Questions 19 to 22

The vectors **a** and **b** are given in terms of Cartesian unit vectors **i**, **j** and **k** by

$$\mathbf{a} = \mathbf{i} - 2\mathbf{j} + 3\mathbf{k},$$
$$\mathbf{b} = \mathbf{i} - \mathbf{j} - \mathbf{k}.$$

19 Select the option which is the magnitude of the vector **a**.

20 Select the option which is the value of $\mathbf{a} \cdot \mathbf{b}$.

Options for Questions 19 and 20

A	-4	B	0	C	2	D	6
E	14	F	$\sqrt{2}$	G	$\sqrt{6}$	H	$\sqrt{14}$

21 Select the option which is the vector $\mathbf{a} - 2\mathbf{b}$.

22 Select the option which is the vector $\mathbf{a} \times \mathbf{b}$.

Options for Questions 21 and 22

A	$-\mathbf{i} - 4\mathbf{j} + \mathbf{k}$	B	$-\mathbf{i} + 4\mathbf{j} + \mathbf{k}$	C	$-\mathbf{i} - 4\mathbf{j} + 5\mathbf{k}$
D	$5\mathbf{i} + 4\mathbf{j} + \mathbf{k}$	E	$5\mathbf{i} + 4\mathbf{j} + 3\mathbf{k}$	F	$5\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}$
G	$-\mathbf{i} + 5\mathbf{k}$	H	$-\mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$		

Question 23

Choose the option which is the angle (in radians) between the positive y-axis and the unit vector

$$\mathbf{e} = \frac{1}{2}\mathbf{i} - \frac{1}{\sqrt{2}}\mathbf{j} - \frac{1}{2}\mathbf{k}.$$

Options

A	$\frac{1}{6}\pi$	B	$\frac{1}{4}\pi$	C	$\frac{1}{3}\pi$	D	$\frac{1}{2}\pi$
E	$\frac{2}{3}\pi$	F	$\frac{3}{4}\pi$	G	$\frac{5}{6}\pi$	H	π

Question 24

If, at a certain point on the Earth's surface, the vector **a** points to the East and the vector **b** points to the South, which of the following options is the direction of the vector $\mathbf{a} \times \mathbf{b}$?

Options

A	North	B	South	C	East
D	West	E	Vertically up	F	Vertically down