SAMPLE PAPER_240224
PRACTICE PAPER 09 (2023-24)
Chapter-05, 06, 07 and 08 (ANSWERS)

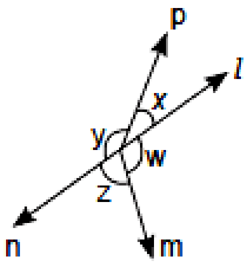
SUBJECT: MATHEMATICS **MAX. MARKS: 40**
CLASS: IX **DURATION: 1½ hrs**

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.

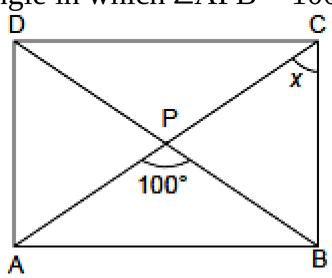
1. In the given figure, ∠x = 20°, ∠y = 160°, ∠w = 105°, ∠z = 75°.



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

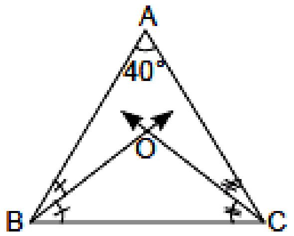
2. Euclid stated that all right angles are equal to each other in the form of
(a) an axiom (b) a definition(c) a postulate (d) a proof
Ans: (c) a postulate

3. In the given figure, ABCD is a rectangle in which ∠APB = 100°. The value of x is



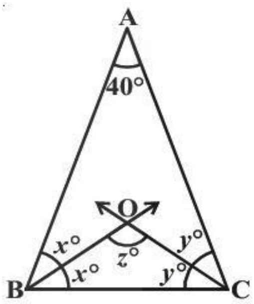
(a) 40° (b) 50° (c) 60° (d) 70°
Ans: (b) 50°
In ΔPBC, ∠BPA + ∠BPC = 180° (linear pair of angles)
⇒ ∠BPC = 180° – 100° = 80°
⇒ ∠PCB = ∠PBC = x
⇒ x + x + 80° = 180° ⇒ 2x = 100° ⇒ x = 50°

4. In the given figure, measure of ∠BOC is



(a) 110° (b) 40° (c) 70° (d) 60°

Ans: (a) 110°



In triangle ABC, applying angle sum property of triangles :

$40° + 2x + 2y = 180°$

$\Rightarrow 2(x + y) = 140°$

$\Rightarrow x + y = 70°$... (1)

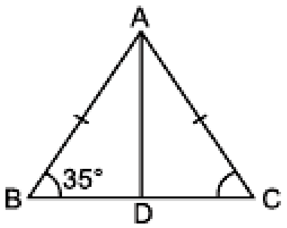
Now, in triangle ABO, applying angle sum property of triangles :

$x + y + z = 180°$

$\Rightarrow 70 + z = 180°$ [from equation ... (1)]

$\Rightarrow z = 110°$

5. In the given figure, AD is the median, then ∠BAD is



(a) 35° (b) 70° (c) 110° (d) 55°

Ans: (d) 55°

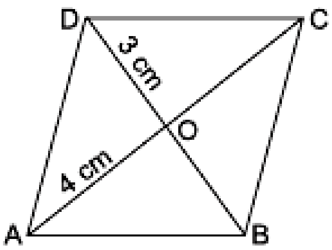
6. Given two right-angled triangles ABC and PRQ, such that ∠A = 30°, ∠Q = 30° and AC = QP. Write the correspondence if triangles are congruent.

(a) ΔABC ≅ ΔPQR (b) ΔABC ≅ ΔPRQ

(c) ΔABC ≅ ΔRQP (d) ΔABC ≅ ΔQRP

Ans: (d) ΔABC ≅ ΔQRP

7. In the given figure, ABCD is a rhombus, AO = 4 cm and DO = 3 cm. Then the perimeter of the rhombus is



(a) 18 cm (b) 20 cm (c) 21 cm (d) 22 cm

Ans: Since ABCD is a rhombus, so diagonals AC and BD bisect each other at right angles at O. So, $\angle AOD = 90°$.
Now, $AD^2 = OA^2 + OD^2$ (By Pythagoras theorem)
$\Rightarrow AD^2 = (4)^2 + (3)^2 \Rightarrow AD^2 = 16 + 9 \Rightarrow AD^2 = 25 \Rightarrow AD = 5$ cm
Since all sides of a rhombus are equal, so AB = BC
= CD = DA = 5 cm.
So, perimeter of rhombus = AB + BC + CD + DA = 5 + 5 + 5 + 5 = 20 cm
∴ Correct option is (b).

