HW 13.2 #4,8,18,26,31,32

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Math 32A Section 1A

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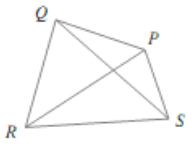
4. Write each combination of vectors as a single vector.

(a) $\overrightarrow{PQ} + \overrightarrow{QR}$ (b) $\overrightarrow{RP} + \overrightarrow{PS}$
(c) $\overrightarrow{QS} - \overrightarrow{PS}$ (d) $\overrightarrow{RS} + \overrightarrow{SP} + \overrightarrow{PQ}$

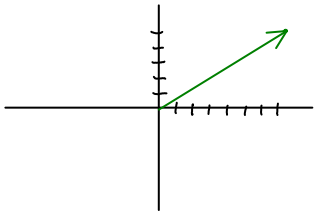


a) $\overrightarrow{PR}$ b) $\overrightarrow{RS}$ c) $\overrightarrow{QP}$ d) $\overrightarrow{RQ}$

7–12 ■ Find a vector **a** with representation given by the directed line segment $\overrightarrow{AB}$. Draw $\overrightarrow{AB}$ and the equivalent representation starting at the origin.

8. $A(-2, -2)$, $B(5, 3)$

$\overrightarrow{AB} = \langle 5+2, 3+2 \rangle = \langle 7, 5 \rangle$



17–22 ■ Find $|\mathbf{a}|$, $\mathbf{a} + \mathbf{b}$, $\mathbf{a} - \mathbf{b}$, $2\mathbf{a}$, and $3\mathbf{a} + 4\mathbf{b}$.

18. $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j}$, $\mathbf{b} = \mathbf{i} + 5\mathbf{j}$

$|a| = \sqrt{4+9} = \sqrt{13}$ $a-b = 2i-3j-i-5j = i-8j$

$a+b = 3i+2j$ $2a = 4i-6j$

$3a+4b = 6i - 9j + 4i + 20j = 10i + 11j$

26. Find a vector that has the same direction as $\langle -2, 4, 2 \rangle$ but has length 6.

$c\langle -2,4,2 \rangle = \langle -2c, 4c, 2c \rangle$

$\sqrt{(-2c)^2 + (4c)^2 + (2c)^2} = 6$

$\sqrt{4c^2 + 16c^2 + 4c^2} = 6$

$\sqrt{24c^2} = 6$

$24c^2 = 36$

$c^2 = 12$

$c = \sqrt{12} = 2\sqrt{3}$

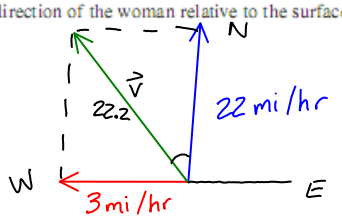
$|\vec{v}| = \sqrt{4+16+4} = \sqrt{24} = 2\sqrt{6}$

$\frac{\langle -2,4,2 \rangle \cdot 6}{2\sqrt{6}}$

$\left\langle \frac{-6}{\sqrt{6}}, \frac{12}{\sqrt{6}}, \frac{6}{\sqrt{6}} \right\rangle$

$\langle -4\sqrt{3}, 8\sqrt{3}, 4\sqrt{3} \rangle$ }

31. A woman walks due west on the deck of a ship at 3 mi/h. The ship is moving north at a speed of 22 mi/h. Find the speed and direction of the woman relative to the surface of the water.



$\langle 0, 22 \rangle$ $\langle -3, 0 \rangle$

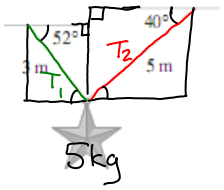
$\vec{v} = \langle -3, 22 \rangle$

$|\vec{v}| = \sqrt{9+484} = 22.2$ mi/hr

$\cos\theta = \frac{22}{22.2}$ $\theta \approx 7.697$

7.697° west of north

32. Ropes 3 m and 5 m in length are fastened to a holiday decoration that is suspended over a town square. The decoration has a mass of 5 kg. The ropes, fastened at different heights, make angles of 52° and 40° with the horizontal. Find the tension in each wire and the magnitude of each tension.



$T_1 = -|T_1|\cos(52°)i + |T_1|\sin(52°)j$

$T_2 = -|T_2|\cos(40°)i + |T_2|\sin(40°)j$

$T_1 = |T_1| \cdot .1723$

$T_2 = |T_2| \cdot -.1234$