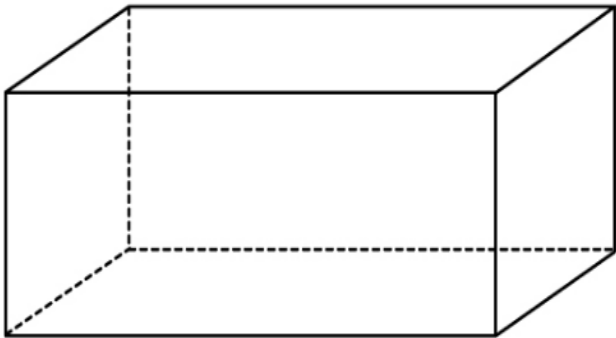




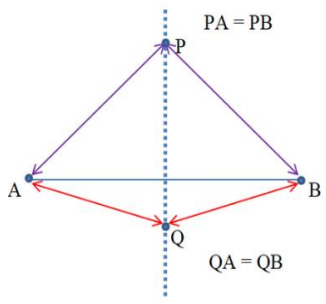

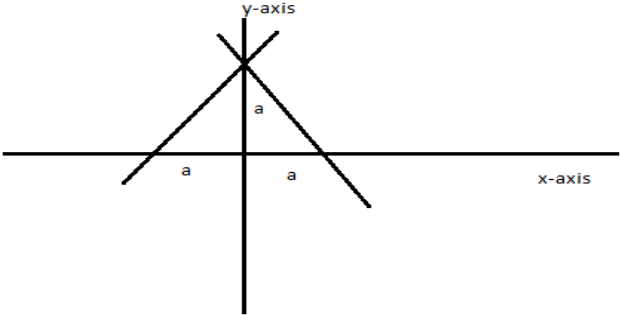


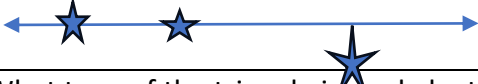
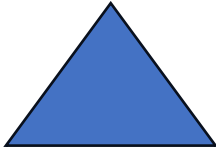
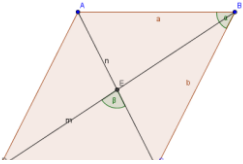
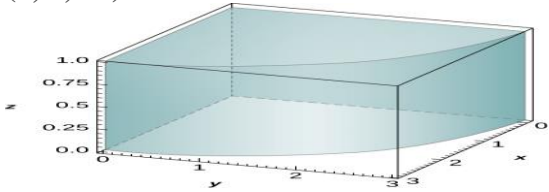


CHAPTER-12  
INTRODUCTION TO 3D  
02 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	 <p>If a rectangular parallelepiped is formed by planes drawn through the points <math>(2, 3, 5)</math> and <math>(5, 9, 7)</math> parallel to the coordinate planes, then find the length of edges of a parallelepiped and the length of the diagonal.</p>	2
2.	<p>Ritika starts walking from his house to shopping mall. Instead of going to the mall directly, she first goes to a ATM, from there to her daughter school and then reaches the mall. In the diagram A, B, C and D represents the coordinates of house, ATM, school and mall respectively.</p> <p>(a) Find the distance between house (A) and ATM(B). (b) Find the distance between ATM(B) and school (C).</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">               A(1,1,1)         </div> <div style="text-align: center;">               B(-2,4,1)         </div> <div style="text-align: center;">               C(-1,5,5)         </div> <div style="text-align: center;">               D(2,2,2)         </div> </div>	2
3.	<p>In today's world, children want to know how one concept can be related with other or in other words how we can integrate different fields of knowledge. When we talk about 3-dimensional geometry, we took for similarities and how one concept can be represented in different forms.</p>  <p>Find the equation of the set of points which are equidistant from the points A <math>(1, 2, 3)</math> and B <math>(3, 2, -1)</math>.</p>	2
4.	<p>The government of india is planning to fix a hoarding board at the face of a building on the road of a busy market for the awareness on COVID-19 protocol. Ram, Robert and Rahim are</p>	2

