

## Trigonometry Final Exam Review

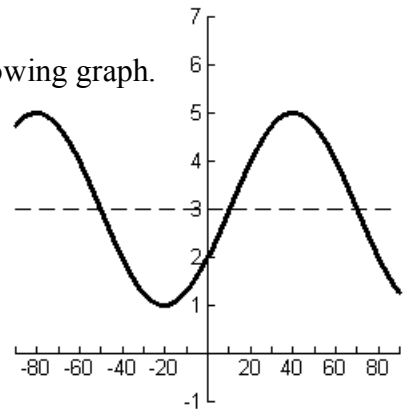
### Chapter 1

1. Find the exact value of  $\cos \theta$  if  $\tan \theta = -3$  and  $\theta$  terminates in quadrant II.
2. From a helicopter 5 km high, a cow is seen with an angle of depression of  $21^\circ$ . How far is it from a point on the ground directly below the helicopter to the cow?
3. Evaluate:  $\sin 315^\circ$
4. Evaluate:  $\theta = \cot^{-1} 8.05$
5. Evaluate  $\cos 234.16^\circ$

### Chapter 2

6. Evaluate:  $\sin \frac{\pi}{3} \cos \frac{\pi}{6} + \cos \frac{\pi}{3} \sin \frac{\pi}{6}$
7. List the domains for the six trigonometric functions?
8. As you stop your car at a traffic light, a pebble becomes wedged between the tire treads. When the car starts to move, the distance of the pebble from the pavement varies sinusoidally with the distance the car has traveled. The period is the circumference of the wheel which is 32 inches in diameter. Write an equation that represents this function?

9. Write a positive sine equation in degrees that matches the following graph.



- 10-13. Consider the function  $y = 6 + 4 \cos \frac{1}{2}(\theta + 20^\circ)$ :

10. Find the amplitude.
11. Find the period.
12. Find the phase shift and the vertical shift.
13. Graph the function.

14. Find the exact value of  $x = \sec\left(-\frac{\pi}{4}\right)$ .
15. Convert  $\frac{11\pi}{6}$  to degree measure.

### Chapter 3

List the **Pythagorean** and the **sum and difference** identities.

Develop the **double angles** and the **half angle** identities.

16. Prove:  $\frac{3 \cos^2 x - 2 \cos x - 1}{\cos x - 1} = 3 \cos x + 1$
17. Prove:  $\cos\left(\frac{4x}{5}\right) \cos\left(\frac{x}{5}\right) - \sin\left(\frac{4x}{5}\right) \sin\left(\frac{x}{5}\right) = \cos x$
18. Use the identity for  $\sin(A - B)$  to find  $\sin 15^\circ$ .
19. Find the exact value for  $\cos 75^\circ$ .
20. Solve for  $x$  if  $\frac{2 \tan x}{1 - \tan^2 x} = \frac{\sqrt{3}}{3}$  when  $x \in [0, 2\pi)$ .
21. Prove:  $\sin(\theta + 30^\circ) + \cos(\theta + 60^\circ) = \cos \theta$ .
22. List the co-function identities.

### More Chapter 3

23. Solve  $2\sin\theta + 1 = 0$  when  $\theta \in \mathbb{R}$ .
24. Solve  $2\sin^2 x = \sqrt{2}\sin x$  in  $[0, 2\pi)$ .
25. Prove  $\frac{1 - \cos 2x}{\sin 2x} = \tan x$ .

### Chapter 4

26. List the ranges for the six circular inverse trig functions.
27. Evaluate.      a)  $\theta = \text{Arc cos}\left(-\frac{1}{2}\right)$       b)  $x = \text{Arc cot}(-\sqrt{3})$
28. Graph the six circular inverse trig functions.
- 29-31. An amusement park has a Ferris wheel with a radius of 16 feet that revolves at 3 rpm.
29. How many radians per minute is the Ferris wheel turning?
30. What is the linear velocity in feet per minute of a point on the rim of the Ferris wheel?
31. What is the linear velocity in feet per minute of a point at the center of the Ferris wheel?
32. Evaluate.      a)  $\cos\left(\text{Arc sin}\left(-\frac{\sqrt{2}}{2}\right)\right)$       b)  $\sin(\text{Arc sin}(-3))$

### Chapter 5

33. Given triangle PIG, angle I is a right angle, angle P =  $56^\circ$ , and side i = 24.7, find side g.
34. Given triangle RAT, angle R =  $37^\circ$ , angle T =  $52^\circ$ , and side a = 13.6, find side t.
35. Given triangle MUD, and U =  $109^\circ$ , sides d = 163 and m = 32, find side u.
36. What is the area of triangle MUD in #35?
- 37-39. Gary walks out the front door of his apartment and gets on his bike. He rides 98 feet due south, on a bearing of  $180^\circ$ , then he turns and rides due west, on a bearing of  $270^\circ$ , for 126 feet.
37. How far is Gary from his apartment?
38. What is Gary's bearing from his apartment?
39. What is Gary's bearing back to his apartment?

