SmartKalike

CBSE Class 12 · Maths

Three Dimensional Geometry

10 most probable questions for Boards 2027

Q1. 1 mark · Multiple choice

The direction cosines of the positive z-axis are

(A) (1, 0, 0) (B) (0, 1, 0) (C) (0, 0, 1) (D) (−1, 0, 0)

Answer

(C) (0, 0, 1) — the z-axis makes angles 90°, 90° and 0° with the x-, y- and z-axes, respectively.

Q2. 1.5 marks · Short answer

Find the shortest distance between the lines $\vec{r} = \lambda(1,0,0)$ and $\vec{r} = (0,1,2) + \mu(0,1,0)$.

Answer

$d = |(a_2 - a_1) \cdot (b_1 \times b_2)| \,/\, |b_1 \times b_2|$

$= |(0, 1, 2) \cdot ((1, 0, 0) \times (0, 1, 0))| \,/\, |(1, 0, 0) \times (0, 1, 0)|$

$= |(0, 1, 2) \cdot (0, 0, 1)| \,/\, 1$

$\therefore d = 2$

Q3. 2 marks · Short answer

Find the direction cosines of the line joining P(1, 2, 2) and Q(3, 5, 6).

Answer

$PQ = \sqrt{[(3 - 1)^2 + (5 - 2)^2 + (6 - 2)^2]}$

$= \sqrt{(4 + 9 + 16)}$

$= \sqrt{29}$

$l = (3 - 1)/\sqrt{29}$, $m = (5 - 2)/\sqrt{29}$, $n = (6 - 2)/\sqrt{29}$

$\therefore$ The direction cosines are $2/\sqrt{29}$, $3/\sqrt{29}$, $4/\sqrt{29}$.

Q4. 3 marks · Medium answer

A line makes angles 60°, 60° and 120° with the positive directions of the x-, y- and z-axes, respectively. Find its direction cosines.

Answer

$l = \cos 60° = 1/2$

$m = \cos 60° = 1/2$

$n = \cos 120° = -1/2$

$l^2 + m^2 + n^2 = 1/4 + 1/4 + 1/4$

$= 3/4 \neq 1$

$\therefore$ The stated angles are inconsistent: no line can make all three angles.

Q5. 4 marks · Long answer

Find the Cartesian equation of the line passing through (2, −1, 4) and having direction cosines 2/3, −1/3 and 2/3.

Answer

The Cartesian equation of a line through (x_1, y_1, z_1) with direction cosines l, m, n is $(x - x_1)/l = (y - y_1)/m = (z - z_1)/n$.

$(x_1, y_1, z_1) = (2, -1, 4)$, $(l, m, n) = (2/3, -1/3, 2/3)$

$(x - 2)/(2/3) = (y + 1)/(-1/3) = (z - 4)/(2/3)$

$\therefore (x - 2)/2 = (y + 1)/(-1) = (z - 4)/2$

Q6. 5 marks · Long answer

Find the symmetric equation of the line passing through (1,−2,3) and having direction cosines 2/3,−1/3,2/3.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/three-dimensional-geometry

Q7. 12 marks · Essay answer

(a) Write two possible sets of direction ratios for the segment joining A(1, 2, −1) and B(4, 0, 3). (3)

(b) Show that the points P(1, 2, 3), Q(3, 6, 7) and R(5, 10, 11) are collinear by comparing the direction ratios of PQ and QR. (5)

(c) Find a set of direction ratios for the line joining S(−2, 1, 4) and T(3, 5, 2), and state the other set obtained by reversing the order of the points. (4)

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/three-dimensional-geometry

Q8. 1 mark · Multiple choice

Which statement describes two skew lines in space?

(A) They intersect and lie in the same plane.

(B) They are parallel and lie in the same plane.

(C) They neither intersect nor are parallel, and lie in different planes.

(D) They intersect at right angles.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/three-dimensional-geometry

Q9. 2 marks · Short answer

Show that the points A(1, 2, 3), B(3, 5, 7) and C(5, 8, 11) are collinear by comparing the direction ratios of AB and BC.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/three-dimensional-geometry

Q10. 3 marks · Medium answer

Find the parametric equations of the line passing through (2, −1, 3) and having direction ratios 3, 2, −4.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/three-dimensional-geometry



Unlock all answers on SmartKalike

Every probable question of every chapter, each with a full answer, plus study targets and answer-sheet checking.

https://smartkalike.com/cbse/class-12/maths/three-dimensional-geometry

Sign up with a friend's email for 30% off their first purchase.