Summer Mathematics Enrichment Packet

For Incoming Calculus Scholars

(2016-2017 School Year)

This packet **must** be turned into your Calculus teacher by the second day of instruction in August 2016! Failure to turn in this packet will result in a grade penalty of 10 points per day. Every problem in the packet must be completed **with work shown** where applicable. If you fail to show work the packet will not be accepted and you will automatically receive a 10 point deduction along with the advice to turn in the packet the next school day. **On the third day of instruction you will take your first Calculus Quiz**, make sure you are prepared by completing this packet and understanding how to perform all operations without the aid of a video, teacher, friend, etc…

No Exceptions, No Excuses, & No Sad Stories!

Inside this mathematics packet you will find a wide range of concepts. If you believe these concepts are too difficult it is your responsibility to find help prior to the packet due date. Ask your Precalculus or future Calculus teacher for help or look for video tutorials online. There are an abundance of self-help videos. Your Precalculus teacher will not accept that you are unable to find assistance.

Incoming Calculus Name_____

Summer Mathematics Assignment

Period____

Solve each equation.

1) $6(2m + 3) = 3(8m + 2)$

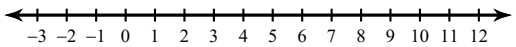
2) $\frac{13}{3}\left(k - \frac{7}{5}\right) = -\frac{83}{20} + \frac{1}{2}k$

3) $8\left|-4 - 2k\right| - 3 = 13$

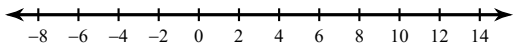
4) $1 - 2\left|v + 1\right| = -19$

Solve each compound inequality. Express the solution using inequality notation, interval notation, and graphically.

5) $8 \le n + 10 < 20$

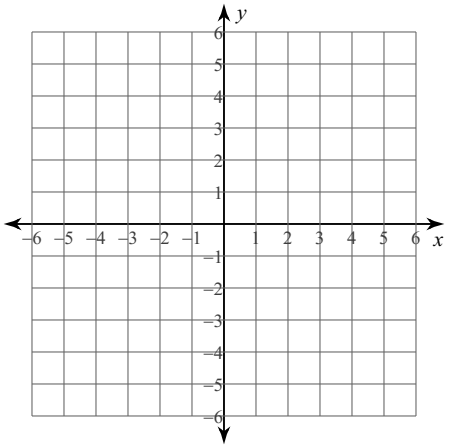


6) $\frac{a}{9} > 1$ or $a + 10 \le 6$

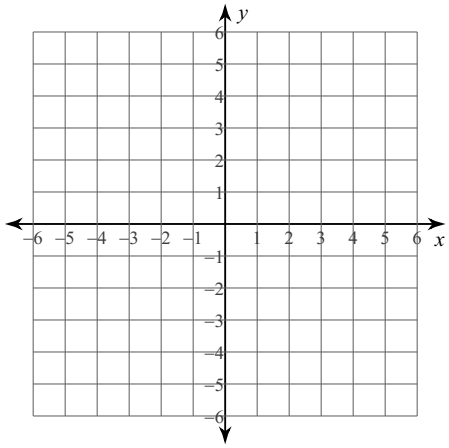


Sketch the graph of each line.

