Final Review

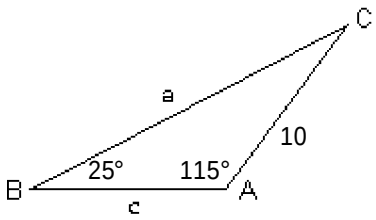
Name_____

Each correct answer with all work shown is worth 1/2 point extra credit for a maximum of 25 points. Due January 8, 2013, NO EXCEPTIONS.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the triangle.

1) 1) _____



Two sides and an angle (SSA) of a triangle are given. Determine whether the given measurements produce one triangle, two triangles, or no triangle at all. Solve each triangle that results. Round lengths to the nearest tenth and angle measures to the nearest degree.

2) B = 41°, a = 4, b = 3 2) _____

Find the area of the triangle having the given measurements. Round to the nearest square unit.

3) A = 20°, b = 15 meters, c = 7 meters 3) _____

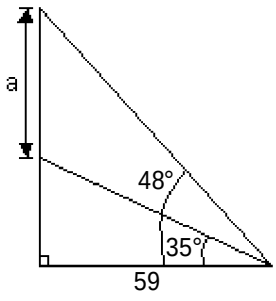
Solve the problem.

4) A surveyor standing 64 meters from the base of a building measures the angle to the top of the building and finds it to be 36°. The surveyor then measures the angle to the top of the radio tower on the building and finds that it is 48°. How tall is the radio tower? 4) _____

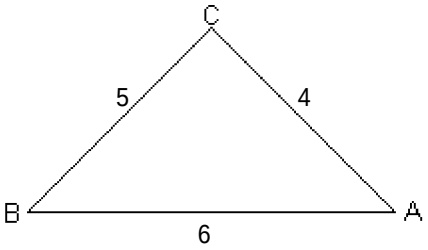
5) To find the distance AB across a river, a distance BC of 1341 m is laid off on one side of the river. It is found that B = 109.7° and C = 18.2°. Find AB. Round to the nearest meter. 5) _____

Find a. If necessary, round your answer to the nearest hundredth.

6) 6) _____



Solve the triangle. Round lengths to the nearest tenth and angle measures to the nearest degree.

7) 

7) _____

8) a = 6, b = 9, C = 123°

8) _____

Solve the problem.

9) Two airplanes leave an airport at the same time, one going northwest (bearing 135°) at 403 mph and the other going east at 347 mph. How far apart are the planes after 2 hours (to the nearest mile)?

9) _____

10) Two points A and B are on opposite sides of a building. A surveyor selects a third point C to place a transit. Point C is 47 feet from point A and 75 feet from point B. The angle ACB is 47°. How far apart are points A and B?

10) _____

11) A painter needs to cover a triangular region 62 meters by 68 meters by 72 meters. A can of paint covers 70 square meters. How many cans will be needed?

11) _____

Determine the amplitude or period as requested.

12) Amplitude of $y = -\frac{1}{3}\sin x$

12) _____

13) Period of $y = 3 \sin 8\pi x$

13) _____

Determine the phase shift of the function.

14) $y = \frac{1}{2}\sin(5x + \pi)$

14) _____

15) $y = -5 \sin\left(2x - \frac{\pi}{2}\right)$

15) _____

Determine the amplitude or period as requested.

16) Amplitude of $y = 2 \cos \frac{1}{3}x$

16) _____

17) Period of $y = -5 \cos \frac{1}{3}x$

17) _____

18) Period of $y = \frac{3}{4}\cos\left(-\frac{8\pi}{5}x\right)$

18) _____

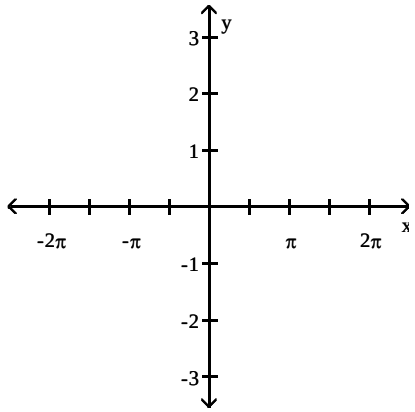
Determine the phase shift of the function.

