

EXERCISE

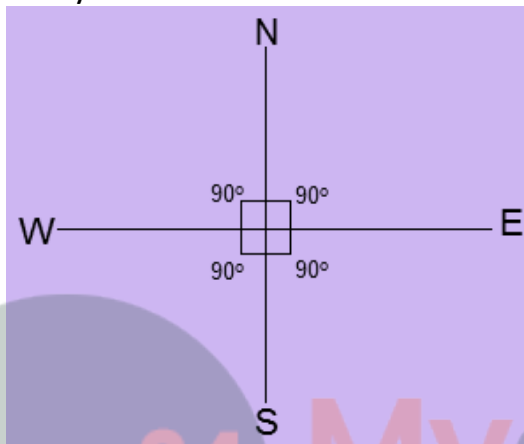
In questions 1 to 41, there are four options out of which one is correct. Write the correct one.

1. The angles between North and West and South and East are

- (a) complementary (b) supplementary
(c) both are acute (d) both are obtuse

Solution:-

(b) supplementary



The angle between North and West is 90° , angle between South and East is 90° as shown in the figure above. So, $90^\circ + 90^\circ = 180^\circ$.

Then, the angles between North and West and South and East are supplementary. When the sum of the measures of two angles is 180° , then the angles are called supplementary angles.

2. Angles between South and West and South and East are

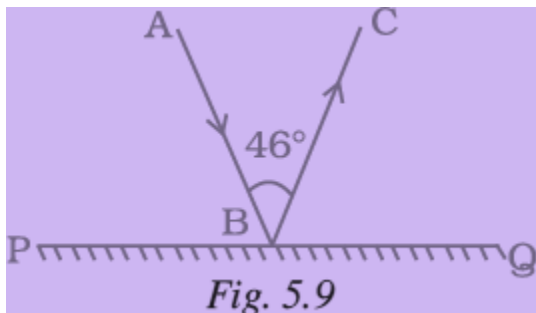
- (a) vertically opposite angles (b) complementary angles
(c) making a linear pair (d) adjacent but not supplementary

Solution:-

(c) making a linear pair

A linear pair is a pair of adjacent angles whose non-common sides are opposite rays.

3. In Fig. 5.9, PQ is a mirror, AB is the incident ray and BC is the reflected ray. If $\angle ABC = 46^\circ$, then $\angle ABP$ is equal to



- (a) 44° (b) 67° (c) 13° (d) 62°

Solution:-

(b) 67°

As we know that, the angle formed by the incident ray and angle formed by the reflected ray is equal.

From the given figure,

PQ is a straight line,

So, $\angle ABP + \angle ABC + \angle CBQ = 180^\circ$

Let us assume the $\angle ABP = \angle CBQ = x$

Then,

$$x + 46^\circ + x = 180^\circ$$

$$2x + 46^\circ = 180^\circ$$

$$2x = 180^\circ - 46^\circ$$

$$2x = 134^\circ$$

$$x = 134^\circ / 2$$

$$x = 67^\circ$$

Therefore, the $\angle ABP = \angle CBQ = 67^\circ$

4. If the complement of an angle is 79° , then the angle will be of

- (a) 1° (b) 11° (c) 79° (d) 101°

Solution:-

(b) 11°

When the sum of the measures of two angles is 90° , the angles are called complementary angles. Each of them is called complement of the other.

The given complement of an angle is 79°

Let the measure of the angle be x° .

Then,

$$x + 79^\circ = 90^\circ$$

$$x = 90^\circ - 79^\circ$$

$$x = 11^\circ$$

Hence, the measure of the angle is 11° .

5. Angles which are both supplementary and vertically opposite are

(a) $95^\circ, 85^\circ$

(b) $90^\circ, 90^\circ$

(c) $100^\circ, 80^\circ$

(d) $45^\circ, 45^\circ$

Solution:-

(b) $90^\circ, 90^\circ$

When the sum of the measures of two angles is 180° , then the angles are called supplementary angles.

6. The angle which makes a linear pair with an angle of 61° is of

(a) 29°

(b) 61°

(c) 122°

(d) 119°

Solution:-

(d) 119°

A linear pair is a pair of adjacent angles whose non-common sides are opposite rays.

We know that, measure of sum of adjacent angles is equal to 180° .

Let the measure of other angle be x° .

Then,

$$x + 61^\circ = 180^\circ$$

$$x = 180^\circ - 61^\circ$$

$$x = 119^\circ$$

7. The angles x and $90^\circ - x$ are

(a) supplementary

(b) complementary

(c) vertically opposite

(d) making a linear pair

Solution:-

(b) complementary

When the sum of the measures of two angles is 90° , then the angles are called complementary angles.

$$x + 90^\circ - x = 90^\circ$$

$$90^\circ = 90^\circ$$

$$\text{LHS} = \text{RHS}$$

8. The angles $x - 10^\circ$ and $190^\circ - x$ are

(a) interior angles on the same side of the transversal

(b) making a linear pair

(c) complementary

(d) supplementary

Solution:-

(d) supplementary

When the sum of the measures of two angles is 180° , then the angles are called supplementary angles.

$$x - 10^\circ + 190^\circ - x = 180^\circ$$

$$190^\circ - 10 = 180^\circ$$

$$180^\circ = 180^\circ$$

$$\text{LHS} = \text{RHS}$$

9. In Fig. 5.10, the value of x is

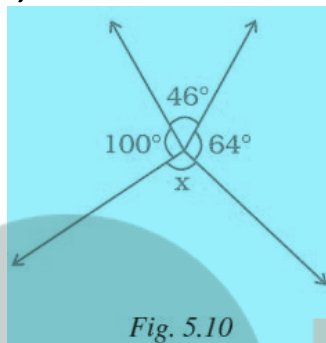


Fig. 5.10

(a) 110°

(b) 46°

(c) 64°

(d) 150°

Solution:-

(d) 150°

Sum of all angles about a point given in the figure are equal to 360° .

