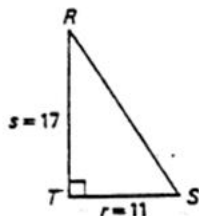


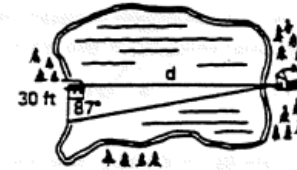
# TRIG / PRECALC – MIDTERM REVIEW & KEY

- Find the distance between  $P_1(-4, -3)$  and  $P_2(1, 1)$ .  
 a. 9      b. 20      c.  $3\sqrt{3}$       d.  $\sqrt{41}$
- Find the quadrant which contains the terminal side of an angle  $\theta$  in standard position and with a measure of  $275^\circ$ .  
 a. III      b. IV      c. II      d. I
- The terminal side of an angle  $\theta$  in standard position passes through the point  $P(-1, -3)$ . Find  $\cos \theta$ .  
 a.  $\sqrt{10}$       b. 10      c.  $\frac{\sqrt{10}}{10}$       d.  $\frac{\sqrt{10}}{10}$
- If  $\tan \theta = -2$  and  $\theta$  is in Quadrant II, find  $\sec \theta$ .  
 a.  $-\sqrt{5}$       b.  $\sqrt{5}$       c.  $5\sqrt{5}$       d.  $-5\sqrt{5}$
- For an angle  $\theta$  in standard position where  $\theta = -225^\circ$ , find the measure of its reference angle.  
 a.  $225^\circ$       b.  $45^\circ$       c.  $145^\circ$       d.  $135^\circ$
- The terminal side of an angle in standard position passes through  $P(-1, \sqrt{3})$ . Find the measure of this angle.  
 a.  $120^\circ$       b.  $240^\circ$       c.  $60^\circ$       d.  $330^\circ$
- use a calculator to find*  
 $\cos 39^\circ 30'$ .  
 a. -0.7716      b. 0.7671      c. -0.7671      d. 0.7716
- use a calculator to find*  
 $\cot 20^\circ 15'$ .  
 a. 1.7107      b. 1.7117      c. 2.7117      d. 2.7107
- In  $\triangle RST$ ,  $r = 11$  and  $s = 17$ . Find  $R$  to the nearest ten minutes.  
 a.  $30^\circ 40'$       b.  $32^\circ 50'$   
 c.  $28^\circ 30'$       d.  $34^\circ 20'$



- The top of a flagpole is sighted at an angle of elevation of  $48^\circ$  from a point on the ground 25 meters from the base of the pole. Find the height of the flagpole to the nearest tenth of a meter.  
 a. 27.8 m      b. 27.5 m      c. 27.7 m      d. 27.6 m

- A cabin on the shore of a lake is opposite a dock. Given the information provided in the figure, find  $d$ , the distance between the cabin and the dock, to the nearest tenth of a foot.

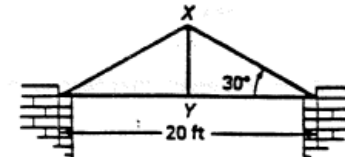


- 572.4 ft
  - 600.9 ft
  - 542.8 ft
  - 1000.7 ft

- A sloop, starting from point A, sails 50 kilometers west and then 75 kilometers due north. How far away from point A is the sloop? Express the answer to the nearest tenth of a kilometer.

- 89.6 km
- 90.1 km
- 92.0 km
- 85.5 km

- A truss for a bridge is constructed with measurements as shown. Find the length, to the nearest tenth of a meter, of the tie rod, XY.



- 8.5 m
- 7.4 m
- 9.4 m
- 5.8 m

- Change  $210^\circ$  to radian measure in terms of  $\pi$ .

- $\frac{7}{6}\pi$
- $\frac{3}{5}\pi$
- $\frac{5}{6}\pi$
- $\frac{4}{3}\pi$

- Find the degree measure of an angle whose radian measure is 3.1416.

- 0
- $60^\circ 20'$
- $180^\circ$
- $20^\circ 60'$

- A central angle of  $\frac{\pi}{2}$  radians in a circle with a radius of 8 centimeters subtends  $\widehat{AB}$ . Find the length of  $\widehat{AB}$ .

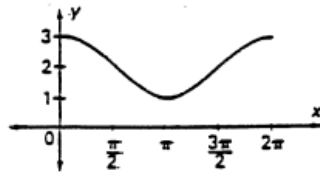
- $16\pi$
- $2\pi$
- $8\pi$
- $4\pi$

- D
- B
- C
- A
- B
- A
- D
- D
- B
- A
- A
- B
- D
- A
- C
- D

18. Given  $\sin 55^\circ = 0.8192$ , find  $\sin(-55^\circ)$ .

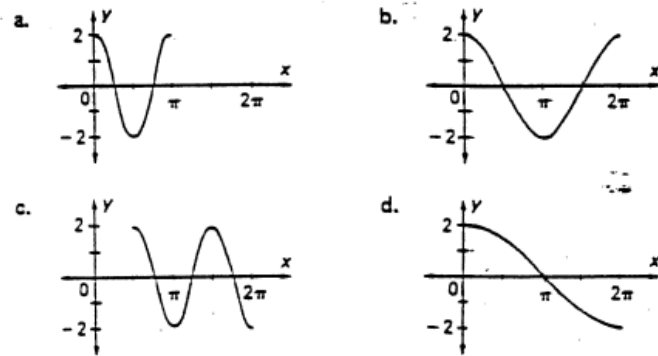
- a.  $-0.8219$    b.  $0.8219$    c.  $0.8192$    d.  $-0.8192$

19. Select the function that best represents the graph at the right.

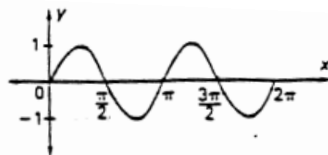


- a.  $y = \sin x + 2$   
 b.  $y = \sin x - 2$   
 c.  $y = \cos x + 2$   
 d.  $y = \cos x - 2$