19) $y = -4 \cos\left(x + \frac{\pi}{2}\right)$ 19) _____

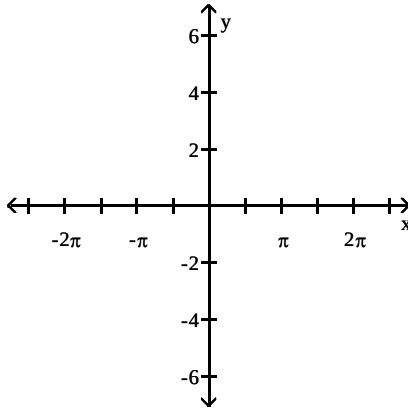
20) $y = 3 \cos\left(\frac{1}{2}x + \frac{\pi}{2}\right)$ 20) _____

Use a vertical shift to graph the function.

21) $y = 1 + \sin x$ 21) _____



22) $y = 4 \cos \frac{1}{2}x - 2$ 22) _____



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

23) $\tan^{-1}\left(\tan \frac{3\pi}{4}\right)$ 23) _____

Find the radian measure of the central angle of a circle of radius r that intercepts an arc of length s.

24) r = 3 inches, s = 21 inches 24) _____

Convert the angle in radians to degrees.

25) $-\frac{19}{9}\pi$ 25) _____

Find a positive angle less than 360° or 2π that is coterminal with the given angle.

26) $\frac{15\pi}{7}$ 26) _____

The point P(x, y) on the unit circle that corresponds to a real number t is given. Find the value of the indicated trigonometric function at t.

27) $\left(\frac{2}{9}, \frac{\sqrt{77}}{9}\right)$ Find tan t. 27) _____

28) $\left(\frac{\sqrt{39}}{8}, \frac{5}{8}\right)$ Find sec t. 28) _____

Use even and odd properties of the trigonometric functions to find the exact value of the expression.

29) $\csc\left(-\frac{\pi}{6}\right)$ 29) _____

Sin t and cos t are given. Use identities to find the indicated value. Where necessary, rationalize denominators.

30) $\sin t = \frac{3}{7}$, $\cos t = \frac{2\sqrt{10}}{7}$. Find tan t. 30) _____

$0 \le t < \frac{\pi}{2}$ and sin t is given. Use the Pythagorean identity $\sin^2 t + \cos^2 t = 1$ to find cos t.

31) $\sin t = \frac{\sqrt{7}}{4}$ 31) _____

Use periodic properties of the trigonometric functions to find the exact value of the expression.

32) $\cos\frac{10\pi}{3}$ 32) _____

Use a calculator to find the value of the trigonometric function to four decimal places.

33) sec 3 33) _____

Find a cofunction with the same value as the given expression.

34) $\tan\frac{\pi}{10}$ 34) _____

Use a calculator to find the value of the acute angle θ in radians, rounded to three decimal places.

35) $\sin\theta = 0.8659$ 35) _____

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

36) $\cos\theta = \frac{8}{9}$, $\tan\theta < 0$ Find $\sin\theta$. 36) _____

Find the reference angle for the given angle.

37) -425° 37) _____

38) $\frac{-25\pi}{3}$ 38) _____

Use reference angles to find the exact value of the expression. Do not use a calculator.

39) csc 660° 39) _____

Use a half-angle formula to find the exact value of the expression.

40) cos 112.5° 40) _____

Solve the equation on the interval [0, 2π).

41) cos x = sin x 41) _____

42) $\sin^2 x - \cos^2 x = 0$ 42) _____

43) $\cos 2x = \frac{\sqrt{2}}{2}$ 43) _____

Use substitution to determine whether the given x-value is a solution of the equation.

44) $\sin x = -\frac{\sqrt{3}}{2}, \quad x = \frac{5\pi}{3}$ 44) _____

Complete the identity.

45) $\sec x - \frac{1}{\sec x} = ?$ 45) _____

46) $\frac{(\sin x + \cos x)^2}{1 + 2 \sin x \cos x} = ?$ 46) _____

Write the expression as the sine, cosine, or tangent of a double angle. Then find the exact value of the expression.

47) 2 sin 120° cos 120° 47) _____

Express the sum or difference as a product.

48) cos 9x - cos 3x 48) _____

Find the exact value of the expression.

49) sin 190° cos 70° - cos 190° sin 70° 49) _____

50) cos (175°) cos (55°) + sin (175°) sin (55°) 50) _____

51) $\cos\left(\frac{5\pi}{18} - \frac{\pi}{9}\right)$ 51) _____

Find all solutions of the equation.

52) 2 cos x + 1 = 0 52) _____

Use the given information to find the exact value of the expression.