$$\text{Then, } 100^\circ + 46^\circ + 64^\circ + x = 360^\circ$$

$$210^\circ + x = 360^\circ$$

$$x = 360^\circ - 210^\circ$$

$$x = 150^\circ$$

10. In Fig. 5.11, if $AB \parallel CD$, $\angle APQ = 50^\circ$ and $\angle PRD = 130^\circ$, then $\angle QPR$ is

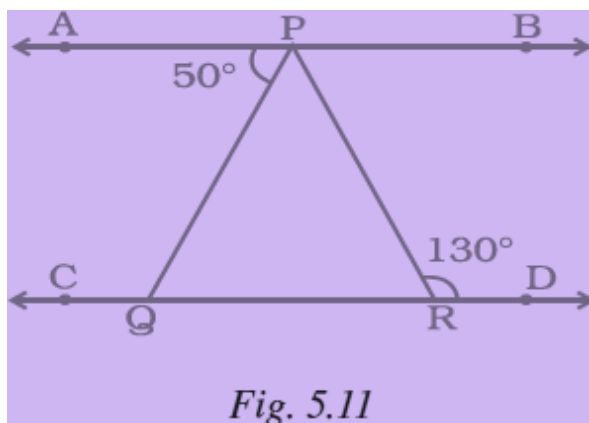


Fig. 5.11

- (a) 130° (b) 50° (c) 80° (d) 30°

Solution:-

(c) 80°

We know that, $\angle APR = \angle PRD$... [because interior alternate angles]

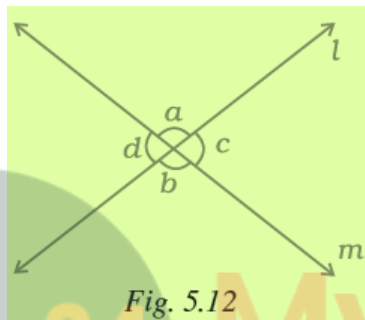
$$\angle APQ + \angle QPR = 130^\circ$$

$$50^\circ + \angle QPR = 130^\circ$$

$$\angle QPR = 130^\circ - 50^\circ$$

$$\angle QPR = 80^\circ$$

11. In Fig. 5.12, lines l and m intersect each other at a point. Which of the following is false?



- (a) $\angle a = \angle b$ (b) $\angle d = \angle c$
 (c) $\angle a + \angle d = 180^\circ$ (d) $\angle a = \angle d$

Solution:-

(d) $\angle a = \angle d$

$$\angle a \neq \angle d$$

$$\angle a = \angle b \text{ [because vertically opposite angles]}$$

$$\angle d = \angle c \text{ [because vertically opposite angles]}$$

$$\angle a + \angle d = 180^\circ \text{ [Linear pair of angles]}$$

12. If angle P and angle Q are supplementary and the measure of angle P is 60° , then the measure of angle Q is

- (a) 120° (b) 60° (c) 30° (d) 20°

Solution:-

(a) 120°

When the sum of the measures of two angles is 180° , then the angles are called supplementary angles.

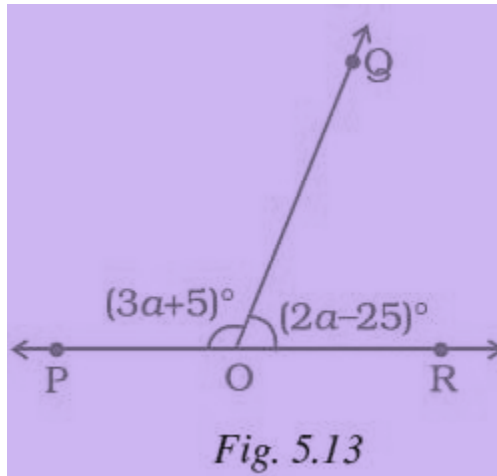
$$P + Q = 180^\circ$$

$$60^\circ + Q = 180^\circ$$

$$Q = 180^\circ - 60^\circ$$

$$Q = 120^\circ$$

13. In Fig. 5.13, POR is a line. The value of a is



(a) 40°

(b) 45°

(c) 55°

(d) 60°

Solution:-

(a) 40°

We know that, when the sum of the measures of two angles is 180° , then the angles are called supplementary angles.

$$(3a + 5)^\circ + (2a - 25)^\circ = 180^\circ$$

$$3a + 5 + 2a - 25 = 180^\circ$$

$$5a - 20 = 180^\circ$$

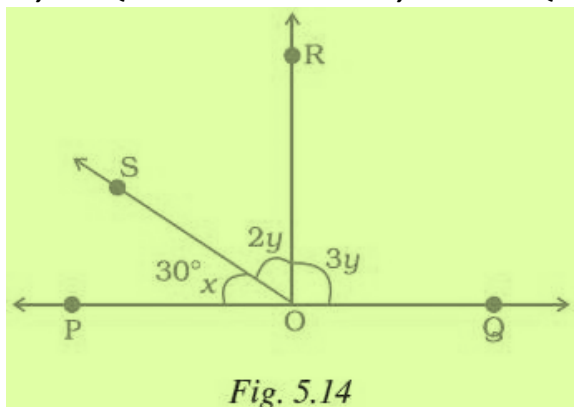
$$5a = 180^\circ + 20$$

$$5a = 200$$

$$a = 200/5$$

$$a = 40^\circ$$

14. In Fig. 5.14, POQ is a line. If $x = 30^\circ$, then $\angle QOR$ is



(a) 90° (b) 30° (c) 150° (d) 60° **Solution:-**(a) 90° Sum of all angles about a straight line given in the figure are equal to 180° .Then, $30^\circ + 2y + 3y = 180^\circ$

$$30^\circ + 5y = 180^\circ$$

$$5y = 180^\circ - 30^\circ$$

$$5y = 150^\circ$$

$$y = 150/5$$

$$y = 30^\circ$$

So, $2y = 2 \times 30 = 60^\circ$

$$3y = 3 \times 30 = 90^\circ$$

Therefore, $\angle QOR = 90^\circ$ **15. The measure of an angle which is four times its supplement is**(a) 36° (b) 144° (c) 16° (d) 64° **Solution:-**(b) 144° We know that, when the sum of the measures of two angles is 180° , then the angles are called supplementary angles.Let us assume the angle be x .Then, its supplement angle = $(180^\circ - x)$ As per the condition given in the question, $x = 4(180^\circ - x)$

