

EXERCISE 14.2

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1. In Fig. 58, line n is a transversal to line l and m . Identify the following:

(i) Alternate and corresponding angles in Fig. 58 (i)

(ii) Angles alternate to $\angle d$ and $\angle g$ and angles corresponding to $\angle f$ and $\angle h$ in Fig. 58 (ii)

(iii) Angle alternate to $\angle PQR$, angle corresponding to $\angle RQF$ and angle alternate to $\angle PQE$ in Fig. 58 (iii)

(iv) Pairs of interior and exterior angles on the same side of the transversal in Fig. 58 (ii)

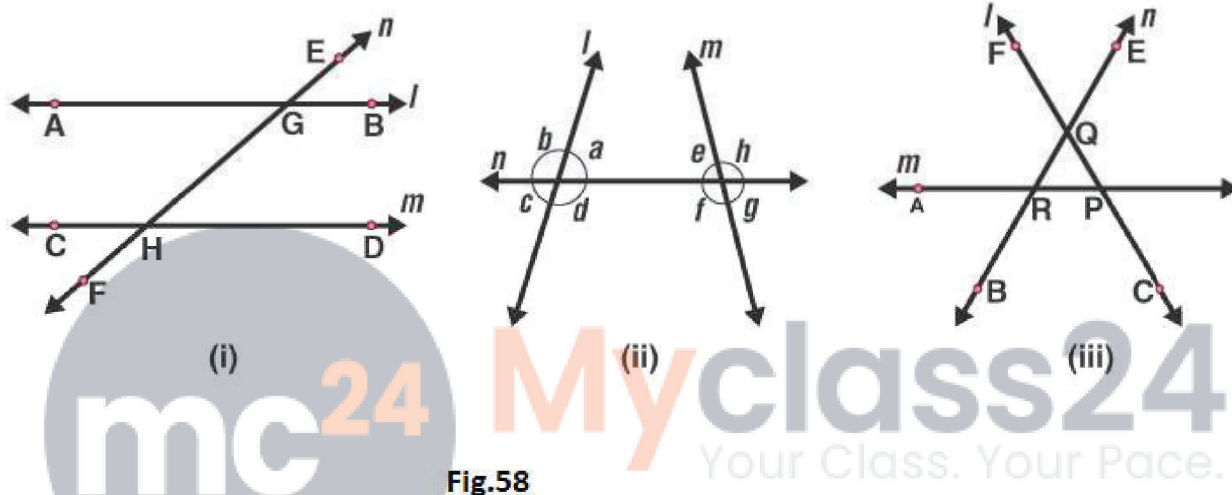


Fig.58

Solution:

(i) A pair of angles in which one arm of both the angles is on the same side of the transversal and their other arms are directed in the same sense is called a pair of corresponding angles.

In Figure (i) Corresponding angles are

$\angle EGB$ and $\angle GHD$

$\angle HGB$ and $\angle FHD$

$\angle EGA$ and $\angle GHC$

$\angle AGH$ and $\angle CHF$

A pair of angles in which one arm of each of the angle is on opposite sides of the transversal and whose other arms include the one segment is called a pair of alternate angles.

The alternate angles are:

$\angle EGB$ and $\angle CHF$

$\angle HGB$ and $\angle CHG$
 $\angle EGA$ and $\angle FHD$
 $\angle AGH$ and $\angle GHD$

(ii) In Figure (ii)

The alternate angle to $\angle d$ is $\angle e$.
The alternate angle to $\angle g$ is $\angle b$.
The corresponding angle to $\angle f$ is $\angle c$.
The corresponding angle to $\angle h$ is $\angle a$.

(iii) In Figure (iii)

Angle alternate to $\angle PQR$ is $\angle QRA$.
Angle corresponding to $\angle RQF$ is $\angle ARB$.
Angle alternate to $\angle POE$ is $\angle ARB$.

(iv) In Figure (ii)

Pair of interior angles are
 $\angle a$ is $\angle e$.
 $\angle d$ is $\angle f$.
Pair of exterior angles are
 $\angle b$ is $\angle h$.
 $\angle c$ is $\angle g$.

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2. In Fig. 59, AB and CD are parallel lines intersected by a transversal PQ at L and M respectively, If $\angle CMQ = 60^\circ$, find all other angles in the figure.

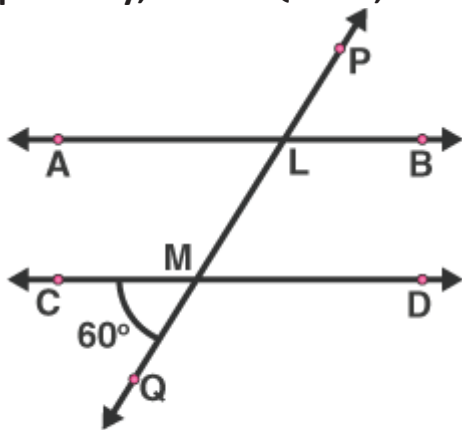


Fig. 59

Solution:

A pair of angles in which one arm of both the angles is on the same side of the transversal and their other arms are directed in the same sense is called a pair of corresponding angles.

Therefore corresponding angles are

$$\angle ALM = \angle CMQ = 60^\circ \text{ [given]}$$

Vertically opposite angles are

$$\angle LMD = \angle CMQ = 60^\circ \text{ [given]}$$

Vertically opposite angles are

$$\angle ALM = \angle PLB = 60^\circ$$

Here, $\angle CMQ + \angle QMD = 180^\circ$ are the linear pair

On rearranging we get

$$\begin{aligned}\angle QMD &= 180^\circ - 60^\circ \\ &= 120^\circ\end{aligned}$$

Corresponding angles are

$$\angle QMD = \angle MLB = 120^\circ$$

Vertically opposite angles

$$\angle QMD = \angle CML = 120^\circ$$

Vertically opposite angles

$$\angle MLB = \angle ALP = 120^\circ$$

3. In Fig. 60, AB and CD are parallel lines intersected by a transversal by a transversal PQ at L and M respectively. If $\angle LMD = 35^\circ$ find $\angle ALM$ and $\angle PLA$.

