Lines and Angles

CHAPTER 6

TRY YOURSELF SOLUTIONS

1. Angle in figure (iii) is an acute angle, as $\angle ABC$ will lie between 0° and 90°.

2. Measure of reflex angle lies between 180° and 360°.

3. Since, $\angle AOB$ is an obtuse angle, therefore x will lie between 90° and 180°.

4. Clearly, $\angle AOB$ + Reflex $\angle AOB = 360°$
$\therefore$ 35° + Reflex $\angle AOB = 360°$
$\Rightarrow$ Reflex $\angle AOB = 360° - 35° = 325°$

5. If the perpendicular distance between two lines is not same everywhere, then the lines will not be parallel and so they will intersect each other.
Hence, the given statement is true.

6. Let the measure of required angle be x.
Then, by the given condition we have
$x = (180° - x) + 100°$
$\Rightarrow 2x = 280° \Rightarrow x = 140°$

7. Let x be the measure of required angle.
Then, by the given condition we have
$6(90° - x) = 2(180° - x) - 20°$
$\Rightarrow 540° - 6x = 360° - 2x - 20°$
$\Rightarrow 4x = 540° - 360° + 20°$
$\Rightarrow 4x = 200° \Rightarrow x = 50°$

8. Since, OA and OB are opposite rays, therefore they will form a line.
Now, as OC is a ray stand on line AB
$\therefore \angle AOC + \angle BOC = 180°$ (By linear pair axiom)
$\Rightarrow y + x = 180°$
(i) If $x = 85°$, then $y = 180° - x = 180° - 85° = 95°$
(ii) If $y = 115°$, then $x = 180° - y = 180° - 115° = 65°$

9. Since, OD is a ray on line AB.
$\therefore \angle AOD + \angle BOD = 180°$ (By linear pair axiom)
$\Rightarrow \angle AOC + \angle COD + \angle BOD = 180°$
[$\because \angle AOD = \angle AOC + \angle COD$]
$\Rightarrow x + (x + 27°) + (x + 33°) = 180°$
$\Rightarrow 3x + 60° = 180°$
$\Rightarrow 3x = 120° \Rightarrow x = 40°$

10. Here, AOB is a straight line. (By linear pair axiom)
$\angle AOC + \angle BOC = 180°$
$\Rightarrow 84° + 2x = 180° \Rightarrow 2x = 96° \Rightarrow x = 48°$
Also, $\angle COA = \angle BOD$ (Vertically opposite angles)
$\therefore 84° = z$
Now, as COD is also a straight line.
$\therefore \angle AOC + \angle EOA + \angle EOD = 180°$
$\Rightarrow 84° + 75° + y = 180°$
$\Rightarrow y = 180° - 159° \Rightarrow y = 21°$
Hence, $x = 48°$, $y = 21°$ and $z = 84°$.

11. For parallel lines, $(3x - 20)° = (2x + 10)°$, *i.e.*, a pair of corresponding angles should be equal.
$\Rightarrow 3x - 20 = 2x + 10$
$\Rightarrow x = 30$

12. Clearly, $\angle 1 + \angle 2 = 180°$ (By linear pair axiom)
$\Rightarrow \angle 2 = 180° - \angle 1 = 180° - 70° = 110°$
Also, $\angle 3 = \angle 1 = 70°$ (Vertically opposite angles)
$\angle 4 = \angle 2 = 110°$ (Vertically opposite angles)
$\angle 5 = \angle 1 = 70°$ (Corresponding angles)
$\angle 6 = \angle 2 = 110°$ (Corresponding angles)
$\angle 7 = \angle 5 = 70°$ (Vertically opposite angles)
and $\angle 8 = \angle 6 = 110°$ (Vertically opposite angles)

13. Let $\angle 3 = 4x$ and $\angle 8 = 5x$ ...(i)
Clearly, $\angle 3 = \angle 5$ (Alternate interior angles) ...(ii)
Also, $\angle 5 + \angle 8 = 180°$ (By linear pair axiom)
$\Rightarrow \angle 3 + \angle 8 = 180°$ [Using (ii)]
$\Rightarrow 4x + 5x = 180°$ [Using (i)]
$\Rightarrow 9x = 180° \Rightarrow x = 20°$
Thus, $\angle 3 = 4x = 4 \times 20° = 80°$ and $\angle 8 = 5x = 5 \times 20° = 100°$

