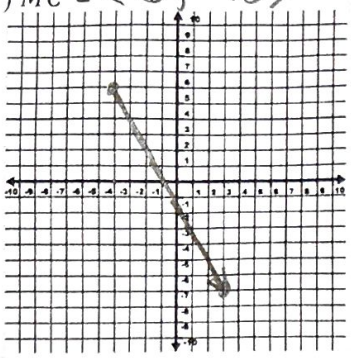
PreCalculus
Vectors Quiz Review

Name Key
Date

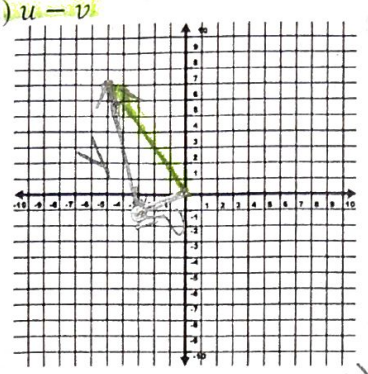
Draw the resultant vector with the given conditions.

$M = (-4, 6)$ $C = (2, -7)$ $H = (0, 6)$ $u = \langle -3, -1 \rangle$ $v = \langle 2, -8 \rangle$ $w = 4i + 8j$

1) $\overrightarrow{MC} = \langle 6, -13 \rangle$

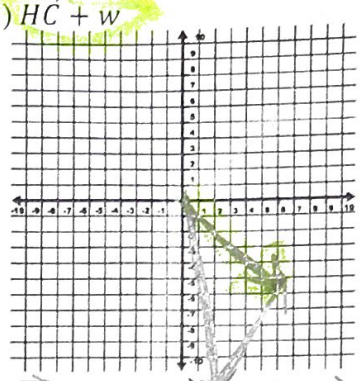


2) $u - v$



$\langle -3, -1 \rangle - \langle 2, -8 \rangle$
$\langle -3, -1 \rangle + \langle -2, 8 \rangle$
$\langle -5, 7 \rangle$

3) $\overrightarrow{HC} + w$



$\overrightarrow{HC} = \langle 2-0, -7-6 \rangle$
$\overrightarrow{HC} = \langle 2, -13 \rangle$
$\langle 2, -13 \rangle + \langle 4, 8 \rangle$
$\langle 6, -5 \rangle$

Determine the unit vector for the following vectors.

4) $v = \langle -5, 8 \rangle$

$\|v\| = \sqrt{(-5)^2 + 8^2} = \sqrt{89}$

unit vector $\left\langle \frac{-5}{\sqrt{89}}, \frac{8}{\sqrt{89}} \right\rangle$

or $\left\langle \frac{-5\sqrt{89}}{89}, \frac{8\sqrt{89}}{89} \right\rangle$

5) $\overrightarrow{HM}$ where $H = (2, -2)$ and $M = (6,1)$

$\overrightarrow{MH} = \langle 2-6, -2-1 \rangle$
$\langle -4, -3 \rangle$

$\|\overrightarrow{MH}\| = 5$

Unit Vector $\left\langle \frac{-4}{5}, \frac{-3}{5} \right\rangle$

6) $w = 6i - 3j$

$\|w\| = \sqrt{6^2 + (-3)^2}$
$= \sqrt{45} = 3\sqrt{5}$

$w = \left\langle \frac{6}{3\sqrt{5}}, \frac{-3}{3\sqrt{5}} \right\rangle$

$\boxed{= \left\langle \frac{2}{\sqrt{5}}, \frac{-1}{\sqrt{5}} \right\rangle \text{ or } \left\langle \frac{2\sqrt{5}}{5}, \frac{-\sqrt{5}}{5} \right\rangle}$

Using the information provided, determine if the vectors are equal.

$v = 3j$ $w = 5i$ $P = (-1, 4)$ $Q = (6, 2)$ $R = (-3, 1)$ $S = (2, 4)$

$\langle 0, 3 \rangle$ $\langle 5, 0 \rangle$

7) $v + w$ and $\overrightarrow{RS}$

$\langle 5, 3 \rangle = \langle 5, 3 \rangle$

yes, same direction & magnitude

8) $u = \langle -7, 2 \rangle$ and $\overrightarrow{PQ}$

$\neq \langle 7, -2 \rangle$

No, different direction

Determine each resultant using the following information:

$u = \langle 2, 5 \rangle$ $v = \langle -1, 3 \rangle$ $w = \langle 9, -6 \rangle$