20. Select the graph that represents the function,  $y = 2 \cos x$ .

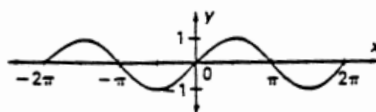


21. Select the function that represents the graph at the right.



- a.  $y = \cos 2x$   
 b.  $y = \sin 2x$   
 c.  $y = 2 \sin x$   
 d.  $y = 2 \cos x$

22. Select the function that represents the graph at the right.

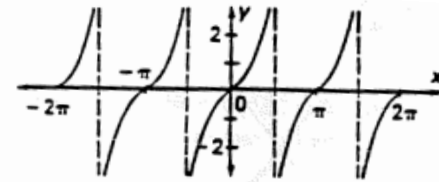


- a.  $y = \cos(x - 2\pi)$   
 b.  $y = \sin(x + 2\pi)$   
 c.  $y = \sin(x - \pi)$   
 d.  $y = \cos(x + 2\pi)$

23. What is the value of  $\sin 90^\circ + \sin 30^\circ$ ?

- a.  $\frac{2}{3}$    b.  $\frac{1}{2}$    c.  $\frac{3}{2}$    d. 60

24. Select the function that best represents the graph at the right.



- a.  $\sec x$    b.  $\tan x$   
 c.  $\cot x$    d.  $\csc x$



25. Which of the following is equivalent to  $1 - \sin^2 \alpha$ ?

- a.  $\cos^2 \alpha$    b.  $\cos \alpha$    c.  $\tan^2 \alpha$    d. 1

26. What is another expression for  $\frac{1}{\tan \beta}$ ?

- a.  $\cot \beta$    b.  $\sin \beta$    c.  $-\tan \beta$    d.  $-\cot \beta$



27. Find the expression that is an identity.

- a.  $\frac{\sec \theta}{\cos \theta} + \frac{\tan \theta}{\cot \theta} = 1$    b.  $\frac{\sec \theta}{\cos \theta} - \frac{\tan \theta}{\cot \theta} = 1$   
 c.  $\frac{\cos \theta}{\sec \theta} - \frac{\tan \theta}{\cot \theta} = 1$    d.  $\frac{\sec \theta}{\cos \theta} + \frac{\cot \theta}{\tan \theta} = 1$



28. Evaluate  $\cos(\frac{\pi}{4} - \frac{\pi}{3})$ . Do not use tables.

- a.  $\frac{\sqrt{2} + \sqrt{6}}{4}$    b.  $\frac{\sqrt{3} + \sqrt{6}}{4}$    c.  $\frac{-\sqrt{2} - \sqrt{6}}{4}$    d.  $\frac{-\sqrt{2} + \sqrt{6}}{4}$



29. Evaluate  $\sin(45^\circ + 30^\circ)$ . Do not use tables.

- a.  $\frac{-\sqrt{6} + \sqrt{2}}{4}$    b.  $\frac{\sqrt{6} + \sqrt{2}}{4}$    c.  $\frac{-\sqrt{2} + \sqrt{6}}{2}$    d.  $\frac{-\sqrt{2} - \sqrt{6}}{2}$



30. Evaluate  $\tan(45^\circ + 30^\circ)$ .

- a.  $-2 - \sqrt{3}$    b.  $2 + \sqrt{3}$    c.  $\sqrt{3}$    d. 3

31. Evaluate  $\sin 2\alpha$ , given that  $\alpha = 25^\circ$ ,  $\sin \alpha = 0.42$ , and  $\cos \alpha = 0.91$ .

- a. 1.32   b. 0.378   c. 0.48   d. 0.756



32. Evaluate  $\sin \frac{\pi}{8}$ .

- a.  $2 - \sqrt{2}$    b.  $\sqrt{2 + \sqrt{2}}$   
 c.  $\frac{1}{2} \sqrt{2 - \sqrt{2}}$    d.  $\frac{1}{2} \sqrt{2 + \sqrt{2}}$

18. D  
 19. C  
 20. B  
 21. B  
 22. B  
 23. C  
 24. B  
 25. A  
 26. A  
 27. B  
 28. A  
 29. B  
 30. B  
 31. D  
 32. C

~~32~~ Express  $2 \sin x \cos 2x$  as a sum.

- a.  $\sin 3x - \sin x$                       b.  $\cos 3x + \cos x$   
 c.  $\sin 6x$                                       d.  $\cos 6x$

34. In  $\triangle ABC$ ,  $A = 35^\circ$ ,  $B = 65^\circ$ , and  $c = 6.0$ . Find  $a$  to the nearest tenth.

- IP a. 3.8                      b. 9.4                      c. 3.5                      d. 10.9

35. In  $\triangle ABC$ ,  $A = 55^\circ$ ,  $b = 8.6$ , and  $c = 6.5$ . Find  $a$  to the nearest tenth.

- LIP a. 7.2                      b. 7.1                      c. 7.3                      d. 7.0

36. In  $\triangle ABC$ ,  $a = 6.5$ ,  $b = 8$ ,  $c = 12$ . Find  $A$  to the nearest 10 minutes.

- LIP a.  $30^\circ 20'$                       b.  $30^\circ 30'$                       c.  $38^\circ 24'$                       d.  $111^\circ 17'$

37. In  $\triangle ABC$ ,  $A = 50^\circ$ ,  $c = 6$ , and  $a = 5$ . Find the number of possible solutions for this triangle.

- IP a. One                      b. Three                      c. Two                      d. None

39. In  $\triangle ABC$ ,  $A = 45^\circ$ ,  $b = 6$  cm; and  $c = 7$  cm. Find the area of the triangle to the nearest tenth of a square centimeter.

