

HALF YEARLY EXAMINATION—2025-26

CLASS-IX

SUBJECT-MATHEMATICS

Time : 3 Hrs.

M.M. : 80

No. of Pages 12

No. of Qs. 38

General Instructions :

1. This question paper contains 11 pages.
2. This question paper contains 38 questions. All questions are compulsory.
3. This question paper is divided into 5 Sections A, B, C, D and E.
4. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and question no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
5. In Section B, Question no. 21-25 are very short answer (VSA) type questions, carrying 2 marks each.
6. In Section C, Question numbers 26-31 are short answer (SA) type questions, carrying 3 marks each.
7. In Section D, Question numbers 32-35 are long answer (LA) type questions, carrying 5 marks each.
8. In Section E, Question numbers 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
9. There is no overall choice. However, an internal choice in 2 Questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
10. Draw neat and clean figures wherever required.
11. Use of calculators is not allowed.

SECTION-A

(Section A consists of 20 questions of 1 mark each).

Q1. The example of an irrational number is :

(1)

(A) $\sqrt{\frac{4}{9}}$

(B) $\frac{\sqrt{12}}{\sqrt{3}}$

(C) $\sqrt{8}$

(D) $\sqrt[3]{27}$

- Q2.** If $\sqrt{2} = 1.4142$, then $\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}}$ is equal to (1)
- (A) 2.4142 (B) 5.8282
(C) 0.4142 (D) 0.1718

- Q3.** The value of $8\sqrt{15} \div 2\sqrt{3}$ is : (1)
- (A) $4\sqrt{5}$ (B) $2\sqrt{5}$ (C) $\sqrt{5}$ (D) 20

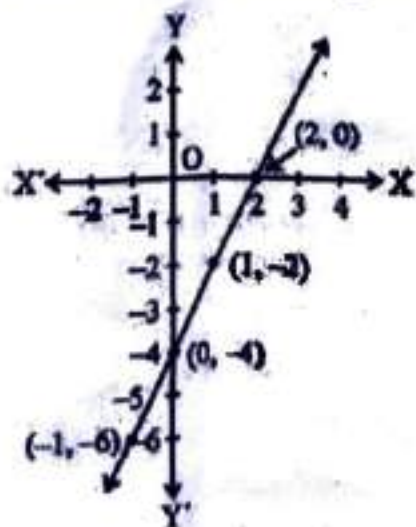
- Q4.** Zero of the zero polynomial is : (1)
- (A) 0 (B) 1
(C) any real number (D) not defined

- Q5.** If $x^{51} + 1$ is divided by $x + 1$, the remainder is : (1)
- (A) 0 (B) 1 (C) -1 (D) 50

- Q6.** If $2(a^2 + b^2) = (a + b)^2$ then (1)
- (A) $a + b = 0$
(B) $a = b$
(C) $2a = b$
(D) $ab = 0$

- Q7.** Given below is the graph of a linear equations in two variables. Select the equation whose graph is from the choices given below : (1)

- (A) $x + y = 0$
(B) $y = 2x$
(C) $y = 2x + 1$
(D) $y = 2x - 4$



Alternative Question for Visually Challenged Students in lieu of Q. 7

Q7. For the linear equation $y = 2x$, one of the point lying on the given line is :

- (A) $(1, -2)$ (B) $(2, 1)$
(C) $(1, 2)$ (D) $(-4, 1)$

Q8. The point of the form $(a, -a)$ always lies on the line : (1)

- (A) $x = a$ (B) $y = -a$
(C) $x - y = 0$ (D) $x + y = 0$

Q9. The distance of point P $(-3, 4)$ from origin is : (1)

- (A) 3 units (B) 4 units
(C) 5 units (D) 7 units

Q10. The point whose coordinates are of the form (a, b) such that $ab < 0$ always lie in : (1)

- (A) I or II quadrant (B) III or IV quadrants
(C) I or III quadrant (D) II or IV quadrant

Q11. It is known that if $x + y = 10$ then $x + y + z = 10 + z$. The Euclid's axiom that illustrates this statement is : (1)