9) $u + v$

$\boxed{\langle 1, 8 \rangle}$

10) $\|w\|$

$\sqrt{9^2 + (-6)^2}$

$\boxed{\sqrt{117}}$

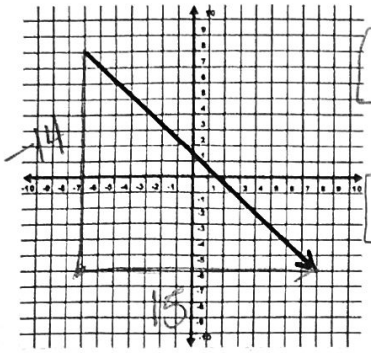
11) $u - 3w$

$\langle 2, 5 \rangle - 3\langle 9, -6 \rangle$
$\langle 2, 5 \rangle + \langle -27, 18 \rangle$
$\boxed{\langle -25, 23 \rangle}$

12) $(v - u) \cdot w$

$(\langle -1, 3 \rangle - \langle 2, 5 \rangle) \cdot \langle 9, -6 \rangle$
$(\langle -1, 3 \rangle + \langle -2, -5 \rangle) \cdot \langle 9, -6 \rangle$
$\langle -3, -2 \rangle \cdot \langle 9, -6 \rangle$
$-3 \cdot 9 + -2 \cdot -6$
$-27 + 12 = \boxed{-15}$

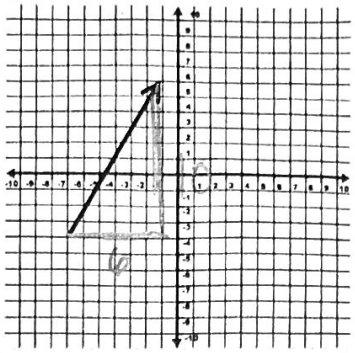
13) Write the graphed vector in $ai + bj$ form and determine its magnitude.



$\boxed{15i - 14j}$

$\sqrt{15^2 + (-14)^2}$

$\boxed{\sqrt{421}}$



$\boxed{6i + 10j}$

$\sqrt{6^2 + 10^2}$

$\sqrt{136} = \boxed{2\sqrt{34}}$

2 68

2 34

14) Determine $u \cdot v$ if $u = \langle 3, -4 \rangle$ and $v = \langle 6, 2 \rangle$.

$3 \cdot 6 + -4 \cdot 2$

$18 + -8 = \boxed{10}$

15) Determine $v \cdot u$ if $u = \langle -1, 4 \rangle$ and $v = \langle 8, 2 \rangle$.

$-1 \cdot 8 + 4 \cdot 2$

$-8 + 8$

$\boxed{0}$

orthogonal

16) Determine the angle between the vectors if $u = \langle -7, 9 \rangle$ and $v = \langle 4, -5 \rangle$

$U \cdot V = -7 \cdot 4 + 9 \cdot -5$

$= -28 + -45$

$= -73$

$\|u\| = \sqrt{(-7)^2 + 9^2}$

$= \sqrt{130}$

$\|v\| = \sqrt{4^2 + (-5)^2}$

$= \sqrt{41}$

$\cos\theta = \frac{-73}{\sqrt{130}\sqrt{41}}$

$\theta \approx 179.215°$

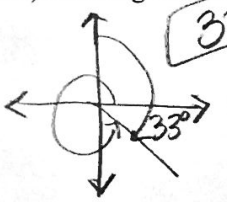
17) Determine the angle between the vectors if $u = \langle 6, 0 \rangle$ and $v = \langle 0, -3 \rangle$

$U \cdot V = 0$

orthogonal $\therefore$ $\boxed{90°}$

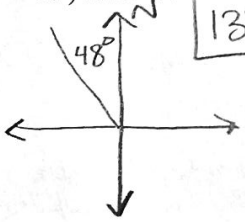
Write the angle in standard form

18) Bearing 123°



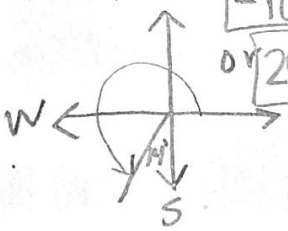
$\boxed{327°}$ or $\boxed{-33°}$

19) N48°W



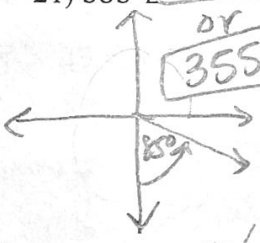
$\boxed{138°}$

20) S14°W



$\boxed{-104°}$ or $\boxed{256°}$

21) S85°E



$\boxed{-15°}$ or $\boxed{355°}$

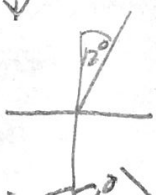
Write each vector given its magnitude and direction in component ($ai + bj$) form.

22) speed = 39 m/s at 73° from the horizontal

$V = \langle 39\cos 73°, 39\sin(73°) \rangle$

$39\cos 73° i + 39\sin 73° j$

23) speed = 39 m/s at N12°E



$V = \langle 39\cos 78°, 39\sin 78° \rangle$

$39\cos 78° i + 39\sin 78° j$