MATHEMATICS
WORKSHEET_150424
CHAPTER 06 LINES AND ANGLES
(ANSWERS)

SUBJECT: MATHEMATICS **MAX. MARKS : 40**

CLASS : IX **DURATION : 1½ hrs**

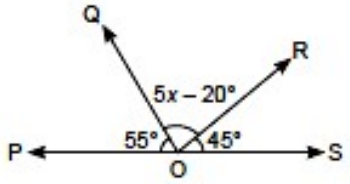
General Instructions:

(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

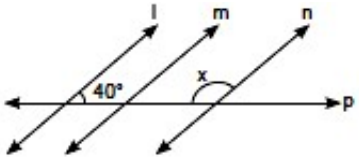
1. In the given figure, POS is a line, then ∠QOR is



(a) 60° (b) 40° (c) 80° (d) 20°

Ans. (c) 80°

2. In the given figure, l||m||n. Then value of x is



(a) 40° (b) 50° (c) 140° (d) 130°

Ans. (c) 140°

Given l || m || n and p is transversal.

⇒ l || n

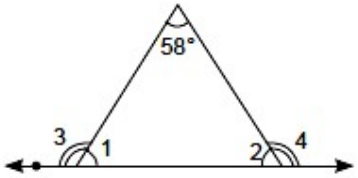
Now, 40° + x = 180°

('∵ Interior angles on the same side of the transversal are supplementary)

⇒ x = 180° – 40° = 140°

Correct option is (c).

3. In the given figure, ∠1 = ∠2 then the measurements of ∠3 and ∠4 respectively are



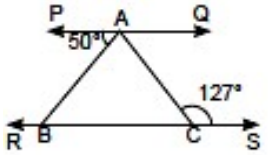
(a) 58°, 61° (b) 61°, 61° (c) 119°, 61° (d) 119°, 119°

Ans. (d) 119°, 119°

From the figure, ∠1 + ∠2 + 58° = 180°

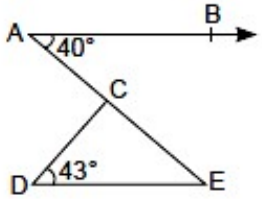
(Angle sum property of triangle)
But given, $\angle 1 = \angle 2$
So, $\angle 1 + \angle 1 + 58° = 180°$
$\Rightarrow 2\angle 1 = 122°$
So, $\angle 2 = 61°$
Now, $\angle 3 = 58° + \angle 2$
('.' Exterior Angle Property)
$= 58° + 61° = 119°$
Also, $\angle 4 = 58° + \angle 1$
('.' Exterior Angle Property)
$= 58° + 61° = 119°$
Correct option is (d).

4. In the given figure, PQ || RS and $\angle ACS = 127°$, $\angle BAC$ is



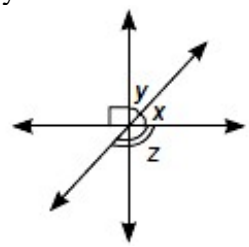
(a) 53° (b) 77° (c) 50° (d) 107°
Ans. (b) 77°
Since PQ || RS, so
$\Rightarrow \angle PAC = \angle ACS$
('.' Alternate interior angles)
$\Rightarrow \angle PAB + \angle BAC = 127°$
$\Rightarrow 50° + \angle BAC = 127°$
$\Rightarrow \angle BAC = 77°$

5. In the given figure, AB || DE, then measure of $\angle ACD$ is



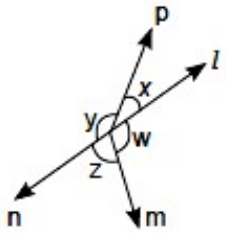
(a) 43° (b) 40° (c) 83° (d) 97°
Ans. (c) 83°

6. In the given figure, if the angles x and y are in the ratio 2 : 3, then angle z is



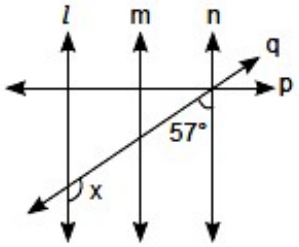
(a) straight angle (b) 144° (c) 126° (d) 90°
Ans. (b) 144°