	<p>the three engineers who are working on this project. A is considered to be a person viewing the hoarding board 20metres away from the building, standing at the edge of a pathway nearby. Ram, Robert and Rahim suggested to firm to place the hoarding board at three different locations namely P, Q and R. we have to prove that P (3, 2, -4), Q (5, 4, -6) and R (9, 8, -10) are collinear. Find the ratio in which Q divides PR.</p>	
5.	<p>Teacher ask a question to the students, He said three trees are at the position of points A, B and C. Prove that the points: A (0, 7, 10), B (-1, 6, 6) and C (-4, 9, 6) are the vertices of a right-angled triangle.</p>	2
6.	<p>The top and bottom line of a designer wall is in the form of a square. If the lines are along <math>5x - 12y + 26 = 0</math> and <math>5x - 12y - 65 = 0</math> then find area of the wall ?</p>	2
7.	<p>If the image of bird at (3, 8) with respect to a line mirror <math>ax + 3y - 7 = 0</math> is the point (-1, - 4) then find the value of a?</p> 	2
8.	<p>If the lines <math>y = 3x + 1</math> and <math>2y = x + 3</math> are equally inclined to the line <math>y = mx + 4</math>, find the value of m.</p> 	2
9.	<p>If the image of KAPIL's position at (2, 1) in a line mirror is (4, 3), then find the equation of the line mirror.</p> 	2
10.	<p>At Indo-China Border Landmines are planted in the form of a Square. With respect to point of intersection of the lines <math>x = 0</math>, <math>y = 0</math>, <math>x = 1</math> and <math>y = 1</math> , find the equations of diagonals of the square ?</p>	2

		
11.	Find the point on x-axis which is equidistant from the points $A(0,3,2)$ and $B(5,0,4)$	2
12.	Find the length of the perpendicular drawn from the point $P(2,3,4)$ on Y-axis	2
13.	Using distance formula, check whether the points $A(0,3,5)$ $B(1,0,3)$ and $(7,0,1)$ are collinear or not.	2
14.	Find the length of the longest piece of a string that can be stretched straight in a rectangular room whose dimensions are 13,10 and 8 unit.	2
15.	Find the distance between the points $P ( 2,4,5 )$ and $( 1,4,3)$	2
16.	Let L,M,N be the feet of the perpendiculars drawn from a point $P(3,4,5)$ on the X,Y and Z-axes respectively. Find the coordinate of L,M and N.	2
17.	Find the point on X axis which is equidistant from the points $A(3,2,2)$ and $B(5,5,4)$ .	2
18.	Find the centroid of a triangle, the mid-point of whose sides are $D(1,2,-3),E(3,0,1)$ and $F(-1,1,-4)$	2
19.	Find the vertex of triangle whose centroid is origin and two vertices are $(2, 4, 6)$ and $(0,-2, 5)$ .	2
20.	Show that $D(-1,4,-3)$ is the circumcentre of $\Delta ABC$ with vertices $A(3,2,-5)$ , $B(-3,8,-5)$ and $C(-3,2,1)$	2
21.	Given that $P ( 3, 2, -4)$ , $Q ( 5, 4, -6)$ and $R ( 9, 8, -10)$ are collinear. Find the ratio in which Q divides PR.	2
22.	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.	2
23.	Are the points $A ( 3, 6, 9)$ , $B ( 10, 20, 30)$ and $C ( 25, - 41, 5)$ , the vertices of a right angled triangle?	2
24.	Two vertices of a parallelogram are $(2,5, -3)$ and $(3,7, -5)$ ; if its diagonals meet at $(4,3,3)$ ; find the coordinates of the other two vertices.	2
25.	Find the equation of the curve formed by the set of all those points the sum of whose distances from the points $A(4,0,0)$ and $B(-4,0,0)$ is 10units.	2
26.	For what value of a the points $(a,-1,3), (2,-4,5)$ and $(5,-13,11)$ are collinear? 	2
27.	What type of the triangle is made by the point $(1,2,3)$ , $(2,3,1)$ and $(3,1,2)$ ? 	2