- a. 21 cm                      b. 42 cm                      c. 14.8 cm                      d. 29.6 cm

40. In  $\triangle RST$ ,  $r = 5$ ,  $s = 6$ , and  $t = 7$ . Find the area of this triangle to the nearest tenth of a square unit.

- a. 236.9                      b. 14.7                      c. 4.8                      d. 24.0

45. Find the inverse of  $y = \cos x$ .

- a.  $y = \sin x$                                       b.  $x = \arccos y$   
 c.  $y = \arcsin x$                                       d.  $x = \sin y$

46. Evaluate  $\sin(\arccos \frac{1}{5})$ .

- a. 0.2                      b. 78.5                      c. 11.5                      d. 0.9798

47. Evaluate  $\cot(\arctan 2)$ .

- a. 2.0000                      b. 63.4                      c. 0.5000                      d. 89.1

Matching — 56.  $x^2 + y^2$

— 52.  $r \cos \theta$  — 57.  $r \sin \theta$

— 53.  $\frac{a+b+c}{2}$  — 59.  $\cos^{-1} x$

— 54.  $P_1 P_2 = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(a)  $\arccos x$

(c)  $y$

(d)  $s$

(f)  $r^2$

(g) distance formula

(h)  $x$

True or False:

1.  $\sin \theta = \frac{1}{\cos \theta}$

2.  $\sin^2 \theta + \cos^2 \theta = 1$

3.  $1 + \csc^2 \theta = \cot^2 \theta$

4.  $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$

5.  $\sin 2\alpha = 1 - 2\sin^2 \alpha$

6.  $\cos 2\alpha = 1 - 2\cos^2 \alpha$

8.  $\cos(\alpha + \beta) = \cos \alpha \sin \beta - \sin \alpha \cos \beta$

9.  $\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$

Simplify  $\cos x + \sin^2 x \sec x$ .

- a.  $\sin^2 x$                       b.  $\tan^2 x$                       c.  $\cos x$                       d.  $\sec x$

If  $\sin x = u$ , then  $\sec^2 x = ?$ .

- a.  $\frac{1}{1-u^2}$                       b.  $\frac{1}{1+u^2}$                       c.  $\frac{1}{u^2}$                       d.  $\frac{1}{\sqrt{1-u^2}}$

Express  $\cos 255^\circ$  in simplest radical form.

- a.  $-\frac{\sqrt{2} + \sqrt{6}}{4}$                       b.  $\frac{\sqrt{6} - \sqrt{2}}{4}$                       c.  $\frac{\sqrt{2} - \sqrt{6}}{4}$                       d.  $\frac{1 - \sqrt{3}}{2}$

④ If  $f(x)$  has period 6, then  $f(2x)$  has period ?

- a. 2                      b. 3                      c. 12                      d. 18

⑤ Which of the following is an equation of the cosine curve shown?

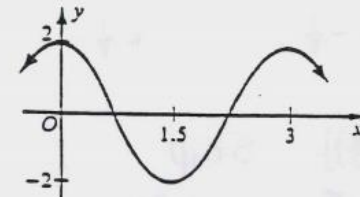
- a.  $y = 2 \cos \frac{2x}{3}$                       b.  $y = 2 \cos \frac{3\pi x}{2}$   
 c.  $y = 2 \cos \frac{2\pi x}{3}$                       d.  $y = 2 \cos 3\pi x$

⑥ Which of the following is an equation of a sine curve with maximum value 2, minimum value 0, and period  $\frac{\pi}{3}$ ?

- a.  $y = 2 + \sin 3\pi x$                       b.  $y = 2 \sin 3x$   
 c.  $y = 1 + \sin 6\pi x$                       d.  $y = 1 + \sin 6x$

⑦ State the period of the function defined by  $y = 2 \tan \pi x$ .

- a. 1                      b. 2                      c.  $\pi$                       d.  $2\pi$



- ~~X~~ A
- ~~X~~ C
- ~~X~~ A
- ~~X~~ A
- ~~X~~ C
- ~~X~~ C
- ~~X~~ B
- 45. B
- 46. D
- 47. C
- 48. D
- 52. H
- 53. D
- 54. G
- ~~X~~ J
- 56. F
- 57. C
- ~~X~~ B
- 59. A
- 1. F
- 2. T
- 3. F
- 4. T
- 5. F
- 6. F
- ~~X~~ T
- 8. F
- 9. T
- 69. T
- 1. D
- 2. A
- 3. C
- 4. B
- 5. C
- 6. D
- 7. A

8. Express  $210^\circ$  in radians.  
 a.  $\frac{7\pi}{3}$       b.  $\frac{5\pi}{6}$       c.  $\frac{7\pi}{6}$       d.  $\frac{7\pi}{12}$

9. Express  $\frac{11\pi}{3}$  radians in degrees.  
 a.  $630^\circ$       b.  $300^\circ$       c.  $330^\circ$       d.  $660^\circ$

10. Find the exact value of  $\sec\left(-\frac{5\pi}{3}\right)$ .  
 a.  $\frac{\sqrt{3}}{2}$       b.  $-\frac{\sqrt{3}}{2}$       c. 2      d. -2

11. If  $\tan s = \sqrt{3}$  and  $-\pi < s < 0$ , then  $s =$  ?  
 a.  $-\frac{2\pi}{3}$       b.  $-\frac{4\pi}{3}$       c.  $-\frac{5\pi}{6}$       d.  $-\frac{7\pi}{6}$

12. In  $\triangle ABC$ ,  $B = 30^\circ$  and  $c = 20$ . For what values of  $b$  will the triangle have two solutions?  
 a.  $0 < b < 10$       b.  $10 < b < 20$       c.  $20 < b$       d. for no  $b$

13. A triangular tract of forest land has sides of lengths 3 km, 6 km, and 7 km. Find its area.  
 a.  $\sqrt{15} \text{ km}^2$       b.  $4 \text{ km}^2$       c.  $8 \text{ km}^2$       d.  $4\sqrt{5} \text{ km}^2$