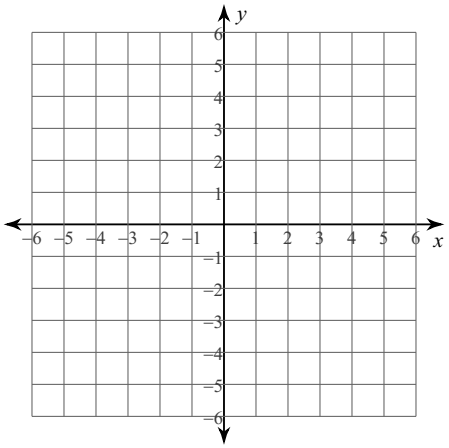
7) x-intercept = –3, y-intercept = 2



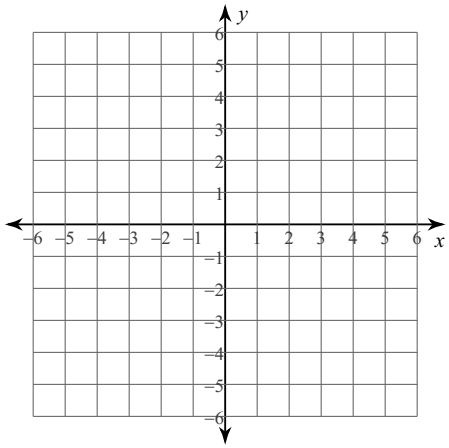
8) $2x + y = -3$



9) $y = 6x - 2$

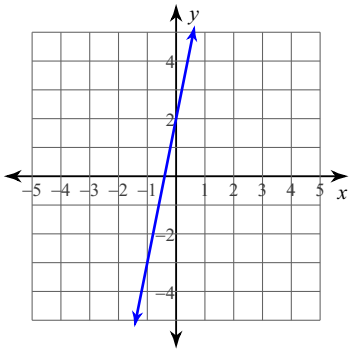


10) $0 = -x - 3y - 6$



Write the slope-intercept form of the equation of each line.

11)



Write the slope-intercept form of the equation of each line given the slope and y-intercept.

12) Slope $= \frac{4}{3}$, y-intercept = 5

Write the slope-intercept form of the equation of each line.

13) $13x + y = 8$

Write the slope-intercept form of the equation of each line.

14) $y - 1 = \frac{1}{5}(x + 5)$

Write the slope-intercept form of the equation of the line through the given point with the given slope.

15) through: $(1, -4)$, slope $= -1$

Write the slope-intercept form of the equation of the line through the given points.

16) through: $(-2, -4)$ and $(0, 3)$

Write the slope-intercept form of the equation of the line described.

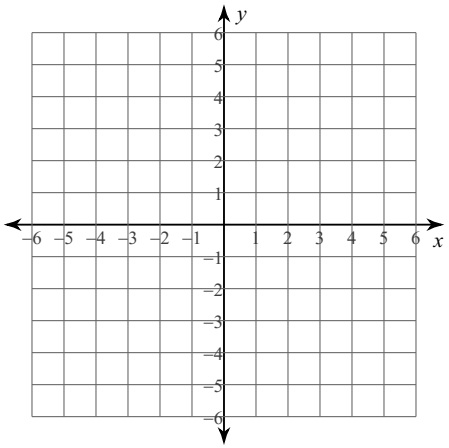
17) through: $(-2, 2)$, parallel to $y = -\frac{1}{2}x$

Write the slope-intercept form of the equation of the line described.

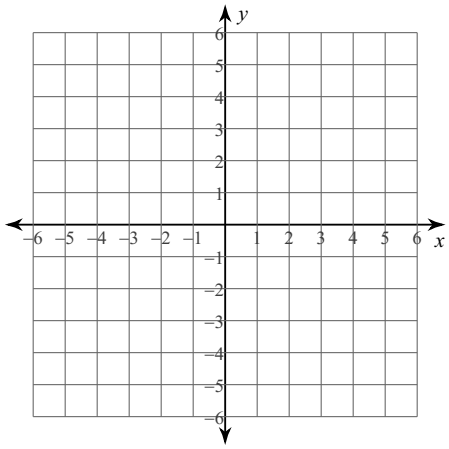
18) through: $(-4, 3)$, perp. to $y = \frac{1}{2}x - 5$

Graph each equation.

19) $y = |x + 3| + 3$



20) $y = -|x - 3| + 1$



Simplify.

