Multiple choice questions - Further vectors

Year: Further Maths · 10

Question 1 $(1,2,3)\cdot(4,-1,2)=$

- **A.** 8
- **B.** 12
- **C.** -8
- **D.** 4

Question 2 Two vectors are perpendicular when:

- **A.** $\mathbf{a}\times\mathbf{b}=\mathbf{0}$
- **B.** $\mathbf{a}\cdot\mathbf{b}=0$
- **C.** $\mathbf{a}=\mathbf{b}$
- **D.** $\mathbf{a}\cdot\mathbf{b}=1$

Question 3 $(1,0,0)\times(0,1,0)=$

- **A.** $(0,0,1)$
- **B.** $(0,0,-1)$
- **C.** $(1,1,0)$
- **D.** 0

Question 4 A normal to the plane $3x-2y+z=7$ is:

- **A.** $(3,2,1)$
- **B.** $(3,-2,1)$
- **C.** $(-3,2,7)$
- **D.** $(7,3,-2)$

Question 5 The angle between a line and a plane uses:

- **A.** $\cos\varphi=\frac{|\mathbf{d}\cdot\mathbf{n}|}{|\mathbf{d}||\mathbf{n}|}$
- **B.** $\sin\varphi=\frac{|\mathbf{d}\cdot\mathbf{n}|}{|\mathbf{d}||\mathbf{n}|}$
- **C.** $\tan\varphi=\mathbf{d}\cdot\mathbf{n}$
- **D.** $\sin\varphi=\mathbf{d}\times\mathbf{n}$

Question 6 The distance from the origin to the plane $2x+2y+z=9$ is:

- **A.** 9
- **B.** 3

- ◯ **C.** 1
- ◯ **D.** 6

Question 7 Two lines in 3D that neither intersect nor are parallel are:

- ◯ **A.** coplanar
- ◯ **B.** skew
- ◯ **C.** perpendicular
- ◯ **D.** coincident

Question 8 The area of the parallelogram spanned by $\mathbf{a}, \mathbf{b}$ is:

- ◯ **A.** $\mathbf{a} \cdot \mathbf{b}$
- ◯ **B.** $|\mathbf{a} \times \mathbf{b}|$
- ◯ **C.** $\frac{1}{2}|\mathbf{a} \times \mathbf{b}|$
- ◯ **D.** $|\mathbf{a}||\mathbf{b}|$

Question 9 Which line is parallel to $\mathbf{r} = (1,2,3) + t(2,4,6)$?

- ◯ **A.** $\mathbf{r} = (0,0,0) + s(1,2,3)$
- ◯ **B.** $\mathbf{r} = (1,2,3) + s(1,2,4)$
- ◯ **C.** $\mathbf{r} = (1,0,0) + s(0,1,2)$
- ◯ **D.** $\mathbf{r} = (2,4,6) + s(3,2,1)$

Question 10 The plane $x + y + z = 6$ contains the point:

- ◯ **A.** $(1,2,3)$
- ◯ **B.** $(2,2,3)$
- ◯ **C.** $(0,0,5)$
- ◯ **D.** $(1,1,1)$

Answer grid - Further vectors

Year: Further Maths

Question	Answer	Explanation
1	**A**	$4 - 2 + 6 = 8$.
2	**B**	$\cos 90^\circ = 0$.
3	**A**	$\mathbf{i} \times \mathbf{j} = \mathbf{k}$.
4	**B**	Coefficients of x, y, z.
5	**B**	The normal is perpendicular to the plane, so use sine.
6	**B**	$9/\sqrt{9} = 3$.
7	**B**	Definition of skew.
8	**B**	$\lvert\mathbf{a}\rvert\lvert\mathbf{b}\rvert \sin\theta$.
9	**A**	Same direction up to a scalar multiple.
10	**A**	$1 + 2 + 3 = 6$.