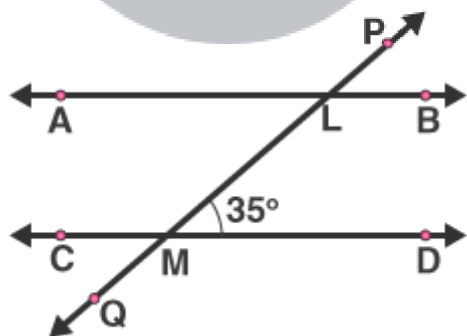


Fig. 60

Solution:

Given that, $\angle LMD = 35^\circ$

From the figure we can write

$\angle LMD$ and $\angle LMC$ is a linear pair

$$\angle LMD + \angle LMC = 180^\circ \text{ [sum of angles in linear pair = } 180^\circ]$$

On rearranging, we get

$$\begin{aligned}\angle LMC &= 180^\circ - 35^\circ \\ &= 145^\circ\end{aligned}$$

$$\text{So, } \angle LMC = \angle PLA = 145^\circ$$

$$\text{And, } \angle LMC = \angle MLB = 145^\circ$$

$\angle MLB$ and $\angle ALM$ is a linear pair

$$\angle MLB + \angle ALM = 180^\circ \text{ [sum of angles in linear pair = } 180^\circ\text{]}$$

$$\angle ALM = 180^\circ - 145^\circ$$

$$\angle ALM = 35^\circ$$

Therefore, $\angle ALM = 35^\circ$, $\angle PLA = 145^\circ$.

4. The line n is transversal to line l and m in Fig. 61. Identify the angle alternate to $\angle 13$, angle corresponding to $\angle 15$, and angle alternate to $\angle 15$.

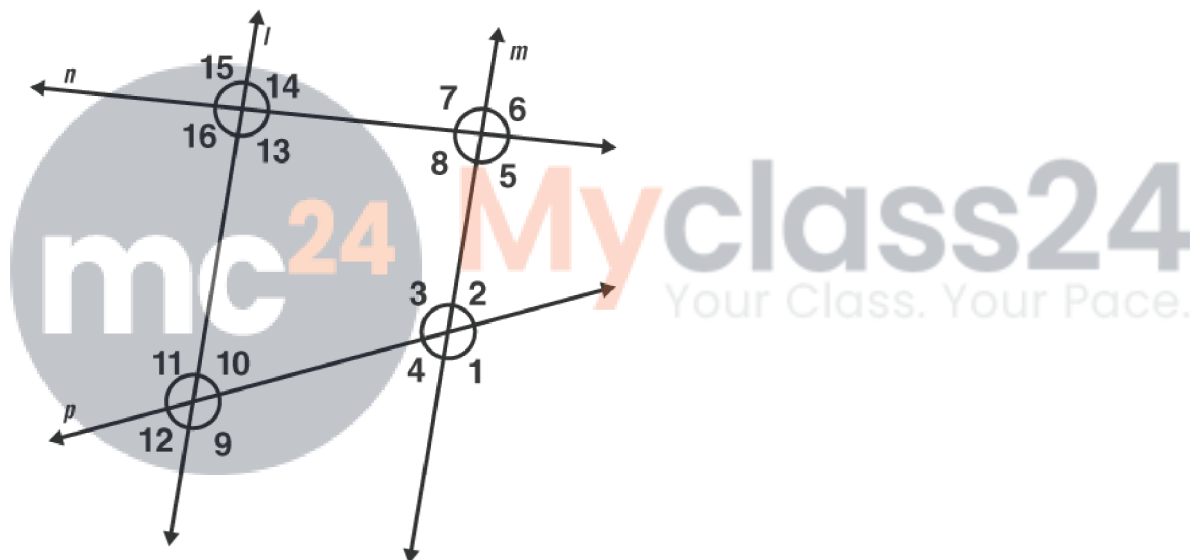


Fig.61

Solution:

Given that, $l \parallel m$

From the figure the angle alternate to $\angle 13$ is $\angle 7$

From the figure the angle corresponding to $\angle 15$ is $\angle 7$ [A pair of angles in which one arm of both the angles is on the same side of the transversal and their other arms are directed in the same sense is called a pair of corresponding angles.]

Again from the figure angle alternate to $\angle 15$ is $\angle 5$

5. In Fig. 62, line $l \parallel m$ and n is transversal. If $\angle 1 = 40^\circ$, find all the angles and check

that all corresponding angles and alternate angles are equal.

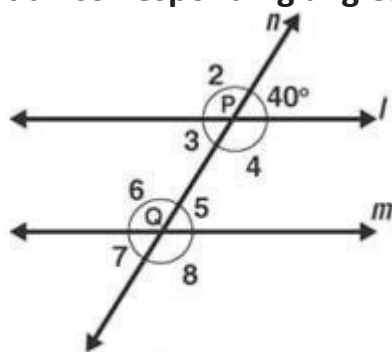


Fig. 62

Solution:

