Trigonometry Final Exam Review Questions

Name_____

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

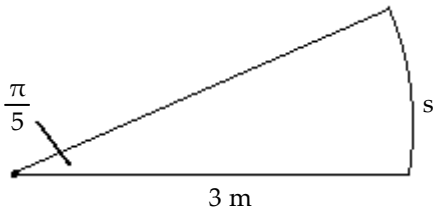**If s denotes the length of the arc of a circle of radius r subtended by a central angle θ, find the missing quantity.**

1) r = 12.05 centimeters, θ = 4 radians, s = ?   1) _____
    A) 49.2 cm   B) 50.2 cm   C) 48.2 cm   D) 47.2 cm

2) $r = \dfrac{2}{3}$ feet, s = 10 feet, θ = ?   2) _____

    A) $\dfrac{20}{3}$ radians   B) 15°   C) 15 radians   D) $\dfrac{20}{3}°$

3) s = 4.62 meters, θ = 1.4 radians, r = ?   3) _____
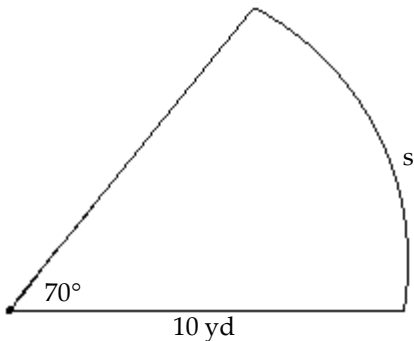   A) 3.3 m   B) 1.65 m   C) 2.9 m   D) 0.3 m

Find the length s. Round the answer to three decimal places.

4)   4) _____

$\dfrac{\pi}{5}$ s   3 m

    A) 4.775 m   B) 5.236 m   C) 1.885 m   D) 3.77 m

5)   5) _____

s   70°   10 yd

    A) 12.217 yd   B) 13.439 yd   C) 9.774 yd   D) 10.995 yd

Solve the problem.

6) For a circle of radius 4 feet, find the arc length s subtended by a central angle of 60°. Round to the nearest hundredth.   6) _____
    A) 4.35 ft   B) 4.19 ft   C) 4.40 ft   D) 4.25 ft

7) A ship in the Atlantic Ocean measures its position to be 30°36' north latitude. Another ship is reported to be due north of the first ship at 39°20' north latitude. Approximately how far apart are the two ships? Round to the nearest mile. Assume that the radius of the Earth is 3960 miles.   7) _____
    A) 593 mi   B) 604 mi   C) 34,573 mi   D) 34,584 mi

Convert the angle in radians to degrees.

8) $\dfrac{8\pi}{5}$

    A) 290°   B) 288°   C) 289°   D) 287°

8) _____

Convert the angle in degrees to radians. Express the answer as multiple of π.

9) 105°

    A) $\dfrac{8\pi}{13}$ B) $\dfrac{6\pi}{11}$ C) $\dfrac{12\pi}{7}$ D) $\dfrac{7\pi}{12}$

9) _____

If A denotes the area of the sector of a circle of radius r formed by the central angle θ, find the missing quantity. If necessary, round the answer to two decimal places.

10) r = 14 feet, A = 61 square feet, θ = ?

    A) 0.31 radians   B) 5978 radians   C) 0.62 radians   D) 11,956 radians

10) _____

11) $\theta = \dfrac{\pi}{3}$ radians, A = 58 square meters, r = ?

    A) 5.51 m   B) 10.52 m   C) 121.47 m   D) 30.37 m

11) _____

12) r = 13 inches, θ = 5 radians, A = ?

    A) 65 in^2 B) 422.5 in^2 C) 32.5 in^2 D) 845 in^2

12) _____

Solve the problem.

13) A weight hangs from a rope 20 feet long. It swings through an angle of 27° each second. How far does the weight travel each second? Round to the nearest 0.1 foot.

    A) 8.7 feet   B) 8.1 feet   C) 9.0 feet   D) 9.4 feet

13) _____

14) An object is traveling around a circle with a radius of 10 centimeters. If in 20 seconds a central angle of $\dfrac{1}{3}$ radian is swept out, what is the linear speed of the object?

