Precalc Unit 6 Review Name Key

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine two pairs of polar coordinates for the point with $0° \le \theta < 360°$.

1) $(-2\sqrt{3}, 2\sqrt{3})$ 1) ________

A) $(2\sqrt{6}, 120°), (-2\sqrt{6}, 240°)$ B) $(2\sqrt{6}, 135°), (-2\sqrt{6}, 315°)$
C) $(2\sqrt{6}, 30°), (-2\sqrt{6}, 330°)$ D) $(2\sqrt{6}, 150°), (-2\sqrt{6}, 210°)$

Eliminate the parameter.

2) $x = \sin \theta$, $y = 3 \cos \theta$ 2) ________

A) $9x^2 + y^2 = 9$ B) $x^2 + 9y^2 = 1$ C) $9x^2 + y^2 = 1$ D) $x^2 + 9y^2 = 9$

Find a· b.

3) $\mathbf{a} = \langle 3, 3 \rangle$, $\mathbf{b} = \langle 5, -7 \rangle$ 3) ________

A) $\langle 8, -4 \rangle$ B) -6 C) -36 D) $\langle 15, -21 \rangle$

Find the angle between the given vectors to the nearest tenth of a degree.

4) $\mathbf{u} = \mathbf{i} + \sqrt{7}\mathbf{j}$, $\mathbf{v} = -\mathbf{i} - 2\mathbf{j}$ 4) ________

~~A) 113.4°~~ B) 105.7° C) 120.9° D) 161.6°

A) 174.1°

Find the component form and magnitude of the indicated vector.

5) Given that P = (-6, 7) and Q = (-5, 8), find the component form and magnitude of the vector $\overrightarrow{QP}$. 5) ________

A) $\langle 1, 1 \rangle, \sqrt{2}$ B) $\langle -1, -1 \rangle, 2$ C) $\langle -11, -1 \rangle, \sqrt{-10}$ D) $\langle -1, -1 \rangle, \sqrt{2}$

Find the component form of the indicated vector.

6) Let $\mathbf{u} = \langle 4, 6 \rangle$, $\mathbf{v} = \langle -5, -3 \rangle$. Find $\mathbf{u} + \mathbf{v}$. 6) ________

A) $\langle 1, 1 \rangle$ B) $\langle 9, 9 \rangle$ C) $\langle 10, -8 \rangle$ D) $\langle -1, 3 \rangle$

Find the magnitude and direction angle for the following vector. Give the direction angle as an angle in [0°, 360°) rounded to the nearest tenth.

7) $\langle 15\sqrt{5}, -15\sqrt{5} \rangle$ 7) ________

A) $15\sqrt{5}, 135°$ B) $15\sqrt{5}, 315°$ C) $15\sqrt{10}, 315°$ D) $15\sqrt{10}, 135°$

Find the rectangular coordinates of the point with the given polar coordinates.

8) $(9, 2\pi/3)$ 8) ________

A) $\left(\frac{9\sqrt{3}}{2}, \frac{-9}{2}\right)$ B) $\left(\frac{-9}{2}, \frac{9\sqrt{3}}{2}\right)$ C) $\left(\frac{-9}{2}, \frac{9}{2}\right)$ D) $\left(\frac{9}{2}, \frac{-9}{2}\right)$

Solve the problem using a graphing calculator.

9) Estimate the maximum height reached by a baseball during its flight if it is thrown with a velocity of 77 feet per second at an angle of 57° relative to level ground. 9) ________

A) 65 feet B) 392 feet C) 42 feet D) 27 feet

Solve the problem.

10) An airplane flies on a compass heading of 90.0° at 480 mph. The wind affecting the plane is blowing from 319° at 33.0 mph. What is the true course and ground speed of the airplane? Round results to an appropriate number of significant digits. 10) ________

A) 93°, 502 mph B) 93°, 505 mph C) 88°, 502 mph D) 88°, 505 mph

11) The locations, given in polar coordinates, of two planes approaching an airport are (2 mi, 19°) and (3 mi, 73°). Find the distance between the two planes. 11) _______

A) ≈ 54.01 mi B) ≈ 3.61 mi C) ≈ 2.44 mi D) ≈ 2.70 mi

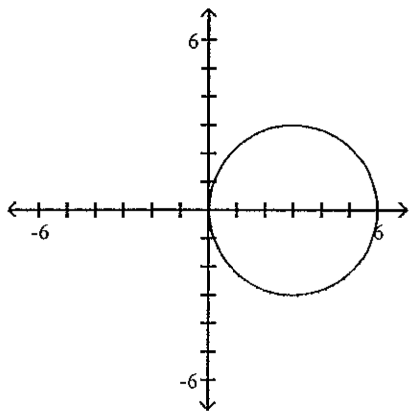
12) A basketball player shoots the ball with a velocity of 23.3 ft/s at an angle of 31.2° with the horizontal. To the nearest tenth, find the magnitude of the horizontal component of the resultant vector. 12) _______