Given that, $\angle 1 = 40^\circ$

$\angle 1$ and $\angle 2$ is a linear pair [from the figure]

$$\angle 1 + \angle 2 = 180^\circ$$

$$\angle 2 = 180^\circ - 40^\circ$$

$$\angle 2 = 140^\circ$$

Again from the figure we can say that

$\angle 2$ and $\angle 6$ is a corresponding angle pair

So, $\angle 6 = 140^\circ$

$\angle 6$ and $\angle 5$ is a linear pair [from the figure]

$$\angle 6 + \angle 5 = 180^\circ$$

$$\angle 5 = 180^\circ - 140^\circ$$

$$\angle 5 = 40^\circ$$

From the figure we can write as

$\angle 3$ and $\angle 5$ are alternate interior angles

So, $\angle 5 = \angle 3 = 40^\circ$

$\angle 3$ and $\angle 4$ is a linear pair

$$\angle 3 + \angle 4 = 180^\circ$$

$$\angle 4 = 180^\circ - 40^\circ$$

$$\angle 4 = 140^\circ$$

Now, $\angle 4$ and $\angle 6$ are a pair of interior angles

So, $\angle 4 = \angle 6 = 140^\circ$

$\angle 3$ and $\angle 7$ are a pair of corresponding angles

So, $\angle 3 = \angle 7 = 40^\circ$

Therefore, $\angle 7 = 40^\circ$

$\angle 4$ and $\angle 8$ are a pair of corresponding angles

So, $\angle 4 = \angle 8 = 140^\circ$

Therefore, $\angle 8 = 140^\circ$

Therefore, $\angle 1 = 40^\circ$, $\angle 2 = 140^\circ$, $\angle 3 = 40^\circ$, $\angle 4 = 140^\circ$, $\angle 5 = 40^\circ$, $\angle 6 = 140^\circ$, $\angle 7 = 40^\circ$ and $\angle 8 = 140^\circ$

6. In Fig.63, line $l \parallel m$ and a transversal n cuts them P and Q respectively. If $\angle 1 = 75^\circ$, find all other angles.

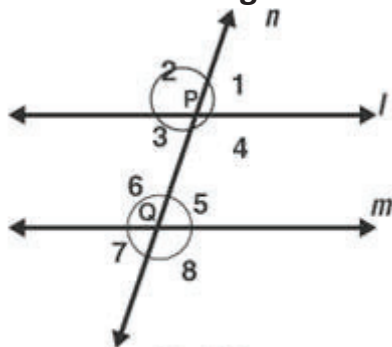


Fig. 63

Solution:

Given that, $l \parallel m$ and $\angle 1 = 75^\circ$

$\angle 1 = \angle 3$ are vertically opposite angles

We know that, from the figure

$\angle 1 + \angle 2 = 180^\circ$ is a linear pair

$\angle 2 = 180^\circ - 75^\circ$

$\angle 2 = 105^\circ$

Here, $\angle 1 = \angle 5 = 75^\circ$ are corresponding angles

$\angle 5 = \angle 7 = 75^\circ$ are vertically opposite angles.

$\angle 2 = \angle 6 = 105^\circ$ are corresponding angles

$\angle 6 = \angle 8 = 105^\circ$ are vertically opposite angles

$\angle 2 = \angle 4 = 105^\circ$ are vertically opposite angles

So, $\angle 1 = 75^\circ$, $\angle 2 = 105^\circ$, $\angle 3 = 75^\circ$, $\angle 4 = 105^\circ$, $\angle 5 = 75^\circ$, $\angle 6 = 105^\circ$, $\angle 7 = 75^\circ$ and $\angle 8 = 105^\circ$

7. In Fig. 64, $AB \parallel CD$ and a transversal PQ cuts at L and M respectively. If $\angle QMD = 100^\circ$, find all the other angles.

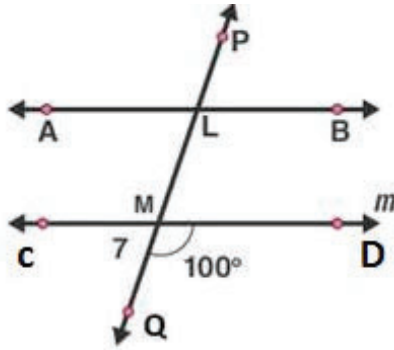


Fig. 64

Solution:

Given that, $AB \parallel CD$ and $\angle QMD = 100^\circ$

We know that, from the figure $\angle QMD + \angle QMC = 180^\circ$ is a linear pair,

$$\angle QMC = 180^\circ - \angle QMD$$

$$\angle QMC = 180^\circ - 100^\circ$$

$$\angle QMC = 80^\circ$$

Corresponding angles are

$$\angle DMQ = \angle BLM = 100^\circ$$

$$\angle CMQ = \angle ALM = 80^\circ$$

Vertically Opposite angles are

$$\angle DMQ = \angle CML = 100^\circ$$

$$\angle BLM = \angle PLA = 100^\circ$$

$$\angle CMQ = \angle DML = 80^\circ$$

$$\angle ALM = \angle PLB = 80^\circ$$



8. In Fig. 65, $l \parallel m$ and $p \parallel q$. Find the values of x , y , z , t .

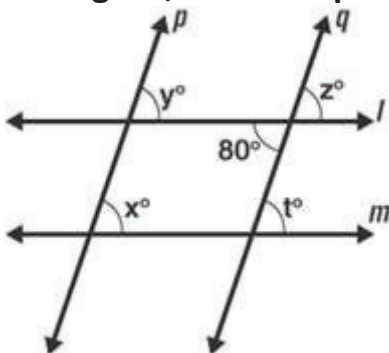


Fig. 65

Solution:

Given that one of the angle is 80°

$\angle z$ and 80° are vertically opposite angles

Therefore $\angle z = 80^\circ$

$\angle z$ and $\angle t$ are corresponding angles

$\angle z = \angle t$

Therefore, $\angle t = 80^\circ$

$\angle z$ and $\angle y$ are corresponding angles

$\angle z = \angle y$

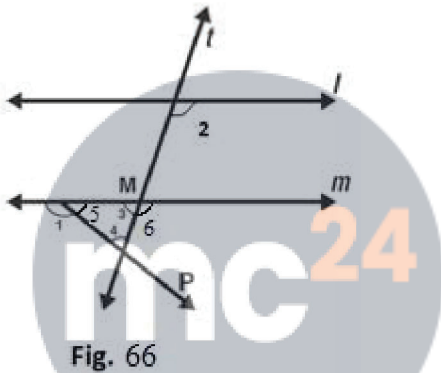
Therefore, $\angle y = 80^\circ$

$\angle x$ and $\angle y$ are corresponding angles

$\angle y = \angle x$

Therefore, $\angle x = 80^\circ$

9. In Fig. 66, line $l \parallel m$, $\angle 1 = 120^\circ$ and $\angle 2 = 100^\circ$, find out $\angle 3$ and $\angle 4$.