    A) $\dfrac{1}{6}$ cm/sec   B) 6 cm/sec   C) $\dfrac{1}{6}$ radians/sec   D) 6 radians/sec

14) _____

15) A gear with a radius of 2 centimeters is turning at $\dfrac{\pi}{9}$ radians/sec. What is the linear speed at a point on the outer edge of the gear?

    A) 18π cm/sec   B) $\dfrac{2\pi}{9}$ cm/sec   C) $\dfrac{\pi}{18}$ cm/sec   D) $\dfrac{9\pi}{2}$ cm/sec

15) _____

16) A wheel of radius 9.7 feet is moving forward at 19 feet per second. How fast is the wheel rotating?

    A) 2 radians/sec   B) 0.32 radians/sec   C) 6 radians/sec   D) 0.51 radians/sec

16) _____

17) A carousel has a radius of 15 feet and takes 30 seconds to make one complete revolution. What is the linear speed of the carousel at its outside edge? If necessary, round the answer to two decimal places.

    A) 94.25 ft/sec   B) 12.57 ft/sec   C) 0.5 ft/sec   D) 3.14 ft/sec

17) _____

In the problem, t is a real number and P = (x, y) is the point on the unit circle that corresponds to t. Find the exact value of the indicated trigonometric function of t.

18) $(\frac{3}{4}, \frac{\sqrt{7}}{4})$ Find sin t.

18) _____

    A) $\frac{\sqrt{7}}{4}$ B) $\frac{\sqrt{7}}{3}$ C) $\frac{3\sqrt{7}}{7}$ D) $\frac{3}{4}$

19) $(\frac{2}{9}, \frac{\sqrt{77}}{9})$ Find tan t.

19) _____

    A) $\frac{\sqrt{77}}{2}$ B) $\frac{\sqrt{77}}{9}$ C) $\frac{2\sqrt{77}}{77}$ D) $\frac{9}{2}$

Find the exact value. Do not use a calculator.

20) sin 0

20) _____

    A) $\frac{\sqrt{2}}{2}$ B) 1   C) 0   D) undefined

21) $\cos \frac{\pi}{2}$

21) _____

    A) 0   B) –1   C) 1   D) undefined

22) sin π

22) _____

    A) 1   B) –1   C) 0   D) undefined

23) cos π

23) _____

    A) 0   B) 1   C) –1   D) undefined

24) $\tan \frac{\pi}{4}$

24) _____

    A) $\frac{\sqrt{3}}{3}$ B) 1   C) 0   D) –1

Find the exact value of the expression. Do not use a calculator.

25) sec 60° – cos 30°

25) _____

    A) $-\frac{\sqrt{3}}{6}$ B) $\frac{4 - \sqrt{2}}{2}$ C) $\frac{4 - \sqrt{3}}{2}$ D) $\frac{4\sqrt{3} - 3\sqrt{2}}{6}$

26) csc 60° – cos 45°

26) _____

    A) $\frac{4\sqrt{3} - 3\sqrt{2}}{6}$ B) $\frac{4 - \sqrt{2}}{2}$ C) $\frac{4\sqrt{2} - 3\sqrt{3}}{6}$ D) $\frac{4 - \sqrt{3}}{2}$

27) cos 60° + tan 60°

27) _____

    A) $\frac{1 + \sqrt{3}}{2}$ B) $\frac{1 + 2\sqrt{3}}{2}$ C) $2\sqrt{3}$ D) $\frac{3\sqrt{3}}{2}$

Find the exact value. Do not use a calculator.

28) $\cos\dfrac{20\pi}{3}$

28) _____

   A) $-\dfrac{1}{2}$ B) $\dfrac{\sqrt{3}}{2}$ C) $-\dfrac{\sqrt{3}}{2}$ D) $\dfrac{1}{2}$

29) $\sec\dfrac{13\pi}{4}$

29) _____

   A) $\dfrac{\sqrt{2}}{2}$ B) $-\sqrt{2}$ C) $-\dfrac{2\sqrt{3}}{3}$ D) -2

Find the exact value of the expression. Do not use a calculator.