28.	<p>If three consecutive vertices of parallelogram are <math>(3, -1, 2)</math>, <math>(1, 2, -4)</math> and <math>(-1, 1, 2)</math>, find the fourth vertex?</p> 	2
29.	<p>Find the equation of the set of points which are equidistant from the points <math>(1, 2, 3)</math> and <math>(3, 2, -1)</math>.</p> 	2
30.	<p>If <math>A (-2, 2, 3)</math> and <math>B (13, -3, 13)</math> are two points. Find the locus of a point <math>P</math> which moves in such a way that <math>3PA = 2PB</math>.</p>	2
31.	<p>If <math>A (1, -3, 2)</math> and <math>B (-2, 5, -1)</math> are the endpoints of a diameter of a sphere, find the coordinates of its center.</p>	2
32.	<p>Find the locus of the point which is equidistant from the point <math>A (0, 2, 3)</math> and <math>B (2, -2, 1)</math></p>	2
33.	<p>Determine the ratio in which the line joining <math>A (2, 1, -3)</math> and <math>B (4, -1, 5)</math> is divided by the <math>x</math> <math>y</math>-plane.</p>	2
34.	<p>If the points <math>A(1, 2, 3)</math>, <math>B(4, 5, 6)</math>, and <math>C(7, 8, 9)</math> are collinear, then the value of <math>k</math> in the equation <math>B = A + k(C - A)</math> is</p>	2
35.	<p>Find the coordinates of the foot of the perpendicular drawn from the point <math>A (4, -3, 5)</math> to the <math>y</math>-<math>z</math> plane</p>	2

**ANSWERS:**

Q. NO	ANSWER	MARKS
1.	Let $A = (2, 3, 5)$ , $B = (5, 9, 7)$ To find the length of the edges of a parallelepiped = $5 - 2, 9 - 3, 7 - 5$ It means that 3, 6, 2. Now, to find the length of a diagonal = $\sqrt{3^2 + 6^2 + 2^2}$ $= \sqrt{9+36+4} = \sqrt{49} = 7$ Therefore, the length of a diagonal of a parallelepiped is 7 units.	2
2.	(i) $A = (1,1,1)$ and $B = (-2,4,1)$ $AB = \sqrt{(-2 - 1)^2 + (4 - 1)^2 + (1 - 1)^2}$ $= \sqrt{(-3)^2 + 3^2 + 0} = \sqrt{9 + 9} = \sqrt{18} = 3\sqrt{2}$ (i) $B = (-2,4,1)$ and $C = (-1,5,5)$ $BC = \sqrt{(-1 + 2)^2 + (5 - 4)^2 + (5 - 1)^2}$ $= \sqrt{1 + 1 + 16} = \sqrt{18} = 3\sqrt{2}$	2
3.	<b>Solution:</b> Assume that P (x, y, z) be the point that is equidistant from two points A (1, 2, 3) and B(3, 2, -1). Thus, we can say that, PA = PB Take square on both the sides, we get $PA^2 = PB^2$ It means that, $(x-1)^2 + (y-2)^2 + (z-3)^2 = (x-3)^2 + (y-2)^2 + (z+1)^2$ $\Rightarrow x^2 - 2x + 1 + y^2 - 4y + 4 + z^2 - 6z + 9 = x^2 - 6x + 9 + y^2 - 4y + 4 + z^2 + 2z + 1$ Now, simplify the above equation, we get: $\Rightarrow -2x - 4y - 6z + 14 = -6x - 4y + 2z + 14$ $\Rightarrow -2x - 6z + 6x - 2z = 0$ $\Rightarrow 4x - 8z = 0$ $\Rightarrow x - 2z = 0$ Hence, the required equation for the set of points is $x - 2z = 0$ .	2
4.	Assume that the point Q (5, 4, -6) divides the line segment joining points P (3, 2, -4) and R (9, 8, -10) in the ratio k:1. Therefore, by using the section formula, we can write it as: $(5, 4, -6) = [ (k(9)+3)/(k+1), (k(8)+2)/(k+1), (k(-10)-4)/(k+1) ]$ $\Rightarrow (9k+3)/(k+1) = 5$ Now, bring the L.H.S denominator to the R.H.S and multiply it $\Rightarrow 9k+3 = 5k+5$ Now, simplify the equation to find the value of k. $\Rightarrow 4k = 2$ $\Rightarrow k = 2/4$ $\Rightarrow k = 1/2$ Therefore, the value of k is $1/2$ .	2

