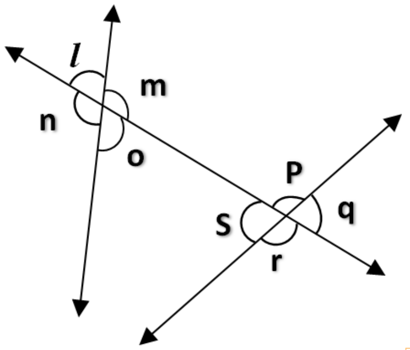
1. From the adjoining figure, write the following pair of angles.

(1) Corresponding angles

(2) Interior angles

(3) Interior alternate angles

(4) Exterior alternate angles



Ans :

(1) The pairs of corresponding angles :

(i) $\angle l$ and $\angle p$ (ii) $\angle n$ and $\angle s$

(iii) $\angle m$ and $\angle q$ (iv) $\angle o$ and $\angle r$

(2) The pairs of interior angles :

(i) $\angle m$ and $\angle p$ (ii) $\angle o$ and $\angle s$

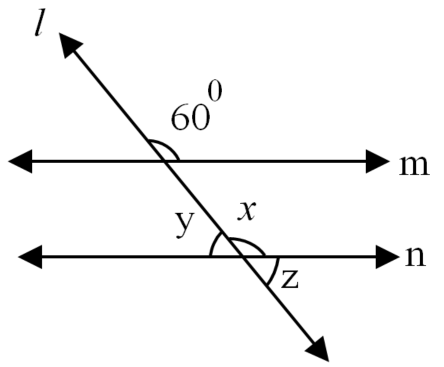
(3) The pairs of interior alternate angles.

(i) $\angle m$ and $\angle s$ (ii) $\angle o$ and $\angle p$

(4) The pairs of exterior alternate angles :

(i) $\angle l$ and $\angle r$ (ii) $\angle n$ and $\angle q$

2. In the given figure, if line m ∥ line n and line l is a transversal then find the value of $m\angle x$, $m\angle y$, and $m\angle z$.



Solution :

line m ∥ line n and l is a transversal.

$\therefore m\angle x = 60^0$....... (corresponding angle)

$m\angle x + m\angle y = 180^0$ ...... (Angles in linear pair)

$\therefore\ 60^0 + m\angle y = 180^0$

$\therefore\ m\angle y = 180^0 - 60^0$

$\therefore\ m\angle y = 120^0$

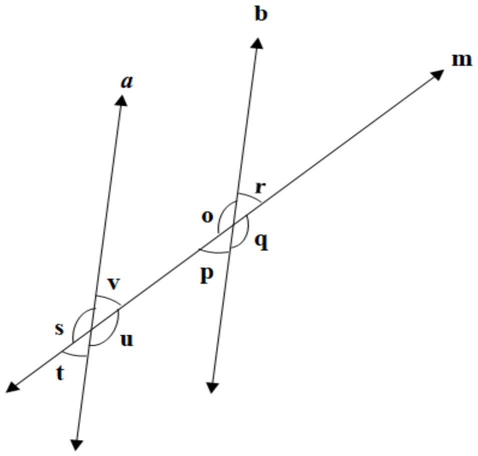
$\because m\angle y$ and $m\angle z$ are the opposite angles.

$\therefore m\angle y \cong m\angle z$

$\therefore m\angle z = m\angle y = 120^0$

$\therefore m\angle x = 60^0$, $m\angle y = 120^0$, $m\angle z = 120^0$

3. In the adjoining figure, line *a* ∥ line b and line m is a transversal, if $m\angle r = 65^0$ then find the measures of the remaining angles, and write observation.



Solution :

(1) line *a* ∥ line b and line m is a transversal.

$\therefore\ m\angle r = 65^0$

$m\angle o + m\angle r = 180^0$ ………(Angles in linear pair)

$\therefore\ m\angle o + 65^0 = 180^0$

$\therefore m\angle o = 180^0 - 65^0$

$\therefore m\angle o = 115^0$

(2) $m\angle r = m\angle p$……. (Opposite angles)

$\therefore\ m\angle p = 65^0$

(3) $m\angle q + m\angle p = 180^0$ ……..(Angles in linear pair)

$\therefore m\angle q + 65^0 = 180^0$

$\therefore\ m\angle q = 180^0 - 65^0$

$\therefore\ m\angle q = 115^0$

(4) $m\angle o + m\angle v = 180^0$…….. (Interior angles)

But $m\angle o = 115^0$

$\therefore 115^0 + m\angle v = 180^0$

$\therefore m\angle v = 180^0 - 115^0$

$\therefore m\angle v = 65^0$

(5) $m\angle v + m\angle u = 180^0$……. (Angles in linear pair)

But $m\angle v = 65^0$

$\therefore 65^0 + m\angle u = 180^0$

$\therefore m\angle u = 180^0 - 65^0$

$\therefore m\angle u = 115^0$

(6) $m\angle t = m\angle v$…….. (Opposite angles)

But $m\angle v = 65^0$

$\therefore m\angle t = 65^0$

(7) $m\angle s = m\angle u$ ……… (Opposite angles)

But $m\angle u = 115^0$

$\therefore m\angle s = 115^0$

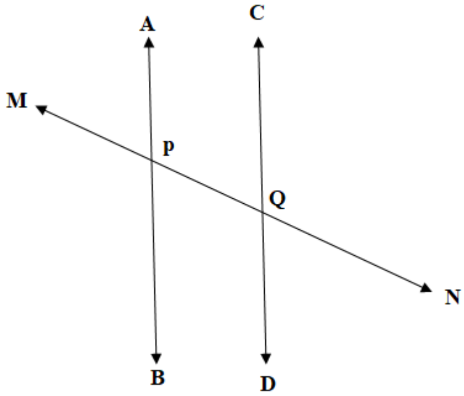
Observation : When two parallel lines are intersected by a transversal eight angles are formed. If the measure of one of these eight angles is given then we can find the measures of remaining seven angles.