30) $\sin 135° - \sin 270°$

30) _____

   A) $\dfrac{\sqrt{2}+2}{2}$ B) 2 C) $\dfrac{\sqrt{2}-2}{2}$ D) $\dfrac{\sqrt{2}}{2}$

31) $\tan\dfrac{7\pi}{4} + \tan\dfrac{5\pi}{4}$

31) _____

   A) $\dfrac{1}{2}$ B) 0 C) $\dfrac{\sqrt{2}+1}{2}$ D) $\dfrac{2\sqrt{2}+1}{6}$

32) $\sin 330° \sin 270°$

32) _____

   A) $-\dfrac{\sqrt{3}}{2}$ B) $\dfrac{\sqrt{3}}{2}$ C) $-\dfrac{1}{2}$ D) $\dfrac{1}{2}$

Use a calculator to find the approximate value of the expression rounded to two decimal places.

33) $\sin 40°$

33) _____

   A) 0.75   B) 0.84   C) 0.55   D) 0.64

34) $\csc 31°$

34) _____

   A) −2.48   B) 2.00   C) 1.94   D) −2.42

35) $\cot 0.1845$

35) _____

   A) 1.02   B) 0.19   C) 0.98   D) 5.36

A point on the terminal side of an angle θ is given. Find the exact value of the indicated trigonometric function of θ.

36) $(-5, -12)$ Find $\sin\theta$.

36) _____

   A) $\dfrac{12}{13}$ B) $\dfrac{5}{13}$ C) $-\dfrac{12}{13}$ D) $-\dfrac{5}{13}$

37) $\left(-\dfrac{1}{2}, \dfrac{1}{5}\right)$ Find $\cos\theta$.

37) _____

   A) $\dfrac{2\sqrt{29}}{29}$ B) $-\dfrac{5\sqrt{29}}{29}$ C) $\dfrac{29}{5}$ D) $-\dfrac{29}{2}$

Solve the problem.

38) If $\sin \theta = \dfrac{1}{4}$, find $\csc \theta$.   38) _____

A) $\dfrac{3}{4}$ B) $-\dfrac{1}{4}$ C) 4   D) undefined

Find the exact value. Do not use a calculator.

39) $\cos \dfrac{3\pi}{2}$ 39) _____

A) 1   B) 0   C) –1   D) undefined

Name the quadrant in which the angle θ lies.

40) $\tan \theta > 0$, $\sin \theta < 0$ 40) _____

A) I   B) II   C) III   D) IV

41) $\sin \theta > 0$, $\cos \theta < 0$ 41) _____

A) I   B) II   C) III   D) IV

42) $\sec \theta < 0$, $\tan \theta < 0$ 42) _____

A) I   B) II   C) III   D) IV

In the problem, sin θ and cos θ are given. Find the exact value of the indicated trigonometric function.

43) $\sin \theta = \dfrac{1}{4}$, $\cos \theta = \dfrac{\sqrt{15}}{4}$ Find $\tan \theta$.   43) _____

A) $\dfrac{4\sqrt{15}}{15}$ B) 4   C) $\dfrac{\sqrt{15}}{15}$ D) $\sqrt{15}$

44) $\sin \theta = \dfrac{1}{4}$, $\cos \theta = \dfrac{\sqrt{15}}{4}$ Find $\sec \theta$.   44) _____

A) 4   B) $\dfrac{4\sqrt{15}}{15}$ C) $\sqrt{15}$ D) $\dfrac{\sqrt{15}}{15}$

Use the properties of the trigonometric functions to find the exact value of the expression. Do not use a calculator.

45) $\sin^2 80° + \cos^2 80°$ 45) _____

A) 1   B) 2   C) 0   D) –1

46) $\tan 70° - \dfrac{\sin 70°}{\cos 70°}$ 46) _____

A) 1   B) 0   C) 70   D) undefined

Find the exact value of the indicated trigonometric function of θ.