21) $(-6 + 5i) - (7 - 5i)$

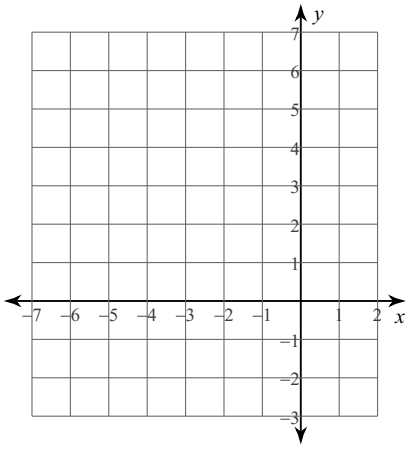
22) $(-7 - 2i)(4 - 2i)$

23) $\dfrac{-5 + 2i}{4i}$

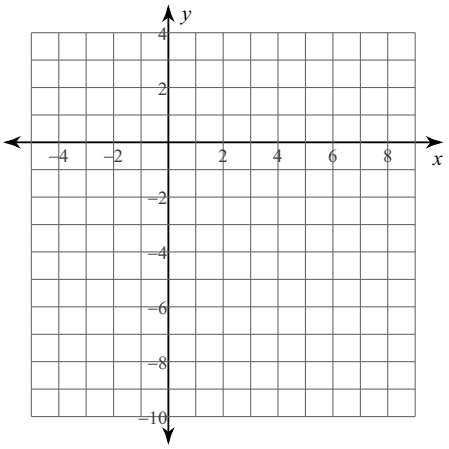
24) $\dfrac{6 - 10i}{-7 + 7i}$

Sketch the graph of each function.

25) $y = 2(x + 4)^2 - 2$



26) $y = -3x^2 - 18x - 24$



Factor each completely.

27) $p^2 - 1$

28) $x^2 + 18x + 81$

29) $u^2 - uv - 42v^2$

30) $v^2 + 7v - 30$

31) $3m^3 - 14m^2 - 80m$

32) $-2a^2 - 3a + 5$

33) $30n^2 + 55n - 35$

34) $-10n^2 - 63n - 18$

Solve each equation by taking square roots.

35) $b^2 = 25$

36) $a^2 + 7 = 32$

37) $9m^2 + 2 = 326$

38) $2x^2 + 2 = -29$

Solve each equation by factoring.

39) $(a - 6)(a - 7) = 0$

40) $x^2 - 14x + 49 = 0$

41) $x^2 - x - 14 = 6$

42) $3x^2 = -3 - 10x$

Solve each equation with the quadratic formula.

43) $5m^2 - 5 = 3m$

44) $-n^2 + 12n + 6 = -8n^2$

Name each polynomial by degree and number of terms.

45) $-x^5 - 2$

46) $6 - 2k^2 + 2k^4 - 6k$

Simplify each sum.

47) $(2n^2 + n + 5n^4) + (8n^4 + n + 6n^2)$

Simplify each expression.

48) $(n^2 - 4n^4 - 2n) - (n + 5n^4 + 4n^2) + (4n^4 - 5n)$

Find each product.

49) $(5m - 3)(8m + 5)$

50) $(7x - 6)(3x^2 + 7x + 3)$

State if the given binomial is a factor of the given polynomial.

51) $(n^4 - 3n^3 - 47n^2 + 40n - 12) \div (n + 6)$

Divide.

52) $(7n^3 - 14n^2 - 14n - 29) \div (n - 3)$

Evaluate each function.

53) $h(n) = 4n - 3$; Find $h(2)$

54) $h(a) = 2a - \frac{7}{4}$; Find $h\left(\frac{1}{2}\right)$

55) $k(a) = a^2 + 3$; Find $k(-5)$

56) $g(a) = 4a + 1$; Find $g(6)$

57) $f(n) = 3n - 5$; Find $f(n - 2)$

58) $g(x) = x^3 - \frac{6}{5}x$; Find $g\left(-\frac{4}{3}x\right)$

59) $g(t) = 3^{t-2} + 3$; Find $g(2)$

60) $g(t) = 3^{-t-2}$; Find $g(2 + t)$

Perform the indicated operation.

