Indicate the answer choice that best completes the statement or answers the question.

1. Find the volume of the parallelepiped with adjacent edges  $\mathbf{t} = 9\mathbf{j} - 6\mathbf{j} + 2\mathbf{k}$ ,  $\mathbf{u} = \mathbf{i} - \mathbf{j} + 3\mathbf{k}$  and  $\mathbf{v} = -2\mathbf{i} - 10\mathbf{j} + 5\mathbf{k}$ .

Class:

- a. 209 cubic units b. 53 cubic units
- c. 11 cubic units d. 267 cubic units
- 2. Find a unit vector **u** with the same direction as  $\mathbf{x} = <12, 9>$ .
  - $\begin{array}{ll} a. & \displaystyle \frac{3}{<5}, \frac{4}{5} \\ c. & \displaystyle \frac{5}{<13}, \frac{12}{13} \\ \end{array} \end{array} \qquad \begin{array}{ll} b. & \displaystyle \frac{4}{<5}, \frac{3}{5} \\ d. & \displaystyle \frac{4}{<7}, \frac{3}{7} \\ \end{array}$
- 3. Which of the following is the graph of  $25x^2 + y^2 = 25$ ?



4. Find the projection of  $\mathbf{u} = \langle -6, 2 \rangle$  onto  $\mathbf{v} = \langle -3, 2 \rangle$ .

a. 
$$< \frac{11}{24}, \frac{11}{36}$$
 b.  $< \frac{132}{13}, \frac{44}{13}$ 

 c.  $< \frac{13}{66}, \frac{13}{44}$ 
 d.  $< \frac{66}{13}, \frac{44}{13}$ 

5. Which of the following is the magnitude of  $\mathbf{a} = \langle -3, 1 \rangle$ ? Round to the nearest hundredth if necessary.

a. –2 b. 3.16 c. 2.45 d. 10

6. Find the component form of the vector  $\mathbf{v}$  with magnitude 3 and direction angle 41°.

a. <-2.96, -0.48>	b. <1.97, 2.26>
c. <0.25, 0.22>	d. <2.26, 1.97>

7. Find the area of the parallelogram with adjacent sides  $\mathbf{u} = -6\mathbf{i} + 6\mathbf{j} + \mathbf{k}$  and  $\mathbf{v} = 3\mathbf{i} - \mathbf{j} - \mathbf{k}$ .

a. about 3.7 square units	b. about 6.7 square units
c. about 26.6 square units	d. about 13.3 square units

# 8. Which of the following is the graph of $16x^2 + 25y^2 = 400$ ?



9. Which of the following is the dot product of  $\mathbf{u} = -3\mathbf{i} + \mathbf{j} + 3\mathbf{k}$  and  $\mathbf{v} = -8\mathbf{i} + 5\mathbf{j} + 5\mathbf{k}$ ?

a. 0 b. 44 c. -528 d. 3

10. Find the direction angle of  $2\mathbf{i} + 12\mathbf{j}$ .

a. 88.10°	b. 260.54°
c. 170.54°	d. 80.54°

11. Let  $\overrightarrow{DE}$  be the vector with initial point D(11, -4) and terminal point E(-5, -2). Write  $\overrightarrow{DE}$  as a linear combination of the vectors iand j.

a. 16i - 2j b. 6i - 6jc. -16i + 2j d. 7i - 7j

# Name:

#### Precalculus-G11-Ch.7-9-Q.3\_Exam

12. An airplane is traveling due east with a velocity of 544 miles per hour. The wind blows at 67 miles per hour at an angle of S74°E. What is the resultant speed and direction of the plane?

a. 611.4 miles per hour; S6.0°E
b. 608.7 miles per hour; S88.3°E
c. 566.1 miles per hour; S83.5°E
d. 614.4 miles per hour; S1.7°E

13. While moving, Jacob pushes a dolly up a ramp with a constant force of 85 N. If the ramp has an incline of 10° with the horizontal, what amount of work (in joules) will Jacob have do to push the dolly 30 meters?

a.	about 443 joules	b. about 2511 joules
c.	about 436 joules	d. about 2550 joules

14. Find the angle  $\theta$  between  $\mathbf{u} = \langle 7, 7 \rangle$  and  $\mathbf{v} = \langle -4, 7 \rangle$ .

a.  $164.7^{\circ}$  b.  $74.7^{\circ}$ c.  $15.3^{\circ}$  d.  $105.3^{\circ}$ 

15. Find the dot product of  $\mathbf{u} = \langle -10, -2, 6 \rangle$  and  $\mathbf{v} = \langle 6, -4, 7 \rangle$ . Are  $\mathbf{u}$  and  $\mathbf{v}$  orthogonal?

a. –10; not orthogonal	b. –10; orthogonal
c. 312; orthogonal	d. 312; not orthogonal