4. In the adjoining figure, line MN is a transversal of line AB ∥ line CD.

$m\angle APM = 2x + 10$ and

$m\angle PQC = x + 35$

then find the value of x. Find the measures of the remaining pairs of corresponding angles.



Solution : Line MN is a transversal of line AB ∥ line CD.

(1) ∠APM and ∠PQC are the corresponding angles.

$\angle APM \cong \angle PQC$ ……….. (I)

$$\left.\begin{aligned} &\text{But } m\angle APM = 2x + 10 \\ &\text{and } m\angle PQC = x + 35 \end{aligned}\right\} \text{…….. (given)}$$

$\therefore 2x + 10 = x + 35$……. [from (I)]

$\therefore 2x - x = 35 - 10$

$\therefore x = 25$

$\therefore m\angle APM = 2x + 10 = 2 \times 25 + 10 = 50 + 10 = 60^0$

$\therefore m\angle PQC = x + 35 = 25 + 35 = 60^0$

$m\angle APM + m\angle MPB = 180^0$…….. (Angles in linear pair)

But , $m\angle APM = 60^0$

$\therefore 60^0 + m\angle MPB = 180^0$

$\therefore m\angle MPB = 180^0 - 60^0$

$\therefore\ m\angle \mathrm{MPB} = 120^0$

(2) $\angle$MPB and $\angle$PQD are the corresponding angles.

$\therefore \angle \mathrm{MPB} \cong \angle \mathrm{PQD}$

But $m\angle \mathrm{MPB}\ = 120^0$

$\therefore m\angle \mathrm{PQD} = 120^0$

(3) $\angle$APQ and $\angle$CQN are the corresponding angles.

$\therefore\ \angle \mathrm{APQ} \cong \angle \mathrm{CQN}$

But $m\angle \mathrm{APQ} =\ m\angle \mathrm{MPB} = 120^0$

$\therefore\ m\angle \mathrm{APQ} = m\angle \mathrm{CQN} = 120$

(4) $\angle$BPQ and $\angle$DQN are the corresponding angles.

$\therefore \angle \mathrm{BPQ} \cong \angle \mathrm{DQN}$

But $\angle \mathrm{BPQ} = \angle \mathrm{APM}$ …….. (Opposite angles)

$\therefore m\angle \mathrm{BPQ} = m\angle \mathrm{APM} = 60^0$

$\therefore m\angle \mathrm{BPQ} = m\angle \mathrm{DQN} = 60^0$

The measures of the pairs of corresponding angles :

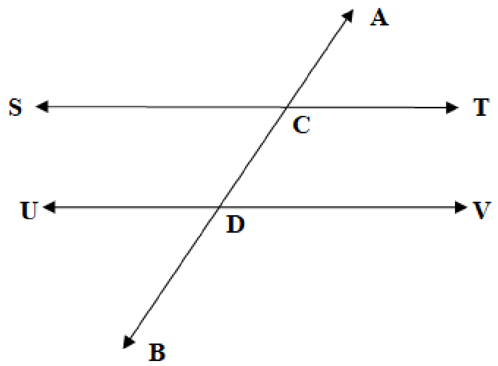
(i) $m\angle \mathrm{APM} \cong m\angle \mathrm{PQC}\ = 60^0$

(ii) $m\angle \mathrm{MPB} \cong m\angle \mathrm{PQD}\ = 120^0$

(iii) $m\angle \mathrm{APQ} \cong m\angle \mathrm{CQN} = 120^0$

(iv) $m\angle \mathrm{BPQ} \cong m\angle \mathrm{DQN}\ = 60^0$

5. In the adjoining figure,



line ST ∥ line UV and line AB is a transversal.

If $\angle SCD = 4y$ and

$\angle CDV = 3y + 26$

then find the value of y. Find the measures of the remaining pairs of interior alternate angles.

Solution : Line AB is a transversal of line ST ∥ line UV

$\because \angle SCD \cong \angle CDV$ ……. (Interior alternate angles)

$\therefore m\angle SCD = m\angle CDV$

But $\angle SCD = 4y$ and $\angle CDV = 3y + 26$

$\therefore \ 4y = 3y + 26$

$\therefore 4y - 3y = 26$

$\therefore y = 26$

$m\angle SCD = 4y = 4 \times 26 = 104$

$m\angle CDV = 3y + 26 = 3 \times 26 + 26 = 78 + 26 = 104$

$\therefore m\angle SCD \cong m\angle CDV = 104^0$

(2) $m\angle SCD + m\angle TCD = 180^0$ ………(Angles in linear pair)

But $m\angle SCD = 104^0$

$\therefore \ 104^0 + m\angle TCD = 180^0$

$\therefore m\angle TCD = 180^0 - 104^0$

$\therefore m\angle TCD = 76^0$

$\angle TCD \cong \angle CDU$ ……… (Interior alternate angles)