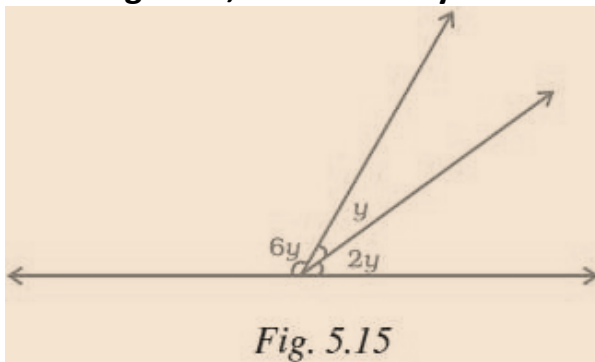
$$x = 720^\circ - 4x$$

$$x + 4x = 720^\circ$$

$$5x = 720^\circ$$

$$x = 720^\circ/5$$

$$x = 144^\circ$$

16. In Fig. 5.15, the value of y is

- (a) 30° (b) 15° (c) 20° (d) 22.5°

Solution:-

(c) 20°

Sum of all angles about a straight line given in the figure are equal to 180° .

Then, $6y + y + 2y = 180^\circ$

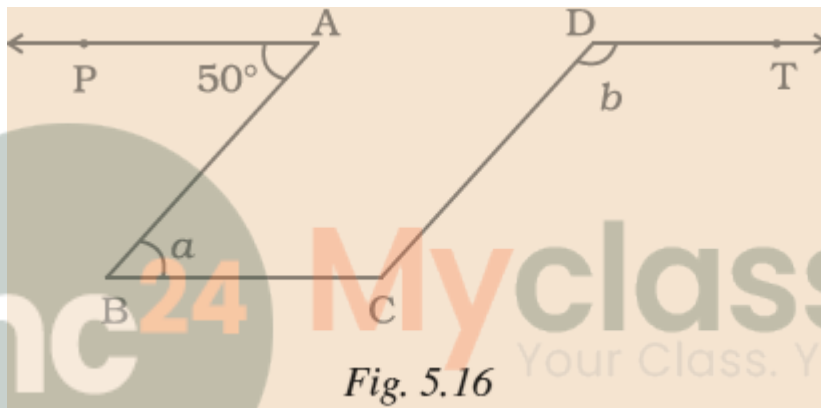
$$9y = 180^\circ$$

$$y = 180/9$$

$$y = 20^\circ$$

So, value of y is 20° .

17. In Fig. 5.16, $PA \parallel BC \parallel DT$ and $AB \parallel DC$. Then, the values of a and b are respectively.



- (a) $60^\circ, 120^\circ$ (b) $50^\circ, 130^\circ$ (c) $70^\circ, 110^\circ$ (d) $80^\circ, 100^\circ$

Solution:-

(b) $50^\circ, 130^\circ$

We know that, $\angle PAB = \angle ABC = 50^\circ$... [because interior alternate angles]

Given, $AB \parallel DC$ so consider it as parallelogram,

In parallelogram adjacent angles of a parallelogram are supplementary.

So, $\angle ABC + \angle BCD = 180^\circ$

$$50^\circ + \angle BCD = 180^\circ$$

$$\angle BCD = 180^\circ - 50^\circ$$

$$\angle BCD = 130^\circ$$

$\angle BCD = \angle CDT = 130^\circ$... [because interior alternate angles]

Therefore, $a = 50^\circ$ and $b = 130^\circ$

18. The difference of two complementary angles is 30° . Then, the angles are

- (a) $60^\circ, 30^\circ$ (b) $70^\circ, 40^\circ$ (c) $20^\circ, 50^\circ$ (d) $105^\circ, 75^\circ$

Solution:-

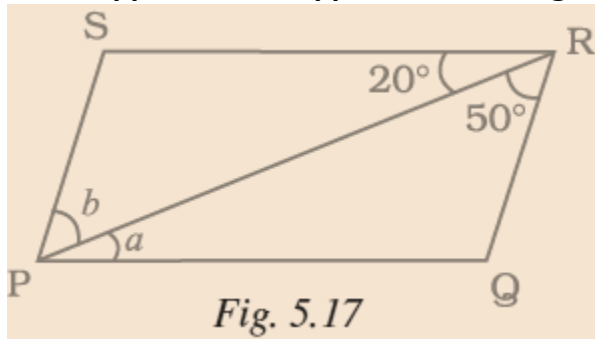
(a) $60^\circ, 30^\circ$

When the sum of the measures of two angles is 90° , then the angles are called complementary angles.