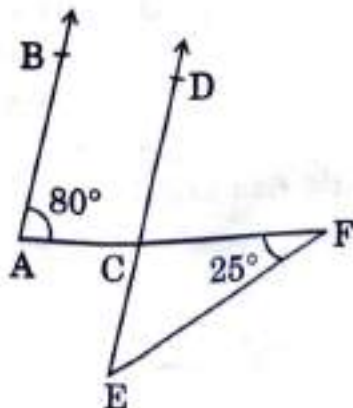
- (A) First Axiom (B) Second Axiom
(C) Third Axiom (D) Fourth Axiom

Q12. The complement of supplement of 105° is : (1)

- (A) 15° (B) 75° (C) 90° (D) 180°

Q13. In the figure given below, $AB \parallel CD$. If $\angle CAB = 80^\circ$ and $\angle EFC = 25^\circ$ then the measure of $\angle CEF$ is : (1)

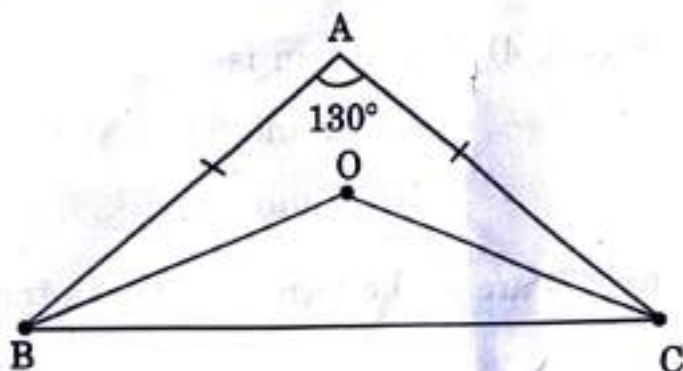
- (A) 45°
(B) 55°
(C) 65°
(D) 75°



Q14. If $\triangle ABC \cong \triangle DEF$, $DE = 6$ cm, $EF = 9$ cm and $AC = 12$ cm, then the perimeter of $\triangle ABC$ is : (1)

- (A) 24 cm (B) 25 cm
(C) 26 cm (D) 27 cm

Q15. In an isosceles $\triangle ABC$, $AB = AC$ and $\angle A = 130^\circ$. If BO and CO are bisectors of $\angle ABC$ and $\angle ACB$ respectively, then the measure of $\angle BOC$ is : (1)



- (A) 50° (B) 65°
(C) 145° (D) 155°

Q16. In $\triangle ABC$ and $\triangle PQR$, $AB = QR$, $BC = PR$ and $CA = PQ$, then : (1)

- (A) $\triangle ABC \cong \triangle PQR$ (B) $\triangle CBA \cong \triangle PRQ$
(C) $\triangle BAC \cong \triangle RPQ$ (D) $\triangle BCA \cong \triangle PQR$

Q17. The perimeter of an equilateral triangle is 60 cm. The area of the triangle is : (1)

- (A) $10\sqrt{3}$ cm² (B) $15\sqrt{3}$ cm²
(C) $20\sqrt{3}$ cm² (D) $100\sqrt{3}$ cm²

Q18. An isosceles right triangle has area 8 cm². The length of its hypotenuse is: (1)

- (A) $\sqrt{32}$ cm (B) $\sqrt{16}$ cm
(C) $\sqrt{24}$ cm (D) $\sqrt{48}$ cm

Directions : In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option :

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).
- (C) Assertion (A) is true but Reason (R) is false.
- (D) Assertion (A) is false but Reason (R) is true.

Q19. Assertion (A) : The equation of x -axis is $y = 0$. (1)

Reason (R) : The line representing the equation $x = a$, where a is any real number is parallel to y -axis.

Q20. Assertion (A) : Two distinct lines cannot have more than one point in common. (1)

Reason (R) : A unique line passes through two distinct points.

SECTION-B

(Section B consists of 5 questions of 2 marks each).

Q21. If $2^{3x} \times 4^x = (8)^{\frac{1}{3}} \times (64)^{\frac{1}{6}}$, then find the value of 'x'. (2)