	Hence, the point Q divides PR in the ratio of 1:2.	
5.	<p>Let the given points be A = (0, 7, 10), B = (-1, 6, 6), and C = (-4, 9, 6)</p> <p>Now, find the distance between the points</p> <p><b>Finding for AB:</b></p> $AB = \sqrt{[(-1-0)^2 + (6-7)^2 + (6-10)^2]}$ $AB = \sqrt{[(-1)^2 + (-1)^2 + (-4)^2]}$ $AB = \sqrt{1+1+16}$ $AB = \sqrt{18}$ $AB = 3\sqrt{2} \dots (1)$ <p><b>Finding for BC:</b></p> $BC = \sqrt{[(-4+1)^2 + (9-6)^2 + (6-6)^2]}$ $BC = \sqrt{[(-3)^2 + (3)^2 + (-0)^2]}$ $BC = \sqrt{9+9}$ $BC = \sqrt{18}$ $BC = 3\sqrt{2} \dots (2)$ <p><b>Finding for CA:</b></p> $CA = \sqrt{[(0+4)^2 + (7-9)^2 + (10-6)^2]}$ $CA = \sqrt{[(4)^2 + (-2)^2 + (4)^2]}$ $CA = \sqrt{16+4+16}$ $CA = \sqrt{36}$ $CA = 6 \dots (3)$ <p>Now, by Pythagoras theorem,</p> $AC^2 = AB^2 + BC^2 \dots (4)$ <p>Now, substitute (1),(2), and (3) in (4), we get:</p> $6^2 = (3\sqrt{2})^2 + (3\sqrt{2})^2$ $36 = 18+18$ $36 = 36$ <p>The given points obey the condition of Pythagoras Theorem. Hence, the given points are the vertices of a right-angled triangle.</p>	2
6.	<p>Each side = distance between parallel lines <math>= (26+65)/\sqrt{5^2 + 12^2} = 7</math></p> <p>Area of the square <math>(side)^2 = 49</math></p>	1 1
7.	<p>Midpoint of AB (where A(3,8) and B(-1,-4) ) is C(1,2)</p> <p>Eq. of perpendicular bisector <math>ax+3y-7=0</math> passes through C(1,2)</p> <p>Hence a=1</p>	1 +1
8.	<p>Angle between lines <math>y = 3x + 1</math> and <math>y = mx + 4</math> is equal to Angle between lines <math>2y = x + 3</math> and <math>y = mx + 4</math></p> $\left  \frac{3-m}{1+3m} \right  = \left  \frac{m-1/2}{1+m/2} \right  \Rightarrow \frac{3-m}{1+3m} = \pm \frac{m-1/2}{1+m/2} \Rightarrow 5m^2 = -5 \text{ or } 7m^2 - 2m - 7 = 0$ $\Rightarrow m = \frac{1 \pm 5\sqrt{2}}{7}$	1 +1
9.	<p>Mid point of A(2,1) &amp; B(4,3) is C(3,2) <math>m(AB)=1, \Rightarrow m(\text{perpendicular})=-1</math> Eq. of perpendicular bisector <math>y-2=-1(x-3) \Rightarrow x+y-5=0</math></p>	1 +1
10.	<p>Vertices are intersection of lines <math>x=0, y=0, x=1</math> &amp; <math>y=1</math></p> <p>O(), A(1,0), B(1,1) &amp; C (0,1)</p> <p>Eq. of diagonals OB <math>y = \{(1-0)/(1-0)\}x</math> i.e. <math>y=x</math></p> <p>Eq. of diagonal AC <math>y-0 = \{(1-0)/(0-1)\}(x-1)</math> i.e. <math>x+y+1=0</math></p>	1 +1