47) $\csc \theta = -\dfrac{5}{2}$, θ in quadrant III   Find $\cot \theta$.   47) _____

A) $-\dfrac{\sqrt{21}}{5}$ B) $-\dfrac{2\sqrt{21}}{21}$ C) $\dfrac{\sqrt{21}}{2}$ D) $-\dfrac{5\sqrt{21}}{21}$

48) $\cos \theta = \dfrac{2}{9}$, $\tan \theta < 0$ Find $\sin \theta$.   48) _____

A) $-\sqrt{77}$ B) $-\dfrac{\sqrt{77}}{2}$ C) $-\dfrac{\sqrt{77}}{9}$ D) $-\dfrac{9}{2}$
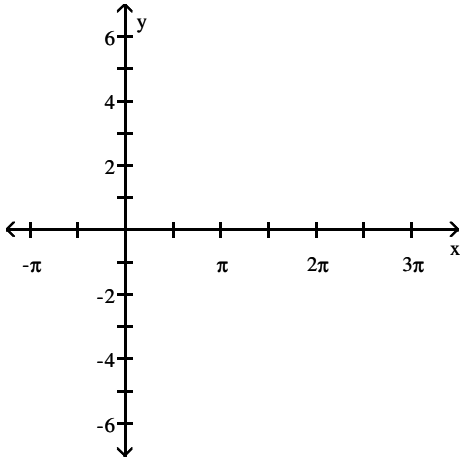
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question

Use transformations to graph the function.

49) $y = -3 \sin \left(x + \dfrac{\pi}{2}\right)$ 49) _____

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

Without graphing the function, determine its amplitude or period as requested.

50) $y = -4 \sin x$ Find the amplitude.   50) _____

A) -4π B) 2π C) $\dfrac{\pi}{4}$ D) 4

51) $y = \sin 3x$ Find the period.   51) _____

A) 3   B) $\dfrac{2\pi}{3}$ C) 2π D) 1

Find the exact value of the expression.

52) $\cos^{-1}\left(-\dfrac{\sqrt{2}}{2}\right)$ 52) _____

A) $\dfrac{-\pi}{4}$ B) $\dfrac{-3\pi}{4}$ C) $\dfrac{3\pi}{4}$ D) $\dfrac{\pi}{4}$

53) $\tan^{-1}(-1)$ 53) _____

A) $-\dfrac{\pi}{4}$ B) $\dfrac{5\pi}{4}$ C) $\dfrac{7\pi}{4}$ D) $\dfrac{\pi}{4}$

54) $\cos\left(\sin^{-1}\frac{1}{4}\right)$

54) _____

    A) $\frac{\sqrt{15}}{2}$ B) $\frac{4\sqrt{15}}{15}$ C) $\frac{2\sqrt{15}}{15}$ D) $\frac{\sqrt{15}}{4}$

55) $\cos^{-1}\left(\sin\frac{7\pi}{6}\right)$

55) _____

    A) $\frac{2\pi}{3}$ B) $\frac{\pi}{3}$ C) $\frac{4\pi}{5}$ D) $\frac{\pi}{6}$

Complete the identity.

56) $\csc\theta(\sin\theta + \cos\theta) = ?$

56) _____

    A) $\sec\theta\csc\theta$ B) $1 + \cot\theta$ C) $\sin\theta\tan\theta$ D) $-2\tan^2\theta$

57) $\dfrac{\sec\theta\sin\theta}{\tan\theta} - 1 = ?$

57) _____

    A) 1 B) $1 - \sin\theta$ C) $-\sec^2\theta$ D) 0

58) $\dfrac{1}{\cot^2\theta} + \sec\theta\cos\theta = ?$

58) _____

    A) $\csc^2\theta$ B) 1 C) $\sec^2\theta$ D) $\tan^2\theta$

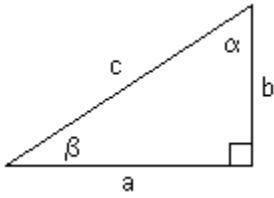**Solve the equation on the interval $0 \le \theta < 2\pi$.**

59) $2\cos\theta + 1 = 0$

59) _____

    A) $\frac{2\pi}{3}, \frac{4\pi}{3}$ B) $\frac{3\pi}{2}$ C) $\frac{\pi}{2}, \frac{3\pi}{2}$ D) $\frac{\pi}{3}, \frac{5\pi}{3}$