53) $\cos\theta = \frac{20}{29}$, θ lies in quadrant IV Find $\sin 2\theta$. 53) _____

Find the exact value by using a sum or difference identity.

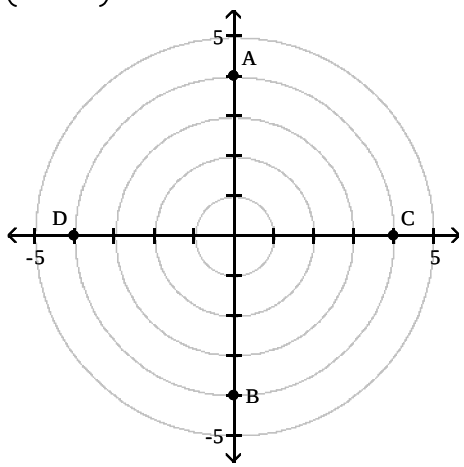
54) $\sin 105°$ 54) _____

Verify the identity.

55) $\cos\left(x + \frac{\pi}{2}\right) = -\sin x$ 55) _____

Match the point in polar coordinates with either A, B, C, or D on the graph.

56) $\left(-4, -\frac{\pi}{2}\right)$ 56) _____



Find the absolute value of the complex number.

57) $z = 10 - 15i$ 57) _____

Write the complex number in polar form. Express the argument in radians.

58) $-4\sqrt{3} - 4i$ 58) _____

Write the complex number in rectangular form.

59) $-3(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3})$ 59) _____

Find the product of the complex numbers. Leave answer in polar form.

60) $z_1 = 7\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$ 60) _____

$z_2 = 5\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$

Find the quotient $\frac{z_1}{z_2}$ of the complex numbers. Leave answer in polar form.

61) $z_1 = 5(\cos 200° + i \sin 200°)$
$z_2 = 4(\cos 50° + i \sin 50°)$ 61) _____

Use DeMoivre's Theorem to find the indicated power of the complex number. Write the answer in rectangular form.

62) $\left[10\left(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4}\right)\right]^3$ 62) _____

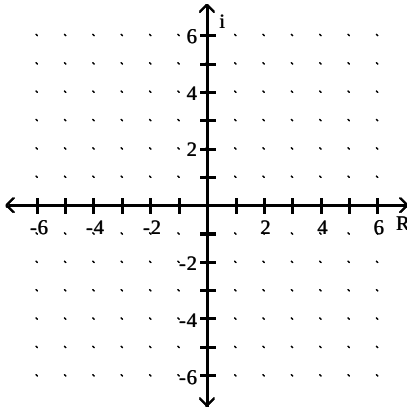
63) $(-2 + 2i\sqrt{3})^3$ 63) _____

Find all the complex roots. Write the answer in the indicated form.

64) The complex cube roots of -8 (rectangular form) 64) _____

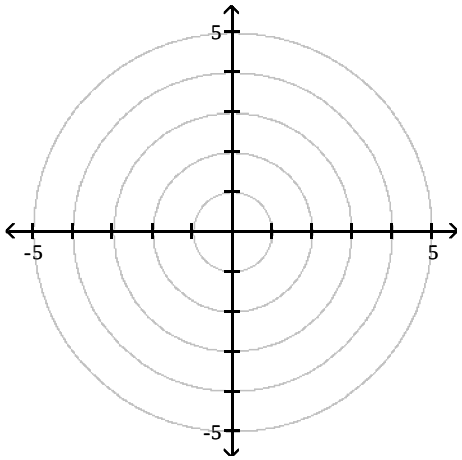
Plot the complex number.

65) $5 + 4i$ 65) _____



Use a polar coordinate system to plot the point with the given polar coordinates.

66) $\left(2, \frac{-3\pi}{4}\right)$ 66) _____



Find another representation, (r, θ), for the point under the given conditions.

67) $\left(1, \frac{\pi}{2}\right)$, $r < 0$ and $0 < \theta < 2\pi$ 67) _____

Polar coordinates of a point are given. Find the rectangular coordinates of the point.

68) (5, 120°) 68) _____

The rectangular coordinates of a point are given. Find polar coordinates of the point. Express θ in radians.

69) (-5, 0) 69) _____

Convert the rectangular equation to a polar equation that expresses r in terms of θ.