$\therefore m\angle CDU = m\angle TCD = 76^0$

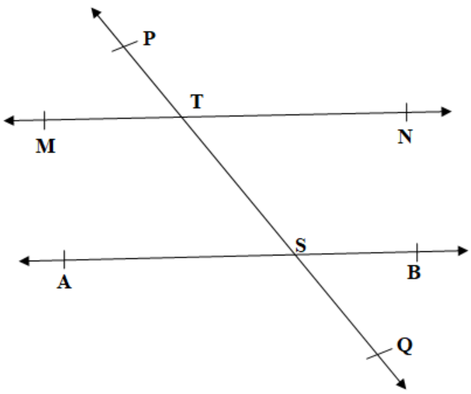
The measures of the pairs of interior alternate angles :

(i) $m\angle SCD \cong m\angle CDV = 104^0$

(ii) $m\angle TCD \cong m\angle CDU = 76^0$

6. In the adjoining figure,

line MN ∥ line AB and line PQ is a transversal. If $\angle PTN = 4x + 17$ and $\angle ASQ = 2x + 43$ then find the value of x.



Solution :

Line MN ∥ line PQ is a transversal.

(1) $\angle PTN \cong \angle ASQ$ ……..(Exterior alternate angle)

But $\angle PTN = 4x + 17$ and

$\angle ASQ = 2x + 43$

$\therefore 4x + 17 = 2x + 43$

$\therefore 4x - 2x = 43 - 17$

$\therefore 2x = 26$

$\therefore x = 13$

$\therefore m\angle \text{PTN} = 4x + 17 = 4 \times 13 + 17 = 52 + 17 = 69$

$m\angle \text{ASQ} \cong m\angle \text{PTN} = 69^0$

(2) $m\angle \text{PTN} + m\angle \text{PTM} = 180^0$ ……..(Angles in linear pair)

But, $m\angle \text{PTN} = 69^0$

$\therefore 69^0 + m\angle \text{PTM} = 180^0$

$\therefore m\angle \text{PTM} = 180^0 - 69^0$

$\therefore m\angle \text{PTM} = 111^0$

$\angle \text{PTN} \cong \angle \text{BSQ}$ ……..(Exterior alternate angles)

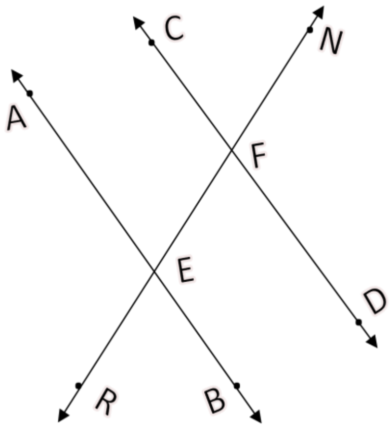
$\therefore m\angle \text{PTM} = m\angle \text{BSQ} = 111^0$

$\therefore$ The measures of the pairs of exterior alternate angles :

(i) $m\angle \text{PTN} \cong m\angle \text{ASQ} = 69^0$

(ii) $m\angle \text{PTM} \cong m\angle \text{BSQ} = 111^0$

7. In the figure alongside, line AB || line CD and line NR is a transversal. If $\angle \text{CFE} = 2x + 29$ and $\angle \text{FEA} = 5x + 25$ then find the measures of remaining all pairs of interior angles.



Solution :

(1) line AB || line CD and line NR is a transversal of them.

$\angle$CFE and $\angle$FEA are the interior angles.

The sum of the measures of the interior angles is 180^0

$\therefore\ \angle CFE + \angle FEA = 180^0$

But $\angle CFE = 2x + 29$ and $\angle FEA = 5x + 25$

$\therefore 2x + 29 + 5x + 25 = 180$

$\therefore 7x + 54 = 180$

$\therefore 7x = 180 - 54$

$\therefore 7x = 126$

$\therefore x = \frac{126}{7}$

$\therefore x = 18^0$

$\therefore m\angle CFE = 2x + 29 = 2 \times 18^0 + 29 = 36 + 29 = 65^0$

$\therefore m\angle FEA = 5x + 25 = 5 \times 18^0 + 25 = 90 + 25 = 115^0$

(2) $m\angle CFE + m\angle DFE = 180^0$ ....(Angles in linear pair)

But , $m\angle CFE = 65^0$

$\therefore\ 65^0 + m\angle DFE = 180^0$

$\therefore m\angle DFE = 180^0 - 65^0$

$\therefore m\angle DFE = 115^0$

$\angle$DFE and $\angle$FEA are the interior angles.

The sum of the measures of the interior angles is 180^0.

$\therefore\ m\angle DFE + m\angle FEB = 180^0$

But , $m\angle DFE = 115^0$

$\therefore\ 115^0 + m\angle\text{FEB} = 180^0$

$\therefore\ m\angle\text{FEB} = 180^0 - 115^0$

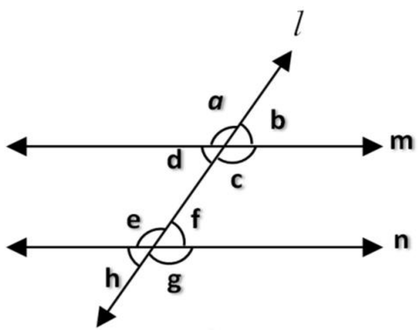
$\therefore\ m\angle\text{FEB} = 65^0$

$\therefore$ **The measures of the pairs of interior angles :**

(1) $m\angle\text{CFE} + m\angle\text{FEA} = 65^0 + 115^0 = 180^0$

(2) $m\angle\text{DFE} + m\angle\text{FEB} = 115^0 + 65^0 = 180^0$

8. In the adjoining figure, line m ∥ line n,
Line *l* is a transversal.
If a = $(4x + 20)^0$ **and f =** $(3x + 20)^0$
then find the value of x**.**
Find $m\angle a$ **and** $m\angle\text{f}$**.**