A) 6.1 ft/s B) 19.9 ft/s C) 10 ft/s D) 12.1 ft/s

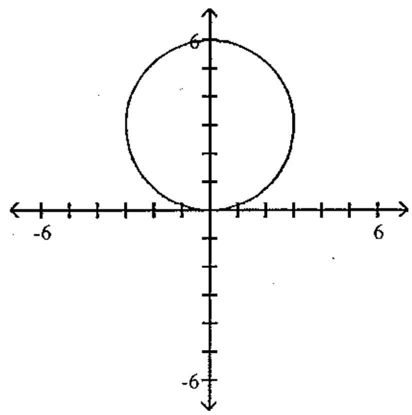
Graph the equation.

13) $r = 6 \sin \theta$ 14) $r = 4 \cos \theta$ 15) $r = 4 \sin 3\theta$ 13) _______

A)



B)



Answer Key
Testname: REVIEW UNIT 6_2016

1) B
2) A
3) B
4) A
5) D
6) D
7) C
8) B
9) A
10) A
11) C
12) B
13) B

---

1) $(-2\sqrt{3}, 2\sqrt{3}) \rightarrow (r, \theta)$ in Q2

x y

$r = \sqrt{(-2\sqrt{3})^2 + (2\sqrt{3})^2}$ $\theta = \tan^{-1}\left(\frac{2\sqrt{3}}{-2\sqrt{3}}\right)$

$\sqrt{4 \cdot 3 + 4 \cdot 3}$ $\theta = \tan^{-1}(-1)$

$\sqrt{24}$ $\theta = -45^\circ \rightarrow$ want $0 \le \theta \le 360^\circ$

$\sqrt{4}\sqrt{6}$ -45° same as 315°, but need "fix" for Q2.

$2\sqrt{6} \approx 4.8989$

$-r$ goes backwards. $\rightarrow$ $\boxed{\text{so } (-2\sqrt{6}, 315^\circ) \quad (2\sqrt{6}, 135^\circ)}$ B

$-45 + 180 = 135^\circ$

2. $x = \sin\theta$ $y = 3\cos\theta$ Eliminate

$(\cos\theta)^2 + (\sin\theta)^2 = 1$ $\rightarrow$ $\frac{y}{3} = \frac{\cancel{3}\cos\theta}{\cancel{3}}$

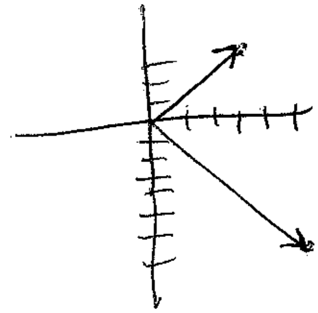
$\left(\frac{y}{3}\right)^2 + (x)^2 = 1$

$9\left(\frac{y^2}{9} + \frac{x^2}{1} = \frac{1}{1}\right)$ A

mc $\boxed{y^2 + 9x^2 = 9}$

3. Scalar! $\langle 3,3\rangle \cdot \langle 5,-7\rangle$

$15 + -21 = -6$ (B)



4. $\cos\theta = \dfrac{\vec{u}\cdot\vec{v}}{\sqrt{u}\cdot\sqrt{v}}$ $\qquad \cos\theta = \dfrac{-1+-2\sqrt{7}}{\sqrt{8}\cdot\sqrt{5}}$

$\vec{u} = \langle 1, \sqrt{7}\rangle$

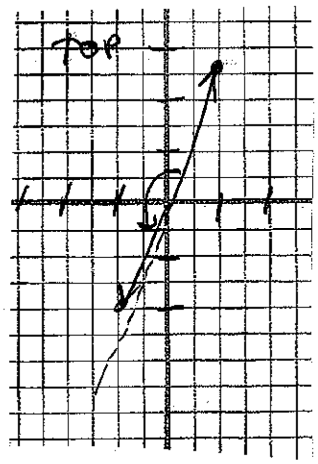
$\vec{v} = \langle -1, -2\rangle$

$\cos\theta = \dfrac{-6.2915}{}$

$\cos\theta = -.99477$

$\theta = 174.139°$

(E) typo.



$\overrightarrow{QP}$ shortway.

Q $(-5,8)$

P $(-6,7)$

5) $\langle -1,-1\rangle$

$|\vec{v}| = \sqrt{(-1)^2+(-1)^2} = \sqrt{2}$ (D)

$\theta = \tan^{-1}\left(\frac{-1}{-1}\right) = 45° + \text{fix}$

$\therefore \theta = 225°$

longway?

$\sqrt{(-6--5)^2+(7-8)^2}$

6) $\langle 4+-5, 6+-3\rangle$

$\langle -1, 3\rangle$ D

7) $|\vec{v}| = \sqrt{(15\sqrt{5})^2+(-15\sqrt{5})^2}$ $\qquad \theta = \tan^{-1}\left(\dfrac{-15\sqrt{5}}{15\sqrt{5}}\right)$

$\sqrt{225\cdot 5 + 225\cdot 5}$ $\qquad \theta = -45°$ true.