11.	<p>Let P(x,0,0) be the point on x-axis which is equidistant from the point A(0,3,2) and B(5,0,4)</p> <p>AP=BP</p> $\sqrt{(X - 0)^2 + (0 - 3)^2 + (0 - 2)^2}$ $= \sqrt{(X - 5)^2 + (0 - 0)^2 + (0 - 4)^2}$ <p>Squaring on both sides</p> $= (x-0)^2+9+4 = (x-5)^2+0+16$ $= x^2 +13 = x^2 +25-10x+16$ $= 10x = 28$ $= x = \frac{14}{5}$ <p>Hence the required point is <math>(\frac{14}{5}, 0,0)</math></p>	2
12.	<p>Given point is P ( 2,3,4 )</p> <p>Let Q be the foot of perpendicular drawn from the point P( 2,3,4 ) on y-axis.</p> <p>Then the coordinates of Q are ( 0,3,0 )</p> <p>Hence, the length of the perpendicular is given by</p> $PQ = \sqrt{(0 - 2)^2 + (3 - 3)^2 + (0 - 4)^2}$ $= \sqrt{4 + 0 + 16} = \sqrt{20} \text{ units.}$	2
13.	<p>Given points are A(0,3,5) B(1,0,3) and C(7,0,1)</p> <p>Then <math>AB = \sqrt{(1 - 0)^2 + (0 - 3)^2 + (3 - 5)^2}</math></p> $= \sqrt{1 + 9 + 4} = \sqrt{14}$ $BC = \sqrt{(7 - 1)^2 + (0 - 0)^2 + (1 - 3)^2}$ $= \sqrt{36 + 0 + 4} = \sqrt{40} = 2\sqrt{10}$ $AC = \sqrt{(7 - 0)^2 + (0 - 3)^2 + (1 - 5)^2}$ $= \sqrt{49 + 9 + 16} = \sqrt{74}$ <p>Since, AB + BC is not equal to AC.</p> <p>Hence, the points A,B and C are not collinear.</p>	2
14.	<p>Since given dimensions are a=10 , b= 13 and c= 8</p> <p>∴ Required length of the string is <math>\sqrt{a^2 + b^2 + c^2}</math></p> <p>i.e., <math>\sqrt{(10)^2 + (13)^2 + (8)^2}</math></p> <p>i.e., <math>\sqrt{100 + 169 + 64} = \sqrt{333}</math> units</p> <p>i.e., the length of the longest piece of a string that can be stretched straight in a rectangular room with dimensions 10,13 and 8 are <math>\sqrt{333}</math> units</p>	2
15.	<p>Given points are P( 2,4,5 ) and Q ( 1,4,3 )</p> <p>Then, the distance between P and Q is given by</p> $PQ = \sqrt{(2 - 1)^2 + (4 - 4)^2 + (5 - 3)^2}$ $= \sqrt{1 + 0 + 4} = \sqrt{5} \text{ units}$	2
16.	L(3,0,0): M(0,4,0) and N(0,0,5)	2
17.	Let the point on X-axis be P(x,0,0)	2

	Then $(x-3)^2+(0-2)^2+(0-2)^2=(x-5)^2+(0-5)^2+(0-4)^2$ (49/4,0,0)	
18.	The centroid of a triangle is equal to the centroid of the triangle formed by mid-points of its sides. therefore The centroid of a triangle is (1,1,-2)	2
19.	$0 = \frac{x+2+0}{3} \Rightarrow x = -2$ ; $0 = \frac{y+4-2}{3} \Rightarrow y = -2$ ; $0 = \frac{z+6+5}{3} \Rightarrow z = -11$ Therefore Third vertex is (-2,-2,-11)	2
20.	Show that AD=BD=CD	2
21.	Assume that the point Q (5, 4, -6) divides the line segment joining points P (3, 2, -4) and R (9, 8, -10) in the ratio k:1.  Therefore, by using the section formula, we can write it as:  $(5, 4, -6) = [ \{k(9)+3\}/(k+1), \{k(8)+2\}/(k+1), \{k(-10)-4\}/(k+1) ]$ $\Rightarrow(9k+3)/(k+1) = 5$ $\Rightarrow 9k+3 = 5k+5$ $\Rightarrow 4k = 2$ $\Rightarrow k = 2/4$ $\Rightarrow k = 1/2$  Therefore, the value of k is $1/2$ . Hence, the point Q divides PR in the ratio of 1:2	2
22.	If P (x, y, z) be any point such that PA = PB.  $\sqrt{\{(x - 3) ^ 2 + (y - 4) ^ 2 + (z + 5) ^ 2\}} = \sqrt{\{(x + 2) ^ 2 + (y - 1) ^ 2 + (z - 4) ^ 2\}}$ or, $10x + 6y - 18z - 29 = 0$	2
23.	By the distance formula, we have $AB^2 = (10 - 3)^2 + (20 - 6)^2 + (30 - 9)^2$ $= 49 + 196 + 441$ $= 686$ $BC^2 = (25 - 10)^2 + (-41 - 20)^2 + (5 - 30)^2$ $= 225 + 3721 + 625$ $= 4571$ $CA^2 = (3 - 25)^2 + (6 + 41)^2 + (9 - 5)^2$ $= 484 + 2209 + 16$ $= 2709$ We find that , $CA^2 + AB^2 \neq BC^2$ .Hence, the triangle ABC is not a right angled triangle.	2
24.	Since the diagonals of a parallelogram bisect each other, the point O(4,3,3) is the mid points of the diagonals.Let the other two vertices of the parallelogram be C(x <sub>1</sub> , y <sub>1</sub> , z <sub>1</sub> ) and D(x <sub>2</sub> , y <sub>2</sub> , z <sub>2</sub> )A(2,5, -3)and B(3,7, -5) Since O(4,3,3) is the mid point of AC, $\frac{x_1+2}{2} = 4$ or, $x_1 = 6$ $\frac{y_1+5}{2} = 3$ or,	2