Solution :

$a = (4x + 20)^0$ **and f =** $(3x + 20)^0$ **…… (given)**

$\angle a \cong \angle\text{e}$ **……. (Corresponding angles)**

$m\angle\text{e} = m\angle a = (4x + 20)^0$

$m\angle\text{e} + m\angle\text{f} = 180^0$ **(Angles in linear pair)**

$\therefore\ 4x + 20 + 3x + 20 = 180^0$

$\therefore\ 7x + 40 = 180$

$\therefore\ 7x = 140$

$\therefore\ x = \frac{140}{7}$

$\therefore\ x = 20$

Put the value of $x = 20$ in $\angle a = 4x + 20$

$\therefore\ \angle a = (4 \times 20) + 20 = 80 + 20 = 100$

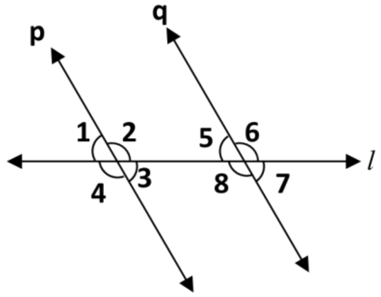
and also put the value of $x = 20$ in $\angle f = 3x + 20$

$\therefore \angle f = (3 \times 20) + 20 = 60 + 20 = 80^0$

$\therefore x = 20^0$, $m\angle a = 100^0$ and $m\angle f = 80^0$

9. In the adjoining figure, line p ∥ line q and line *l* is a transversal.

If $\angle 4 = 3x$, $\angle 7 = x + 4y$ then find the value of x and y.



Solution :

line p ∥ line q and line *l* is a transversal.

$\angle 3 = 7x + y$, $\angle 4 = 3x$ and $\angle y = x + 4y$ ……… (given)

$m\angle 3 + m\angle 4 = 180^0$…….. (Angles in a linear pair)

$\therefore 7x + y + 3x = 180^0$

$\therefore 10x + y = 180^0$……..(i)

$\angle 3 = \angle 7$………(Corresponding angles)

$\therefore 7x + y = x + 4y$

$\therefore 7x - x = 4y - y$

$6x = 3y$

$\therefore 6x - 3y = 0$……..(ii)

Multiple. eq.^{n} (i) by 3 We get,

$$30x + 3y = 540 \text{ .... (iii)}$$

Adding eq.^{n} (iii) and eq.^{n} (ii) We get,

$$30x + 3y + 6x - 3y = 540 + 0$$

$$\therefore\ 36x = 540$$

$$\therefore\ x = \frac{540}{36}$$

$$\therefore\ x = 15$$

Put the value of $x = 15$ in eq.^{n} (i) We get,

$$\therefore 10 \times 15 + y = 180$$

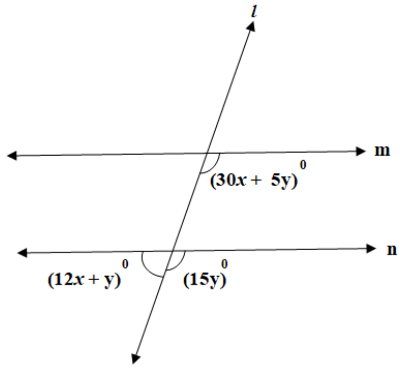
$$\therefore 150 + y = 180$$

$$\therefore\ y = 180 - 150$$

$$\therefore\ y = 30$$

$$\therefore x = 15^0 \text{ and } y = 30^0$$

10. In the adjoining figure, if line m || line n and line l is a transversal then find the value of x and y.



Solution :

$30x + 5y$ and $15y$ are the Corresponding angles.

$$\therefore 30x + 5y = 15y$$

$$\therefore 30x = 15y - 5y$$

$$\therefore 30x = 10y$$

$$\therefore y = \frac{30x}{10}$$

$$\therefore y = 3x \text{ ....(i)}$$

Also , $12x + y$ and 15y are the angles in a linear pair.

$$\therefore 12x + y + 15y = 180$$

$$\therefore 12x + 16y = 180 \text{........ (ii)}$$

Put the value of eq.^{n} (i) in eq.^{n} (ii) we get,

$$\therefore 12x + (16 \times 3x) = 180$$

$$12x + 48x = 180$$

$$\therefore 60x = 180^0$$

$$\therefore x = \frac{180}{60}$$

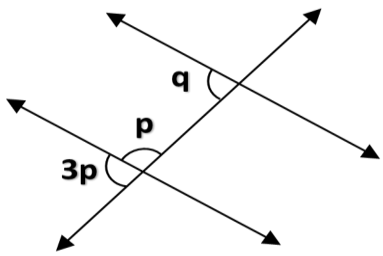
$$\therefore x = 3$$

Now, put the value of $x = 3$ in eq.^{n} (i) we get,

$$\therefore y = 3x = 3 \times 3 = 9$$

$$\therefore x = 3^0 \text{ and } y = 9^0$$

11. In the adjoining figure, line $a \parallel$ line b line t is a transversal. Find the measures of $\angle p$, $\angle q$ and $\angle 3p$.