$\sqrt{2250}$ $\qquad 0 \le \theta < 360°$

Q4

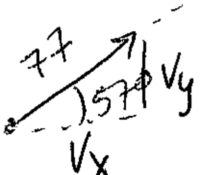
$\sqrt{225}\sqrt{10}$

$15\sqrt{10} \approx 47.43$ (C) $\therefore 315°$

8) $\left(9, \frac{2\pi}{3}\right)$

$(r,\theta) \rightarrow (x,y)$ $\qquad \left(9\cos\frac{2\pi}{3}, 9\sin\frac{2\pi}{3}\right) = \left(-4.5, \frac{9\sqrt{3}}{2}\right)$ B

9)



$V_x = 77\cos 57°$ (41.937)

$V_y = 77\sin 57°$ (64.577)

$$\boxed{\begin{aligned} x(t) &= 41.937t \\ y(t) &= -16t^2 + 64.577t \end{aligned}}$$

max height $\cancel{x} = \frac{-b}{2a} = t$

$t = \dfrac{-64.577}{-32} = 2.018$ (A)

$y(2.018) = 65.159$ ft max height

* Didn't give start height.. so just use start $(x_0, y_0) = (0,0)$

unit ⊙ angles comp-form.

10) p: $(480, 90°B) \rightarrow (480, 0° uc) \rightarrow \langle 480\cos 0, 480 \sin 0 \rangle =$

w: $(33, 139°B) \rightarrow (33, -49° uc) \rightarrow \langle 33\cos -49°, 33\sin -49 \rangle = +$

$\langle 501.6499, -24.90547 \rangle$ actual comp form.

From 319°

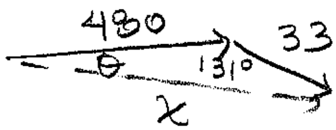
$\begin{array}{r} 319 \\ -180 \\ \hline 139° B. \end{array}$ $\begin{array}{r} 139 \\ -90 \\ \hline 49° \end{array}$

Mag: $\sqrt{x^2+y^2} = 502.262$ mph

$\theta = \tan^{-1}\left(\frac{-24.9054}{501.6499}\right) = -2.8422°$ uc.

$\theta_{Bear} = 90 + 2.842 = 92.84°$ Ⓐ (502mph, 93° Bear.)

OR Law of Cosines.



$x^2 = 480^2 + 33^2 - 2(480)(33)\cos 131°$

$x = \underline{502.267 \text{ mph}}$

$33^2 = 502.267^2 + 480^2 - 2(502.267)(480) \cdot \cos\theta$

$.99876 = \cos\theta$

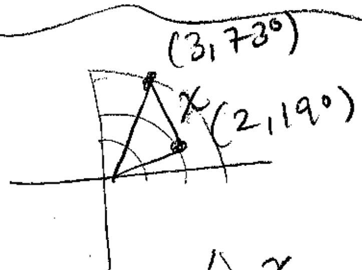
$\cos^{-1}(.998) = \theta$

$\theta = 2.8422°$ in △.

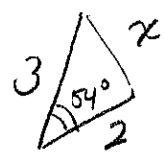
Bearing: $90 + \theta$

$\boxed{92.84°}$

11)



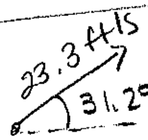
$\begin{array}{r} 73° \\ -19° \\ \hline 54° \end{array}$



$x^2 = 2^2 + 3^2 - 2(2)(3)\cos 54°$

$\underline{x = 2.438}$ Ⓒ

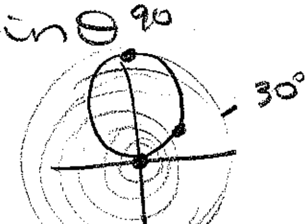
12)



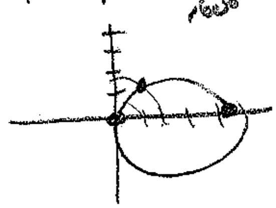
$V_x = 23.3\cos(31.2°) = 19.929$ ft/s Ⓑ

13) $r = 6\sin\theta$

θ	r
0	0
30°	3
90°	6



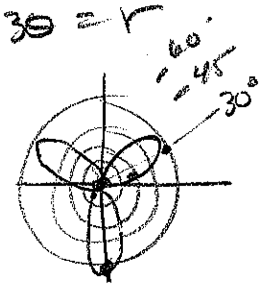
14) $r = 4\cos\theta$



θ	r
0	4
60	2
90°	0

16) $4\sin 3\theta = r$

θ	r
0	0
π/18	2
π/6	4
π/3	0
π/2	-4



rose curve w/ 3 petals