Name: _____ **Class:** _____ **Date:** _____ **ID: P**

Pre-Calculus; Unit 10 Practice

Target 10A

I can represent, model with, and perform operations on vector quantities.

1. Let **v** be a vector from initial point $A(-14,5)$ to terminal point $B(5,-8)$. Write **v** in terms of the **i** and **j** vectors, then write it in component form. (2 pts.)

_____

_____

2. Let $\mathbf{u} = 15\mathbf{i} + 5\mathbf{j}$, $\mathbf{v} = -5\mathbf{i} + 5\mathbf{j}$, and $\mathbf{w} = -5\mathbf{j}$. Find $\mathbf{u}-(2\mathbf{v}+\mathbf{w})$. (2pts.)

_____

3. Let $\mathbf{u} = \langle -1, 10 \rangle$. Find $|\mathbf{u}|$ and the direction angle of **u**. (2pts.)

$|\mathbf{u}|$ =_____

Angle=_____

4. The magnitude and direction of two forces acting on an object are 40 pounds at 57°, and 60 pounds at 112°. Find the magnitude, to the nearest hundredth of a pound, and the direction angle, to the nearest tenth of a degree, of the resulant force. (4pts.)

Magnitude=_____

Angle=_____

Name: _____ **ID: P**

Target 10B

I can apply the dot product of vectors to solve problems.

5. Let $\mathbf{u} = \langle 5, -14 \rangle$, $\mathbf{v} = \langle 4, 5 \rangle$.

   a) Find $\mathbf{u} \bullet \mathbf{v}$ (1 pt.)

   _____

   b) Find the angle between **u** and **v** to the nearest tenth of a degree. (1 pt.)

   _____

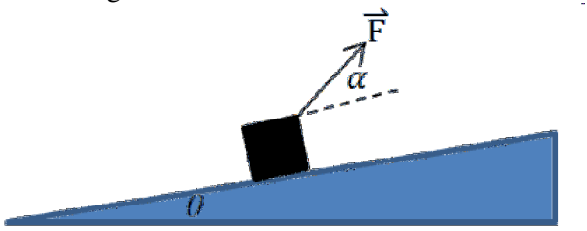
   c) Find the projection of **u** onto **v.** (2 pts.)

   _____

6. Let $\mathbf{u} = \langle -13, 11 \rangle$, $\mathbf{v} = \langle x, -5 \rangle$. Find the value of x that will make **u** and **v** orthogonal. Defend your answer with your work. (2 pts.)

   _____

7. A force **F** of 100 pounds on a rope is used to pull a box up a ramp inclined at 13° from the horizontal. The rope forms an angle of 32° with the horizontal.



   a) Find the component form of the force vector. (2 pts.) _____

   b) Find the amount of work done on the box if it is pulled 28 feet along the ramp. (2 pts.) _____

Name: _____ **ID: P**

Target 10D

I can locate points, create graphs, and analyze graphs in the polar coordinate system.

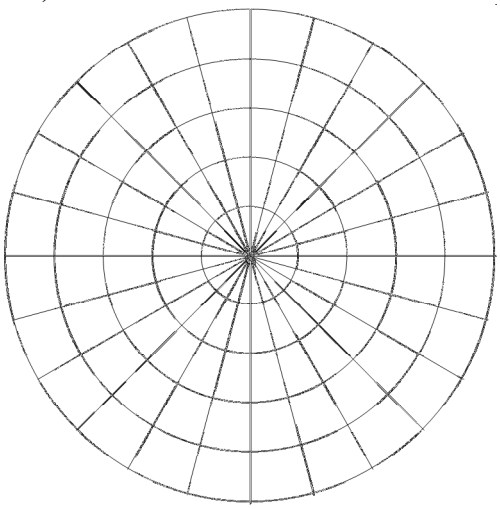
8. What do the two values in a polar coordinate represent? (1 pt.)

9. Graph the following points on the polar grid below. (1 pt. each)

   a. $(2,45°)$

   b. $(-3,150°)$

   c. $(4, \frac{-2\pi}{3})$



10. For each of the points graphed above, find one other point that could represent the same point with an opposite r-value. (e.g. If the r-value is 5, find the coordinates of a point with an r-value of -5.) (1 pt. each)

a._____

b._____

c.._____

11. Find the rectangular coordinates for each point graphed above. Leave your answers in exact form. (1 pt. each)

a._____

b._____

c.._____

Pre-Calculus; Unit 10 Practice
Answer Section

1. ANS:
   19**i**+−13**j**

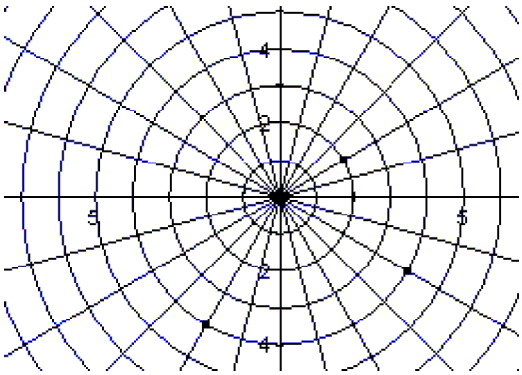
   <19,−13>
2. ANS:
   25**i**+**0j**
3. ANS:
   $|\mathbf{u}| = \sqrt{101}$
   Angle=95.7106
4. ANS:
   First find the component form of the two vectors:
   $\mathbf{u} = \langle 40 \cdot \cos(57), 40 \cdot \sin(57) \rangle = \langle 21.785561400601, 33.546822717817 \rangle$
   $\mathbf{v} = \langle 60 \cdot \cos(112), 60 \cdot \sin(112) \rangle = \langle -22.476395604955, 55.631031274007 \rangle$
   Then find the resultant by adding the vectors:
   $\mathbf{u} + \mathbf{v} = \mathbf{r} = \langle -0.690834204354, 89.177853991824 \rangle$
   Magnitude of the resultant: $|\mathbf{r}| = \sqrt{-0.690834204354^2 + 89.177853991824^2} = 89.18$
   Angle of resultant:$\arctan(\frac{89.177853991824}{-0.690834204354}) = -89.6$
5. ANS:
   a) −50

   b) 2.1

   c) $\langle -200/41, -250/41 \rangle$
6. ANS:
   We know that the dot product of the vectors must equal zero. So,
   $\mathbf{u} \cdot \mathbf{v} = -13x + (11)(-5) = 0$
   $x = \frac{-(11)(-5)}{-13}$
   $x = -\frac{55}{13}$
7. ANS:
   a. $\langle 100\cos(32), 100\sin(32) \rangle = \langle 84.8, 52.99 \rangle$

   b. $W = (100)(28)\cos(32 - 13) = 2647.45 foot - pounds$
8. ANS:
   Radius and angle

9. ANS:



10. ANS:

a. (-2,215°)

b. (3,330°)

c. (-4, π/3)

11. ANS:

a. $(2\cos 45, 2\sin 45) = (\sqrt{2}, \sqrt{2})$

b. $(-3\cos 150, -3\sin 150) = \left(\frac{-3\sqrt{3}}{2}, \frac{-3}{2}\right)$

c. $\left(4\cos\frac{-2\pi}{3}, 4\sin\frac{-2\pi}{3}\right) = \left(-2, 2\sqrt{3}\right)$