Solution :

p and 3p are the angles in a linear pair.

$$\therefore m\angle p + m\angle 3p = 180^0$$

$$\therefore m\angle 4p = 180^0$$

$$\therefore m\angle p = \frac{180^0}{4}$$

$$\therefore m\angle p = 45^0$$

$$m\angle q + m\angle p = 180 \ldots\ldots \text{(Interior angles)}$$

$$\therefore m\angle q + 45 = 180$$

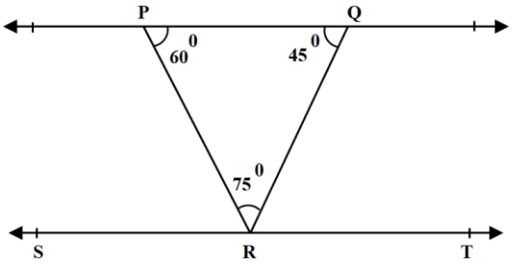
$$\therefore m\angle q = 180 - 45$$

$$\therefore m\angle q = 135$$

$$\therefore 3p = 3 \times 45 = 135$$

$$\therefore m\angle p = 45^0, m\angle q = 135^0 \text{ and } m\angle 3P = 135^0$$

12. In the figure alongside, line PQ ∥ line ST, $\angle QPR = 60^0$, $\angle PQR = 45^0$ and $\angle PRQ = 75^0$ then find the value of $m\angle PRS + m\angle QRT$.



Solution :

line PQ ∥ line ST

$\angle QPR \cong \angle PRS$ ……..(Alternate angles)

But $m\angle QPR = 60^0$……..(given)

$\therefore\ m\angle PRS = m\angle QPR = 60^0$

Also $\angle PQR \cong \angle QRT$…….. (Alternate angles)

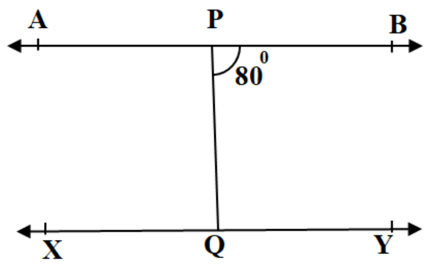
But, $m\angle PQR = 45^0$ ……..(given)

$\therefore m\angle QRT = m\angle PQR = 45^0$

$\therefore m\angle PRS + m\ \angle QRT = 60^0 + 45^0 = 105^0$

$\therefore m\angle PRS + m\ \angle QRT = 105^0$

13. In the adjoining figure line AB ∥ line XY and PQ is a transversal. If $m\angle BPQ = 80^0$ then find the measures of $\angle PQY$, $\angle APQ$, $\angle PQX$.



Solution :

Line AB ∥ line XY and PQ is a transversal.

$\angle BPQ$ and $\angle PQY$ are the interior angles.

The sum of the measures of the interior angles is 180^0 .

$\therefore m\angle BPQ + m\angle PQY = 180^0$

But $m\angle BPQ = 80^0$

$\therefore 80^0 + m\angle PQY = 180^0$

$\therefore m\angle PQY = 180^0 - 80^0$

$\therefore m\angle PQY = 100^0$

$\angle BPQ \cong \angle PQX$ ……. (Alternate angles)

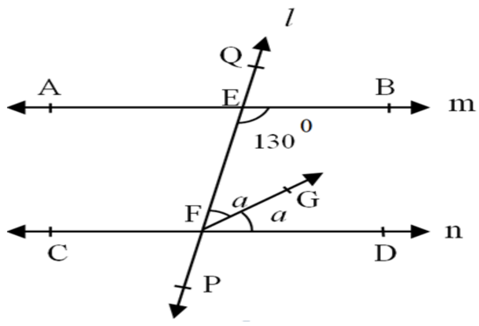
$\therefore m\angle BPQ = m\angle PQX = 80^0$

Also, $\angle PQY \cong \angle APQ$ …….(Alternate angles)

$\therefore m\angle APQ = \angle PQY = 100^0$

$\therefore m\angle PQY = 100^0, m\angle APQ = 100^0, m\angle PQX = 80^0$

14. line m || line n and line *l* is a Transversal. Ray FG is a angle bisector of ∠EFD. Find the measures of ∠*a* and ∠DFP.



Solution :

line m || line n and line l is a transversal. ∠BEF and ∠EFD are the interior angles.

The sum of the measures of the interior angles is 180^0.

$\therefore m\angle BEF + m\angle EFD = 180^0$

But , $m\angle EFD = 2a$, $m\angle BEF = 130^0$

$\therefore 130 + 2a = 180$

$\therefore 2a = 180 - 130^0$

$\therefore 2a = 50$

$\therefore a = \frac{50}{2}$

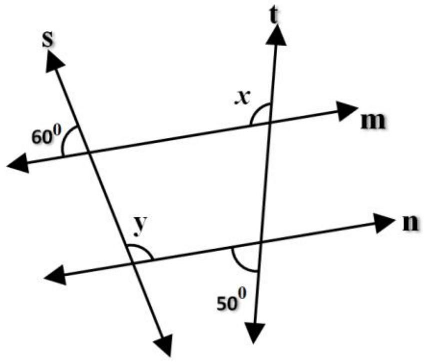
$\therefore a = 25$

∠BEF and ∠DFP are the corresponding angles.