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Solution:

Given that, $\angle 1 = 120^\circ$ and $\angle 2 = 100^\circ$

From the figure $\angle 1$ and $\angle 5$ is a linear pair

$$\angle 1 + \angle 5 = 180^\circ$$

$$\angle 5 = 180^\circ - 120^\circ$$

$$\angle 5 = 60^\circ$$

Therefore, $\angle 5 = 60^\circ$

$\angle 2$ and $\angle 6$ are corresponding angles

$$\angle 2 = \angle 6 = 100^\circ$$

Therefore, $\angle 6 = 100^\circ$

$\angle 6$ and $\angle 3$ is a linear pair

$$\angle 6 + \angle 3 = 180^\circ$$

$$\angle 3 = 180^\circ - 100^\circ$$

$$\angle 3 = 80^\circ$$

Therefore, $\angle 3 = 80^\circ$

By, angles of sum property

$$\angle 3 + \angle 5 + \angle 4 = 180^\circ$$

$$\angle 4 = 180^\circ - 80^\circ - 60^\circ$$

$$\angle 4 = 40^\circ$$

Therefore, $\angle 4 = 40^\circ$

10. In Fig. 67, $l \parallel m$. Find the values of a , b , c , d . Give reasons.

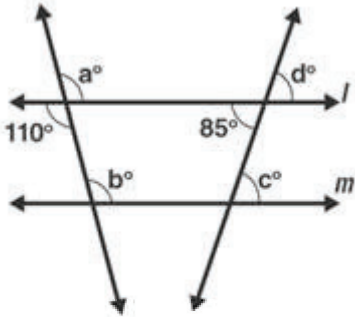


Fig. 67

Solution:

Given $l \parallel m$

From the figure vertically opposite angles,

$$\angle a = 110^\circ$$

Corresponding angles, $\angle a = \angle b$

Therefore, $\angle b = 110^\circ$

Vertically opposite angle,

$$\angle d = 85^\circ$$

Corresponding angles, $\angle d = \angle c$

Therefore, $\angle c = 85^\circ$

Hence, $\angle a = 110^\circ$, $\angle b = 110^\circ$, $\angle c = 85^\circ$, $\angle d = 85^\circ$

11. In Fig. 68, $AB \parallel CD$ and $\angle 1$ and $\angle 2$ are in the ratio of 3: 2. Determine all angles from 1 to 8.

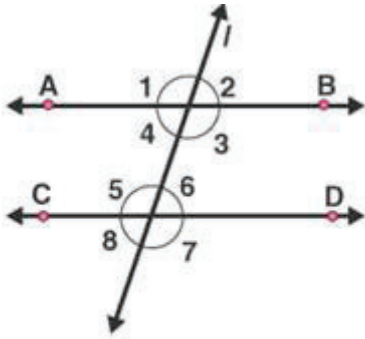


Fig. 68

Solution:

Given $\angle 1$ and $\angle 2$ are in the ratio 3: 2

Let us take the angles as $3x$, $2x$

$\angle 1$ and $\angle 2$ are linear pair [from the figure]

$$3x + 2x = 180^\circ$$

$$5x = 180^\circ$$

$$x = 180^\circ / 5$$

$$x = 36^\circ$$

$$\text{Therefore, } \angle 1 = 3x = 3(36) = 108^\circ$$

$$\angle 2 = 2x = 2(36) = 72^\circ$$

$\angle 1$ and $\angle 5$ are corresponding angles

$$\text{Therefore } \angle 1 = \angle 5$$

$$\text{Hence, } \angle 5 = 108^\circ$$

$\angle 2$ and $\angle 6$ are corresponding angles

$$\text{So } \angle 2 = \angle 6$$

$$\text{Therefore, } \angle 6 = 72^\circ$$

$\angle 4$ and $\angle 6$ are alternate pair of angles

$$\angle 4 = \angle 6 = 72^\circ$$

$$\text{Therefore, } \angle 4 = 72^\circ$$

$\angle 3$ and $\angle 5$ are alternate pair of angles

$$\angle 3 = \angle 5 = 108^\circ$$

$$\text{Therefore, } \angle 3 = 108^\circ$$

$\angle 2$ and $\angle 8$ are alternate exterior of angles

$$\angle 2 = \angle 8 = 72^\circ$$

$$\text{Therefore, } \angle 8 = 72^\circ$$

$\angle 1$ and $\angle 7$ are alternate exterior of angles

$$\angle 1 = \angle 7 = 108^\circ$$

Therefore, $\angle 7 = 108^\circ$

Hence, $\angle 1 = 108^\circ$, $\angle 2 = 72^\circ$, $\angle 3 = 108^\circ$, $\angle 4 = 72^\circ$, $\angle 5 = 108^\circ$, $\angle 6 = 72^\circ$, $\angle 7 = 108^\circ$, $\angle 8 = 72^\circ$

12. In Fig. 69, l , m and n are parallel lines intersected by transversal p at X , Y and Z respectively. Find $\angle 1$, $\angle 2$ and $\angle 3$.