So, $60^\circ + 30^\circ = 90^\circ$

As per the condition in the question, $60^\circ - 30^\circ = 30^\circ$

19. In Fig. 5.17, $PQ \parallel SR$ and $SP \parallel RQ$. Then, angles a and b are respectively



(a) $20^\circ, 50^\circ$

(b) $50^\circ, 20^\circ$

(c) $30^\circ, 50^\circ$

(d) $45^\circ, 35^\circ$

Solution:-

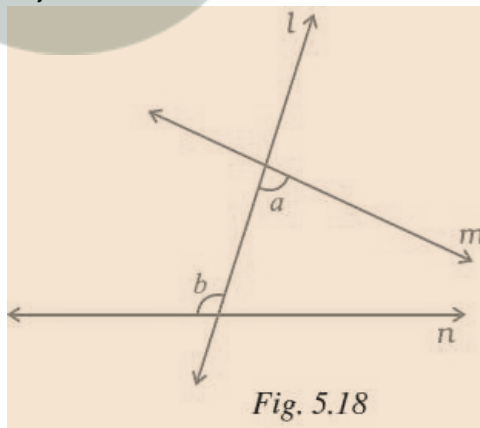
(a) $20^\circ, 50^\circ$

$\angle QRP = \angle RPS = 50^\circ$... [because interior alternate angles]

$\angle SRP = \angle RPQ = 20^\circ$... [because interior alternate angles]

Therefore, angle $a = 20^\circ$ and angle $b = 50^\circ$

20. In Fig. 5.18, a and b are



(a) alternate exterior angles

(b) corresponding angles

(c) alternate interior angles

(d) vertically opposite angles

Solution:-

(c) alternate interior angles

21. If two supplementary angles are in the ratio 1: 2, then the bigger angle is

- (a) 120° (b) 125° (c) 110° (d) 90°

Solution:-

(a) 120°

We know that, when the sum of the measures of two angles is 180° , then the angles are called supplementary angles.

Let us assume two angles be $1x$ and $2x$.

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

$$3x = 180^\circ$$

$$x = 180^\circ/3$$

$$x = 60^\circ$$

Then the bigger angle is $2x = 2 \times 60^\circ = 120^\circ$

22. In Fig. 5.19, $\angle ROS$ is a right angle and $\angle POR$ and $\angle QOS$ are in the ratio 1: 5. Then, $\angle QOS$ measures

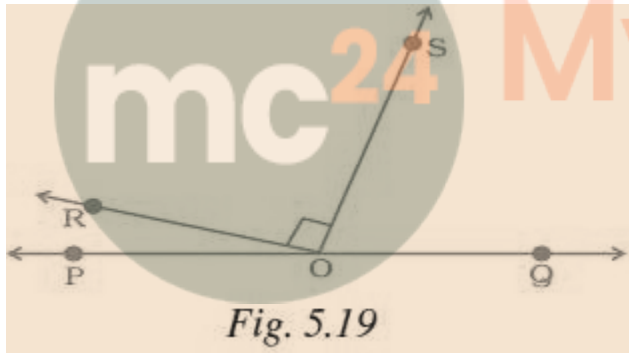


Fig. 5.19

- (a) 150° (b) 75° (c) 45° (d) 60°

Solution:-

(b) 75°

Sum of all angles about a straight line given in the figure are equal to 180° .

Given, $\angle ROS$ is a right angle = 90°

Let us assume $\angle POR = x$ and $\angle QOS = 5x$.

Then, $\angle POR + \angle ROS + \angle QOS = 180^\circ$

$$x + 90^\circ + 5x = 180^\circ$$

$$6x = 180^\circ - 90^\circ$$

$$6x = 90^\circ$$

$$x = 90^\circ/6$$

$$x = 15^\circ$$

So, $\angle QOS$ measures = $5x = 5 \times 15^\circ = 75^\circ$

23. Statements a and b are as given below:

a : If two lines intersect, then the vertically opposite angles are equal.

b : If a transversal intersects, two other lines, then the sum of two interior angles on the same side of the transversal is 180° .

Then

(a) Both a and b are true

(b) a is true and b is false

(c) a is false and b is true

(d) both a and b are false

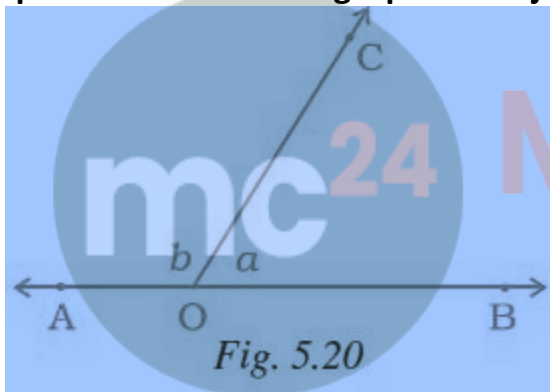
Solution:-

(b) a is true and b is false

24. For Fig. 5.20, statements p and q are given below:

p : a and b are forming a linear pair.

q : a and b are forming a pair of adjacent angles.



Then,

(a) both p and q are true

(b) p is true and q is false

(c) p is false and q is true

(d) both p and q are false

Solution:-

(a) both p and q are true

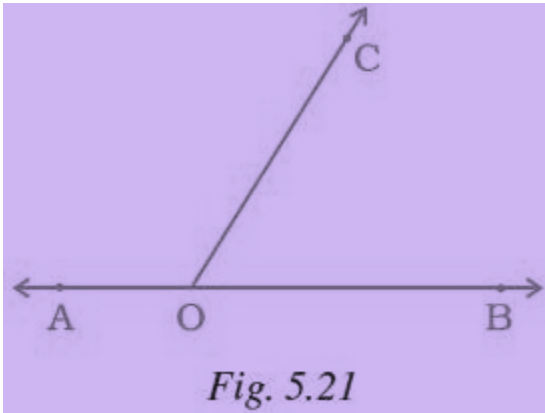
25. In Fig. 5.21, $\angle AOC$ and $\angle BOC$ form a pair of