$\therefore m\angle BEF = m\angle DFP = 130^0$

$\therefore m\angle a = 25^0$, $m\angle DFP = 130^0$

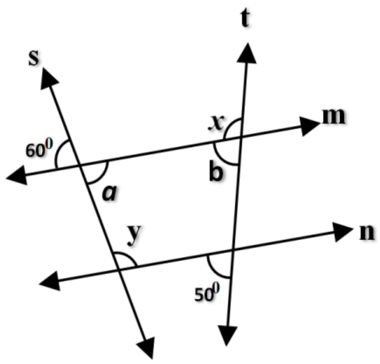
15. In the adjoining figure, line m ∥ line n. Line s and line t are transversals. Find measure of $\angle x$ and $\angle y$ using the measures of angles given in the figure.



Solution :

Consider $\angle a$, $\angle b$ as shown in figure.

(i) line m∥ line n and line t is a transversal.



$m\angle b = 50^0$ ……..(Corresponding angle)

$m\angle x + m\angle b = 180^0$ ………. (Angles in linear pair)

$\therefore m\angle x + 50^0 = 180^0$

$\therefore m\angle x = 180^0 - 50^0$

$\therefore m\angle x = 130^0$

(ii) $\because m\angle a = 60^0$ ……(Opposite angle)

line m ∥ line n and line ‘s’ is a transversal.

$m\angle a + m\angle y = 180^0$ ……(Interior angles)

$60^0 + m\angle y = 180^0$

$\therefore m\angle y = 180^0 - 60^0$

$\therefore m\angle y = 120^0$

$\therefore m\angle x = 130^0$ and $m\angle y = 120^0$

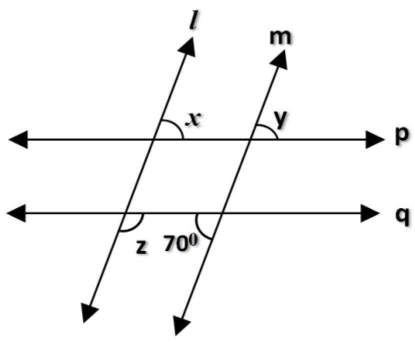
16. In the figure alongside,

line p ∥ line q . Line l ∥ line m.

Find measure of $\angle x$, $\angle y$ and $\angle z$

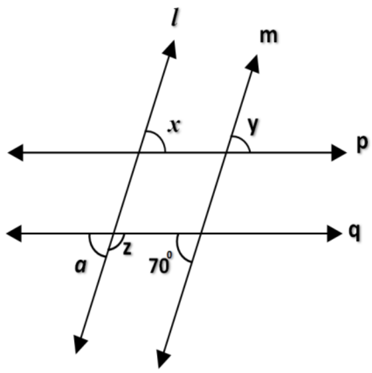
using the measures of angles given

in the figure.



Solution :

Consider $\angle a$ as shown in the figure.



(i) line l ∥ line m and line q is a transversal

$m\angle a = 70^0$……..(Corresponding angles)

$m\angle a + m\angle z = 180^0$……. (Angles in linear pair)

$\therefore 70^0 + m\angle z = 180^0$

$\therefore m\angle z = 180^0 - 70^0$

$\therefore m\angle z = 110^0$

(ii) line p ∥ line q and line l is a transversal.

$\angle a \cong \angle x$ ………(Exterior alternate angle)

$\therefore\ m\angle a = m\angle x = \ 70^0$

$\therefore m\angle x = \ 70^0$

(iii) line l || line m and line p is a transversal.

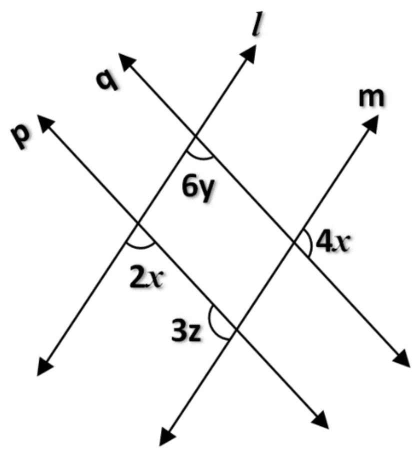
$\angle x \cong \ \angle$y……..(Corresponding angles)

$\therefore m\angle x = m\angle \text{y} = \ 70^0$

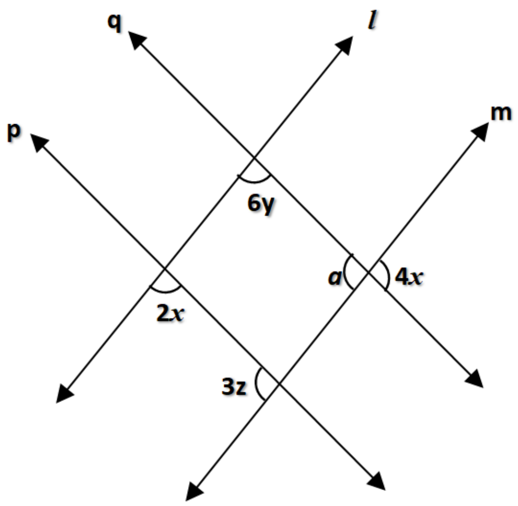
$\therefore\ m\angle \text{y} = \ 70^0$

$\therefore m\angle x = \ 70^0\ , m\angle \text{y} = \ 70^0\ , m\angle \text{z} = \ 110^0$.

17. In the adjoining figure, line p || line q and line l || line m. Find measures of $\angle 2x$, $\angle$3z , $\angle 4x$, $\angle$6y using the measures of given angles.