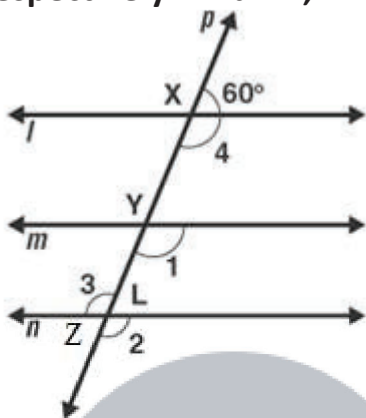


Fig. 69

Solution:

Given l , m and n are parallel lines intersected by transversal p at X , Y and Z

Therefore linear pair,

$$\angle 4 + 60^\circ = 180^\circ$$

$$\angle 4 = 180^\circ - 60^\circ$$

$$\angle 4 = 120^\circ$$

From the figure,

$\angle 4$ and $\angle 1$ are corresponding angles

$$\angle 4 = \angle 1$$

Therefore, $\angle 1 = 120^\circ$

$\angle 1$ and $\angle 2$ are corresponding angles

$$\angle 2 = \angle 1$$

Therefore, $\angle 2 = 120^\circ$

$\angle 2$ and $\angle 3$ are vertically opposite angles

$$\angle 2 = \angle 3$$

Therefore, $\angle 3 = 120^\circ$

13. In Fig. 70, if $l \parallel m \parallel n$ and $\angle 1 = 60^\circ$, find $\angle 2$

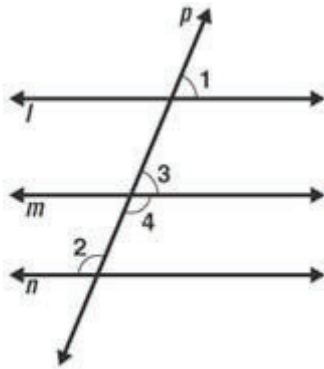


Fig. 70

Solution:

Given that $l \parallel m \parallel n$

From the figure Corresponding angles are

$$\angle 1 = \angle 3$$

$$\angle 1 = 60^\circ$$

Therefore, $\angle 3 = 60^\circ$

$\angle 3$ and $\angle 4$ are linear pair

$$\angle 3 + \angle 4 = 180^\circ$$

$$\angle 4 = 180^\circ - 60^\circ$$

$$\angle 4 = 120^\circ$$

$\angle 2$ and $\angle 4$ are alternate interior angles

$$\angle 4 = \angle 2$$

Therefore, $\angle 2 = 120^\circ$

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14. In Fig. 71, if $AB \parallel CD$ and $CD \parallel EF$, find $\angle ACE$

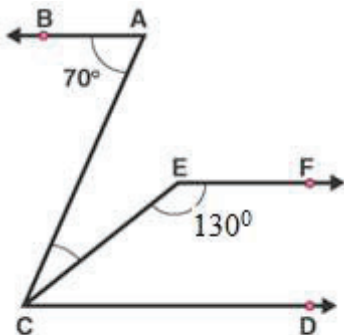


Fig. 71

Solution:

Given that, $AB \parallel CD$ and $CD \parallel EF$

Sum of the interior angles,

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

$$130^\circ + \angle ECD = 180^\circ$$

$$\angle ECD = 180^\circ - 130^\circ$$

$$\angle ECD = 50^\circ$$

We know that alternate angles are equal

$$\angle BAC = \angle ACD$$

$$\angle BAC = \angle ECD + \angle ACE$$

$$\angle ACE = 70^\circ - 50^\circ$$

$$\angle ACE = 20^\circ$$

Therefore, $\angle ACE = 20^\circ$

15. In Fig. 72, if $l \parallel m$, $n \parallel p$ and $\angle 1 = 85^\circ$, find $\angle 2$.

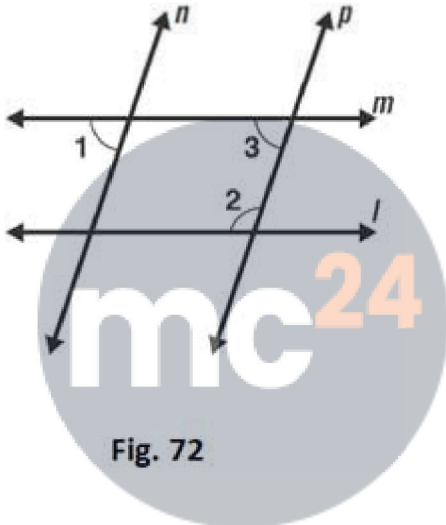


Fig. 72

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Solution:

Given that, $\angle 1 = 85^\circ$

$\angle 1$ and $\angle 3$ are corresponding angles

So, $\angle 1 = \angle 3$

$$\angle 3 = 85^\circ$$

Sum of the interior angles is 180°

$$\angle 3 + \angle 2 = 180^\circ$$

$$\angle 2 = 180^\circ - 85^\circ$$

$$\angle 2 = 95^\circ$$

16. In Fig. 73, a transversal n cuts two lines l and m . If $\angle 1 = 70^\circ$ and $\angle 7 = 80^\circ$, is $l \parallel m$?

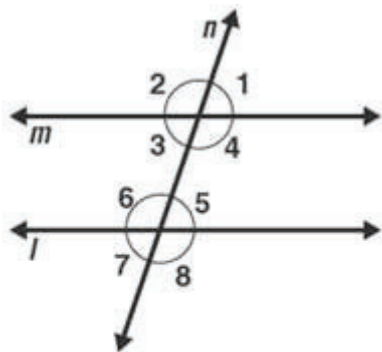


Fig. 73

Solution:

Given $\angle 1 = 70^\circ$ and $\angle 7 = 80^\circ$

We know that if the alternate exterior angles of the two lines are equal, then the lines are parallel.

Here, $\angle 1$ and $\angle 7$ are alternate exterior angles, but they are not equal

$\angle 1 \neq \angle 7$

17. In Fig. 74, a transversal n cuts two lines l and m such that $\angle 2 = 65^\circ$ and $\angle 8 = 65^\circ$. Are the lines parallel?