16. A discus is thrown from a height of 3 feet with an initial velocity of 55 ft/s at an angle of  $44^{\circ}$  with the horizontal. How long will it take for the discus to reach the ground?

a. 2.5 seconds b. 18.3 seconds

c. 0.8 second d. 2.6 seconds

17. Graph the polar equation  $\theta = -\frac{2\pi}{3}$ 



18. Determine the zeros of  $r = 7\cos 4\theta$ .

a.  $\theta = \frac{\pi}{12}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{11\pi}{12}$ b.  $\theta = \frac{\pi}{8}, \frac{3\pi}{8}, \frac{5\pi}{8}, \frac{7\pi}{8}$ c.  $\theta = 0, \frac{\pi}{2}$ d.  $\theta = 0, \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \pi$ 

- 19. Write an equation for the conic in the *xy*-plane for  $\frac{(x')^2}{22} \frac{(y')^2}{32} = 1$  at  $\theta = 30^\circ$ .
  - a.  $74x^2 + 81\sqrt{3}xy 34y^2 2816 = 0$ b.  $74x^2 + 108\sqrt{3}xy - 34y^2 - 2816 = 0$ c.  $10x^2 + 108\sqrt{3}xy + 10y^2 - 1408 = 0$ d.  $-34x^2 + 108\sqrt{3}xy + 74y^2 - 2816 = 0$

20. Use a metric ruler and a protractor to find  $2\vec{a} - 2\vec{b}$ . Then find the magnitude and amplitude of the resultant.

<sup>*b*</sup> 135°

a. 8 cm, 41° b. 4 cm, 31° c. 9 cm, 38° d. 6 cm, 36°

21. Which of the following vectors is shown in the graph below?



 $\begin{array}{ll} a. \left< 4, 5, -6 \right> & b. \left< 4, 5, 6 \right> \\ c. \left< 4, -5, -6 \right> & d. \left< -4, 5, -6 \right> \end{array}$ 

# Precalculus-G11-Ch.7-9-Q.3\_Exam

22. Identify the equation of the graph shown.



23. A rock is tossed at an initial velocity of 60 m/s at an angle of  $10^{\circ}$  with the ground. Write parametric equations to represent the path of the rock.

a. $x = 60t \cos 10^{\circ}$	b. $x = 60t \cos 10^{\circ}$
$y = 60t \sin 10^\circ - 16t^2$	$y = 60t \sin 10^\circ - 4.9t^2$
c. $x = 60t \cos 80^{\circ}$	d. $x = 10t \cos 10^{\circ}$
$y = 60t \sin 80^{\circ} - 16t^2$	$y = 10t \sin 10^\circ - 4.9t^2$

24. Identify the equation of the graph shown.



Write each polar equation in rectangular form.

25. 
$$r = \frac{0.5}{1 - 0.5 \cos \theta}$$
  
a.  $\frac{x^2}{1} + \frac{(y - 1)^2}{1} = 1$   
b.  $\frac{(x - 0.33)^2}{0.44} + \frac{y^2}{0.33} = 1$   
c.  $\frac{x^2}{0.33} + \frac{(y - 0.33)^2}{0.11} = 1$   
d.  $\frac{(x - 1)^2}{0.44} + \frac{y^2}{0.33} = 1$ 

26. Graph the polar equation  $\theta = -\frac{\pi}{3}$ 



27. A golf ball is hit with an initial velocity of 155 ft/s at an angle of  $23^{\circ}$  with the horizontal. After 1.4 seconds, how far has the golf ball traveled horizontally and vertically?

- a. 199.7 feet horizontally and 75.2 feet vertically
- b. 60.6 feet horizontally and 168.4 feet vertically
- c. 199.7 feet horizontally and 53.4 feet vertically
- d. 60.6 feet horizontally and 174.4 feet vertically

28. Determine the zeros of  $r = 8 \sin 3\theta$ .

a.  $\theta = 0, \frac{\pi}{3}, \frac{2\pi}{3}$  b.  $\theta = 0, \frac{\pi}{3}$ c.  $\theta = 0, \frac{2\pi}{3}$  d.  $\theta = \frac{\pi}{3}, \frac{2\pi}{3}$ 

29. Write the equation for the graph with vertex (-1, -2) and focus (-1, 0.5).

a. $(x+1)^2 = -10(y+2)$	b. $(x+1)^2 = 10(y+2)$
c. $(y+2)^2 = 10(x+1)$	d. $(y+1)^2 = 10(x+2)$

30. Find  $(-5 + i)^5$ . Express the result in rectangular form.

a. –2876 + 1900 <i>i</i>	b. 1900 – 2876 <i>i</i>
c. –3125 + <i>i</i>	d. –1024 <i>i</i>

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