(a) vertically opposite angles

(b) complementary angles

(c) alternate interior angles

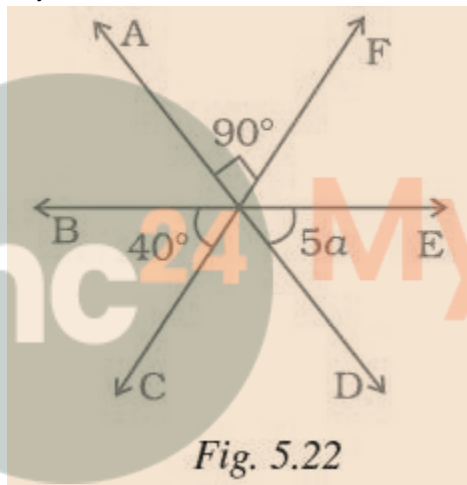
(d) supplementary angles



Solution:-

(d) supplementary angles

26. In Fig. 5.22, the value of a is



(a) 20°

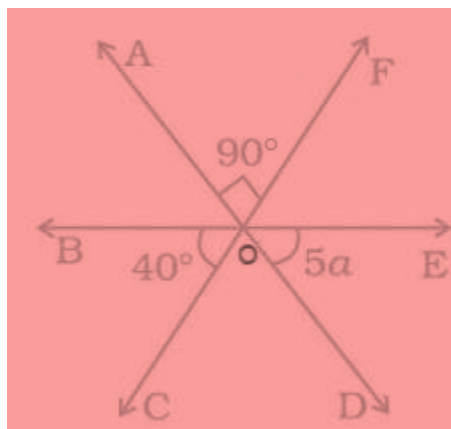
(b) 15°

(c) 5°

(d) 10°

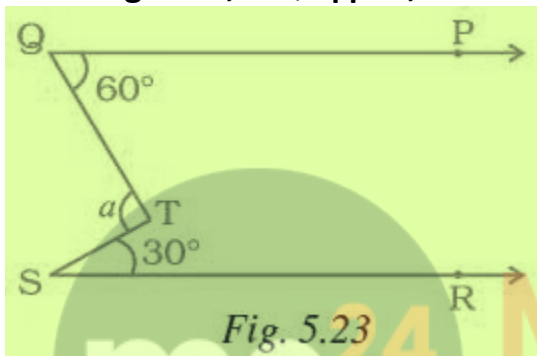
Solution:-

(d) 10°



$\angle AOF = \angle COD = 90^\circ$ [because vertically opposite angles]
 Sum of all angles about a straight line given in the figure are equal to 180° .
 Then, $\angle BOC + \angle COD + \angle DOE = 180^\circ$
 $40^\circ + 90^\circ + 5a = 180^\circ$
 $130^\circ + 5a = 180^\circ$
 $5a = 180^\circ - 130^\circ$
 $5a = 50^\circ$
 $a = 50/5$
 $a = 10^\circ$

27. In Fig. 5.23, if $QP \parallel SR$, the value of a is

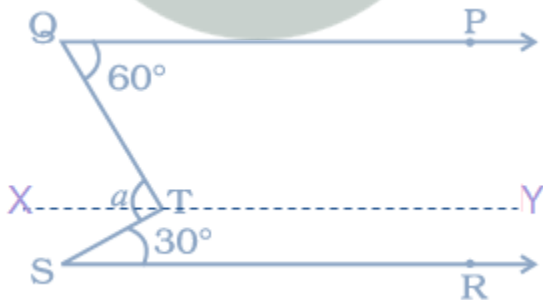


- (a) 40° (b) 30° (c) 90° (d) 80°

Solution:-

(c) 90°

To find out the value of 'a', draw a line XY, to cut at 'a'.



So, $XY \parallel SR$

$\angle XTS = \angle TSR = 30^\circ$

... [because interior alternate angles]

$\angle PQT = \angle QTX = 60^\circ$

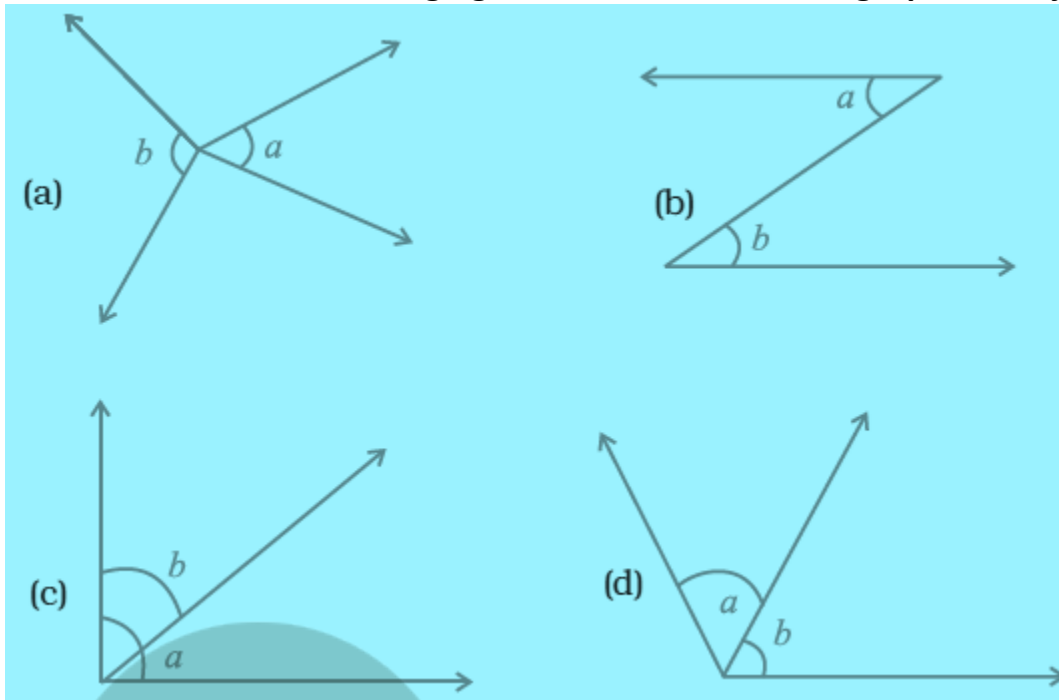
... [because interior alternate angles]

Then, $a = \angle XTS + \angle QTX$

$= 30^\circ + 60^\circ$

$= 90^\circ$

28. In which of the following figures, a and b are forming a pair of adjacent angles?



Solution:-

In figure (d) a and b are forming a pair of adjacent angles.