8. Which of the following statement is correct?
(a) a trapezium is a parallelogram (b) every rectangle is a parallelogram
(c) every parallelogram is a rectangle (d) every rhombus is a square
Ans: (b) every rectangle is a parallelogram

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):** The angles of a quadrilateral are x°, (x – 10)°, (x + 30)° and (2x)°, the smallest angle is equal to 58°
Reason (R): Sum of the angles of a quadrilateral is 360°
Ans: (a) Both A and R are true and R is the correct explanation of A.

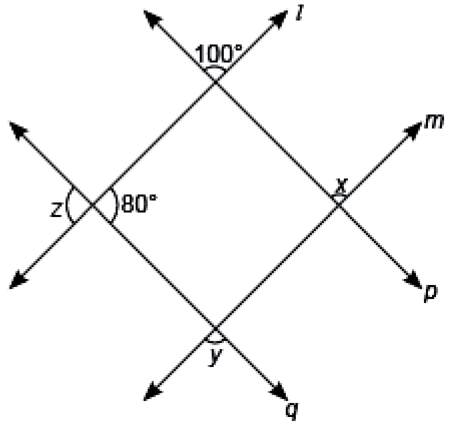
10. **Assertion (A):** Two angles measures a – 60° and 123° – 2a. If each one is opposite to equal sides of an isosceles triangle, then the value of a is 61°.
Reason (R): Sides opposite to equal angles of a triangle are equal.
Ans: (b) Both A and R are true but R is not the correct explanation of A.

SECTION – B

Questions 11 to 14 carry 2 marks each.

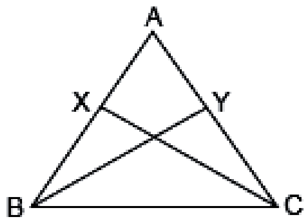
11. Solve the equation, $x - 10 = 25$ and state which Euclid's axiom do you use here.
Ans: $x - 10 = 25$
On adding 10 both sides, we have
$x - 10 + 10 = 25 + 10 \Rightarrow x = 35$
Here, we use Euclid axiom, "If equal be added to the equal, the whole are equal."

12. Find the value of x and y in the given figure, if $l \parallel m$ and $p \parallel q$.



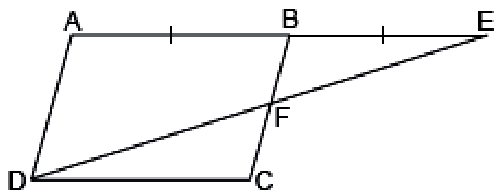
Ans: As $l \parallel m$ and line p is transversal
So, $x = 100°$ (Corresponding angles)
Now, $z = 80°$ (Vertically opposite angles)
But $y = 180° - z$ (Corresponding angles)
$\therefore$ $y = 180° - 80° = 100°$.

13. In the figure below, ABC is a triangle in which AB = AC. X and Y are points on AB and AC such that AX = AY. Prove that $\Delta ABY \cong \Delta ACX$.



Ans: In ΔABY and ΔACX,
AB = AC (Given)
$\angle A = \angle A$ (Common)
AX = AY (Given)
$\Rightarrow$ $\Delta ABY \cong \Delta ACX$ (SAS congruence rule)

14. ABCD is a parallelogram. AB is produced to E so that BE = AB. Prove the ED bisects BC.
Ans:

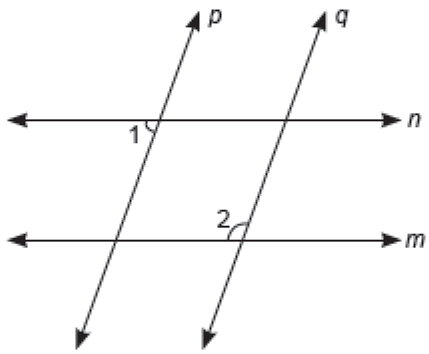


We have AB = DC (Opposite sides of parallelogram)
But AB = BE (Given)
$\therefore$ BE = DC
In ΔBEF and ΔCDF, BE = DC (Proved above)
$\angle BEF = \angle CDF$ (Alternate interior angles)
$\angle BFE = \angle CFD$ (Vertically opposite angles)
$\therefore$ $\Delta BEF \cong \Delta CDF$ (AAS congruence rule)
$\therefore$ BF = FC (CPCT)
$\therefore$ ED bisects BC.

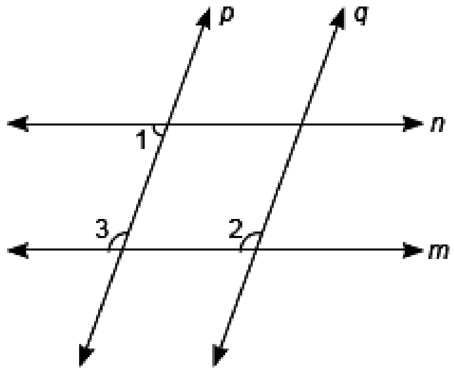
SECTION – C

Questions 15 to 17 carry 3 marks each.