7. In the given figure, $\angle x = 20°$, $\angle y = 160°$, $\angle w = 105°$, $\angle z = 75°$.



Indicate the correct option.
(a) ray m and ray n are opposite rays (b) ray l and ray n are opposite rays
(c) ray p and ray n are opposite rays (d) none of these
Ans. (b) ray l and ray n are opposite rays

8. In the given figure, line l || line m || line n, line p and line q are transversals . Then , measurement of ∠ x is



(a) 57° (b) 43° (c) 150° (d) 123°
Ans. (d) 123°

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

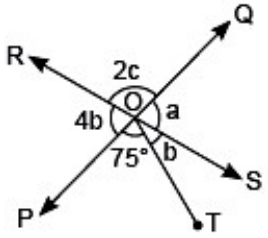
9. **Assertion (A):** If a ray $\overrightarrow{CD}$ stands on a line $\overrightarrow{AB}$, such that ∠ACD = ∠BCD, then ∠ACD = 45°.
Reason (R): If a ray $\overrightarrow{CD}$ stands on a line $\overrightarrow{AB}$ then ∠ACD + ∠BCD = 180°.
Ans. (d) Assertion (A) is false but reason (R) is true.

10. **Assertion (A):** If angles 'a' and 'b' form a linear pair of angles and a = 40°, then b = 140°.
Reason (R): Sum of linear pair of angles is always 180°.
Ans. (a) Both A and R are true and R is the correct explanation of A.

SECTION – B

Questions 11 to 14 carry 2 marks each.

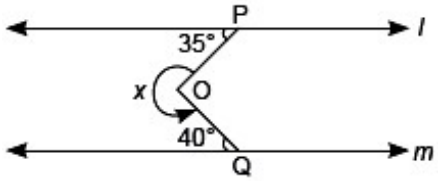
11. In the given figure, two straight lines PQ and RS intersect each other at O. If ∠POT = 75°. Find the value of *a*, *b* and *c*.



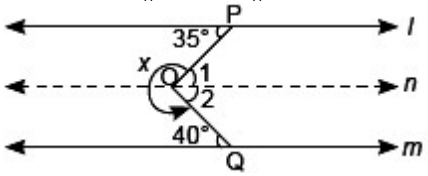
Ans. Given: RS is a straight line.
∠ROP + ∠POT + ∠TOS = 180° (Linear pair axiom)
∴ $4b + 75° + b = 180°$

$\Rightarrow 5b = 180° - 75° = 105°$
$\Rightarrow b = 21°$
$\angle$QOS and $\angle$POR are vertically opposite angles. Therefore, their values are equal.
$\Rightarrow a = 4b = 4 \times 21° = 84°$
$\Rightarrow 2c + a = 180°$
$\Rightarrow 2c + 84° = 180°$
$\Rightarrow 2c = 180° - 84° = 96°$
$\Rightarrow c = 48°$
Hence, $a = 84°$, $b = 21°$ and $c = 48°$.

12. In the given figure, if $l \parallel n$, find the value of x.

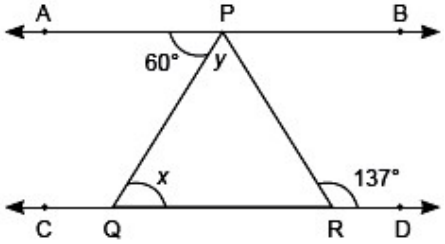


Ans. Draw a line 'n' through O such that $n \parallel l$ and $n \parallel m$.



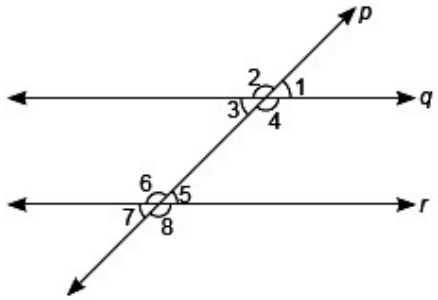
As $l \parallel n$, OP is transversal.
$\Rightarrow \angle 1 = 35°$ (Alternate interior angles)
Also, $n \parallel m$, OQ is transversal
$\angle 2 = 40°$ (Alternate interior angles)
$\therefore \angle POQ = \angle 1 + \angle 2 = 35° + 40° = 75°$
So, x = reflex $\angle POQ$
$= 360° - \angle POQ = 360° - 75° = 285°$

