

Math 12 Review for vectors test

Name: Key
Date: _____ Period: _____

1) Given a vector v with magnitude 18 and a direction angle of 330 degrees, find the component form of v . Show exact value.

$$18 \left(\cos 330^\circ i + \sin 330^\circ j \right) = 18 \frac{\sqrt{3}}{2} i + 18 \left(-\frac{1}{2}\right) j$$

1) $\langle 27\sqrt{3}, -9 \rangle$

2) A vector v has a magnitude of 4 and makes an angle of 240 degrees with the positive x-axis. Find the component form of v .

a) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ b) $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ c) $(4, -4\sqrt{3})$ d) $(2, 2\sqrt{3})$ **e) $(-2, -2\sqrt{3})$**

$$4 \left(\cos 240^\circ i + \sin 240^\circ j \right) = 4 \left(-\frac{1}{2}\right) i + 4 \left(-\frac{\sqrt{3}}{2}\right) j = \langle -2, -2\sqrt{3} \rangle$$

2) E

3) Given $u=4i+2j$, $w=4-2j$, and $v=2u-3w$, find the component form of v .

$$2(4i+2j) - 3(4-2j) = 8i + 4j - 12 + 6j = 8i + 10j$$

3) $\langle 8, 10 \rangle$

4) A vector has an initial point of (2,5) and a terminal point of (0, -4). Find the component form of v .

a) $(2,9)$ b) $(9,2)$ c) $(2,j)$ **d) $(-2, -9)$** e) None of these.

$$\text{End} - \text{Start} = \langle 0-2, -4-5 \rangle = \langle -2, -9 \rangle$$

4) D

5) The direction angle for the linear combination of $-\sqrt{3}i + 1j$ is:

a) 30 b) 60 c) 120 **d) 150** e) 300 f) 330 g) None of these

$\tan \theta_r = \frac{1}{\sqrt{3}} \Rightarrow \theta_r = 30^\circ \Rightarrow \theta = 150^\circ$

5) D

6) A vector has an initial point of (4,7) and a terminal point of (3, -2). Find its magnitude.

a) $\sqrt{12}$ **b) $\sqrt{82}$** c) $\sqrt{79}$ d) $\sqrt{26}$ e) None of these

$$\|v\| = \sqrt{(3-4)^2 + (-2-7)^2} = \sqrt{(-1)^2 + (-9)^2} = \sqrt{1+81} = \sqrt{82}$$

6) B

7) Find the unit vector in the direction of $v = -2i + 4j$.

a) $(-2\sqrt{20}, 4\sqrt{20})$ b) $(-2\sqrt{5}, 2\sqrt{5})$ c) $\left(\frac{4}{\sqrt{20}}, \frac{16}{\sqrt{20}}\right)$ **d) $\left(-\frac{\sqrt{5}}{5}, 2\frac{\sqrt{5}}{5}\right)$** e) None of these

unit vector $= \frac{v}{\|v\|} = \frac{-2i + 4j}{\sqrt{(-2)^2 + 4^2}} = \frac{-2i + 4j}{\sqrt{20}} = \left\langle -\frac{2}{\sqrt{20}}, \frac{4}{\sqrt{20}} \right\rangle = \left\langle -\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}} \right\rangle = \left\langle -\frac{\sqrt{5}}{5}, \frac{2\sqrt{5}}{5} \right\rangle$

ans in rational form D

8) Find the magnitude of $u = 3i - 5j$

$$\|u\| = \sqrt{(3)^2 + (-5)^2} = \sqrt{9+25} = \sqrt{34}$$

8) $\sqrt{34}$

9) Find to the nearest degree, the angle between vectors $\langle 4,2 \rangle$ and $\langle 5,1 \rangle$

9) $\theta \approx 15^\circ$

$$\cos \theta = \frac{u \cdot v}{\|u\| \|v\|} = \frac{20 + 2}{\sqrt{20} \cdot \sqrt{26}} = \frac{22}{\sqrt{520}} \approx .9648 \approx 15.25^\circ$$

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Eugene Hecht



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