14. Clearly, $\angle QPR = \angle PRC$ (Alternate interior angles)
$\Rightarrow y = 60°$ ...(i)
Also, $\angle BQR = \angle QRC$ (Alternate interior angles)
$\Rightarrow x + y = 125°$
$\Rightarrow x = 125° - 60° = 65°$ [Using (i)]
and $\angle QPR + \angle PRD = 180°$ (Co-interior angles)
$\Rightarrow 60° + x + z = 180°$
$\Rightarrow z = 180° - 60° - 65° = 180° - 125° = 55°$

15. Since, $l \parallel m$ and $m \parallel n$, therefore $l \parallel n$
Clearly, using the concept of vertically opposite angles and the concept of co-interior angles, we get
$\omega + \theta = 180°$
$\Rightarrow (3p + 5)° + (2p)° = 180°$
$\Rightarrow (3p + 5) + 2p = 180$
$\Rightarrow 5p = 175$
$\Rightarrow p = 35$
$\therefore \omega = (3p + 5)° = (3 \times 35 + 5)° = 110°$
and $\theta = (2p)° = (2 \times 35)° = 70°$
Also, $y = \theta = 70°$ (Corresponding angles as $l \parallel n$)
$z = y = 70°$ (Alternate interior angles as $l \parallel m$)
and $x = y = 70°$ (Vertically opposite angles)

16. Since, $AB \parallel CD$ and $CD \parallel EF$, therefore $AB \parallel EF$.
So, $\angle BAE + \angle AEF = 180°$ (Co-interior angles)

$\Rightarrow$ $90° + \angle AEF = 180°$ ($\because$ $EA \perp AB$)

$\Rightarrow$ $27° + z = 90° \Rightarrow z = 63°$

Also, $y + z = 180°$ (Co-interior angles as $CD \parallel EF$)

$\Rightarrow$ $y = 180° - z = 180° - 63° = 117°$

and $x = y = 117°$ (Corresponding angles as $AB \parallel CD$)

17. In ΔPBC, we have

$\angle PBC + \angle BPC + \angle PCB = 180°$

(Angle sum property of a triangle)

$\Rightarrow$ $25° + 90° + \angle PCB = 180°$

$\Rightarrow$ $\angle PCB = 65°$

Now, by using exterior angle property, we have

$x = \angle DAC + \angle ACD$

$\Rightarrow$ $x = 30° + 65°$ [$\because$ $\angle ACD$ is same as $\angle PCB$]

$= 95°$

18. Since, $PQ \parallel RS$, therefore

$\angle QPS = \angle PSR$ (Alternate interior angle)

$\Rightarrow$ $50° = \angle PSR$

Also, in ΔORS, we have

$\angle ORS + \angle SOR + \angle OSR = 180°$

(By angle sum property of a triangle)

$\Rightarrow$ $20° + \angle SOR + 50° = 180°$

($\therefore$ $\angle ORS = 20°$ (given) and $\angle OSR$ is same as $\angle PSR$)

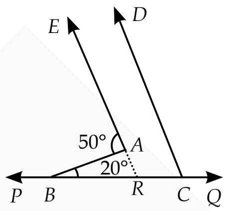
$\Rightarrow$ $\angle SOR = 180° - 50° - 20° = 110°$

19. Let us produce EA and let it intersect BC at R. Then, clearly $RE \parallel CD$.

Also $\angle ARB = \angle DCB$ (Corresponding angles) ...(i)

Now, using linear pair axiom, we can say

$\angle BAR = 130°$



and by using angle sum property of a triangle in ΔABR, we get

$\angle ABR + \angle BAR + \angle ARB = 180°$

$\Rightarrow$ $20° + 130° + \angle ARB = 180°$

$\Rightarrow$ $\angle ARB = 30°$

$\Rightarrow$ $\angle DCB = 30°$ (Using (i))

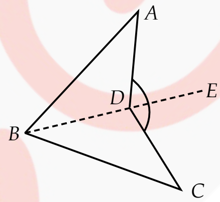
20. Let us join BD and extend it upto E as shown in the figure.

Clearly, $\angle ADE = \angle ABD + \angle BAD$ ...(i)

(By exterior angle property)

and $\angle CDE = \angle CBD + \angle BCD$ ...(ii)

(By exterior angle property)



Adding (i) and (ii), we get

$\angle ADE + \angle CDE = (\angle ABD + \angle CBD) + \angle BAD + \angle BCD$

$\Rightarrow$ $\angle ADC = \angle B + \angle A + \angle C$

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