Solution : Consider $\angle a$ as shown in the figure.



line p ∥ line q . Line m is a transversal.

$\angle a \cong \angle 4x$....... **(Opposite angles)**

$\therefore m\angle a = m\angle 4x$ ....**(I)**

line p ∥ line q and line l is a transversal.

$\angle 6y = \angle 2x$........ **(Corresponding angles) ......(II)**

line l ∥ line m and line q is a transversal.

$\therefore m\angle 6y + m\angle a = 180^0$ .... **(Interior angles)**

$\therefore 2x + 4x = 180^0$ ......**[From(I) and (II)]**

$\therefore 6x = 180^0$

$\therefore x = \frac{180}{6}$

$\therefore x = 30^0$

$\therefore \angle 2x = 2 \times 30 = 60^0$ **and** $4x = 4 \times 30 = 120^0$

Put the value of $x = 30^0$ in eq^n (II) we get,

$\therefore 6y = 2x = 2 \times 30 = 60^0$

line l || line m and line p is a transversal.

$\therefore \angle 2x + \angle 3z = 180^0$ **…….. (Interior angles)**

$\therefore 60^0 + \angle 3z = 180^0$

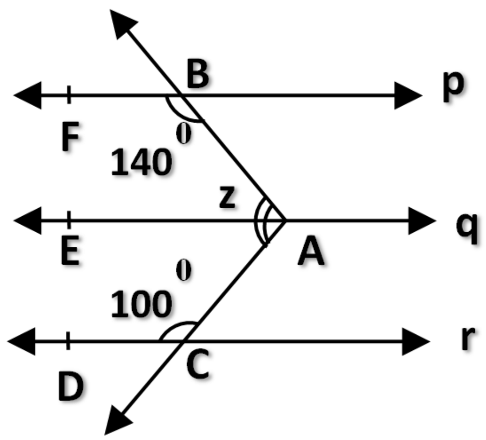
$\therefore \angle 3z = 180^0 - 60^0$

$\therefore \angle 3z = 120^0$

$\therefore \angle 2x = 60^0, \angle 4x = 120^0, \angle 6y = 60^0, \angle 3z = 120^0.$

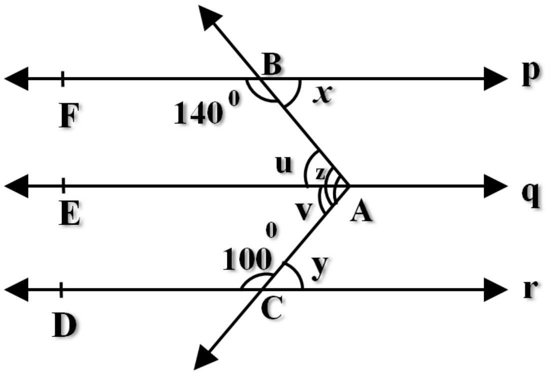
18. In the adjoining figure, line p || line q || line r.

If $m\angle FBA = 140^0$ and $m\angle DCA = 100^0$ then find the value of z.



Solution :

Consider $\angle x, \angle y, \angle u, \angle v$ as shown in the figure.



line p ∥ line q and seg AB is a transversal.

$\therefore\ m\angle x + 140^0 = 180^0$……. (Angles in linear pair)

$\therefore m\angle x = 180^0 - 140^0$

$\therefore\ m\angle x = 40^0$ ………(I)

$m\angle u = m\angle x$…….. (Alternate angles)

$\therefore m\angle u = 40^0$ ……… (II)

line q ∥ line r and seg AC is a transversal.

$\therefore m\angle y + 100 = 180$ …….. (Angles in linear pair)

$\therefore m\angle y = 180 - 100$

$\therefore m\angle y = 80$

$m\angle v = m\angle y$……. (Alternate angles)

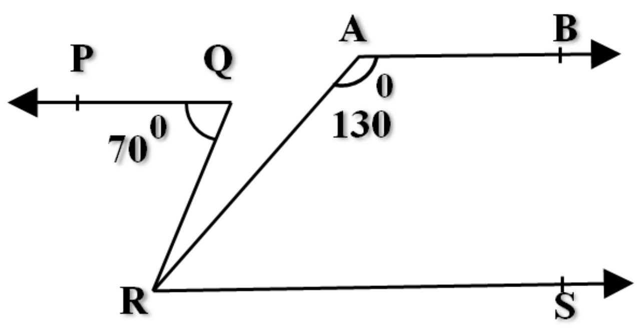
$\therefore m\angle v = 80$……. (III)

$m\angle z = m\angle u + m\angle v$

$= 40 + 80$…… [from (II) and (III)]

$\therefore m\angle z = 120^0$

19. In the adjoining figure, AB || PQ || RS and if $\angle BAR = 130^0$ $\angle PQR = 70^0$ then find $\angle QRA$ and $\angle ARS$.



Solution :

Ray AB || Ray RS and seg AR is a transversal.

$\angle BAR$ and $\angle ARS$ are the interior angles.

The sum of measures of the interior angles is 180^0.

$\therefore m\angle BAR + m\angle ARS = 180^0$

But $m\angle BAR = 130^0$ **…….. (Given)**

$\therefore \ 130^0 + m\angle ARS = 180^0$

$\therefore m\angle ARS = 180^0 - 130^0$

$\therefore m\angle ARS = 50^0$ **…….. (I)**

Ray PQ || Ray RS and seg QR is a transversal.

