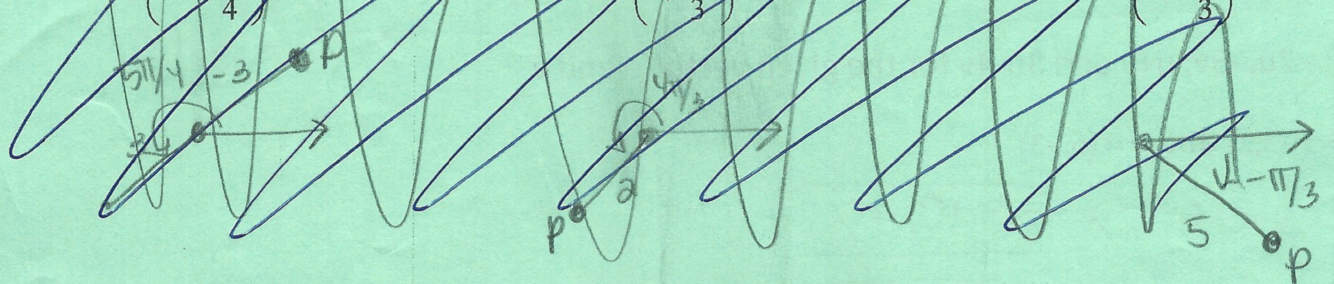
Name <u>Answer Key</u>

Period# ______

Pre-Calculus: CH#8 Review

Plot the point that has the following polar coordinates:

1. $P\left(-3, \frac{5\pi}{4}\right)$ 2. $P\left(2, \frac{4\pi}{3}\right)$ 3. $P\left(5, -\frac{\pi}{3}\right)$



Find the rectangular coordinates for the point that has the following polar coordinates:

1 4. $\left(3, \frac{2\pi}{3}\right)$ $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

$x = r\cos\theta$ $y = r\sin\theta$

$x = 3\cdot\cos\frac{2\pi}{3}$ $y = 3\sin\frac{2\pi}{3}$

$x = 3\cdot -\frac{1}{2}$ $y = 3\cdot\frac{\sqrt{3}}{2}$

$x = -\frac{3}{2}$ $y = \frac{3\sqrt{3}}{2}$

$\boxed{\left(-\frac{3}{2}, \frac{3\sqrt{3}}{2}\right)}$

2 5. $\left(-2, \frac{5\pi}{3}\right)$ $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

$x = r\cos\theta$ $y = r\sin\theta$

$x = -2\cos\frac{5\pi}{3}$ $y = -2\sin\frac{5\pi}{3}$

$x = -2\cdot\frac{1}{2}$ $y = \cancel{-2}\cdot\frac{-\sqrt{3}}{\cancel{2}}$

$x = -1$ $y = \sqrt{3}$

$\boxed{(-1, \sqrt{3})}$

Find the polar coordinates for the point that has the following rectangular coordinates:

3 6. $(-5,5)$

$r^2 = x^2 + y^2$ $\tan\theta = \frac{-5}{5} = -1$

$r^2 = (5)^2 + 5^2$ $\theta = \frac{3\pi}{4}$

$r^2 = 25 + 25$

$\sqrt{r^2} = \sqrt{50}$

$r = 5\sqrt{2}$

$\boxed{\left(5\sqrt{2}, \frac{3\pi}{4}\right)}$

4 7. $(2\sqrt{3},2)$

$r^2 = (2\sqrt{3})^2 + 2^2$ $\tan\theta = \frac{2}{2\sqrt{3}}$

$r^2 = 12 + 4$ $\tan\theta = \frac{1}{\sqrt{3}}$

$\sqrt{r^2} = \sqrt{16}$

$r = 4$ $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ $\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\pi/6$

$\boxed{\left(4, \frac{\pi}{6}\right)}$

Express the vector with the initial point P and the terminal point Q in component form.