61) $h(n) = 3n^3 + 1$
$g(n) = 4n - 4$
Find $(h + g)(n)$

62) $f(x) = x^2 + x$
$g(x) = -3x - 3$
Find $(f - g)(x)$

63) $g(x) = x + 3$
$f(x) = 4x - 2$
Find $(g \cdot f)(x)$

64) $g(x) = 2x + 2$
$f(x) = 2x - 4$
Find $\left(\frac{g}{f}\right)(x)$

65) $g(n) = 3n - 5$
Find $(g \circ g)(n)$

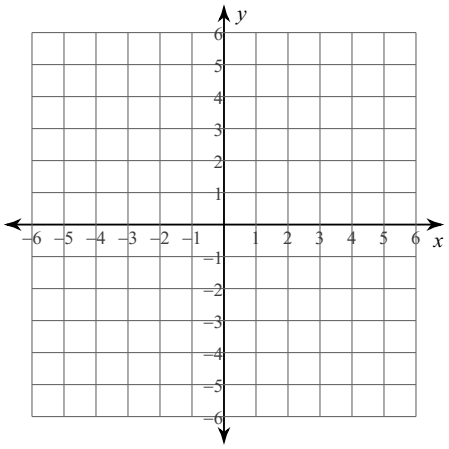
66) $g(x) = x^2 + 2$
$h(x) = -3x + 4$
Find $(g \circ h)(0)$

67) $g(x) = 4x + 3$
$f(x) = 4x + 4$
Find $(g \circ f)(9)$

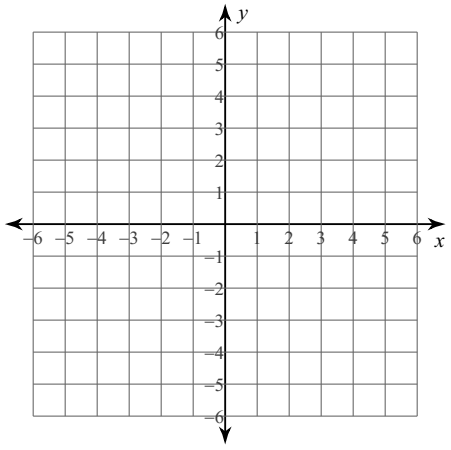
68) $g(n) = -2n + 1$
$h(n) = -n^3 + 3n^2$
Find $(g \circ h)(n - 1)$

Find the inverse of each function. Then graph the function and its inverse.

69) $f(n) = -4n - 20$



70) $f(n) = 2 + \frac{1}{3}n$



Find the inverse of each function.

71) $g(x) = \sqrt[3]{x + 2} - 1$

72) $f(x) = \sqrt[5]{x - 2} + 2$

73) $f(n) = \dfrac{4n - 16}{7}$

74) $f(x) = -\dfrac{4}{x - 2} + 3$

Simplify.

75) $\sqrt{72p^2qr^3}$

76) $\sqrt[3]{64x^2yz^6}$

77) $2\sqrt[3]{162m^5p^3q^8}$

78) $-3\sqrt[3]{64p^7q^6r^8}$

Simplify. Your answer should contain only positive exponents.

79) $4y^3z^2 \cdot 3x^{-2}y^4z^{-3}$

80) $\left(p^4q^3 \cdot \left(2mpq^{-3}\right)^{-3}\right)^4$

81) $\left(\dfrac{xz^4 \cdot 2x^3z^4}{x^{-3}}\right)^{-1}$

82) $\dfrac{\left(n^2p^{-1}\right)^3}{2m^0n^0p^3 \cdot m^3p^2}$

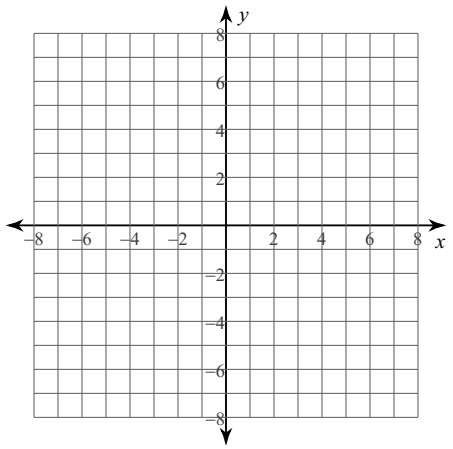
Solve each equation. Remember to check for extraneous solutions.

83) $\sqrt{2a - 2} = 2$

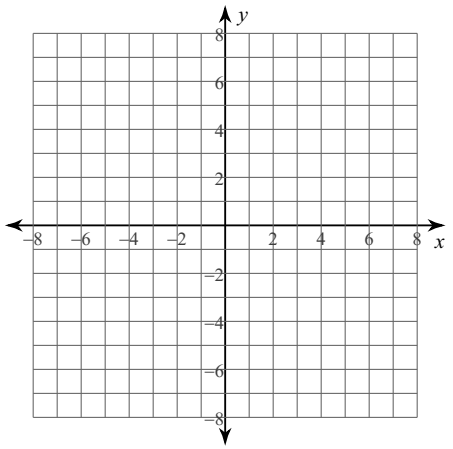
84) $-4\sqrt{b - 1} = -8$

Identify the domain and range of each. Then sketch the graph.