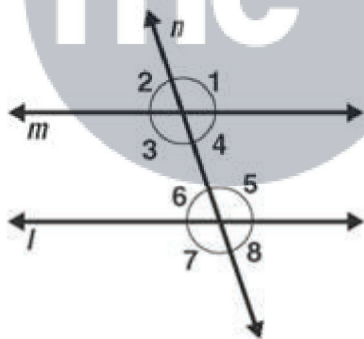


Fig. 74

Solution:

From the figure $\angle 2 = \angle 4$ are vertically opposite angles,

$\angle 2 = \angle 4 = 65^\circ$

$\angle 8 = \angle 6 = 65^\circ$

Therefore, $\angle 4 = \angle 6$

Hence, $l \parallel m$

18. In Fig. 75, Show that $AB \parallel EF$.

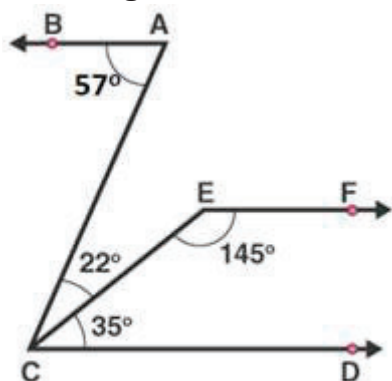


Fig. 75

Solution:

We know that,

$$\angle ACD = \angle ACE + \angle ECD$$

$$\angle ACD = 22^\circ + 35^\circ$$

$$\angle ACD = 57^\circ = \angle BAC$$

Thus, lines BA and CD are intersected by the line AC such that, $\angle ACD = \angle BAC$

So, the alternate angles are equal

Therefore, $AB \parallel CD$ 1

Now,

$$\angle ECD + \angle CEF = 35^\circ + 145^\circ = 180^\circ$$

This, shows that sum of the angles of the interior angles on the same side of the transversal CE is 180°

So, they are supplementary angles

Therefore, $EF \parallel CD$ 2

From equation 1 and 2

We conclude that, $AB \parallel EF$

19. In Fig. 76, $AB \parallel CD$. Find the values of x , y , z .

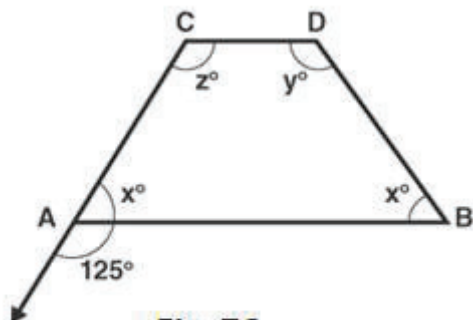


Fig. 76

Solution:

Given that $AB \parallel CD$

Linear pair,

$$\angle x + 125^\circ = 180^\circ$$

$$\angle x = 180^\circ - 125^\circ$$

$$\angle x = 55^\circ$$

Corresponding angles

$$\angle z = 125^\circ$$

Adjacent interior angles

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

$$\angle x + 125^\circ = 180^\circ$$

$$\angle x = 180^\circ - 125^\circ$$

$$\angle x = 55^\circ$$

Adjacent interior angles

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

$$\angle y + 55^\circ = 180^\circ$$

$$\angle y = 180^\circ - 55^\circ$$

$$\angle y = 125^\circ$$

20. In Fig. 77, find out $\angle PXR$, if $PQ \parallel RS$.

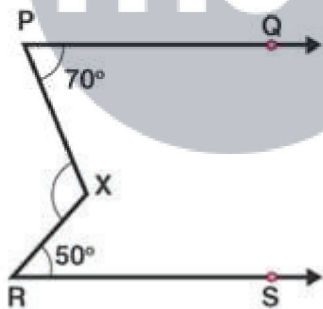


Fig. 77

Solution:

Given $PQ \parallel RS$

We need to find $\angle PXR$

$$\angle XRS = 50^\circ$$

$$\angle XPQ = 70^\circ$$

Given, that $PQ \parallel RS$

$$\angle PXR = \angle XRS + \angle XPQ$$

$$\angle PXR = 50^\circ + 70^\circ$$

$$\angle PXR = 120^\circ$$

Therefore, $\angle PXR = 120^\circ$

21. In Figure, we have

(i) $\angle MLY = 2\angle LMQ$

(ii) $\angle XLM = (2x - 10)^\circ$ and $\angle LMQ = (x + 30)^\circ$, find x .

(iii) $\angle XLM = \angle PML$, find $\angle ALY$

(iv) $\angle ALY = (2x - 15)^\circ$, $\angle LMQ = (x + 40)^\circ$, find x .

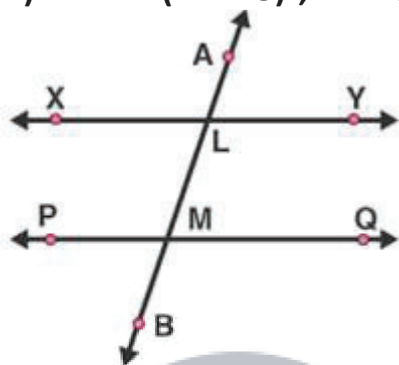


Fig. 78

Solution:

(i) $\angle MLY$ and $\angle LMQ$ are interior angles

$$\angle MLY + \angle LMQ = 180^\circ$$

$$2\angle LMQ + \angle LMQ = 180^\circ$$

$$3\angle LMQ = 180^\circ$$

$$\angle LMQ = 180^\circ / 3$$

$$\angle LMQ = 60^\circ$$

(ii) $\angle XLM = (2x - 10)^\circ$ and $\angle LMQ = (x + 30)^\circ$, find x .

$$\angle XLM = (2x - 10)^\circ \text{ and } \angle LMQ = (x + 30)^\circ$$

$\angle XLM$ and $\angle LMQ$ are alternate interior angles

$$\angle XLM = \angle LMQ$$

$$(2x - 10)^\circ = (x + 30)^\circ$$

$$2x - x = 30^\circ + 10^\circ$$

$$x = 40^\circ$$

Therefore, $x = 40^\circ$

(iii) $\angle XLM = \angle PML$, find $\angle ALY$

$$\angle XLM = \angle PML$$

Sum of interior angles is 180 degrees

$$\angle XLM + \angle PML = 180^\circ$$

$$\angle XLM + \angle XLM = 180^\circ$$

$$2\angle XLM = 180^\circ$$

$$\angle XLM = 180^\circ/2$$

$$\angle XLM = 90^\circ$$

$\angle XLM$ and $\angle ALY$ are vertically opposite angles

Therefore, $\angle ALY = 90^\circ$

(iv) $\angle ALY = (2x - 15)^\circ$, $\angle LMQ = (x + 40)^\circ$, find x .

