4-9-18 Vectors day 1 show all steps Name key

1. The initial point of a vector is (7, 4) and the terminal point is (3, -2).

a. What is the component form of the vector?
<3-7, -2-4>
<-4, -6>

b. What is the linear combination form of the vector?
$-4i-6j$

c. What is the magnitude of the vector
$\sqrt{(-4)^2+(-6)^2}$
$\sqrt{16+36}$
$\sqrt{52}$ $2\sqrt{13}$

2. The initial point of a vector is (3, -4) and the terminal point is (2, -8).

a. What is the component form of the vector?
<2-3, -8--4>
<-1, -4>

b. What is the linear combination form of the vector?
$-1i-4j$

c. What is the magnitude of the vector?
$\sqrt{(-1)^2+(-4)^2}$
$\sqrt{1+16}$
$\sqrt{17}$

Given the vectors $u = \langle 6, 2\rangle$ and $v = \langle -4, 3\rangle$ find the following:

3. $u + v$
$\langle 6+-4, 2+3\rangle$
$\langle 2, 5\rangle$

4. $u - v$
$\langle 6--4, 2-3\rangle$
$\langle 10, -1\rangle$

5. $3u - v$
$3\langle 6,2\rangle - \langle -4,3\rangle$
$\langle 18, 6\rangle - \langle -4,3\rangle$
$\langle 18--4, 6-3\rangle$
$\langle 22, 3\rangle$

6. $u + 2v$
$\langle 6,2\rangle + \langle -8,6\rangle$
$\langle -2, 8\rangle$

7. $7v - 4u$
$7\langle -4,3\rangle - 4\langle 6,2\rangle$
$\langle -28, 21\rangle - \langle 24, 8\rangle$
$\langle -28-24, 21-8\rangle$

Given the vectors $u = 3i + 2j$ and $v = 4i - 5j$ find the following:

8. $u + v$
$3i+2j + 4i-5j$
$7i-3j$

9. $u - v$
$3i+2j-(4i-5j)$
$3i+2j-4i+5j$
$-1i+7j$

10. $2u - v$
$2(3i+2j)-(4i-5j)$
$6i+4j-4i+5j$
$2i+9j$

11. $u + 3v$
$3i+2j+3(4i-5j)$
$3i+2j+12i-15j$
$15i-13j$

12. $-5v - 3u$
$-5(4i-5j)-3(3i+2j)$
$-20i+25j-9i-6j$
$-29i+19j$

Find the exact(simplified radical form) unit vector in the direction of v for each vector:

14. $v = 2i - 5j$
$\frac{2i-5j}{\sqrt{4+25}}$
$\frac{2i}{\sqrt{29}} - \frac{5j}{\sqrt{29}} = \frac{2\sqrt{29}}{29}i - \frac{5\sqrt{29}}{29}j$

15. $u = \langle 3,-2\rangle$
$\frac{\langle 3,-2\rangle}{\sqrt{9+4}}$
$\langle \frac{3}{\sqrt{13}}, \frac{-2}{\sqrt{13}}\rangle$
$\langle \frac{3\sqrt{13}}{13}, \frac{-2\sqrt{13}}{13}\rangle$

16. $w = 2i - 6j$
$\frac{2i-6j}{\sqrt{4+36}} = \frac{2i-6j}{2\sqrt{10}}$
$\frac{i}{\sqrt{10}} - \frac{3j}{\sqrt{10}}$
$\frac{\sqrt{10}i}{10} - \frac{3\sqrt{10}j}{10}$

17. $v = \langle -4, 2\rangle$
$\frac{\langle -4,2\rangle}{\sqrt{16+4}} = \frac{\langle -4,2\rangle}{\sqrt{20}} = \frac{\langle -4,2\rangle}{2\sqrt{5}}$
$\langle \frac{-4}{2\sqrt{5}}, \frac{2}{2\sqrt{5}}\rangle = \langle \frac{-2}{\sqrt{5}}, \frac{1}{\sqrt{5}}\rangle$
$\langle \frac{-2\sqrt{5}}{5}, \frac{1\sqrt{5}}{5}\rangle$

Find the direction angle of each vector:

18. $v = 2i - 5j$
$\theta = 360 - 68.199$
$\theta = 291.801°$
$\theta' = \tan^{-1}(\frac{5}{2})$
$\theta' = 68.199$

19. $u = \langle 3,-2\rangle$
$\theta' = \tan^{-1}(\frac{2}{3})$
$\theta' = 33.690$
$\theta = 360 - 33.690$
$\theta = 326.31°$

20. $w = 2i - 6j$
$\theta' = \tan^{-1}(\frac{6}{2})$
$\theta' = 71.565°$
$\theta = 360 - 71.565°$
$\theta = 288.435°$

21. $v = \langle -4, 2\rangle$
$\theta' = \tan^{-1}(\frac{2}{4})$
$\theta' = 26.565°$
$\theta = 180 - 26.565°$
$\theta = 153.435°$

Find the component form and linear combination form of each vector: Give EXACT answers.

22. v has magnitude 8 and direction angle $\theta = 150°$.
$8\langle \cos 150°, \sin 150°\rangle$

23. u has magnitude of 3 and direction angle $\theta = 60°$
$3\langle \cos 60°, \sin 60°\rangle$