85) $y = 2\sqrt{x+2} - 4$

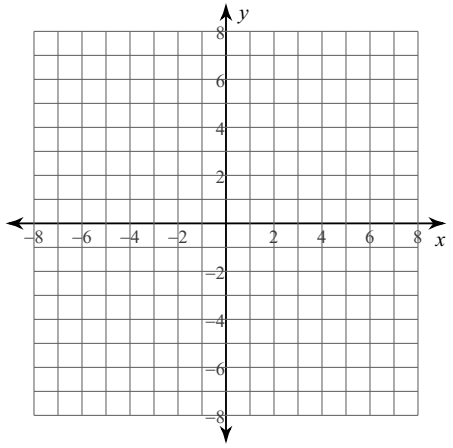


86) $y = -2\sqrt{x+4} + 4$

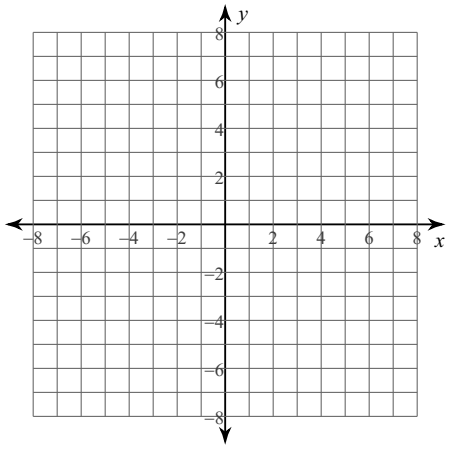


Identify the center and radius of each. Then sketch the graph.

87) $x^2 + y^2 = 9$



88) $(x+2)^2 + (y-3)^2 = 3$



Evaluate each expression.

89) $\log_7 343$

90) $\log_3 27$

91) $\log_4 \frac{1}{64}$

92) $\log_2 -32$

Find the inverse of each function.

93) $y = \log x^5$

94) $y = \ln (x - 1)$

95) $y = \frac{10^x}{4}$

96) $y = e^{\frac{x}{2}}$

Expand each logarithm.

97) $\log_3 (a \cdot b \cdot c^4)$

Condense each expression to a single logarithm.

98) $12 \log_8 x - 4 \log_8 y$

Solve each equation.

99) $10^{2-5n} + 10 = 60$

100) $-5 \cdot 3^{10a-6} - 7 = -62$

101) $\log_{13} -4n = \log_{13} (-5n - 5)$

102) $\log_{13} (9 - a^2) = \log_{13} -8a$

103) $\log_2 (-2x - 1) - \log_2 7 = 1$

104) $\log_4 (2 - 4x^2) + \log_4 2 = 1$

Identify the points of discontinuity of each.

105) $f(x) = -\dfrac{4}{x+2}$

106) $f(x) = -\dfrac{1}{x^2+x-6}$

Identify the vertical asymptotes of each.

107) $f(x) = \dfrac{1}{x-3} + 3$

108) $f(x) = \dfrac{x^2+3x+2}{-3x-9}$

Identify the horizontal asymptote of each.

109) $f(x) = -\dfrac{1}{x} - 3$

110) $f(x) = \dfrac{-x^2+4}{x^2+2x-3}$

111) $f(x) = \dfrac{x^3-9x}{3x^2+3x-6}$

112) $f(x) = \dfrac{2}{x+2}$

Identify the x-intercepts of each.

113) $f(x) = \dfrac{3}{x-2} + 1$

114) $f(x) = \dfrac{2x^2 - 2x}{x^2 - 4x + 3}$

Identify the holes of each.

115) $f(x) = \dfrac{4}{x+2} + 1$

116) $f(x) = \dfrac{x^3 + x^2 - 2x}{3x^2 + 6x}$

Identify the domain of each.