70) $x^2 + y^2 = 4$ 70) _____

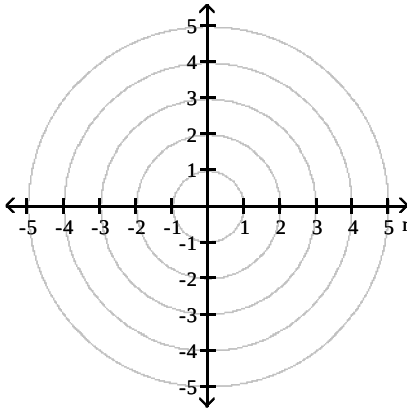
Convert the polar equation to a rectangular equation.

71) $r = 9 \csc \theta$ 71) _____

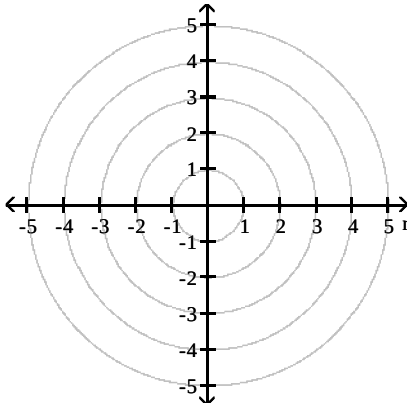
72) $r = 9 \cos \theta + 5 \sin \theta$ 72) _____

Graph the polar equation.

73) $r = 1 + \cos \theta$ 73) _____

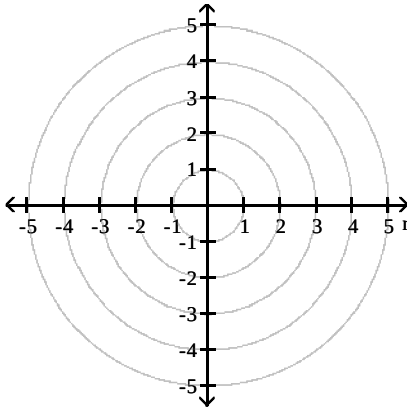


74) $r = 2 + 2\sin \theta$ 74) _____

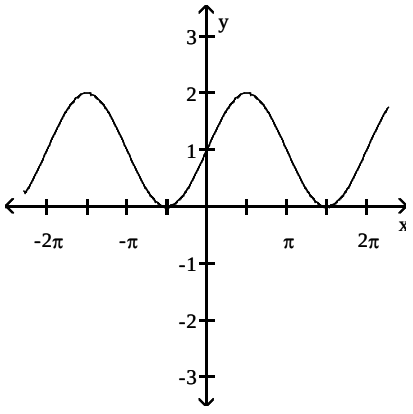


75) $r^2 = 16 \sin(2\theta)$

75) _____



1) C = 40°, a = 21.45, c = 15.21
2) $A_1 = 61°, C_1 = 78°, c_1 = 4.5$;
   $A_2 = 119°, C_2 = 20°, c_2 = 1.6$
3) 18 square meters
4) 24.58 meters
5) 531 meters
6) 24.21
7) A = 56°, B = 41°, C = 83°
8) c = 13.3, A = 22°, B = 35°
9) 1386 miles
10) 55 feet
11) 28 cans
12) $\frac{1}{3}$
13) $\frac{1}{4}$
14) $\frac{\pi}{5}$ units to the left
15) $\frac{\pi}{4}$ units to the right
16) 2
17) 6π
18) $\frac{5}{4}$
19) $\frac{\pi}{2}$ units to the left
20) π units to the left
21)



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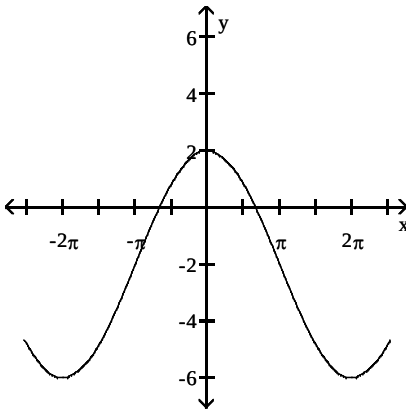