15. Find  $\sec \theta$  if the terminal side of  $\theta$  passes through  $(-3, 5)$  when  $\theta$  is in standard position.  
 a.  $-\frac{\sqrt{34}}{3}$       b.  $\frac{\sqrt{34}}{5}$       c.  $-\frac{5}{3}$       d.  $\frac{5}{4}$

16. Find  $\cos \theta$  if  $\tan \theta = -\frac{12}{5}$  and  $-90^\circ < \theta < 90^\circ$ .  
 a.  $\frac{12}{13}$       b.  $-\frac{5}{13}$       c.  $\frac{5}{13}$       d.  $-\frac{12}{13}$

17. Give the exact value of  $\cos 240^\circ$ .  
 a.  $-\frac{1}{2}$       b.  $\frac{1}{2}$       c.  $-\frac{\sqrt{3}}{2}$       d.  $\frac{\sqrt{3}}{2}$

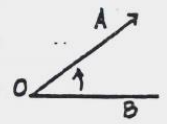
18. If  $\sin \theta = \frac{3}{4}$ , then  $\cos 2\theta =$  ?  
 a.  $\frac{7}{16}$       b.  $-\frac{1}{8}$       c.  $\frac{1}{8}$       d.  $\frac{1}{2}$

19. Evaluate  $\cos^{-1}\left[\cos\left(-\frac{\pi}{3}\right)\right]$ .  
 a.  $\frac{\pi}{3}$       b.  $-\frac{\pi}{3}$       c.  $\frac{2\pi}{3}$       d.  $\frac{5\pi}{6}$

20. Evaluate  $\sec^{-1}(-2)$ .  
 a.  $\frac{2\pi}{3}$       b.  $\frac{\pi}{3}$       c.  $-\frac{\pi}{3}$       d. nonexistent

1.  $\sin 150^\circ =$   
 a.  $\sin 60^\circ$       b.  $-\sin 60^\circ$       c.  $-\sin 30^\circ$   
 d.  $\sin 30^\circ$       e. none of these

2. Name the terminal side of the illustrated angle?  
 a.  $\vec{AB}$       b.  $\vec{OB}$       c.  $\vec{OA}$       d. none of these



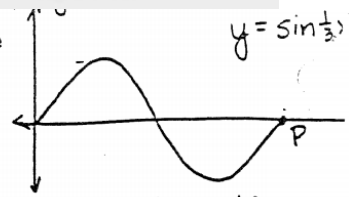
3. How many revolutions does it take a wheel with a radius of 3 feet to travel a distance of  $54\pi$  feet?  
 a. 4.5      b. 6      c. 9      d. 18

4. The value of  $\sin 30^\circ - \cos 60^\circ + \cos 180^\circ + \sin 90^\circ$  is:  
 a. 2      b. 1      c. -1      d. 0

7. The period of  $y = \cos 2x$  is:  
 a.  $\pi$       b.  $\pi/2$       c.  $2\pi$       d. 1      e.  $4\pi$

8. Which of the following is equal to  $\cos 67^\circ$ ?  
 a.  $\csc 23^\circ$       b.  $\sec 23^\circ$       c.  $\sin 23^\circ$   
 d.  $\cos 23^\circ$       e. none of these

9. The figure at the right shows the graph of  $y = \sin(1/3)x$ . What is the value of  $x$  at point P?  
 a.  $6\pi$       b.  $3\pi$       c.  $\pi/3$   
 d.  $2\pi/3$       e.  $3\pi/2$



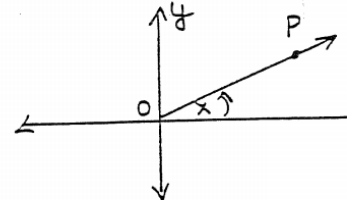
10. If an angle is in standard position and the terminal side contains the ordered pair  $(3, 3)$ , the measure of the angle is:  
 a.  $60^\circ$       b.  $22.5^\circ$       c.  $90^\circ$       d.  $45^\circ$

11. The maximum value of the function  $y = 4 \sin 1000x$  is:  
 a. 1000      b. 4      c.  $1000(2\pi)$       d. 4000

12. What is the reference angle for  $-300^\circ$ ?  
 a.  $-30^\circ$       b.  $-60^\circ$       c.  $30^\circ$       d.  $60^\circ$

13.  $\text{Arc Cos}(-1) =$   
 a. 180      b. 150      c. 270      d. 30      e. none of these

14. In the figure at the right, what is the y coordinate of point P if  $\sin x = 1/3$  and  $OP = 6$ ?  
 a.  $4\sqrt{2}$       b. 18      c.  $2\sqrt{2}$   
 d. 4      e. 2



- 8. C
- 9. D
- 10. C
- 11. A
- 12. B
- 13. D
- 14. D
- 15. A
- 16. C
- 17. A
- 18. B
- 19. A
- 20. A
- 1. D
- 2. C
- 3. C
- 4. D
- 5. A
- 6. B
- 7. A
- 8. C
- 9. A
- 10. D
- 11. B
- 12. D
- 13. A
- 14. E

SKIP  
SKIP



SKIP

15. If  $\sin x = 4/5$ , which statement is NOT TRUE?

- a.  $\tan x = 4/3$       b.  $\cot x = 4/5$   
c.  $\csc x = 5/4$       e.  $\cos x = 3/5$

16. What is the value of  $\cos x$  if  $\sin x = 1/4$ ?

- a.  $\sqrt{15}/4$     b.  $3/4$     c.  $1/\sqrt{17}$     d.  $\sqrt{17}/4$     e.  $1/\sqrt{15}$

17. If  $\sin^2 60 + \sin x + \cos^2 60 = 0$ , then one value of  $x$  is:

- a.  $0^\circ$     b.  $90^\circ$     c.  $180^\circ$     d.  $270^\circ$     e. none of these

18. If  $x$  is an angle in standard position with a measure of  $-500^\circ$  in what quadrant does its terminal side lie?