117) $f(x) = \dfrac{2}{x+1} + 2$

118) $f(x) = -\dfrac{2}{x+2} - 2$

Write each expression in radical form.

119) $(5r)^{\frac{1}{2}}$

120) $5^{-\frac{2}{3}}$

Write each expression in exponential form.

121) $\left(\sqrt{v}\right)^3$

122) $\dfrac{1}{\left(\sqrt[3]{6}\right)^4}$

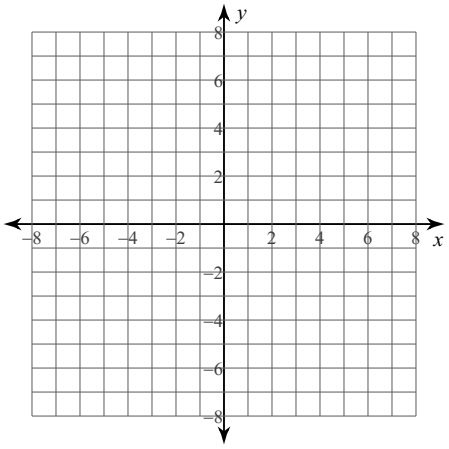
Describe the end behavior of each function.

123) $f(x) = -x^3 - 10x^2 - 32x - 34$

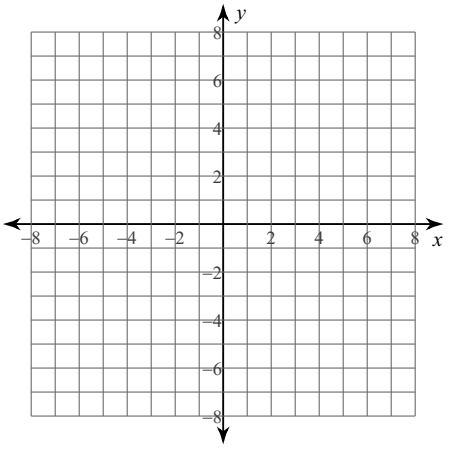
124) $f(x) = -x^4 + 3x^2 - 3x - 4$

Sketch the graph of each function. Approximate each real zero to the nearest tenth. Approximate the relative minima and relative maxima to the nearest tenth.

125) $f(x) = x^3 - x^2 - 2$

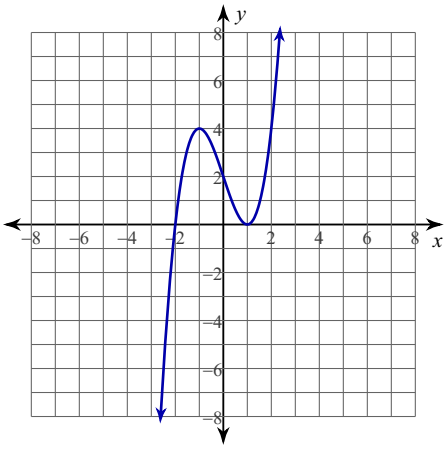


126) $f(x) = x^4 - x^2$



Given a graph find the intervals of increasing and decreasing slope. Express the answer in interval and inequality notation.

127)



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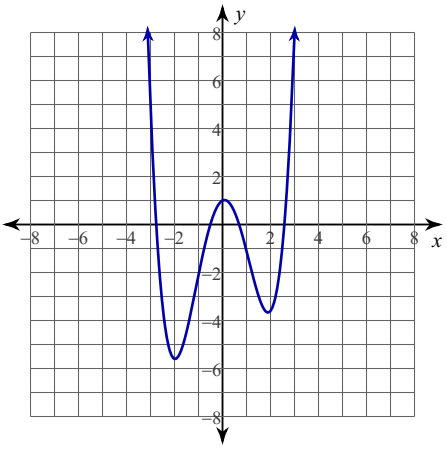
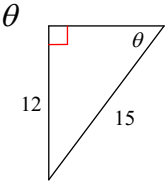
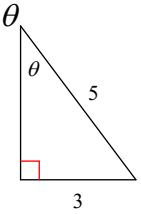


Find the value of the trig function indicated.