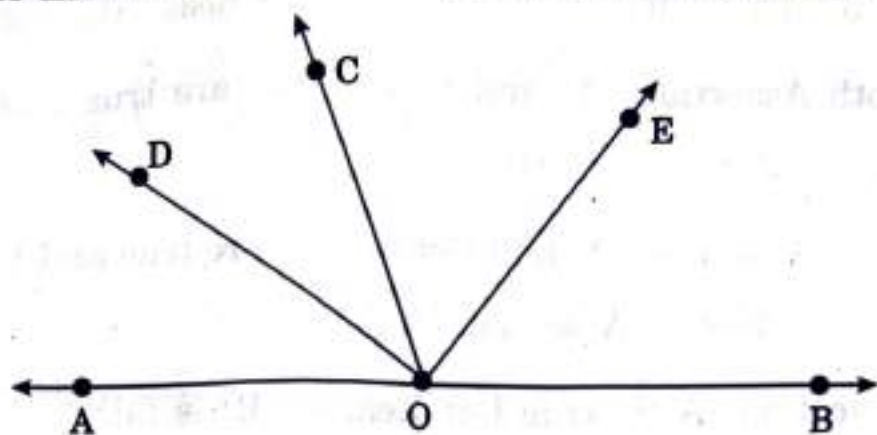
Q22. (A) Evaluate : $(125)^3 - (117)^3 - (8)^3$, using suitable algebraic identity.

OR

(B) Factorise : $8x^3 - 27y^3 + 18xy + 1$ (2)

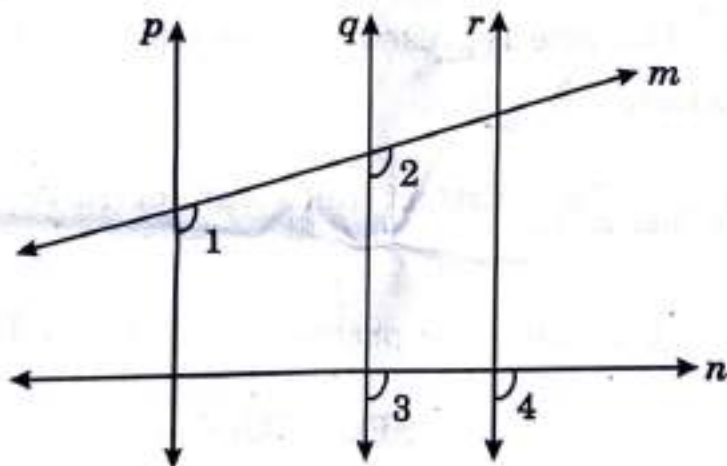
Q23. Find the coordinates of the points where the graph of the equation $3x - 2y + 6 = 0$ intersects with x -axis and y -axis respectively. (2)

- Q24. (A)** In the figure given below, a ray OC stands on line AOB . OD and OE are the bisectors of $\angle AOC$ and $\angle BOC$ respectively. Prove that $\angle DOE$ is a right angle.



OR

- (B)** In figure given below, $\angle 1 = \angle 2$ and $\angle 3 = \angle 4$. Prove that line p is parallel to line r .



(2)

Alternative Question for Visually Challenged Students in lieu of Q. 24(B)

- Q24. (B)** If one of the four angles formed by two intersecting lines is a right angle, then show that each of the four angles is a right angle.
- Q25.** Prove that any point on the perpendicular bisector of a line segment is equidistant from its end points. (2)

SECTION-C

(Section C consists of 6 questions of 3 marks each).

- Q26.** Express the value of $0.\bar{6} + 0.4\bar{7}$ in the form of $\frac{p}{q}$. (3)
- Q27.** Represent $\sqrt{7.9}$ on the number line. (3)

Alternative Question for Visually Challenged Students in lieu of Q. 27

Q27. If $x^2 + \frac{1}{x^2} = 34$, find $x^3 + \frac{1}{x^3} - 9$

Q28. Factorize : $9x^3 - 3x^2 - 5x - 1$ (3)

Q29. (A) If $(6, 5)$ is a solution of the equation $(2k + 1)x - (k + 1)y = 15$, find the value of ' k '. Hence, write the resultant equation.

OR

(B) Express $2(x + 3) = 3(y + 2)$ in standard form $ax + by + c = 0$. Write values of a , b and c . Also, check whether the line representing the given equation passes through the origin. (3)

Q30. If $P(a + 1, 4) = Q(3, b - 2)$, then find the value of ' ab '. Also, write coordinates of the reflection of point $R(a, b)$ in x -axis. (3)

Q31. (A) The perimeter of an isosceles triangle is 32 cm. The ratio of the equal side to its base is 3 : 2. Find the area of the triangle.

OR

(B) The perimeter of a triangle is 50 cm. One side of a triangle is 4 cm longer than the smaller side and the third side is 6 cm less than twice the smaller side. Find the area of the triangle. (3)

SECTION-D

(Section D consists of 4 questions of 5 marks each).

