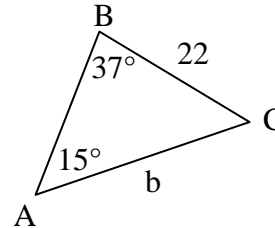
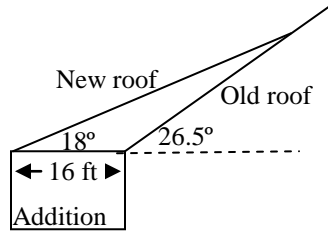


Precalculus – Final Exam Review

Do all work on a separate piece of paper.

1. Convert to degrees: $\frac{3\pi}{5}$
2. Use trigonometric identities to simplify the expression: $(\sin \theta - 1)(\sin \theta + 1)$.
3. Given $\sin \theta = -\frac{1}{5}$ and $\tan \theta < 0$, find $\cos \theta$.
4. Graph the following equation: $y = \frac{1}{2} \cos\left(\frac{3x}{2}\right)$
5. Evaluate: $\arccos\left(-\frac{1}{2}\right)$
6. Evaluate: $\cos\left[\arctan\left(-\frac{2}{3}\right)\right]$
7. Simplify: $\frac{\csc x \cos^2 x}{1 + \csc x}$
8. Simplify: $\frac{\sin^2 x}{\sec^2 x - 1}$
9. Evaluate: $\tan \frac{13\pi}{12}$ (Use the fact $\frac{13\pi}{12} = \frac{4\pi}{3} - \frac{\pi}{4}$)
10. Simplify: $\sin\left(\frac{3\pi}{2} + x\right)$
11. Find all the solutions in the interval $[0, 2\pi)$: $\cos 2x + \sin x = 0$.
12. A 16-foot ladder leaning against the side of a house reaches 12 feet up the side of the house. What angle does the ladder make with the ground?
13. From point P, a cone is set 112 feet away at point A. Another cone is set 145 feet away from point P at point B. The angle at P is 50° . What is the distance between points A and B?
14. From a point 300 feet from a building, the angle of elevation to the base of an antenna on the roof is 26.6° and the angle of elevation to the top of the antenna is 31.5° . Determine the height of the antenna.

15. From a point on a cliff 75 feet above water level an observer can see a ship. The angle of depression to the ship is 4° . How far is the ship from the base of the cliff?
16. A room 16 feet on a side is to be added on to the side of a house. The angle of elevation of the present roof is 26.5° , and the angle of elevation of the new roof is to be 18.0° . How far along the old roof will the new roof reach?



17. Find b in the triangle at the right:

18. Find the vertex, focus and directrix of the parabola: $4y^2 - 4y - 4x + 5 = 0$

19. Graph: $\frac{x^2}{16} + \frac{y^2}{1} = 1$

20. Find the foci of the hyperbola: $\frac{(x+3)^2}{27} - \frac{(y-5)^2}{22} = 1$

21. Find the center and radius of the circle: $(x+2)^2 + (y-7)^2 = 16$

22. Classify the graph of the equation as a circle, parabola, hyperbola, or ellipse:

$$x^2 - y^2 + 2x - 6y - 8 = 0$$

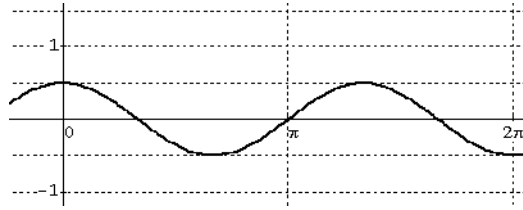
23. Find the magnitude of the vector $\langle -3, 6 \rangle$.

24. An airplane has a velocity of 580 mph, and its bearing is $N60^\circ W$. The wind has a velocity of 60 mph, and its bearing is $N45^\circ E$. What is the resultant speed and bearing of the airplane (with wind)?

Answers:

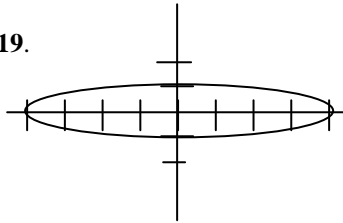
1. 108° 2. $-\cos^2 \theta$ 3. $\frac{2\sqrt{6}}{5}$

4.



5. $\frac{2\pi}{3}$ 6. $\frac{3\sqrt{13}}{13}$ 7. $1 - \sin x$ 8. $\cos^2 x$ 9. $2 - \sqrt{3}$ 10. $-\cos x$ 11. $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$
12. 48.6° 13. 112.7 ft. 14. 33.6 ft 15. 1072.5 ft 16. 33.5 feet 17. 51.2

18. $v: (1, \frac{1}{2})$ $f: (\frac{5}{4}, \frac{1}{2})$ $d: x = \frac{3}{4}$ 19.



20. $(-10, 5)$ $(4, 5)$ 21. $(-2, 7)$, $r = 4$ 22. Hyperbola

23. $3 \cdot \text{square root of } 5$

24. 567.4 mph, N 54.1° W