13. In the given figure, if AB || CD, $\angle APQ = 60°$ and $\angle PRD = 137°$, then find the value of x and y.



Ans. Given AB || CD
PQ is transversal
$\Rightarrow \angle APQ = \angle PQR$ (Alternate interior angles)
$\Rightarrow 60° = x$
Again in ΔPQR, exterior angle is $\angle PRD$
So, $\angle PRD = \angle PQR + \angle QPR$ ($\because$ Exterior angle theorem)
$\Rightarrow 137° = x + y$
$\Rightarrow 137° = 60° + y$
$\Rightarrow y = 137° - 60° = 77°$

14. In the given figure, p is transversal to q and r. Given $q \parallel r$ and $\angle 1 = 75°$. Find $\angle 6$ and $\angle 7$.

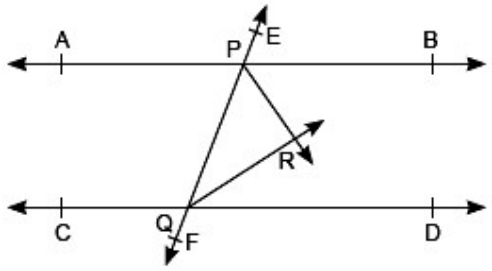


Ans. We have $\angle 1 = \angle 3$ (Vertically opposite angles)
$\therefore\ \angle 3 = 75°$ (Given that $\angle 1 = 75°$)
Now, $\angle 3 + \angle 6 = 180°$ (Interior angles on the same side of transversal is supplementary.)
$\Rightarrow\ \angle 6 = 180° - \angle 3 = 180° - 75° = 105°$
Also, $\angle 3 = \angle 7$ (Corresponding angles)
$\therefore\ \angle 7 = 75°$
Thus, $\angle 6 = 105°$ and $\angle 7 = 75°$.

SECTION – C

Questions 15 to 17 carry 3 marks each.

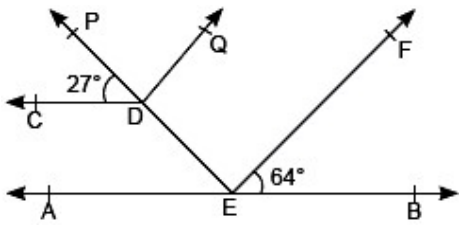
15. In the given figure, AB and CD are two parallel lines intersected by a transversal EF. Bisector of interior angles BPQ and DQP intersect at R. Prove that $\angle PRQ = 90°$



Ans. Given AB || CD and EF is transversal
$\therefore\ \angle BPQ + \angle DQP = 180°$ (Interior angles on the same side of transversal is supplementary)
$\Rightarrow \frac{1}{2}\angle BPQ + \frac{1}{2}\angle DQP = 180^0 \times \frac{1}{2} = 90^0$ ...(i)
Now, PR is the bisector of $\angle BPQ$
$\Rightarrow\ \angle RPQ = \frac{1}{2}\angle BPQ$ and QR is the bisector $\angle DQP$.
$\Rightarrow\ \angle PQR = \frac{1}{2}\angle DQP$
From (i), we have $\angle RPQ + \angle PQR = 90°$ ...(ii)
In ΔPQR, $\angle RPQ + \angle PQR + \angle PRQ = 180°$ (Angle sum property of a triangle)
$\Rightarrow\ 90° + \angle PRQ = 180°$
$\Rightarrow\ \angle PRQ = 180° - 90° = 90°$

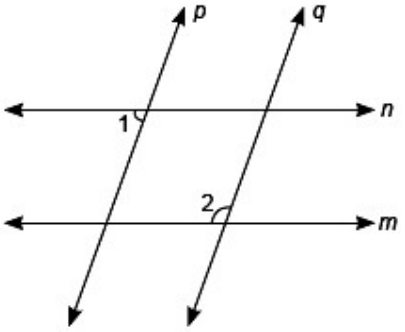
OR

In the given figure, EF || DQ and AB || CD. If $\angle FEB = 64°$, $\angle PDC = 27°$, then find $\angle PDQ$, $\angle AED$ and $\angle DEF$.