$\angle PQR = \angle QRS$ **…….. (Alternate angles)**

$m\angle QRS = m\angle PQR - 70^0$ **……… (II)**

But $m\angle QRS = m\angle QRA + m\angle ARS$

$70 = m\angle QRA + 50$ …… [from (I) and (II)]

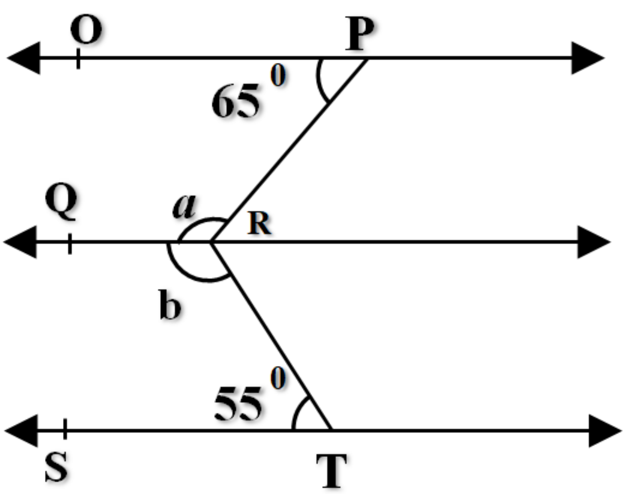
$\therefore m\angle QRA = 70 - 50$

$\therefore m\angle QRA = 20$

$\therefore m\angle QRA = 20$ and $m\angle ARS = 50^0$

20. In the figure alongside, line OP ∥ line QR ∥ line ST.

If $m\angle OPR = 65^0$ and $m\angle RTS = 55^0$ then find the value of $m\angle a$ and $m\angle b$



Solution :

(i) line OP ∥ line QR and seg PR is a transversal.

$\angle OPR$ and $\angle a$ are the interior angles.

The sum of measures of the interior angles is 180^0 .

$\therefore m\angle \mathrm{OPR} + m\angle a = 180^0$

But $m\angle \mathrm{OPR} = 65$ **……. (Given)**

$\therefore 65^0 + m\angle a = 180^0$

$\therefore m\angle a = 180^0 - 65^0$

$\therefore m\angle a = 115^0$

(ii) line QR ∥ line ST and seg RT is a transversal.

∠b and ∠RTS are the interior angles.

The sum of measures of the interior angles is 180^0.

$\therefore m\angle \mathrm{b} + \mathrm{m}\angle \mathrm{RTS} = 180^0$

But $\mathrm{m}\angle \mathrm{RTS} = 55^0$ **……..(Given)**

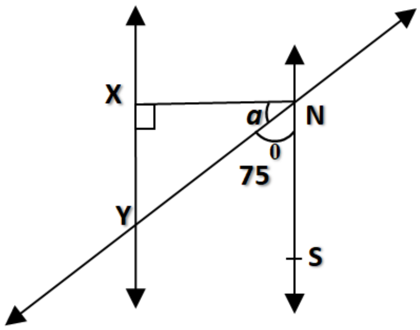
$\therefore m\angle \mathrm{b} + 55^0 = 180^0$

$\therefore m\angle \mathrm{b} = 180^0 - 55^0$

$\therefore m\angle \mathrm{b} = 125^0$

$\therefore m\angle a = 115^0$ **and** $m\angle \mathrm{b} = 125^0$

21. In the adjoining figure, line XY ∥ line NS and seg NS is a transversal. If $\angle NXY = 90^0$ and $\angle SNY = 75^0$ then find the value of a.



Solution : line XY ∥ line NS and seg NY is a transversal

$\angle XYN = \angle SNY$ …….. (Alternate angles)

$\therefore m\angle XYN = m\angle SNY = 75^0$

The sum of the measures of three angle of a triangle is 180^0

$\therefore$ In Δ NXY ,

$m\angle NXY + m\angle XYN + m\angle XNY = 180^0$

$\therefore 90^0 + 75^0 + \angle a = 180^0$

$165^0 + \angle a = 180^0$

$\therefore \angle a = 180^0 - 165^0$

$\therefore \angle a = 15^0$

22. Write the following statement true or false.

1) The lines in the same plane which intersect each other are called parallel lines.

Ans : False , the lines in the same plane which do not intersect each other are called parallel lines.

2) If a line intersects given two lines in two distinct points then that line is called a transversal of those two lines.

Ans : True

3) If two parallel lines are intersected by a transversal eight pairs of corresponding angles are formed.

Ans : False, if two parallel lines are intersected by a transversal four pairs of corresponding angles are formed.

4) When two parallel lines are intersected by a transversal four pairs of interior angles are formed.

Ans : False, when two parallel lines are intersected by a transversal two pairs of interior angles are formed.

5) When two parallel lines are intersected by a transversal four pairs of interior alternate angles are formed.

Ans : False, when two parallel lines are intersected by a transversal two pairs of interior alternate angles are formed.

6) When two parallel lines are intersected by a transversal two pairs of exterior alternate angles are formed.

Ans : True

7) When two parallel lines are intersected by a transversal eight angles are formed.

Ans : True

8) When two parallel lines are intersected by a transversal then the angles formed in each pair of corresponding angles are congruent.

Ans : True

9) When two parallel lines are intersected by a transversal then the angles formed in each pair of alternate angles are not congruent.

Ans : False, when two parallel lines are intersected by a transversal then the angles formed in each pair of alternate angles are congruent.

10) When two parallel lines are intersected by a transversal the angles formed in each pair of interior angles are supplementary.

Ans : True

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