- a. IV    b. III    c. I    d. II

19. If  $\cos 43^\circ 10' = 0.7294$  and  $\cos 43^\circ 20' = 0.7274$ , find  $\cos 43^\circ 13'$  correct to four significant digits.

- a. 0.7280    b. 0.6849    c. 0.6851    d. 0.7288

20. Which pair of angles are coterminal?

- a.  $225^\circ$  and  $-135^\circ$       b.  $180^\circ$  and  $720^\circ$   
c.  $150^\circ$  and  $-270^\circ$       d.  $135^\circ$  and  $420^\circ$

21.  $\sin x = \cos ( ? )$

- a.  $90 + x$     b.  $180 - x$     c.  $90 - x$     d.  $x$

22. Which of these three statements are NOT ALWAYS TRUE?

- I  $\sin(-x) = \sin x$   
II  $\cos(-x) = \cos x$   
III  $\sec(-x) = \sec x$

- a. I is not always true      b. II is not always true  
c. III is not always true  
d. None of these is always true

23. Given  $\triangle XYZ$  with  $X=60^\circ$ ,  $y=2$ , and  $z=4$ . Find  $x$ .

- a.  $2\sqrt{7}$     b.  $2\sqrt{3}$     c.  $2\sqrt{6}$     d.  $4\sqrt{7}$     e.  $4\sqrt{3}$

24. If  $x$  is an angle in standard position such that the point  $(5,5)$  lies on its terminal side,  $\sin x =$

- a. 1    b.  $2\sqrt{2}$     c.  $\sqrt{2}/2$     d. 5

25. Given  $\triangle ABC$  with  $A = 30^\circ$ ,  $b=5$ , and  $c=4$ . The area of  $\triangle ABC =$

- a.  $5/2$  sq. units    b. 10 sq. units  
c. 2 sq. units      d. 5 sq. units  
e. not enough information is given to find the area

26. If  $x$  is an angle in standard position such that the point  $(0,6)$  is on its terminal ray,  $\cos x =$

- a.  $\sqrt{3}/2$     b.  $\sqrt{2}/2$     c. 0    d.  $3/2$

27. Solve for  $x$ :

$$\frac{x}{\sin \frac{\pi}{6}} = \frac{10}{\sin \frac{\pi}{4}}$$

- a. 5    b.  $5\sqrt{2}$     c.  $5\sqrt{3}$     d.  $10\sqrt{2}$

28. If  $x$  is an angle in standard position such that the point  $(-3,0)$  lies on its terminal side,  $\tan x =$

- a. 0    b. -3    c. 1    d. -1

29. What is the fundamental period for the sine function?

- a.  $\pi/2$     b.  $2\pi$     c.  $\pi$     d.  $3\pi$     e. none of these

30. What is the measure of an angle whose sine is twice the sine of  $30^\circ$ ?

- a.  $120^\circ$     b.  $240^\circ$     c.  $30^\circ$     d.  $90^\circ$

31. The angle of elevation of the sun is  $74^\circ$  from a point 15 feet from the base of a flagpole. Find the height of the flagpole to the nearest foot. ( $\sin 74 = 0.9613$ ;  $\cos 74 = 0.2756$ ;  $\tan 74 = 3.487$ )

- a. 4    b. 14    c. 52    d.  $15\sqrt{3}$

32. If  $x$  is a first quadrant angle with  $\tan x = 3$ ,  $\cot x =$

- a.  $3/\sqrt{10}$     b.  $\sqrt{10}/3$     c.  $2/3$     d. none of these

33. What is the maximum value of  $y = \tan x$ ?

- a. 0    b. 1000    c. 1    d. there is no maximum value

34. If  $x$  is a first quadrant angle with  $\sin x = 24/25$ ,  $\tan x =$

- a.  $25/7$     b.  $25/24$     c.  $24/7$     d. none of these

35. Which one of the following has no triangle solution?

- a.  $A = 30^\circ$ ,  $b = 20$ ,  $a = 9$       b.  $A = 30^\circ$ ,  $b = 20$ ,  $B = 70^\circ$   
c.  $A = 30^\circ$ ,  $b = 20$ ,  $a = 11$       d.  $A = 30^\circ$ ,  $b = 20$ ,  $c = 25$

36. Which of these statements is false?

I.  $\cos 45^\circ - \sin 45^\circ = 0$

II.  $\cos^2 30^\circ + \sin^2 30^\circ = 1$

III.  $\cos 45^\circ + \sin 45^\circ = 1$

- a. Only I is false      b. Only I and II are false  
c. Only II is false      d. Only III is false  
e. All three statements are false

15. B  
16. A  
17. D  
18. B  
19. D  
20. A  
21. C  
22. A  
23. B  
24. C  
25. D  
26. C  
27. B  
28. A  
29. B  
30. D  
31. C  
32. D  
33. D  
34. C  
35. A  
36. D

37. If the domain of the function  $f = \{(x, y) : y = 2x + 3\}$  is  $D = \{-1, 0, 1\}$  then the range  $R$  of  $f$  is:
- a.  $\{-1, 0, 1\}$     b.  $\{1, 3, 5\}$     c.  $\{\text{all real numbers}\}$   
 d.  $\{\text{odd integers}\}$     e.  $\{\text{nonnegative real numbers}\}$
38. What is the area of right triangle ABC if  $A = 30^\circ$ ,  $C = 90^\circ$ , and  $a = 2$ ?
- a. 4    b. 2    c.  $4\sqrt{2}$     d.  $2\sqrt{3}$
39. Solve  $\sin^2 x - \sin x = 0$  for  $x$  if  $0 \leq x \leq 2\pi$ .
- a.  $\emptyset$     b.  $\{\pi/2\}$     c.  $\{0, \pi/2, \pi\}$     d.  $\{\pi/2, 3\pi/2\}$
40. If  $\sin 52^\circ = 0.7880$ , find  $\sin 232^\circ$ .
- a. 0.7880    b. 0.2120    c. -0.2120    d. none of these
41. Given  $\triangle ABC$  with  $a = 2$ ,  $b = 3$ , and  $c = 4$ . Find  $\cos A$ .
- a.  $1/4$     b.  $3/4$     c.  $11/16$     d.  $-1/4$     e.  $7/8$