Q32. (A) If $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$ and $y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$,

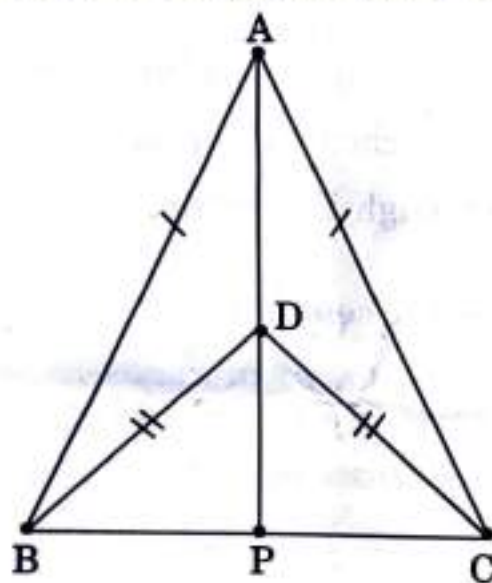
then find the value of $x^2 - y^2$. (5)

OR

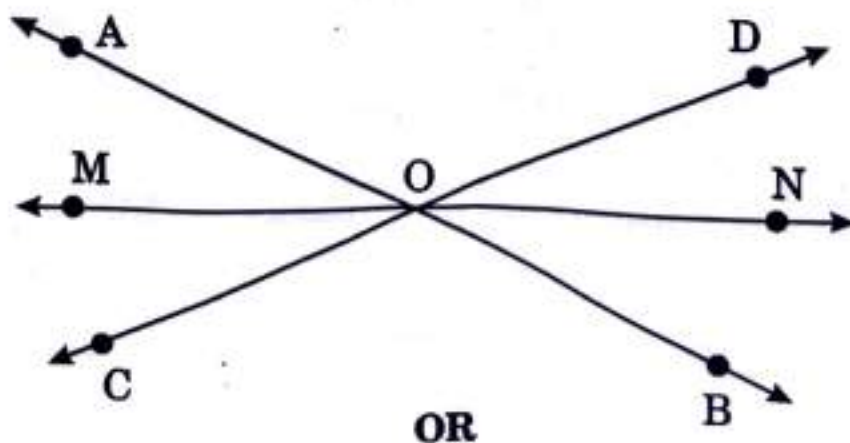
(B) If $a = 3 + 2\sqrt{2}$, then find the value of $a^3 + \frac{1}{a^3}$.

Q33. If $2x^3 + ax^2 + bx - 6$ has $(x - 1)$ as a factor and leaves a remainder '2' when divided by $(x - 2)$, find the relation between 'a' and 'b'. Also, find the values of a and b. (5)

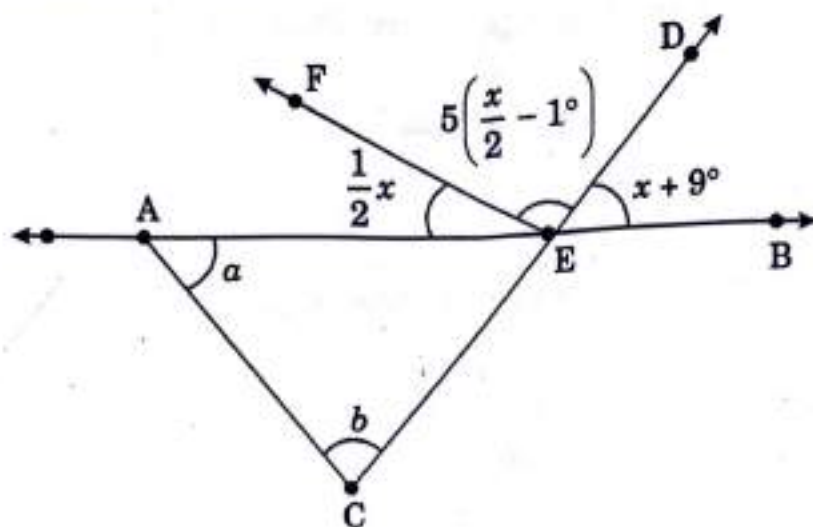
Q34. In the figure given below, $\triangle ABC$ and $\triangle DBC$ are two isosceles triangles on the same base BC and the vertices A and D are on the same side of BC. AD is extended to intersect BC at P, prove that AP is perpendicular bisector of BC. (5)



Q35. (A) Prove that if two lines intersect, each pair of vertically opposite angles are equal. In the figure given below, lines AB and CD intersect at point O. OM and ON bisect the pair of vertically opposite angles $\angle AOC$ and $\angle BOD$ respectively. Prove that MON is a straight line.