29. In a pair of adjacent angles, (i) vertex is always common, (ii) one arm is always common, and (iii) uncommon arms are always opposite rays

Then

- (a) All (i), (ii) and (iii) are true
- (b) (iii) is false
- (c) (i) is false but (ii) and (iii) are true
- (d) (ii) is false

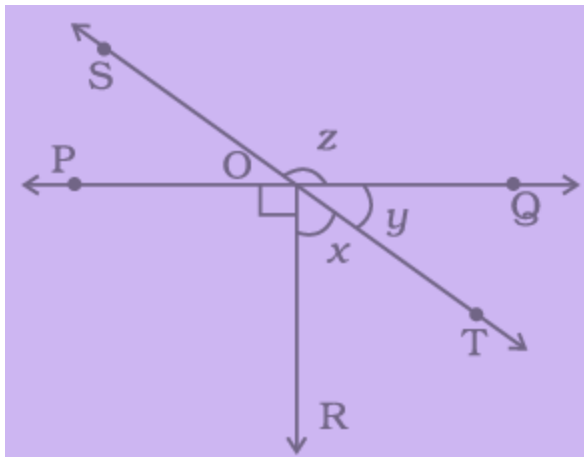
Solution:-

(b) (iii) is false

Two angles are called adjacent angles, if they have a common vertex and a common arm but no common interior points.

30. In Fig. 5.25, lines PQ and ST intersect at O. If $\angle POR = 90^\circ$ and $x : y = 3 : 2$, then z is equal to

- (a) 126°
- (b) 144°
- (c) 136°
- (d) 154°



Solution:-

(b) 144°

Sum of all angles about a straight line given in the figure are equal to 180° .

PQ is a straight line.

Then, $\angle POR + \angle ROT + \angle TOQ = 180^\circ$

Given, $x : y = 3 : 2$

Let us assume $x = 3a$, $y = 2a$

$$90^\circ + 3a + 2a = 180^\circ$$

$$90^\circ + 5a = 180^\circ$$

$$5a = 180^\circ - 90^\circ$$

$$5a = 90^\circ$$

$$a = 90/5$$

$$a = 18^\circ$$

So, $x = 3a = 3 \times 18 = 54^\circ$

$$y = 2a = 2 \times 18 = 36^\circ$$

From the figure SOT is a straight line,

Then, $z + y = 180^\circ$

$$z + 36^\circ = 180^\circ$$

$$z = 180^\circ - 36^\circ$$

$$z = 144^\circ$$

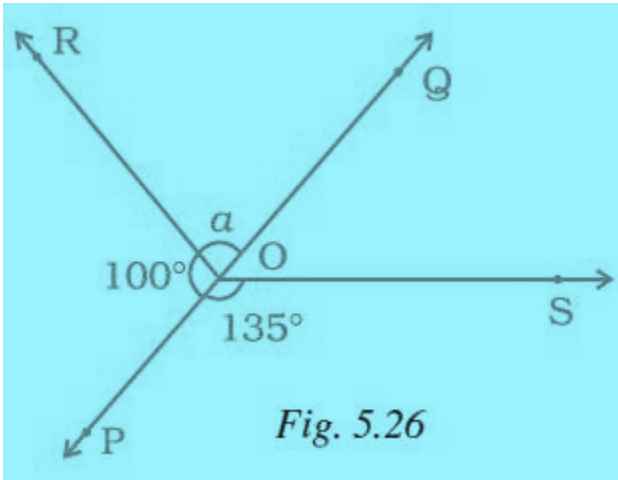
31. In Fig. 5.26, POQ is a line, then a is equal to

(a) 35°

(b) 100°

(c) 80°

(d) 135°



Solution:-

(c) 80°

From the figure POQ is a straight line,

Then, $100 + a = 180^\circ$

$$a = 180^\circ - 100$$

$$a = 80^\circ$$

32. Vertically opposite angles are always

(a) supplementary

(c) adjacent

Solution:-

(d) equal

(b) complementary

(d) equal

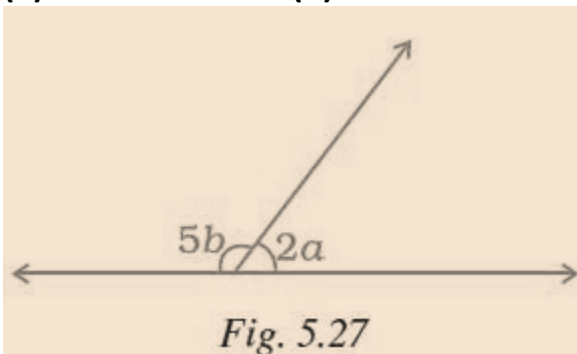
33. In Fig. 5.27, $a = 40^\circ$. The value of b is

(a) 20°

(b) 24°

(c) 36°

(d) 120°



Solution:-

(a) 20°

Given, $a = 40^\circ$

Then, $2a = 2 \times 40 = 80^\circ$

From the figure, angles formed on the straight line are equal to 180° ,

Then, $5b + 2a = 180^\circ$

$$5b + 80^\circ = 180^\circ$$

$$5b = 180^\circ - 80^\circ$$

$$5b = 100^\circ$$

$$b = 100/5$$

$$b = 20^\circ$$

34. If an angle is 60° less than two times of its supplement, then the greater angle is

(a) 100°

(b) 80°

(c) 60°

(d) 120°

Solution:-

(a) 100°

Let us assume the angle be P.

