

MATHEMATICS
WORKSHEET_170324
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. 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
2. If the point A (3, 2, 2) and B (5, 5, 4) are equidistant from P, which is on X-axis, then the coordinates of P are
(a) (39/4, 2, 0) (b) (49/4, 2, 0) (c) (39/4, 0, 0) (d) (49/4, 0, 0)
3. The points (5, -1, 1), (7, -4, 7), (1, -6, 10) and (-1, -3, 4) are
(a) the vertices of a rectangle (b) the vertices of a square
(c) the vertices of a rhombus (d) None of these
4. The ratio in which the line joining (2, 4, 5) and (3, 5, -4) is divided by the YZ-plane, is
(a) 2 : 3 (b) 3 : 2 (c) -2 : 3 (d) 4 : -3
5. The coordinate of the point P which divides the line joining the points A(-2, 0, 6) and B(10, -6, -12) internally in the ratio 5 : 1.
(a) (8, 5, 9) (b) (-8, 5, 9) (c) (8, -5, -9) (d) None of these
6. L is the foot of the perpendicular drawn from a point P (6, 7, 8) on the XY-plane, then the coordinates of point L are
(a) (6, 0, 0) (b) (6, 7, 0) (c) (6, 0, 8) (d) None of these
7. The point (-2, -3, -4) lies in the
(a) first octant (b) seventh octant (c) second octant (d) eighth octant
8. The point on Y-axis which is at a distance $\sqrt{10}$ from the point (1, 2, 3), is
(a) (0, 2, 0) (b) (0, 0, 2) (c) (0, 0, 3) (d) None of these

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 distance between the points $(1 + \sqrt{11}, 0, 0)$ and $(1, -2, 3)$ is $2\sqrt{6}$ units.

Reason (R): Distance between any two points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ is,

$$|AB| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

10. **Assertion (A):** The points $A(3, -1, 2)$, $B(1, 2, -4)$, $C(-1, 1, 2)$ and $D(1, -2, 8)$ are the vertices of a parallelogram.

Reason (R): Coordinates of mid-point of a line joining the points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A point R with x-coordinate 4 lies on the line segment joining the points $P(2, -6, 4)$ and $Q(8, 6, 10)$. Find the coordinates of the point R.
12. Find the coordinates of the point which divides the join of $P(2, -1, 4)$ and $Q(4, 3, 2)$ in the ratio 2 : 3 externally.
13. Find the point on y-axis which is equidistant from the point $A(3, 2, 2)$ and $B(5, 5, 4)$.
14. Show that the points $A(0, 7, 10)$, $B(-1, 6, 6)$ and $C(-4, 9, 6)$ form an isosceles right-angled triangle.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Find the points of trisection of the segment joining the points $A(1, 0, -6)$ and $B(-5, 9, 6)$.
16. Find the equation of the set of points which are equidistant from the points $(1, 2, 3)$ and $(3, 2, -1)$.
17. Find the ratio in which the join of $A(2, 1, 5)$ and $B(3, 4, 3)$ is divided by the plane $2x + 2y - 2z = 1$. Also, find the coordinates of the point of division.

SECTION – D

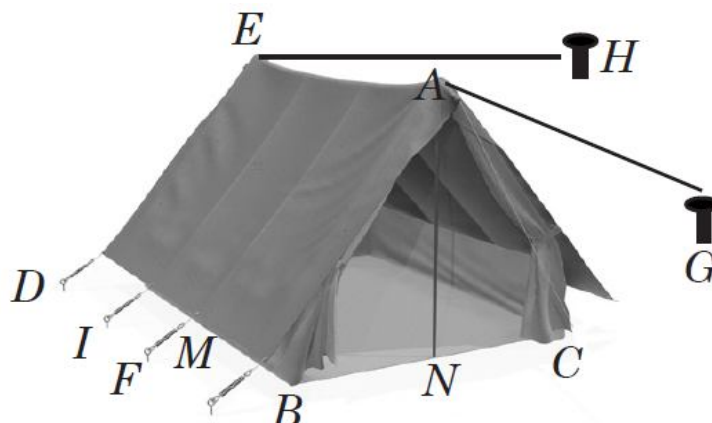
Questions 18 carry 5 marks.

18. The midpoints of the sides of a triangle are $(1, 5, -1)$, $(0, 4, -2)$ and $(2, 3, 4)$. Find its vertices.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

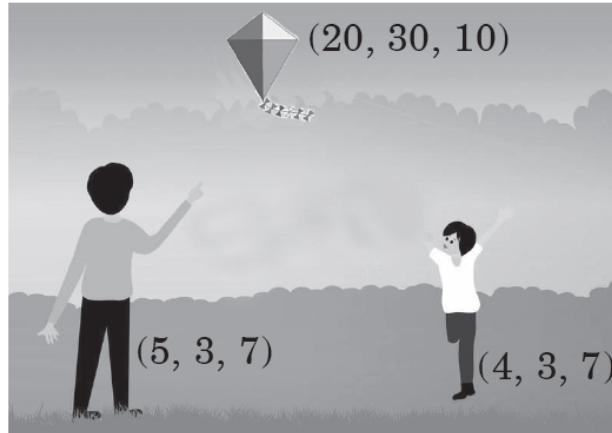
19. Deepak and his friends went for camping for 2 or 3 days. There they set up a tent which is triangular in shape. The vertices of the tent are $A(4, 5, 9)$, $B(3, 2, 5)$, $C(5, 2, 5)$, $D(-3, 2, -5)$ and $E(-4, 5, -9)$ respectively. The vertex A is tied up by the rope at the ends F and G and the vertex E is tied up at the ends I and H.



On the basis of above information, answer the following:

- (i) If M denotes the position of their bags inside the tent and it is just in middle of the vertices B and D, then find the coordinates of M. (1)
- (ii) Find the length AE. (1)
- (iii) If the length of the rope by which E is tied up with H is $5\sqrt{2}$ units, then the equation denotes the set of point of H (2)

20. Raj and his father were walking in a large park. They saw a kite flying in the sky. The position of kite, Raj and Raj's father are at $(20, 30, 10)$, $(4, 3, 7)$ and $(5, 3, 7)$ respectively.



On the basis of above information, answer the following:

- (i) Find the distance between Raj and kite. Also find the distance between Raj's father and kite. (2)
- (ii) Find the form of the co-ordinates of points in the XY-plane (1)
- (iii) If co-ordinates of kite, Raj and Raj's father form a triangle, then find the centroid of it. (1)

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