$\angle ALY$ and $\angle LMQ$ are corresponding angles

$$\angle ALY = \angle LMQ$$

$$(2x - 15)^\circ = (x + 40)^\circ$$

$$2x - x = 40^\circ + 15^\circ$$

$$x = 55^\circ$$

Therefore, $x = 55^\circ$

22. In Fig. 79, $DE \parallel BC$. Find the values of x and y .

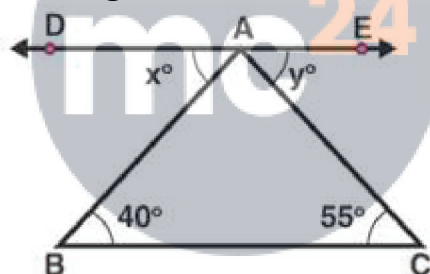


Fig. 79

Solution:

We know that,

ABC , DAB are alternate interior angles

$$\angle ABC = \angle DAB$$

$$\text{So, } x = 40^\circ$$

And ACB , EAC are alternate interior angles

$$\angle ACB = \angle EAC$$

$$\text{So, } y = 55^\circ$$

23. In Fig. 80, line $AC \parallel$ line DE and $\angle ABD = 32^\circ$, Find out the angles x and y if $\angle E = 122^\circ$.

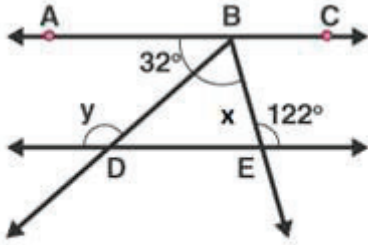


Fig. 80

Solution:

Given line AC \parallel line DE and $\angle ABD = 32^\circ$
 $\angle BDE = \angle ABD = 32^\circ$ – Alternate interior angles
 $\angle BDE + y = 180^\circ$ – linear pair
 $32^\circ + y = 180^\circ$
 $y = 180^\circ - 32^\circ$
 $y = 148^\circ$
 $\angle ABE = \angle E = 122^\circ$ – Alternate interior angles
 $\angle ABD + \angle DBE = 122^\circ$
 $32^\circ + x = 122^\circ$
 $x = 122^\circ - 32^\circ$
 $x = 90^\circ$

24. In Fig. 81, side BC of $\triangle ABC$ has been produced to D and $CE \parallel BA$. If $\angle ABC = 65^\circ$, $\angle BAC = 55^\circ$, find $\angle ACE$, $\angle ECD$, $\angle ACD$.

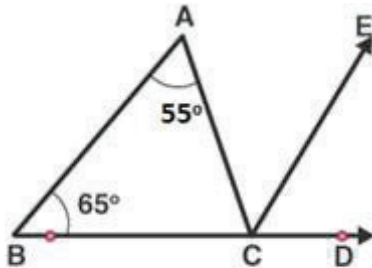


Fig. 81

Solution:

Given $\angle ABC = 65^\circ$, $\angle BAC = 55^\circ$
 Corresponding angles,
 $\angle ABC = \angle ECD = 65^\circ$
 Alternate interior angles,

$$\angle BAC = \angle ACE = 55^\circ$$

$$\text{Now, } \angle ACD = \angle ACE + \angle ECD$$

$$\angle ACD = 55^\circ + 65^\circ$$

$$= 120^\circ$$

25. In Fig. 82, line $CA \perp AB \parallel$ line CR and line $PR \parallel$ line BD . Find $\angle x$, $\angle y$, $\angle z$.

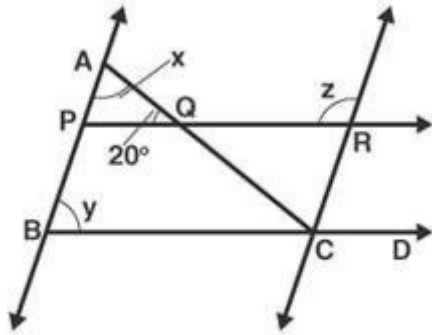


Fig. 82

Solution:

Given that, $CA \perp AB$

$$\angle CAB = 90^\circ$$

$$\angle AQP = 20^\circ$$

By, angle of sum property

In $\triangle ABC$

$$\angle CAB + \angle AQP + \angle APQ = 180^\circ$$

$$\angle APQ = 180^\circ - 90^\circ - 20^\circ$$

$$\angle APQ = 70^\circ$$

y and $\angle APQ$ are corresponding angles

$$y = \angle APQ = 70^\circ$$

$\angle APQ$ and $\angle z$ are interior angles

$$\angle APQ + \angle z = 180^\circ$$

$$\angle z = 180^\circ - 70^\circ$$

$$\angle z = 110^\circ$$

26. In Fig. 83, $PQ \parallel RS$. Find the value of x .

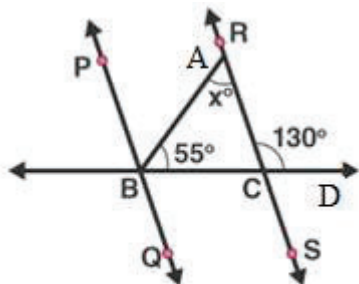


Fig. 83

Solution:

Given, linear pair,

$$\angle RCD + \angle RCB = 180^\circ$$

$$\angle RCB = 180^\circ - 130^\circ$$

$$= 50^\circ$$

In $\triangle ABC$,

$$\angle BAC + \angle ABC + \angle BCA = 180^\circ$$

By, angle sum property

$$\angle BAC = 180^\circ - 55^\circ - 50^\circ$$

$$\angle BAC = 75^\circ$$

27. In Fig. 84, $AB \parallel CD$ and $AE \parallel CF$, $\angle FCG = 90^\circ$ and $\angle BAC = 120^\circ$. Find the value of x , y and z .