23) $-\frac{\pi}{4}$

24) 7 radians

25) -380°

26) $\frac{\pi}{7}$

27) $\frac{\sqrt{77}}{2}$

28) $\frac{8\sqrt{39}}{39}$

29) -2

30) $\frac{3\sqrt{10}}{20}$

31) $\frac{3}{4}$

32) $-\frac{1}{2}$

33) -1.0101

34) $\cot\frac{2\pi}{5}$

35) 1.047 radians

36) $-\frac{\sqrt{17}}{9}$

37) 65°

38) $\frac{\pi}{3}$

39) $-\frac{2\sqrt{3}}{3}$

40) $-\frac{1}{2}\sqrt{2-\sqrt{2}}$

41) $\frac{\pi}{4}, \frac{5\pi}{4}$

42) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

43) $\frac{\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{15\pi}{8}$

44) Yes

45) sin x tan x

46) 1

47) $-\frac{\sqrt{3}}{2}$

48) $-2 \sin 6x \sin 3x$

49) $\frac{\sqrt{3}}{2}$

50) $-\frac{1}{2}$

51) $\frac{\sqrt{3}}{2}$

52) $x = \frac{2\pi}{3} + 2n\pi$ or $x = \frac{4\pi}{3} + 2n\pi$

53) $-\frac{840}{841}$

54) $\frac{\sqrt{2}(\sqrt{3}+1)}{4}$

55) $\cos\left(x + \frac{\pi}{2}\right) = \cos x \cos \frac{\pi}{2} - \sin x \sin \frac{\pi}{2} = (\cos x)(0) - (\sin x)(1) = -\sin x.$

56) A

57) $5\sqrt{13}$

58) $8\left(\cos\frac{7\pi}{6} + i \sin\frac{7\pi}{6}\right)$

59) $\frac{3}{2} + \frac{-3\sqrt{3}}{2}i$

60) $35\left(\cos\frac{5\pi}{12} + i \sin\frac{5\pi}{12}\right)$

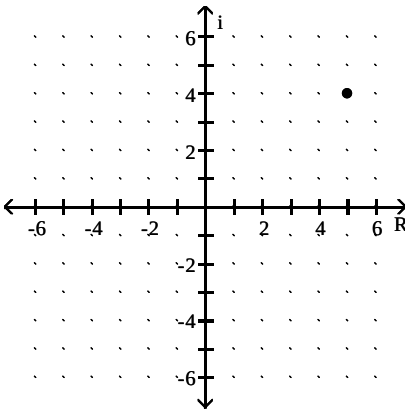
61) $\frac{5}{4}(\cos 150° + i \sin 150°)$

62) $-500\sqrt{2} + 500\sqrt{2}i$

63) 64

64) $-2, 1 + \sqrt{3}i, 1 - \sqrt{3}i$

65)



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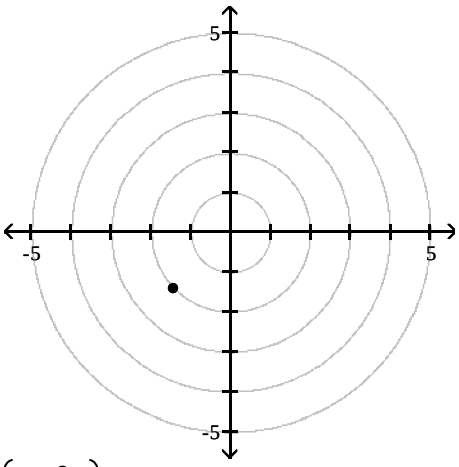


67) $\left(-1, \frac{3}{2}\pi\right)$

68) $\left(-\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)$

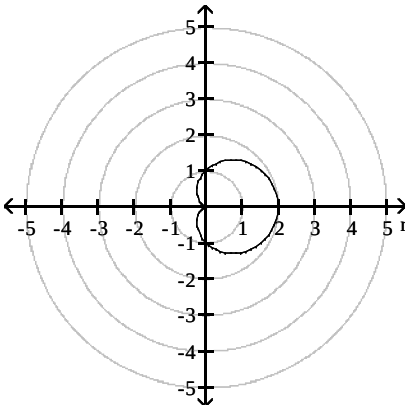
69) $(5, \pi)$

70) $r = 2$

71) $y = 9$

72) $x^2 + y^2 = 9x + 5y$

73)



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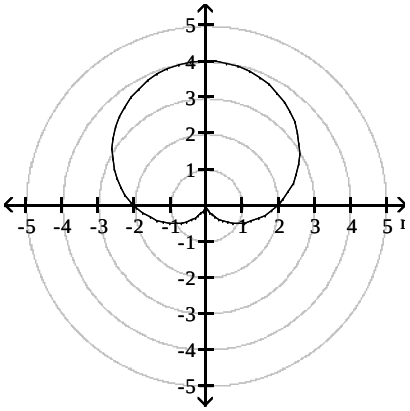

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