60) $2\sin^2\theta = \sin\theta$

60) _____

    A) $\frac{\pi}{3}, \frac{2\pi}{3}$ B) $0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$ C) $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{2\pi}{3}$ D) $\frac{\pi}{6}, \frac{5\pi}{6}$

61) $\cos^2\theta + 2\cos\theta + 1 = 0$

61) _____

    A) π B) 2π C) $\frac{\pi}{4}, \frac{7\pi}{4}$ D) $\frac{\pi}{2}, \frac{3\pi}{2}$

62) $\sin^2\theta + \sin\theta = 0$

62) _____

    A) $0, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$ B) $0, \pi, \frac{\pi}{3}, \frac{2\pi}{3}$ C) $0, \pi, \frac{3\pi}{2}$ D) $0, \pi, \frac{\pi}{3}, \frac{5\pi}{3}$

Solve the right triangle using the information given. Round answers to two decimal places, if necessary.

63) $b = 8$, $\alpha = 25°$; find a, c, and β

    A) $a = 3.73$ B) $a = 3.73$ C) $a = 4.73$ D) $a = 4.73$

       $c = 9.83$ $c = 8.83$ $c = 8.83$ $c = 9.83$

       $\beta = 65°$ $\beta = 65°$ $\beta = 65°$ $\beta = 65°$

63) _____

Solve the problem.

64) A radio transmission tower is 170 feet tall. How long should a guy wire be if it is to be attached 8 feet from the top and is to make an angle of 29° with the ground? Give your answer to the nearest tenth of a foot.

    A) 350.7 ft   B) 185.2 ft   C) 194.4 ft   D) 334.2 ft

64) _____

65) A tree casts a shadow of 26 meters when the angle of elevation of the sun is 24°. Find the height of the tree to the nearest meter.

    A) 12 m   B) 13 m   C) 11 m   D) 10 m

65) _____

66) A forest ranger at Lookout A sights a fire directly north of her position. Another ranger at Lookout B, exactly 2 kilometers directly west of A, sights the same fire at a bearing of N41.2°E. How far is the fire from Lookout A? Round your answer to the nearest 0.01 km.

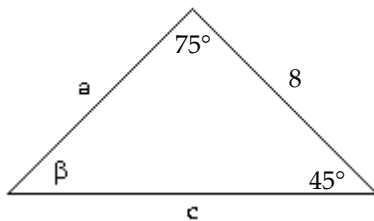   A) 2.25 km   B) 2.18 km   C) 2.28 km   D) 2.32 km

66) _____

Solve the triangle.

67)

    A) $a = 8.92$, $c = 6.53$, $\beta = 60°$ B) $a = 8.92$, $c = 6.53$, $\beta = 55°$

    C) $a = 6.53$, $c = 8.92$, $\beta = 65°$ D) $a = 6.53$, $c = 8.92$, $\beta = 60°$

67) _____

Two sides and an angle are given. Determine whether the given information results in one triangle, two triangles, or no triangle at all. Solve any triangle(s) that results.

68) $a = 7$, $b = 9$, $\beta = 49°$

    A) one triangle   B) two triangles

       $\alpha = 76.01°$, $\gamma = 54.99°$, $c = 7.60$ $\alpha_1 = 76.01°$, $\gamma_1 = 54.99°$, $c_1 = 7.60$ or

                                      $\alpha_2 = 103.99°$, $\gamma_2 = 27.01°$, $c_2 = 12.14$

    C) one triangle   D) no triangle

       $\alpha = 35.94°$, $\gamma = 95.06°$, $c = 11.88$

68) _____

69) $a = 4$, $\quad b = 8$, $\quad \alpha = 75°$
    A) one triangle
       $\beta = 37°, \gamma = -48°, c = 14$
    C) one triangle
       $\alpha = 38°, \gamma = 67°, c = 12$

                    B) one triangle
                       $\beta = 39°, \gamma = 66°, c = 16$
                    D) no triangle

