

CARTESIAN COORDINATES IN THREE-DIMENSIONAL SPACE

- 1 Find the lengths of the sides of the triangle ABC and determine whether it is isosceles, right-angled, equilateral or none of these.

(a) $A(5, 5, 1), B(3, 3, 2), C(1, 4, 4)$

(b) $A(3, 4, -1), B(-5, 3, 0), C(6, -7, 4)$

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2 Determine whether the given sets of points are collinear.

(a) $A(1, 2, 3), B(3, 4, 1), C(5, 6, -2)$

(b) $D(3, 1, -4), E(-2, 3, 2), F(1, 3, 5)$

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3 Find the equation of the sphere with centre C and radius r .

(a) $C(1, 2, 3), r = 4$

(b) $C(-1, 0, 5), r = \sqrt{3}$

6 Find the equation of the sphere with centre $(4, 5, -2)$ that passes through the point $(1, 0, 0)$.

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4 Show that the given equation is the equation of a sphere and find the coordinates of its centre and the radius.

(a) $x^2 + y^2 + z^2 + 4x - 2y + 6z + 4 = 0$

(b) $x^2 + y^2 + z^2 - 8x + 4y + 6 = 0$

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9 Find the equation of the sphere, centre $(2, 2, 3)$ that:

- (a) touches both the x - z and y - z planes (b) touches the x - y plane only.

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- 11** The spheres $x^2 + y^2 + z^2 = 16$ and $x^2 + (y - 2)^2 + z^2 = 9$ intersect. Find:
- (a) the value of y when they intersect
 - (b) the equation of the circle in which they intersect, giving the coordinates of the centre and the radius.