- (B) In the figure given below, lines AB and CD intersect at point E. Find the value of $(a + b)$.



(5)

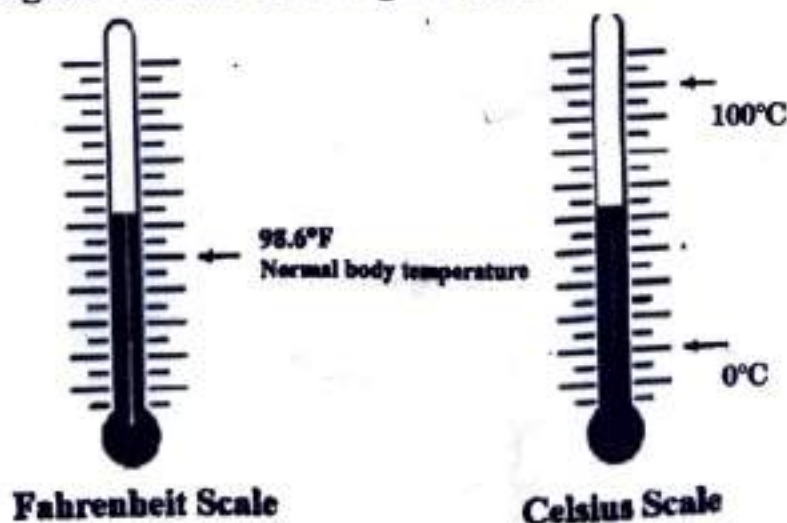
Alternative Question for Visually Challenged Students in lieu of Q. 35(B)

- Q35.** AD and BE are respectively altitudes of a triangle ABC such that $AE = BD$. Angle A and angle B are base angles of $\triangle ABC$. Prove that $AD = BE$.

SECTION-E

(Section E consists of 3 case study based questions of 4 marks each).

- Q36.** The definition of temperature says that it is a measure of the hotness and coldness of a body. The two main units we often use to measure temperature are degree Celsius and degree Fahrenheit.



The linear equation that converts Fahrenheit (F) to Celsius (C) is given by

$$^{\circ}\text{C} \times 1.8 = ^{\circ}\text{F} - 32$$

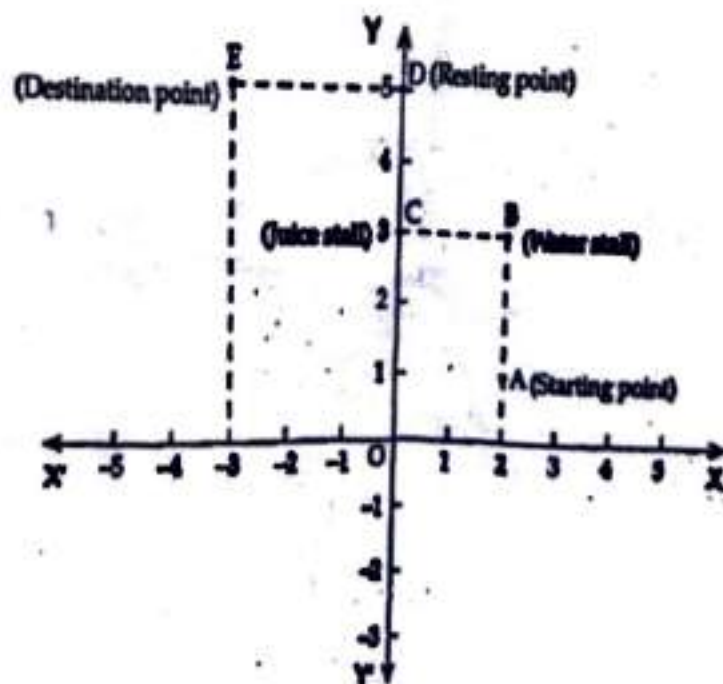
Based on the above information, answer the following questions :

- (i) Convert the normal body temperature in degree Celsius. (1)
- (ii) If the room temperature on a day is 35°C , then what will be its value in Fahrenheit scale? (1)
- (iii) (A) Convert the freezing point and boiling point of water in Fahrenheit scale.