15. 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)

$\Rightarrow 75° + \angle 3 = 180°$

$\Rightarrow \angle 3 = 180° - 75° = 105°$

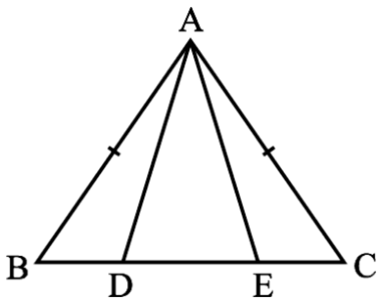
Now, $p \parallel q$ and m is transversal

$\Rightarrow \angle 2 = \angle 3 = 105$ (Corresponding angles)

$= 75° + 30° = 75° + \frac{1}{3} \times 90°$

$\angle 2 = \angle 1 + \frac{1}{3} \times$ right angle.

16. In the given figure, AB = AC and BE = CD. Prove that AD = AE.



Ans: In ΔABC, AB = AC

$\Rightarrow \angle ACB = \angle ABC$ (Angles opposite to equal sides are equal)

Now, in ΔABE and ΔACD,

AB = AC (Given)

$\angle ABE = \angle ACD$ (Proved above)

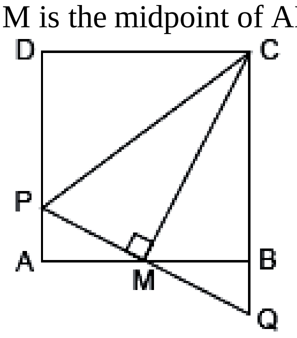
BE = CD (Given)

$\Rightarrow \Delta ABE \cong \Delta ACD$ (SAS congruence rule)

$\Rightarrow$ AE = AD (CPCT)

or AD = AE

17. In the given figure, ABCD is a square. M is the midpoint of AB and $PQ \perp CM$. Prove that CP = CQ.



Ans: In ΔAPM and ΔBQM,

$\angle PAM = \angle QBM$ (Each 90°)

AM = BM (Given)

∠PMA = ∠BMQ (Vertically opposite angles)
∴ ΔAPM ≅ ΔBQM (ASA congruence rule)
∴ PM = MQ (CPCT)
In ΔPMC and ΔQMC,
PM = MQ (Proved above)
∠PMC = ∠QMC (Each 90°)
MC = MC (Common)
∴ ΔPMC ≅ ΔQMC (SAS congruence rule)
∴ CP = CQ (CPCT)

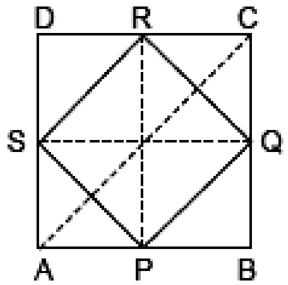
SECTION – D

Questions 18 carry 5 marks.

18. Show that the quadrilateral formed by joining the mid-points of the sides of a square, is also a square.

Ans:

ABCD is a square. P, Q, R and S are the mid-points of sides AB, BC, CD and DA respectively.



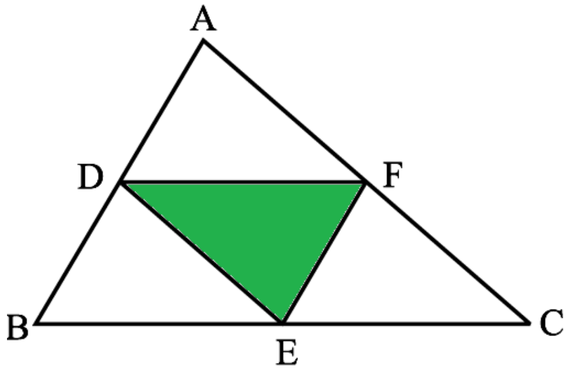
Join AC, PR and SQ.
In ΔABC,
P and Q are mid-points of side AB and BC respectively.
∴ PQ || AC and PQ = $\frac{1}{2}$AC ...(i) (By mid-point theorem)
Similarly, in ΔADC,
S and R are mid-points of sides AD and DC respectively.
∴ RS || AC and RS = $\frac{1}{2}$AC ...(ii) (By mid-point theorem)
From (i) and (ii), we get
PQ || RS
PQ = RS
Similarly, we can prove that RQ || PS and PS = RQ
⇒ PQRS is a parallelogram ....(iii)
In ΔPBQ and ΔQCR
BQ = QC (Q is mid-point of BC)
∠B = ∠C = 90° (Each angle of square is 90°)
BP = CR (Halves of equal sides of square)
⇒ ΔPBQ ≅ ΔQCR (SAS congruence rule)
⇒ PQ = QR (CPCT) ...(iv)
From (iii) and (iv), we get
PQRS is a rhombus (If adjacent sides of parallelogram are equal, then it is a rhombus)... (v)
Also, PBCR is a rectangle. (As CR || PB, CR = PB and ∠B = ∠C = 90°)
⇒ PR = BC
Similarly, DCQS is a rectangle. (As CQ || DS, CQ = DS and ∠C = ∠D = 90°)
∴ CD = QS
Now, BC and CD are equal (Equal sides of square)
⇒ PR = QS