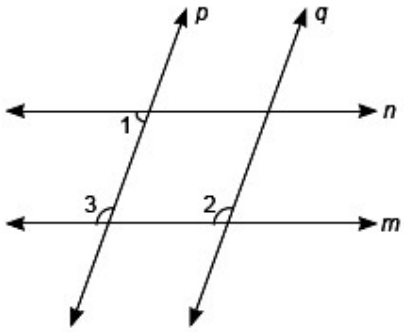


Ans. Given: EF || DQ and AB || CD
Now $\angle AED = \angle CDP$ (Corresponding angles)
$\Rightarrow \angle AED = 27°$ (Given that $\angle CDP = 27°$)
Also, $\angle AED + \angle DEF + \angle FEB = 180°$ (Linear pair axiom)
$\Rightarrow 27° + \angle DEF + 64° = 180°$
$\Rightarrow \angle DEF = 180° - 91° = 89°$
Now, DQ || EF (Given)
PE is transversal
$\therefore \angle PDQ = \angle DEF$ (Corresponding angles)
$\Rightarrow \angle PDQ = 89°$

16. In the given figure, $n \parallel m$ and $p \parallel q$ of $\angle 1 = 75°$, prove that $\angle 2 = \angle 1 + \frac{1}{3}$ of a right angle.



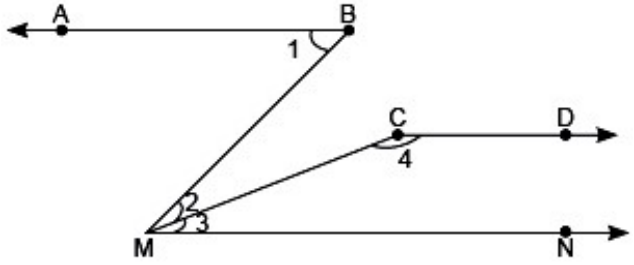
Ans. Given: $\angle 1 = 75°$



Now, $m \parallel n$ and p is transversal
$\Rightarrow \angle 1 + \angle 3 = 180°$ (Co-interior angles)
$\Rightarrow 75° + \angle 3 = 180°$
$\Rightarrow \angle 3 = 180° - 75° = 105°$
Now, $p \parallel q$ and m is transversal
$\Rightarrow \angle 2 = \angle 3 = 105$ (Corresponding angles)
$= 75° + 30° = 75° + \frac{1}{3} \times 90°$
$\angle 2 = \angle 1 + \frac{1}{3} \times$ right angle.

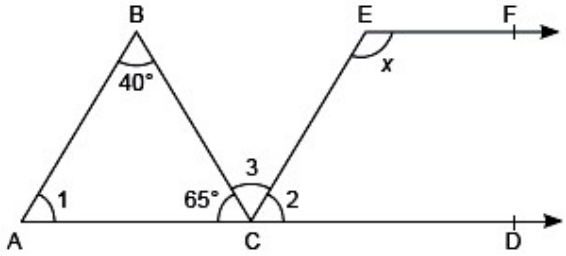
OR

In the given figure, $\angle 1 = 55°$, $\angle 2 = 20°$, $\angle 3 = 35°$ and $\angle 4 = 145°$. Prove that AB || CD.



Ans: We have,
$\angle BMN = \angle 2 + \angle 3 = 20° + 35° = 55° = \angle 1 = \angle ABM$.
But these are the alternate angles formed by transversal BM on AB and MN.
So, by converse of alternate interior angles theorem.
AB || MN ...(i)
Now, $\angle 3 + \angle 4 = 35° + 145° = 180°$
This, shows that sum of the co-interior angles is 180°.
Hence, CD || MN ...(ii)
From (i) and (ii), we have AB || CD. Hence proved.