Then, its supplement is $180^\circ - P$

As per the condition in the question,

$$P = 2(180^\circ - P) - 60^\circ$$

$$P = 360^\circ - 2P - 60^\circ$$

$$P + 2P = 300^\circ$$

$$3P = 300^\circ$$

$$P = 300/3$$

$$P = 100^\circ$$

So, its supplement is $180^\circ - P = 180^\circ - 100^\circ = 80^\circ$

Therefore, the greater angle is 100° .

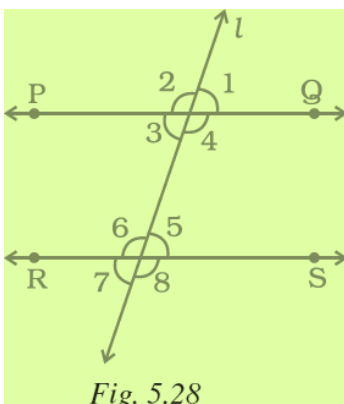
35. In Fig. 5.28, $PQ \parallel RS$. If $\angle 1 = (2a+b)^\circ$ and $\angle 6 = (3a-b)^\circ$, then the measure of $\angle 2$ in terms of b is

(a) $(2+b)^\circ$

(b) $(3-b)^\circ$

(c) $(108-b)^\circ$

(d) $(180-b)^\circ$



Solution: -

(c) $(108-b)^\circ$

From the question it is given that, $\angle 1 = (2a + b)^\circ$ and $\angle 6 = (3a - b)^\circ$

Since $\angle 5$ and $\angle 6$ forms a linear pair of angles

Then,

$$\angle 5 = (180-3a + b)^\circ \quad \dots \text{[equation 1]}$$

$$\angle 5 = \angle 1 = (180-3a + b)^\circ \quad \text{[Because Corresponding angles]} \quad \dots \text{equation (2)}$$

From equation (2) we get,

$$2a + b = 180-3a + b$$

$$5a = 180$$

$$a = 36^\circ$$

Since $\angle 1$ and $\angle 2$ forms a linear pair so

$$\angle 2 = 180^\circ - 2a - b$$

Substituting the value of a

$$\angle 2 = 180^\circ - 72^\circ - b$$

$$\angle 2 = 108^\circ - b$$

36. In Fig. 5.29, $PQ \parallel RS$ and $a : b = 3 : 2$. Then, f is equal to

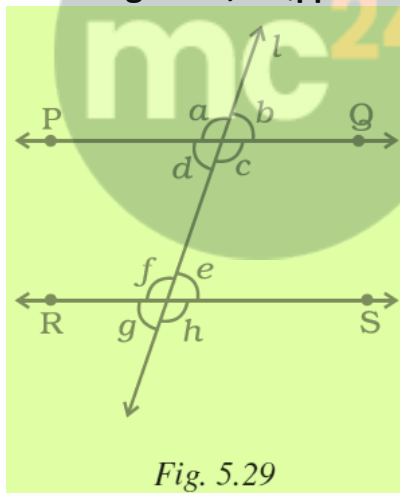


Fig. 5.29

(a) 36°

(b) 108°

(c) 72°

(d) 144°

Solution: -

(b) 108°

From the figure, $PQ \parallel RS$.

From the question it is given that, $a : b = 3 : 2$

So, let us assume $a = 3m$ and $b = 2m$

We know that, sum of angles on the straight line is equal to 180°

Then, $\angle a + \angle b = 180^\circ$

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

$$5m = 180^\circ$$

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

$$m = 36^\circ$$

$$\text{So, } a = 3m = 3 \times 36^\circ = 108^\circ$$

$$b = 2m = 2 \times 36^\circ = 72$$

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

[because corresponding angles]

37. In Fig. 5.30, line l intersects two parallel lines PQ and RS . Then, which one of the following is not true?

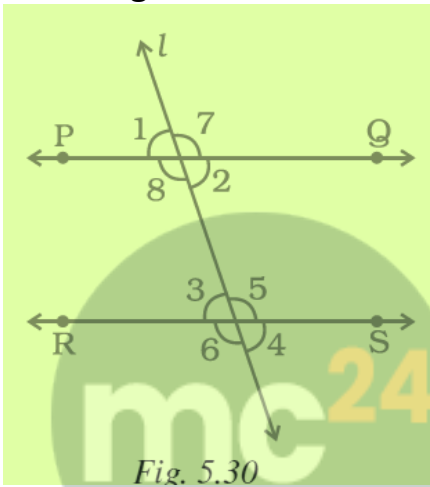


Fig. 5.30

(a) $\angle 1 = \angle 3$

(c) $\angle 6 = \angle 7$

Solution:-

(d) $\angle 4 = \angle 8$

Because, $\angle 4 \neq \angle 8$

(b) $\angle 2 = \angle 4$

(d) $\angle 4 = \angle 8$

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Your Class. Your Pace.

38. In Fig. 5.30, which one of the following is not true?

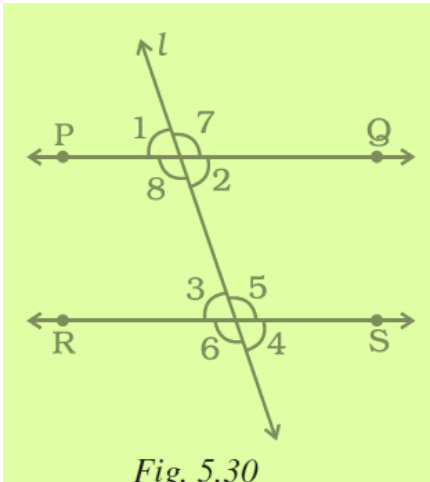


Fig. 5.30

- (a) $\angle 1 + \angle 5 = 180^\circ$
- (b) $\angle 2 + \angle 5 = 180^\circ$
- (c) $\angle 3 + \angle 8 = 180^\circ$
- (d) $\angle 2 + \angle 3 = 180^\circ$