But these are diagonals of rhombus PQRS.
If diagonals of rhombus are equal, then it is a square.
⇒ PQRS is a square.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. In a school, group of Class IX students prepared Rangoli in triangular shape. Dimensions of ΔABC are AC = 26 cm, BC = 28 cm, AB = 25 cm. Garland is to be placed along the side of ΔDEF which is formed by joining midpoints of sides of ΔABC.



(a) Show that ADEF, BDFE and DFCE are all parallelograms. (2)
(b) Find the length of garland. (2)

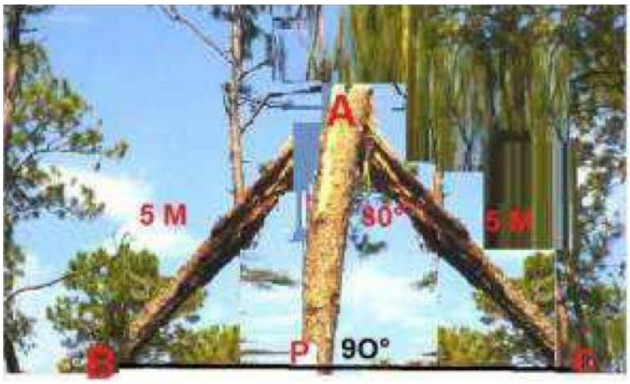
OR

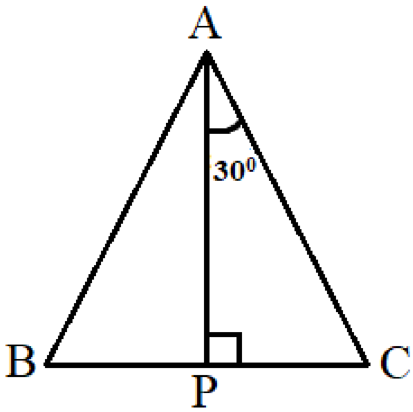
(b) Show that ΔABC is divided into four congruent triangles (2)
Ans:
(a) As D and E are mid-points of sides AB and BC of the triangle ABC, by Midpoint Theorem
DE || AC
Similarly, DF || BC and EF || AB
Therefore ADEF, BDFE and DFCE are all parallelograms.
(b) DF || BC and DF =1/2 BC (By Midpoint theorem)
⇒ DF = 14 cm
Similarly, EF = 12.5 cm
DE = 13 cm
∴ Length of garland = Perimeter = 14 + 12.5 + 13 = 39.5 cm

OR

From (a), ADEF, BDFE and DFCE are all parallelograms.
Now DE is a diagonal of the parallelogram BDFE,
therefore, Δ BDE ≅ Δ FED
Similarly Δ DAF ≅ Δ FED
and Δ EFC ≅ Δ FED
So, all the four triangles are congruent.

20. Aditya and his friends went to a forest, they saw a big tree got broken due to heavy rain and wind. Due to this rain the big branches AB and AC with lengths 5m fell down on the ground. Branch AC makes an angle of 30° with the main tree AP. The distance of Point B from P is 4 m. You can observe that ΔABP is congruent to ΔACP.





(a) Show that ΔABP is congruent to ΔACP (1)
(b) Find the value of ∠ACP? (2)

OR

What is the total height of the tree? (2)
(c) Find the value of ∠BAP? (1)
Ans: (a) In ΔACP and ΔABP
AB = AC (Given)
AP = AP (common)
∠APB = ∠APC =90°
By RHS criteria ΔACP ≅ ΔABP
(b) In ΔACP, ∠APC + ∠PAC + ∠ACP = 180°
⇒ 90° + 30° + ∠ACP = 180° (angle sum property of triangle)
⇒ ∠ACP =180° - 120° = 60°
∠ACP = 60°

OR

In ΔACP, by Pythagoras theorem,
$AC^2 = AP^2 + PC^2$
⇒ $25 = AP^2 + 16$
⇒ $AP^2 = 25 – 16 = 9$
⇒ AP = 3 m
Total height of the tree = AP + 5 = 3 + 5 = 8m
(c) ΔACP ≅ ΔABP
Corresponding part of congruent triangle
∠BAP = ∠CAP
∠BAP = 30° (given ∠CAP = 30°)