### Supplemental

Graph the following conic sections.

40.  $x^2 + 2x + y^2 - 14y + 41 = 0$       41.  $9x^2 - y^2 - 2y - 8 = 0$
42.  $4x^2 - 48x + y^2 + 128 = 0$       43.  $y + 2x^2 + 4x - 6 = 0$
44. The  $n$ th term in a sequence is given by  $a_n = (-1)^{n+1}(3n+1)$ . Find the 6th term in the sequence.
45. Find the  $n$ th term of the sequence  $\left\{1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots\right\}$ .

# Trigonometry Final Exam Review Answers

1.  $-\frac{\sqrt{10}}{10}$       2. 13.025 km      3.  $-\frac{\sqrt{2}}{2}$       4.  $7.081^\circ$   
 5. -0.586      6. 1      7. see notes      8.  $y = 16 - 16 \cos \frac{1}{16}x$   
 9.  $y = 3 + 2 \sin 3(\theta - 10^\circ)$       10. 4      11.  $720^\circ$

12. phase shift:  $-20^\circ$ , vertical shift: 6      13.       14.  $\sqrt{2}$

15.  $330^\circ$  \*\*see notes in chapter 3 for identities

16. LS: 
$$= \frac{(3 \cos x + 1)(\cancel{\cos x - 1})}{\cancel{\cos x - 1}} = 3 \cos x + 1 \square$$

17. LS: 
$$= \cos\left(\frac{4x}{5} + \frac{x}{5}\right) = \cos x \square$$
      18.  $\frac{\sqrt{6} - \sqrt{2}}{4}$       19.  $\frac{\sqrt{6} - \sqrt{2}}{4}$

LS: 
$$= \sin \theta \cos 30 + \cos \theta \sin 30 + \cos \theta \cos 60 - \sin \theta \sin 60$$

20.  $\frac{\pi}{12}, \frac{7\pi}{12}, \frac{13\pi}{12}, \frac{19\pi}{12}$       21. 
$$= \frac{\sqrt{3}}{2} \sin \theta + \frac{1}{2} \cos \theta + \frac{1}{2} \cos \theta - \frac{\sqrt{3}}{2} \sin \theta$$
  

$$= \cos \theta \square$$

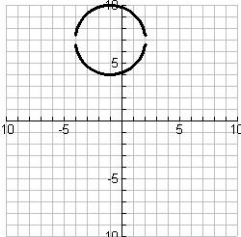
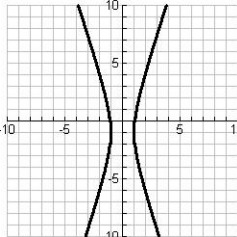
22. see notes      23. 
$$\theta = \begin{cases} 210^\circ + 360^\circ n \\ 330^\circ + 360^\circ n \end{cases}$$
      24.  $0, \pi, \frac{\pi}{4}, \frac{3\pi}{4}$

25. LS: 
$$= \frac{1 - (1 - 2 \sin^2 x)}{2 \sin x \cos x} = \frac{-2 \sin^2 x}{-2 \sin x \cos x} = \tan x \square$$
      26. see notes      27. a)  $120^\circ$  b)  $\frac{5\pi}{6}$

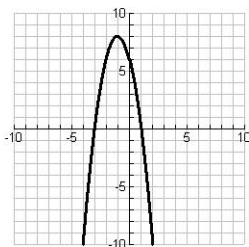
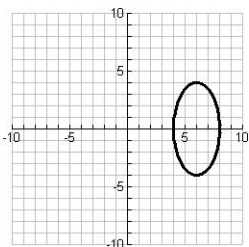
28. see notes      29. 18.85 rad/min      30. 301.593 ft/min      31. 0 ft/min

32. a)  $\frac{\sqrt{2}}{2}$       b) no solution      33.  $g = 13.812$       34.  $t = 10.719$

35.  $u = 176.038$       36.  $A = 2465.912 \text{ unit}^2$       37. 159.625 ft      38.  $232.125^\circ$

39.  $52.125^\circ$       40.  $(x+1)^2 + (y-7)^2 = 9$        41.  $x^2 - \frac{(y+1)^2}{9} = 1$  

42.  $\frac{(x-6)^2}{4} + \frac{y^2}{16} = 1$       43.  $y = -2(x+1)^2 + 8$



44.  $a_6 = -19$       45.  $a_n = \frac{1}{2^{n-1}}$