42. Another name for  $1 + \tan^2 x$  is:
- a.  $\sin^2 x$     b.  $\cos^2 x$     c.  $\sec^2 x$   
 d.  $\cot^2 x$     e. none of these

43. If  $\tan x = -1$ , one value of  $x$  is:
- a.  $135^\circ$     b.  $45^\circ$     c.  $180^\circ$     d.  $120^\circ$
52. The radian measure for  $105^\circ$  is:
- a.  $7\pi/24$     b.  $7\pi/48$     c.  $7\pi/12$   
 d. none of these
53.  $\sin(11\pi/3) =$
- a.  $-\sqrt{3}/2$     b.  $(1 - \sqrt{3})/2$     c.  $\sqrt{3}/2$     d. none of these
54. If  $\cos \theta = 5/13$  and  $\sin \alpha = 12/13$ , and  $\theta$  and  $\alpha$  are first quadrant angles, then  $\sin(\theta + \alpha) =$
- a.  $26/17$     b.  $13/17$     c.  $17/13$     d.  $17/26$     e.  $120/169$
55. An incline makes an angle of  $45^\circ$  with the level ground. How many feet up the incline must one go in order to rise 10 feet above ground?
- a.  $10\sqrt{2}$     b.  $\sqrt{2}/10$     c. 20    d. 10    e.  $10\sqrt{2}$

56. Given  $\triangle ABC$  with  $B = 30^\circ$ ,  $b = 3$ , and  $a = 2$ .  $\sin A =$
- a.  $3/\sqrt{13}$     b.  $1/3$     c.  $3/2$     d.  $2/3$   
 e. none of these

57. If  $\sin 14^\circ = 0.24$ , then  $\sin 25^\circ =$
- a.  $2 \sin 14^\circ \cos 14^\circ$     b.  $\sin 14^\circ - \cos 14^\circ$   
 c. 0.48    d.  $2 \sin 14^\circ$

58. Which of the following is a formula for the area of triangle ABC?

- a.  $ab \sin C$     b.  $ab \cos C$   
 c.  $(1/2)(ab) \sin C$     d. none of these

59. Convert 3 radians to degrees.

- a.  $3(180/\pi)$     b.  $3(\pi/180)$   
 c.  $3(180\pi)$     d.  $3\pi$

60. The positive angles less than  $360^\circ$  represented by  $\arctan(-1)$  are:

- a.  $235^\circ, 315^\circ$     b.  $135^\circ, 315^\circ$     c.  $135^\circ, 235^\circ$     d.  $35^\circ, 135^\circ$

1. Find the distance between  $P(1, -3)$  and  $Q(-2, 5)$ . (Section 1-1)
- a.  $\sqrt{5}$     b. 5    c. 73    d.  $\sqrt{73}$
2. The domain of a function is  $\{-2, -1, 0, 1, 2\}$ . The function is described by the equation  $y = 3x - 2$ . Find the range of the function. (Section 1-1)
- a.  $\{-2, 1, 4\}$     b.  $\{-4, -2, -1, 1, 4\}$   
 c.  $\{-8, -5, -2, 1, 4\}$     d.  $\{-8, -5, -2, 5, 8\}$
3. Find, in degrees, the measure of a  $\frac{3}{4}$  counterclockwise rotation. (Section 1-2)
- a.  $135^\circ$     b.  $270^\circ$     c.  $-135^\circ$     d.  $-270^\circ$
4. Point  $P(x, y)$  is on the terminal side of an angle with measure  $\theta$  in standard position.  $P$  is located  $r$  units from the origin. Tell which statement is false. (Sections 1-3 and 1-4)
- a.  $\sin \theta = \frac{y}{r}$     b.  $\cos \theta = \frac{x}{r}$     c.  $\cot \theta = \frac{x}{y}$     d.  $\sec \theta = \frac{r}{y}$
5. Find the value of  $\tan 30^\circ$ . (Section 1-5)
- a.  $\frac{\sqrt{3}}{3}$     b.  $\sqrt{3}$     c.  $\frac{\sqrt{3}}{2}$     d. 2
6. Find the value of  $\cos 225^\circ$ . (Section 1-5)
- a. 2    b.  $-\frac{\sqrt{2}}{2}$     c.  $\frac{\sqrt{2}}{2}$     d.  $\frac{1}{2}$
7. Tell which angle is coterminal with  $172^\circ$ . (Section 1-6)
- a.  $18^\circ$     b.  $-172^\circ$     c.  $432^\circ$     d.  $-188^\circ$

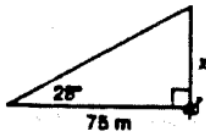
37. B  
 38. D  
 39. C  
 40. D  
 41. E  
 42. C  
 43. A  
 44. C  
 45. A  
 46. E  
 47. A  
 48. B  
 49. A  
 50. B  
 51. D  
 52. C  
 53. B  
 54. D  
 55. A  
 56. B  
 57. D  
 58. A  
 59. B

8. Given that  $\sin 13^\circ = .2250$ , find  $\sin 193^\circ$ . (Section 1-6)
- a. .9744      b. -.2250      c. .2250      d. -.9744

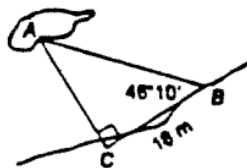
9. Tell which equality is false. (Section 2-4)
- a.  $\sin(-\theta) = \sin(180^\circ + \theta)$       b.  $\cos(2\pi - \theta) = \cos(-\theta)$   
 c.  $\cos(180^\circ + \theta) = \cos(360^\circ - \theta)$       d.  $\sin(-\theta) = \sin(360^\circ - \theta)$