Solution:-

(d) $\angle 2 + \angle 3 = 180^\circ$

We know that, interior opposite angles are equal

$\angle 2 = \angle 3$

39. In Fig. 5.30, which of the following is true?

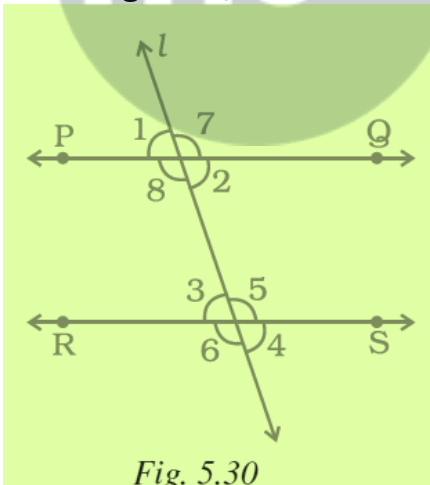


Fig. 5.30

- (a) $\angle 1 = \angle 5$
- (b) $\angle 4 = \angle 8$
- (c) $\angle 5 = \angle 8$
- (d) $\angle 3 = \angle 7$

Solution:-

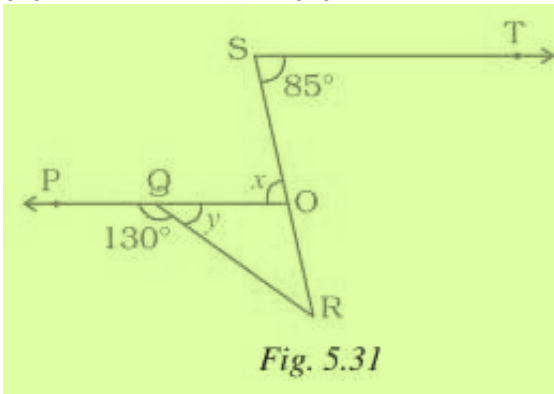
(c) $\angle 5 = \angle 8$

From the figure, $PQ \parallel RS$

$\angle 5 = \angle 8$ [interior alternate angles are equal]

40. In Fig. 5.31, $PQ \parallel ST$. Then, the value of $x + y$ is

- (a) 125° (b) 135° (c) 145° (d) 120°



Solution: -

(b) 135°

From the figure, PO is a straight line

We know that, sum of angles on the straight is equal to 180° .

Then,

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

$$y + 130^\circ = 180^\circ$$

$$y = 50^\circ$$

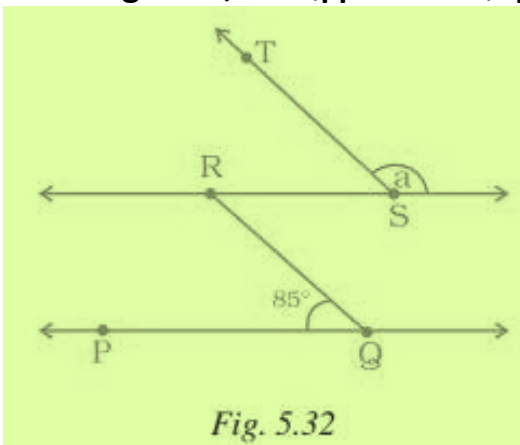
Then,

$$\angle QOS = \angle TSO \quad [\text{Co-interior angle}]$$

$$x = 85^\circ$$

$$x + y = 135$$

41. In Fig. 5.32, if $PQ \parallel RS$ and $QR \parallel TS$, then the value a is



- (a) 95° (b) 90° (c) 85° (d) 75°

Solution:-

(a) 95°

We know that, corresponding angles are equal

So,

$$\angle RQP = \angle TSR = 85^\circ \text{ (Corresponding angles)}$$

$$a + \angle TSR = 180^\circ$$

$$\angle a = 95$$

In questions 42 to 56, fill in the blanks to make the statements true.

42. If sum of measures of two angles is 90° , then the angles are _____.

Solution:-

If sum of measures of two angles is 90° , then the angles are complementary.

43. If the sum of measures of two angles is 180° , then they are _____.

Solution:-

If the sum of measures of two angles is 180° , then they are supplementary.

44. A transversal intersects two or more than two lines at _____ points.

Solution:-

A transversal intersects two or more than two lines at distinct points.

If a transversal intersects two parallel lines, then (Q. 45 to 48).

45. sum of interior angles on the same side of a transversal is _____.

Solution:-

Sum of interior angles on the same side of a transversal is 180° .

46. Alternate interior angles have one common _____.

Solution:-

Alternate interior angles have one common arm.

47. Corresponding angles are on the _____ side of the transversal.

Solution:-

Corresponding angles are on the same side of the transversal.

48. Alternate interior angles are on the _____ side of the transversal.

Solution:-

Alternate interior angles are on the opposite side of the transversal

49. Two lines in a plane which do not meet at a point anywhere are called _____ lines.

Solution:-

Two lines in a plane which do not meet at a point anywhere are called parallel lines.

50. Two angles forming a _____ pair are supplementary.

Solution:-

Two angles forming a linear pair are supplementary.

51. The supplement of an acute is always _____ angle.

Solution:-

The supplement of an acute is always obtuse angle.

52. The supplement of a right angle is always _____ angle.

Solution:-

The supplement of a right angle is always right angle.

53. The supplement of an obtuse angle is always _____ angle.

Solution:-

The supplement of an obtuse angle is always acute angle.

54. In a pair of complementary angles, each angle cannot be more than _____.

Solution:-

In a pair of complementary angles, each angle cannot be more than 90°.

55. An angle is 45°. Its complementary angle will be _____.

Solution:-

An angle is 45°. Its complementary angle will be 45°.

56. An angle which is half of its supplement is of _____.

Solution:-

An angle which is half of its supplement is of 60°.

Let us assume the angle be p , and supplement be $2p$

$$p + 2p = 180^\circ$$

$$3p = 180^\circ$$

$$p = 60^\circ$$