70) $a = 33$, $\quad b = 17$, $\quad \beta = 15°$
    A) one triangle
       $\alpha = 30.16°, \gamma = 134.84°, c = 46.57$

    C) one triangle
       $\alpha = 149.84°, \gamma = 15.16°, c = 17.18$

                    B) two triangles
                       $\alpha_1 = 30.16°, \gamma_1 = 134.84°, c_1 = 46.57$ or
                       $\alpha_2 = 149.84°, \gamma_2 = 15.16°, c_2 = 17.18$
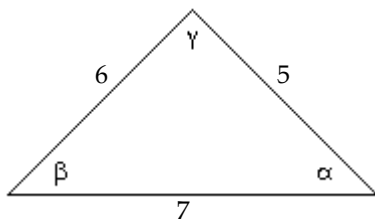   D) no triangle

Solve the triangle.

71)
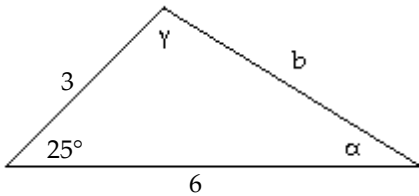
    A) $b = 2.52, \alpha = 133.8°, \gamma = 21.2°$
    C) $b = 3.52, \alpha = 21.2°, \gamma = 133.8°$

                    B) $b = 4.52, \alpha = 21.2°, \gamma = 133.8°$
                    D) $b = 3.52, \alpha = 133.8°, \gamma = 21.2°$

Solve the triangle. Find the angles α and β first.

72)

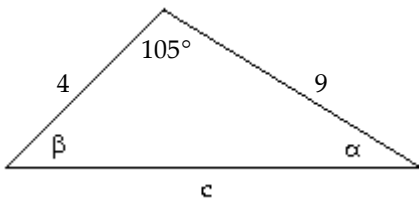   A) $\alpha = 57.1°, \beta = 78.5°, \gamma = 44.4°$
    C) $\alpha = 44.4°, \beta = 78.5°, \gamma = 57.1°$

                    B) $\alpha = 57.1°, \beta = 44.4°, \gamma = 78.5°$
                    D) $\alpha = 44.4°, \beta = 57.1°, \gamma = 78.5°$

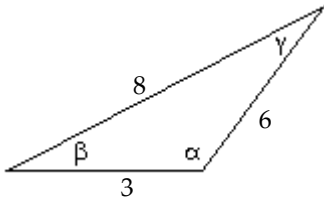**Find the area of the triangle. If necessary, round the answer to two decimal places.**

73)

    A) 17.39   B) 69.55   C) 4.66   D) 101.42

74)

A) 2.62   B) 7.64   C) 153.5   D) 37.23

1) C
2) C
3) A
4) C
5) A
6) B
7) B
8) B
9) D
10) C
11) B
12) B
13) D
14) A
15) B
16) A
17) D
18) A
19) A
20) C
21) A
22) C
23) C
24) B
25) C
26) A
27) B
28) A
29) B
30) A
31) B
32) D
33) D
34) C
35) D
36) C
37) B
38) C
39) B
40) C
41) B
42) B
43) C
44) B
45) A
46) B
47) C
48) C

49)
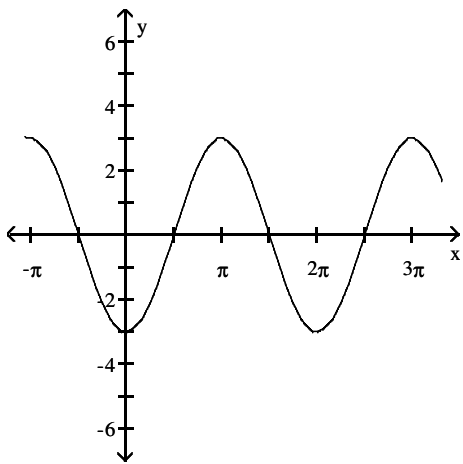
50) D
51) B
52) C
53) A
54) D
55) A
56) B
57) D
58) C
59) A
60) B
61) A
62) C
63) B
64) D
65) A
66) C
67) D
68) C
69) D
70) B
71) C
72) B
73) A
74) B