10. Tell which number you multiply by in order to change  $213^\circ$  to radian measure. (Section 2-1)
- a.  $2\pi$       b.  $\pi$       c.  $\frac{180}{\pi}$       d.  $\frac{\pi}{180}$

11. Refer to the figure at the right. Then find the value of  $x$  to the nearest meter. (Section 1-8)
- a. 39 m      b. 39.5 m  
 c. 40 m      d. 40.5 m



12. The angle of depression from the top of a cliff 600 meters high to the foundation of a house is  $33^\circ 40'$ . To the nearest meter, how far is the house from the foot of the cliff? (Section 1-9)
- a. 901      b. 400      c. 333      d. 499



13. To find the distance from point C on the shore to point A on Maple Island, a surveyor made the measurements shown in the figure at the right. Find the distance AC to the nearest tenth of a meter. (Section 1-10)
- a. 17.9      b. 17.3      c. 18.1      d. 18.7

14. Given that  $\sin 73^\circ = .96$ ,  $\cos 73^\circ = .29$ ,  $\sin 41^\circ = .66$ , and  $\cos 41^\circ = .75$ , evaluate  $\cos 32^\circ$ . (Section 3-3)
- a. -.85      b. -.42      c. .42      d. .85

15. Evaluate  $\sin 75^\circ$  without tables. (Section 3-4)
- a.  $\frac{\sqrt{3}}{2}(\sqrt{3}-1)$       b.  $\frac{\sqrt{3}}{2}(\sqrt{3}+1)$       c.  $\frac{\sqrt{3}}{2}(\sqrt{2}-1)$       d.  $\frac{\sqrt{3}}{2}(\sqrt{2}+1)$

- Given that  $\sin \alpha = .42$  and  $\cos \alpha = .91$ , evaluate  $\sin 2\alpha$ . (Section 3-6)
- a. .78      b. -.78      c. .38      d. -.38

16. Find the equality that is not an identity
- a.  $1 = \csc^2 \theta - \cot^2 \theta$       b.  $\cot \theta = \frac{\cos \theta}{\sin \theta}$   
 c.  $\tan^2 \theta - \sec^2 \theta = 1$       d.  $\sin \theta = \frac{1}{\csc \theta}$

17. Find the equality that is an identity. (Section 3-2)

- a.  $\sin^2 \theta = \frac{\sec^2 \theta - 1}{\sec \theta}$       b.  $\frac{\csc \theta}{\sin \theta} = \cot^2 \theta + 1$   
 c.  $\sec \theta = \sin \theta \cdot \tan \theta$       d.  $\sin \theta \cdot \sec \theta = 1$

19. Evaluate  $\cos 15^\circ$  without tables. (Section 3-3)

- a.  $\frac{\sqrt{3}}{2}(\sqrt{3}+1)$       b.  $\frac{\sqrt{3}}{2}(\sqrt{2}-1)$       c.  $\frac{\sqrt{3}}{2}(\sqrt{2}+1)$       d.  $\frac{\sqrt{3}}{2}(\sqrt{3}+1)$

20. If  $r = 10$  m and  $s = 12$  m, find the radian measure of  $\theta$
- (a) 0.8      (b) 1.2      (c) 120      (d)  $\frac{6\pi}{5}$

21. If  $s = 10$  m and  $\theta = \frac{\pi}{5}$ , find  $r$ .
- (a)  $\frac{50}{\pi}$  m      (b)  $2\pi$  m      (c)  $\frac{\pi}{50}$  m      (d) 50 m

22. If  $\theta = 40^\circ$  and  $r = 18$  cm, find  $s$ .
- (a) 720 cm      (b)  $2\frac{2}{3}$  cm      (c)  $4\pi$  cm      (d) 4 cm

23. Change  $\frac{5\pi}{4}$  to degrees.
- (a)  $50^\circ$       (b)  $100^\circ$       (c)  $200^\circ$       (d)  $225^\circ$

24. Change  $42^\circ 20'$  to radians.
- (a)  $\frac{127\pi}{180}$       (b)  $\frac{127\pi}{540}$       (c)  $\frac{127\pi}{270}$       (d)  $\frac{127\pi}{90}$

25. The distance  $r$  from the origin to a point P on the terminal side of an angle in standard position is the:
- (a) measure of the angle      (b) radius vector      (c) rotation      (d) reciprocal.

26. An angle is Quadrant III whose reference angle is  $21^\circ 37'$  is (a)  $201^\circ 37'$  (b)  $158^\circ 23'$  (c)  $248^\circ 23'$  (d)  $158^\circ 37'$

27. This is the graph of
- 
- (a)  $y = \csc x$       (b)  $y = \sec x$       (c)  $y = \tan x$       (d)  $y = \cot x$

28. The amplitude of the function  $y = -2 \sin \frac{1}{2} x + 1$  is
- (a) -2      (b)  $\frac{1}{2}$       (c) 1      (d) 2

29. The period of  $y = -2 \sin \frac{1}{2} x + 1$  is
- (a)  $\frac{\pi}{2}$       (b)  $\pi$       (c)  $2\pi$       (d)  $4\pi$

30. The frequency of  $y = -2 \sin \frac{1}{2} x + 1$  is
- (a)  $\frac{1}{2}$       (b) 1      (c) 2      (d) 4

8. B  
 9. C  
 10. P  
 11. C  
 12. A  
 13. D  
 14. D  
 15. B  
 16. B  
 17. C  
 18. B  
 19. D  
 20. B  
 21. A  
 22. C  
 23. B  
 24. B  
 25. B  
 26. A  
 27. B  
 28. D  
 29. D  
 30. 1/4π

# I. Solving Triangles

1. Find all of the missing side lengths and angle measures for the following triangles:



Directions: Write the solutions to the following expressions in radians if the answer is an angle and a fraction if the answer is a ratio!