	$y_1 = 1$ $\frac{z_1 - 3}{2} = 3$ or, $z_1 = 9$ Again, $O(4,3,3)$ is the mid point of the diagonal BD, hence we have $\frac{x_2 + 3}{2} = 4$ or, $x_2 = 5$ $\frac{y_2 + 7}{2} = 3$ or $y_2 = -1$ $\frac{z_2 - 5}{2} = 3$ or $z_2 = 11$ Therefore the other two vertices of the parallelogram ABCD are $C(6,1,9)$ and $D(5, -1, 11)$ .	
25.	Let $P(x, y, z)$ be an arbitrary point on the given curve. Then $PA + PB = 10$ or, $\sqrt{(x - 4)^2 + y^2 + z^2} + \sqrt{(x + 4)^2 + y^2 + z^2} = 10$ or, $\sqrt{(x - 4)^2 + y^2 + z^2} = 10 - \sqrt{(x + 4)^2 + y^2 + z^2}$ On squaring both sides, $(x + 4)^2 + y^2 + z^2$ $= 100 + (x - 4)^2 + y^2 + z^2 - 20\sqrt{(x + 4)^2 + y^2 + z^2}$ or, $16x = 100 - 20\sqrt{(x + 4)^2 + y^2 + z^2}$ or, $5\sqrt{(x + 4)^2 + y^2 + z^2} = (25 - 4x)$ or, $25[(x - 4)^2 + y^2 + z^2] = 625 + 16x^2 - 200x$ or, $9x^2 + 25y^2 + 25z^2 - 225 = 0$ Hence the required equation of the curve is $9x^2 + 25y^2 + 25z^2 - 225 = 0$ .	2
26.	$a=1$	
27.	Equilateral triangle	
28.	$(1, -2, 8)$	
29.	$x - 2z = 0$	
30.	$x^2 + y^2 + z^2 + 28x - 12y + 10z - 247 = 0$	
31.	: The center of the sphere is $((1 - 2)/2, (-3 + 5)/2, (2 - 1)/2) = (-0.5, 1, 0.5)$ .	2
32.	Let $P(x, y, z)$ be any point which is equidistant from $A(0, 2, 3)$ and $B(2, -2, 1)$ . Then $PA = PB$ $\Rightarrow \sqrt{(x - 0)^2 + (y - 2)^2 + (z - 3)^2} = \sqrt{(x - 2)^2 + (y + 2)^2 + (z - 1)^2}$ $\Rightarrow 4x - 8y - 4z + 4 = 0$ or $x - 2y - z + 1 = 0$	2
33.	Answer: Step 1: Find the distance between point A and the xy-plane. - The distance between a point $(x_1, y_1, z_1)$ and the xy-plane ( $z = 0$ ) is given by: distance = $ z_1 $ . Step 2: Calculate the distance.	2

	<ul style="list-style-type: none"> <li>- Substituting the z-coordinate of point A: distance = <math> -3  = 3</math>.</li> <li>Step 3: Find the ratio.</li> <li>- The ratio is the part in which the line is divided by the xy-plane.</li> <li>- Ratio = Distance from A to xy-plane / Total distance between A and B = <math>3 / \text{Distance between A and B}</math>.</li> </ul>	
34.	1	2
35.	The foot of the perpendicular is (4, 0, 0).	2