

MATHEMATICS
WORKSHEET_061125
INTRODUCTION TO 3-DIMENSIONAL GEOMETRY

SUBJECT: MATHEMATICS

MAX. MARKS : 40

CLASS : XI

DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 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. The two vertices of a triangle are (4, 2, 1) and (5, 1, 4). If the centroid is (5, 2, 3), then the third vertex is
(a) (3, 4, 5) (b) (6, 2, 3) (c) (6, 3, 2) (d) (6, 3, 4)
2. If the distance between the points (a, 0, 1) and (0, 1, 2) is $\sqrt{27}$, then the value of a is
(a) 5 (b) ± 5 (c) -5 (d) None of these
3. M is the foot of the perpendicular drawn from the point A(6, 7, 8) on the yz-plane. What are the coordinates of point M?
(a) (6, 0, 0) (b) (6, 7, 0) (c) (6, 0, 8) (d) (0, 7, 8)
4. L is the foot of the perpendicular drawn from a point (3, 5, 6) on x-axis. The coordinates of L are
(a) (3, 0, 0) (b) (0, 6, 0) (c) (0, 0, 5) (d) (0, 5, 6)
5. What is the perpendicular distance of the point (6, 7, 8) from xy-plane?
(a) 8 units (b) 7 units (c) 6 units (d) 5 units
6. Find the equation of the set of the points P such that its distances from the points A(3, 4, -5) and B(-2, 1, 4) are equal.
(a) $10x + 6y - 18z - 29 = 0$ (b) $10x + 18y - 6z - 29 = 0$
(c) $5x + 3y - 9z - 29 = 0$ (d) $10x + 6y - 18z - 45 = 0$
7. Determine the point in yz-plane which is equidistant from three points A(2, 0, 3), B(0, 3, 2) and C(0, 0, 1).
(a) (0, 1, 3) (b) (1, 0, 3) (c) (0, 2, 3) (d) (0, 3, 1)
8. Find the distance between the points P(1, -3, 4) and Q(-4, 1, 2).
(a) $\sqrt{5}$ units (b) $5\sqrt{3}$ units (c) $3\sqrt{5}$ units (d) $2\sqrt{2}$ units

For Q9 and Q10, 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 points A(1, -1, 3), B(2, -4, 5) and C(5, -13, 11) are collinear.

Reason (R): If $AB + BC = AC$, then A, B, C are collinear.

10. Assertion (A): The foot of perpendicular drawn from the point A(1, 2, 8) on the xy-plane is (1, 2, 0).

Reason (R): Equation of xy-plane is $y = 0$.

SECTION – B

Questions 11 to 14 carry 2 marks each.

- 11.** Find the point on z-axis which is equidistant from (1, 5, 7) and (5, 1, -4).
- 12.** Find the coordinates of a point which divides the line segment joining the points (5, 4, 2) and (-1, -2, 4) in the ratio 2 : 3 externally.
- 13.** Three consecutive vertices of a parallelogram ABCD are A (3, -1, 2), B (1, 2, -4) and C(-1, 1, 2). Find the fourth vertex.
- 14.** Find the ratio in which the line segment joining the points (2, 4, 5) and (3, 5, -4) is divided by the XY-plane.

SECTION – C

Questions 15 to 17 carry 3 marks each.

- 15.** Show that the points (-2, 6, -2), (0, 4, -1), (-2, 3, 1) and (-4, 5, 0) are vertices of a square.
- 16.** Determine the point on XY-plane which is equidistant from three points A (2, 0, 3), B (0, 3, 2) and C (0, 0, 1).
- 17.** Find the equation of the set of points P such that $PA^2 + PB^2 = 2k^2$, where A and B are the points (3, 4, 5) and (-1, 3, -7) respectively.

SECTION – D

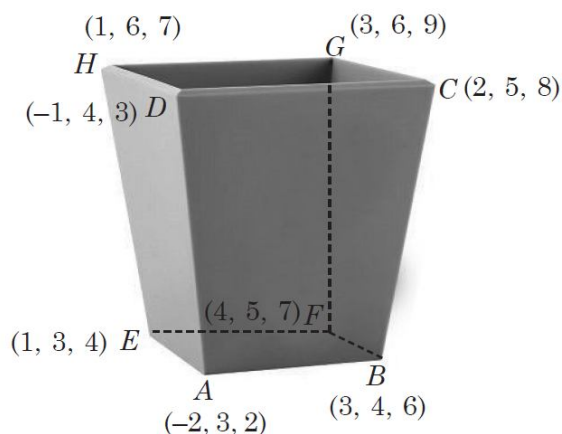
Questions 18 carry 5 marks.

- 18.** (a) Using section formula, prove that the three points (-2, 3, 5), (1, 2, 3) and (7, 0, -1) are collinear.
(b) Centroid of a triangle with vertices (a, 1, 3), (-2, b, -5) and (4, 7, c), is origin. Find the values of a, b, c.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

- 19.** Ravi makes a plan to gift his friend a hand made pen-stand of the trapezoidal shape given in the figure:



The vertices of the pen-stand are $A(-2, 3, 2)$, $B(3, 4, 6)$, $C(2, 5, 8)$, $D(-1, 4, 3)$, $E(1, 3, 4)$, $F(4, 5, 7)$, $G(3, 6, 9)$ and $H(1, 6, 7)$.

On the basis of above information, answer the following:

- (i) Find the coordinates of the point which divides the line segment EH in 2 : 1. (1)
- (ii) Find the length of foot of perpendicular drawn from C on y-axis. (1)
- (iii) Find the ratio in which the line segment joining the vertices E and F is divided by yz-plane externally. (2)

20. A parent decorates his son's room for his birthday celebration. During the decoration he arranged the balloons hanging from the ceiling. Now assuming balloons as points in space, they lie on the same line and the co-ordinate for three balloons (points) are $A(3, 2, -4)$, $B(5, 4, -6)$ and $C(9, 8, -10)$.



On the basis of above information, answer the following:

- (i) What is the distance between points A and B ? (1)
- (ii) What is the distance between points B and C? (1)
- (iii) In what ratio does the point $B(5, 4, -6)$ divides line segment AC? (2)

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