- a.  $A = 33^\circ; B = 72^\circ; a = 4.2 \text{ in}$       b.  $A = 35.2^\circ; B = 67.5^\circ; c = 12 \text{ cm}$   
 c.  $A = 50^\circ; a = 12 \text{ in}; b = 42 \text{ in}$       d.  $A = 49^\circ; a = 6.8 \text{ ft}; b = 7.9 \text{ ft}$   
 e.  $C = 120^\circ; a = 10 \text{ cm}; c = 25 \text{ cm}$       f.  $a = 4 \text{ km}; b = 11 \text{ km}; c = 12 \text{ km}$

a.  $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$       b.  $\sin^{-1}\left(-\frac{1}{2}\right)$       c.  $\arcsin(-1)$

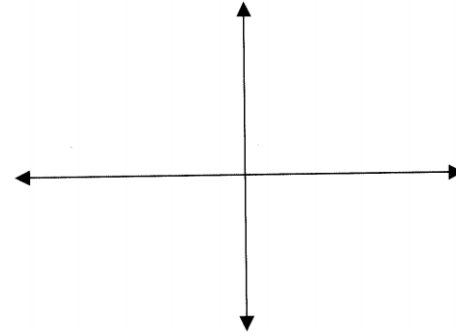
d.  $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$       e.  $\arccos(0)$       f.  $\arctan(-1)$

g.  $\tan^{-1}(0)$       h.  $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$       i.  $\arccos(-1)$

j.  $\tan\left(\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$       k.  $\sin\left(\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$       l.  $\cos(\arctan(-\sqrt{3}))$

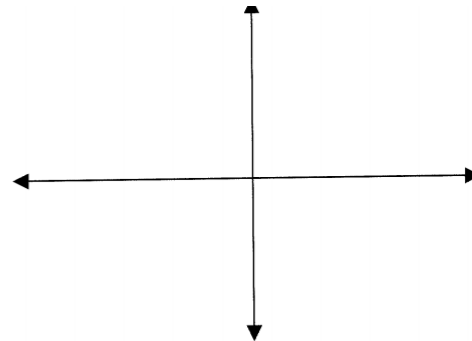
1. Draw  $y = \sin^{-1} x$ .

- a. The domain for  $y = \sin^{-1} x$  is \_\_\_\_\_.  
 b. The range for  $y = \sin^{-1} x$  is \_\_\_\_\_.  
 c.  $y = \sin^{-1} x$  is located in quadrants \_\_\_\_\_ and \_\_\_\_\_.  
 d.  $y = \sin^{-1} x$  is positive in quadrant \_\_\_\_\_.  
 e.  $y = \sin^{-1} x$  is negative in quadrant \_\_\_\_\_.



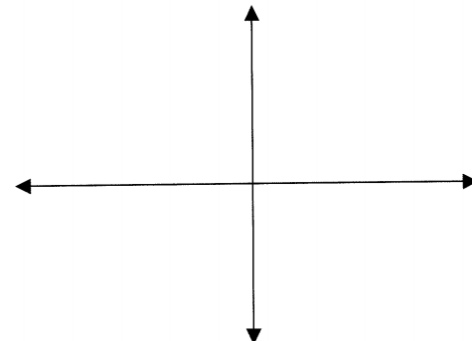
2. Draw  $y = \cos^{-1} x$ .

- a. The domain for  $y = \cos^{-1} x$  is \_\_\_\_\_.  
 b. The range for  $y = \cos^{-1} x$  is \_\_\_\_\_.  
 c.  $y = \cos^{-1} x$  is located in quadrants \_\_\_\_\_ and \_\_\_\_\_.  
 d.  $y = \cos^{-1} x$  is positive in quadrant \_\_\_\_\_.  
 e.  $y = \cos^{-1} x$  is negative in quadrant \_\_\_\_\_.



3. Draw  $y = \tan^{-1} x$ .

- a. The domain for  $y = \tan^{-1} x$  is \_\_\_\_\_.  
 b. The range for  $y = \tan^{-1} x$  is \_\_\_\_\_.  
 c.  $y = \tan^{-1} x$  is located in quadrants \_\_\_\_\_ and \_\_\_\_\_.  
 d.  $y = \tan^{-1} x$  is positive in quadrant \_\_\_\_\_.  
 e.  $y = \tan^{-1} x$  is negative in quadrant \_\_\_\_\_.



## Answers

### I. Solving Triangles

1.  
 a.  $b = 7.33$   $C = 75^\circ$   $c = 7.45$   
 b.  $C = 77.3^\circ$   $a = 7.09$   $b = 11.36$   
 c. No Solution  
 d. Big Triangle:  $C = 69.7^\circ$   $B = 61.3^\circ$   $c = 8.453$   
 Small Triangle:  $C = 12.3^\circ$   $B = 118.7^\circ$   $c = 1.9$   
 e.  $A = 20.3^\circ$   $B = 39.7^\circ$   $b = 18.5$   
 f.  $A = 19.4^\circ$   $B = 66^\circ$   $C = 94.6^\circ$

1.	a. $x \in (-1, 1)$ b. $y \in (-\pi/2, \pi/2)$ c. I, IV   d. I   e. IV
2.	a. $x \in (-1, 1)$ b. $y \in (0, \pi)$ c. I, II   d. I   e. II
3.	a. All reals   b. $y \in (-\pi/2, \pi/2)$ c. I, IV   d. I   e. IV
4.	a. $\pi/4$ b. $-\pi/6$ c. $\pi/2$ d. $5\pi/6$ e. $\pi/2$ f. $-\pi/4$ g. 0   h. $-\pi/4$ i. $\pi$ j. 1   k. $\frac{1}{2}$ l. $\frac{1}{2}$