OR

- (B) What is the numerical value of the temperature which is same in both the scales? (2)

37. To keep herself fit, Sumati used to walk 5 km daily. On one particular day, Sumati participated in a marathon. The organizers used a coordinate plane to mark the course of the marathon. The path for the marathon is as follows:



Scale : one unit on the plane represents 1 km

The starting point is A. At B, there is a water stall to keep the participants hydrated. There is a juice stall at point C to keep them energetic. At D, there is a rest point for those who want to take rest in between. E is the final destination point.

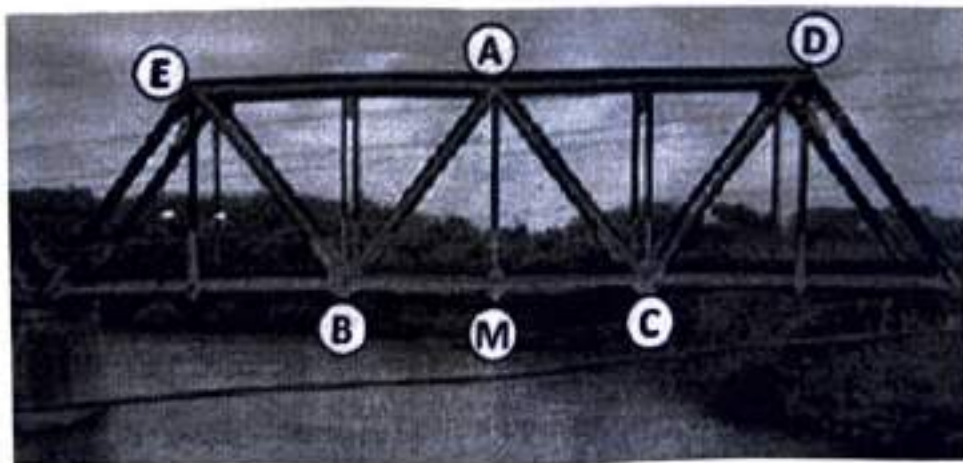
Based on the above situation, answer the following questions :

- (i) What are the coordinates of the point where juice stall is installed? (1)
- (ii) Write the quadrant in which destination point lie. (1)
- (iii) (A) Find the distance which each participant has to cover to reach the resting point.

OR

- (B) Find the distance which each participant has to cover to reach the destination point from water stall. (2)

Q38. Truss bridges are formed with a structure of connected elements that form triangular structures to make up the bridge. Trusses are the triangles that connect to the top and bottom cord and two end posts. You can see that there are some triangular shapes as shown in the picture given below and these are represented as $\triangle ABC$, $\triangle CAD$ and $\triangle ABE$.



Based on the above situation, answer the following questions :

- (i) If $AB = CD$ and $AD = BC$, by which congruency rule $\triangle ABC \cong \triangle CDA$? (1)
- (ii) If $BE = AC$ and $\angle EBA = \angle BAC$, by which congruency rule $\triangle EBA \cong \triangle CAB$? (1)

(iii) (A) If $AM \perp BC$ and $AB = AC$, prove that AM bisects BC .

OR

(B) If A is the mid point of DE , $BE \parallel CA$ and $AB \parallel DC$ show that
 $EB = AC$. (2)

Alternative Question for Visually Challenged Students in lieu of Q. 38

Q38. A civil engineer is designing supports for a small wooden bridge. To make the bridge strong, triangular frames are used. Each support is divided into two smaller triangles using a diagonal beam. The engineer explains to the workers how the strength of the bridge depends on the fact that the two triangles formed are congruent.

Answer the following questions :

- (i) If two triangles have all three sides equal to each other, by which congruence rule can they be proved congruent? (1)
- (ii) Two triangular frame of the bridge have two angles and the included side equal to each other. By which congruence rule can we prove the triangles congruent? (1)
- (iii) In an isosceles triangle support, ABC where $AB = AC$ and a line segment drawn from vertex A to midpoint D of base BC . Show that $\triangle ABD \cong \triangle ACD$. Write the congruence condition also.

OR

In a triangular support PQR , the engineer draws the perpendicular bisector PS from vertex P to the base QR . Prove that $\triangle PQS \cong \triangle PRS$. Write the congruence condition also.