7 8. P(-12, -5) and Q(-5, 3)

$\langle -5++12, 3++5 \rangle$

$\boxed{\langle 7, 8 \rangle}$

6 9. P(10, 7) and Q(6, -2)

$\langle 6-10, -2-7 \rangle$

$\boxed{\langle -4, -9 \rangle}$

Find the 2u, -3v, u+v and 3u-4v for the given vector u and v.

7 10. $u = \langle -5, 2 \rangle$ and $v = \langle 6, -3 \rangle$

$2u = 2\langle -5, 2 \rangle = \boxed{\langle -10, 4 \rangle}$

$-3v = -3\langle 6, -3 \rangle = \boxed{\langle -18, 9 \rangle}$

$u+v = \langle -5, 2 \rangle + \langle 6, -3 \rangle = \boxed{\langle 1, -1 \rangle}$

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

$= \langle -15, 6 \rangle + \langle -24, 12 \rangle = \boxed{\langle -39, 18 \rangle}$

8 11. If u= 5i +4j and v=2i – 8j. Find the following:

$u = \langle 5, 4 \rangle$ $v = \langle 2, -8 \rangle$

a) $|u| =$ $\sqrt{5^2+4^2}$

$\sqrt{25+16} = \boxed{\sqrt{41}}$

e) $|u+v| =$ $u+v = \langle 7, -4 \rangle$

$\sqrt{7^2+(-4)^2}$

$\sqrt{49+16} = \boxed{\sqrt{65}}$

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

$= \sqrt{4+64} = \sqrt{68} = \boxed{2\sqrt{17}}$

2|68
2|34
17

f) $|u-v| =$ $u-v = \langle 3, 12 \rangle$

$\sqrt{3^2+12^2} = \sqrt{9+144} = \boxed{\sqrt{153}}$

c) $|2u| =$ $\boxed{2\sqrt{41}}$

g) $|u| - |v|$ $\boxed{\sqrt{41} - 2\sqrt{17}}$

3|153
51

d) $\left|\frac{1}{2}u\right| =$ $\frac{1}{2}\sqrt{41} = \boxed{\frac{1}{2}\sqrt{41}}$

Find $u \bullet v$

9 12. Let $u = \langle -7,5 \rangle$ and $v = \langle -3,8 \rangle$

$-7 \cdot -3 + 5 \cdot 8$

$21 + 40$

$\boxed{61}$

10 13. Let $u = \langle -5,-4 \rangle$ and $v = \langle -4,3 \rangle$

$-5 \cdot -4 + -4 \cdot 3$

$20 + -12$

$\boxed{8}$

Find the indicated quantity, assuming u=3i + 5j , v=2i – 3j and w=4i + j

$\langle 3,5 \rangle$ $\langle 2,-3 \rangle$ $\langle 4,1 \rangle$

11 14. $u \bullet v + u \bullet w$

$u \cdot v = 3 \cdot 2 + 5 \cdot -3$

$6 + -15 = -9$

$u \cdot w = 3 \cdot 4 + 5 \cdot 1$

$12 + 5 = 17$

$-9 + 17 = \boxed{8}$

12 15. $u \bullet (v + w)$

$v + w = \langle 6,-2 \rangle$

$\langle 3,5 \rangle \cdot \langle 6,-2 \rangle$

$3 \cdot 6 + 5 \cdot -2$

$18 + -10$

$\boxed{8}$

Determine whether the vectors are orthogonal

13 16. $u = \langle 4,6 \rangle$ and $v = \langle -3,4 \rangle$

$u \cdot v$

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

$-12 + 24 = 12$

$\boxed{\text{No}}$

14 17. u=5i – 10j and v=-4i – 2j

$\langle 5,10 \rangle$ $\langle -4,-2 \rangle$

$5 \cdot -4 + -10 \cdot -2$

$-20 + 20 = 0$

$\boxed{\text{yes}}$