17. In the figure, AB || CE, CD || EF. Find the value of x.

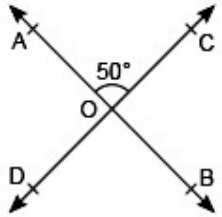


Ans. In ΔABC,
$\angle ABC + \angle BAC + \angle ACB = 180°$ (Angle sum property of a triangle)
$\Rightarrow 40° + \angle 1 + 65° = 180°$
$\Rightarrow \angle 1 = 180° - (40° + 65°) = 180° - 105° = 75°$
Now, given AB || CE, AC is transversal
$\Rightarrow \angle 2 = \angle 1$ (Corresponding angle)
$\Rightarrow \angle 2 = 75°$
Now, $65° + \angle 3 + \angle 2 = 180°$ (Linear pair axiom)
$\Rightarrow 65° + \angle 3 + 75° = 180°$
$\Rightarrow \angle 3 = 180° - (65° + 75°) = 180° - 140°$
$\Rightarrow \angle 3 = 40°$
Again, given CD || EF
$\Rightarrow$ AD || EF and EC is transversal
$\Rightarrow \angle CEF = \angle ECA$ (Alternate interior angles)
$\Rightarrow x = 65° + \angle 3 = 65° + 40° = 105°$
Therefore, $x = 105°$

SECTION – D

Questions 18 carry 5 marks.

18. (a) Prove that "If two lines intersect each other, the vertically opposite angles are equal." (4)
(b) In the given figure, if $\angle AOC = 50°$ then find the measure of ($\angle AOD + \angle COB$). (1)



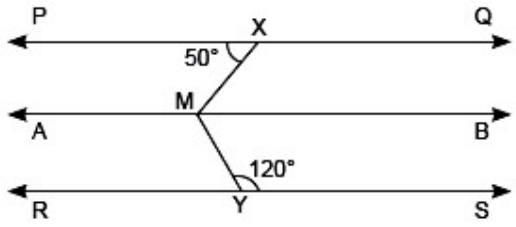
Ans. (a) Given, To Prove and Figure – 2 marks
Proof – 2 marks
(b) Ray OA stands on line DOC
$\angle AOD + \angle AOC = 180°$ (Linear pair axiom)
$\Rightarrow \angle AOD + 50° = 180°$ (Given: $\angle AOC = 50°$)
$\Rightarrow \angle AOD = 180° - 50° = 130°$
But $\angle COB = \angle AOD$ (Vertically opposite angles)

$\Rightarrow \angle COB = 130°$
$\Rightarrow \angle AOD + \angle COB = 130° + 130° = 260°$

SECTION – E (Case Study Based Questions)

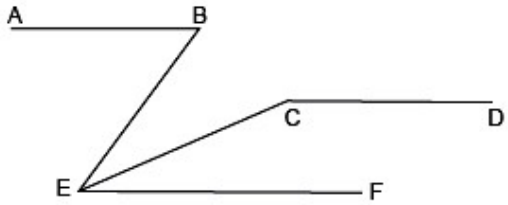
Questions 19 to 20 carry 4 marks each.

19. Two parallel roads PQ and RS are at the center of the city. It was decided to put two huge lamp posts at point X and Y and a statue of Mahatma Gandhi to be placed at point M with lots of palm trees to be planted along the line AB which is parallel to both PQ and RS. The area around M is to be decorated with flowering plants and greenery. The angle $\angle PXY$ is of 50° and angle $\angle MYS$ is of 120°



Based on the above information answer the following questions :
(a) What is the measure of $\angle XMB$?
(b) What is the measure of the angle $\angle YMB$?
(c) What is the measure of the reflex angle $\angle XMY$?
(d) What is ratio between the angles $\angle XMB$ and $\angle YMB$?
Ans. (a) 50°
(b) 60°
(c) 250°
(d) 5 : 6

20. Three book shelves AB, CD and EF, made up of wooden boards are fitted on the wall horizontal to the floor as shown in the figure. To give stability and a good look the two shelves AB and CD were joined by a wooden plank BE. Similarly CD and EF were joined by CE. The entire arrangement was such that the angles measured as follows: $\angle ABE = 66°$, $\angle BEC = 36°$, $\angle CEF = 30°$, $\angle DCE = 150°$



Based on the above information and the given figure answer the following questions:
(a) What is the measure of angle $\angle BEF$?
(b) What is the relation between AB and EF ?
(c) What is the relation between $\angle DCE$ and $\angle CEF$?
(d) What can we conclude about CD and EF?
Ans. (a) 66°
(b) AB | | EF
(c) They are linear pairs
(d) They are parallel to each other