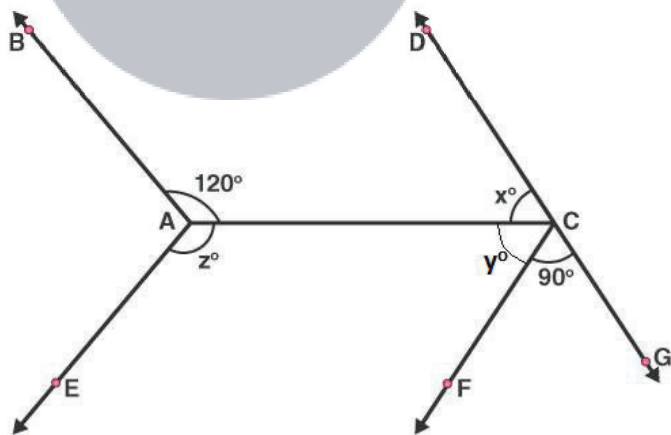


Fig. 84

Solution:

Alternate interior angle

$$\angle BAC = \angle ACG = 120^\circ$$

$$\angle ACF + \angle FCG = 120^\circ$$

$$\begin{aligned} \text{So, } \angle ACF &= 120^\circ - 90^\circ \\ &= 30^\circ \end{aligned}$$

Linear pair,

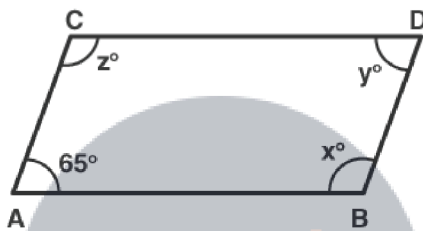
$$\angle DCA + \angle ACG = 180^\circ$$

$$\begin{aligned} \angle x &= 180^\circ - 120^\circ \\ &= 60^\circ \end{aligned}$$

$$\angle BAC + \angle BAE + \angle EAC = 360^\circ$$

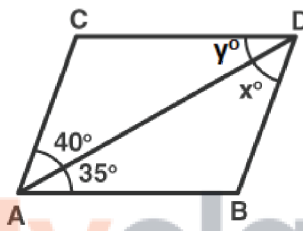
$$\begin{aligned} \angle CAE &= 360^\circ - 120^\circ - (60^\circ + 30^\circ) \\ &= 150^\circ \end{aligned}$$

28. In Fig. 85, $AB \parallel CD$ and $AC \parallel BD$. Find the values of x , y , z .



(i)

Fig. 85



(ii)

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Solution:

(i) Since, $AC \parallel BD$ and $CD \parallel AB$, ABCD is a parallelogram

Adjacent angles of parallelogram,

$$\angle CAB + \angle ACD = 180^\circ$$

$$\angle ACD = 180^\circ - 65^\circ$$

$$= 115^\circ$$

Opposite angles of parallelogram,

$$\angle CAB = \angle CDB = 65^\circ$$

$$\angle ACD = \angle DBA = 115^\circ$$

(ii) Here,

$AC \parallel BD$ and $CD \parallel AB$

Alternate interior angles,

$$\angle CAD = x = 40^\circ$$

$$\angle DAB = y = 35^\circ$$

29. In Fig. 86, state which lines are parallel and why?

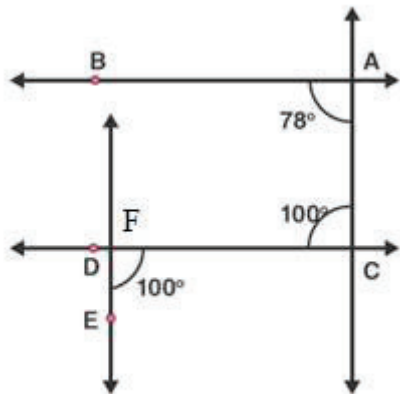


Fig. 86

Solution:

Let, F be the point of intersection of the line CD and the line passing through point E.
Here, $\angle ACD$ and $\angle CDE$ are alternate and equal angles.

So, $\angle ACD = \angle CDE = 100^\circ$

Therefore, $AC \parallel EF$

30. In Fig. 87, the corresponding arms of $\angle ABC$ and $\angle DEF$ are parallel. If $\angle ABC = 75^\circ$, find $\angle DEF$.

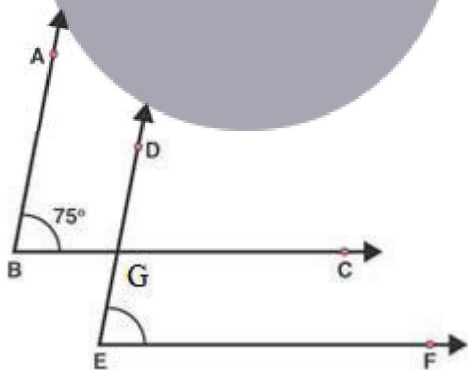


Fig. 87

Solution:

Let, G be the point of intersection of the lines BC and DE

Since, $AB \parallel DE$ and $BC \parallel EF$

The corresponding angles are,

$\angle ABC = \angle DGC = \angle DEF = 75^\circ$