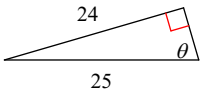
129) cot θ



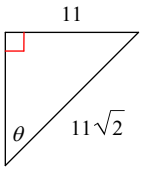
130) sec θ



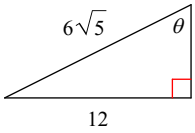
131) csc θ



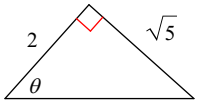
132) cos θ



133) tan θ



134) sin θ



Find the exact value of each trigonometric function.

135) $\cot \frac{3\pi}{2}$

136) $\cos \frac{3\pi}{4}$

137) $\sec \frac{\pi}{3}$

138) $\tan \frac{5\pi}{4}$

139) $\csc \frac{7\pi}{6}$

140) $\sin \frac{\pi}{6}$

Solve each equation for $0 \le \theta < 2\pi$.

141) $\sin \theta = \frac{\sqrt{3}}{2}$

142) $-3\sqrt{3} = 3\tan \theta$

143) $3 - \frac{3}{5} \cdot \tan \theta = \frac{15 + \sqrt{3}}{5}$

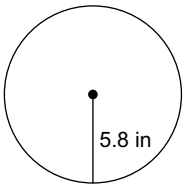
144) $0 = \tan -2\theta$

145) $-\frac{\sqrt{3}}{3} = \tan\left(2\theta + \frac{4\pi}{3}\right)$

146) $\frac{1}{2} \cdot \tan\left(\theta + \frac{2\pi}{3}\right) = 0$

Find the area of each. Use your calculator's value of π. Round your answer to the nearest tenth.

147)



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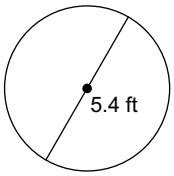
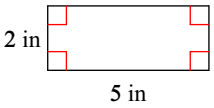


Find the area of each.

149)



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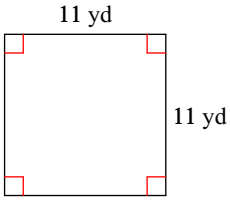

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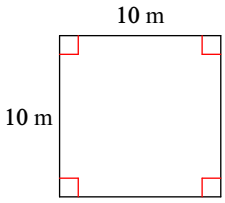

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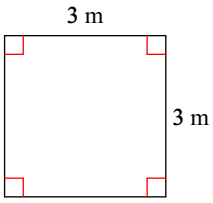
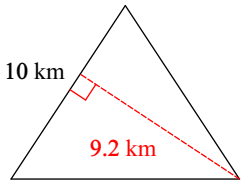
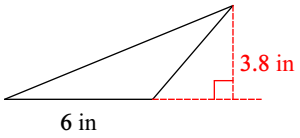


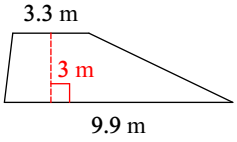
153)



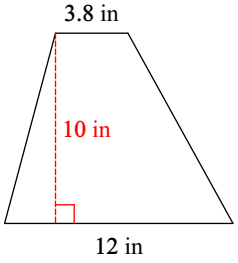
154)



155)

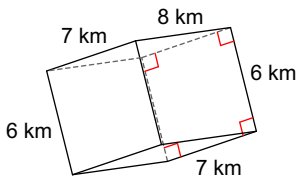


156)

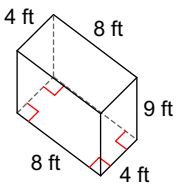


Find the volume of each figure. Round your answers to the nearest hundredth, if necessary.

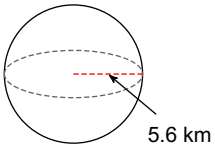
157)



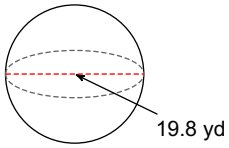
158)



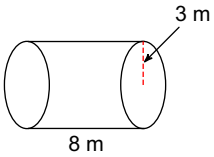
159)



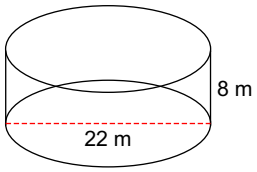
160)



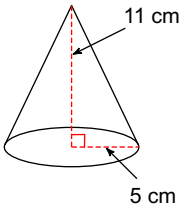
161)



162)



163)



164)