Secondary Math 3 Name_____

Final Review

Date_____ Period____

Find the remainder.

1) $(x^3 + 9x^2 + 9x - 7) \div (x + 2)$

2) $(a^3 + 2a^2 - 40a + 17) \div (a - 5)$

State if the factor is a root of the polynomial. If so, write as a product of two factors.

3) $(6x^3 + 17x^2 + 13x + 6) \div (x + 2)$

4) $(10x^3 + 100x^2 + 85x - 44) \div (x + 9)$

State the possible rational zeros for each function.

5) $f(x) = 6x^3 + 10x^2 + 29x - 11$

6) $f(x) = 4x^3 - 8x^2 + 5x - 1$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

7) $4,\ \ 1,\ \ -\frac{1}{4}$

8) $-2i,\ \ -2 - i$

9) $-\frac{2}{5},\ \ 3 + 2\sqrt{2}$

10) $0,\ \ 1 + 2\sqrt{2},\ \ 1 - 2\sqrt{2}$

Find all zeros.

11) $f(x) = 5x^4 + 6x^3 + x^2$

12) $f(x) = 2x^4 + x^2 - 36$

13) $f(x) = 2x^3 + x^2 - 6x$

14) $f(x) = 5x^4 - 18x^2 - 8$

Simplify each and state the excluded values.

15) $\dfrac{81x}{81x^2}$

16) $\dfrac{16a^4}{16a^3}$

17) $\dfrac{5x^2 - 39x + 54}{x - 6}$

18) $\dfrac{x + 3}{9x + 27}$

19) $(x + 6) \cdot \dfrac{5x + 3}{5x^2 - 2x - 3}$

20) $\dfrac{5n^2 + 40n + 60}{5n + 10} \div (n^2 + 6n - 7)$

Simplify each expression.

21) $\dfrac{\frac{16}{x^2}}{\frac{x^2}{16}}$

22) $\dfrac{\frac{9}{4}}{\frac{9}{a^2}}$

23) $\dfrac{6x}{2x} - \dfrac{x + 2}{9x + 9}$

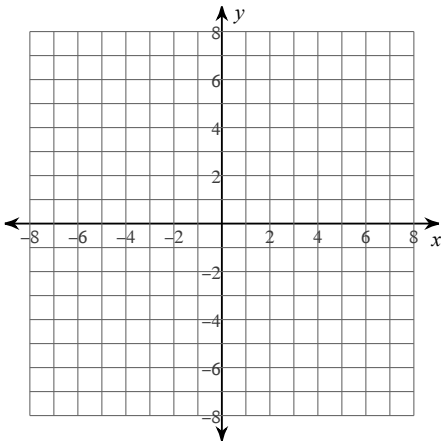
24) $5 + \dfrac{m + 1}{m^2 + 3m - 4}$

25) $\dfrac{5k}{6k^3} + \dfrac{6}{2k^2 + 14k + 20}$

26) $\dfrac{b - 4}{5b^2 - 34b + 24} + \dfrac{4b}{2}$

Find the given information. Then graph the function.

27) $f(x) = \dfrac{-3x^2 - 9x + 12}{x^2 + x - 2}$



28) # of Discontinuities:

Domain:

Vertical Asymptotes:

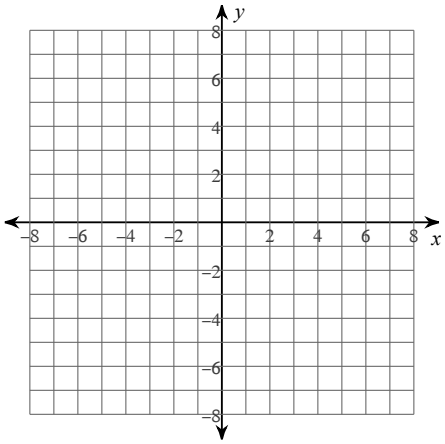
Holes:

Horizontal Asymptotes:

x-intercepts:

y-intercepts:

29) $f(x) = \dfrac{x^2 - x}{x^2 - 2x}$



30) # of Discontinuities:

Domain:

Vertical Asymptotes:

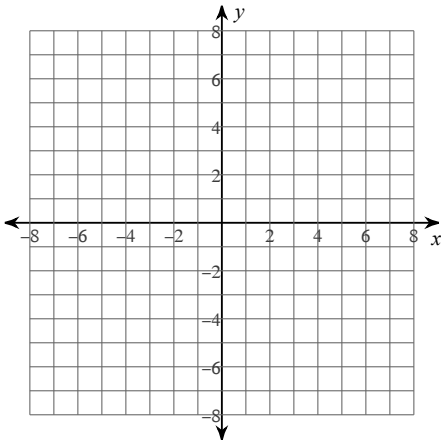
Holes:

Horizontal Asymptotes:

x-intercepts:

y-intercepts:

31) $f(x) = \dfrac{x^2 - 2x - 8}{x^2 - x - 2}$



32) # of Discontinuities:

Domain:

Vertical Asymptotes:

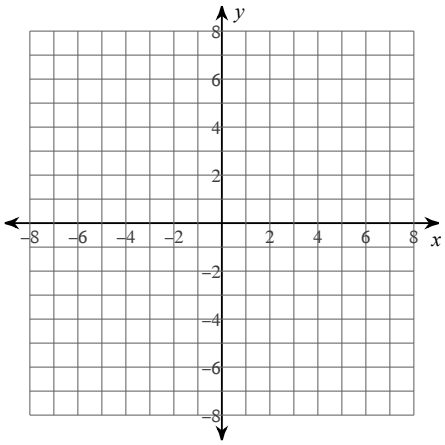
Holes:

Horizontal Asymptotes:

x-intercepts:

y-intercepts:

33) $f(x) = \dfrac{x^2 + 5x + 4}{x^2 + 2x - 8}$



34) # of Discontinuities:

Domain:

Vertical Asymptotes:

Holes:

Horizontal Asymptotes:

x-intercepts:

y-intercepts:

State the domain and solve each rational equation.

35) $\dfrac{k+6}{4k} = \dfrac{1}{4k} - \dfrac{1}{4}$

36) $\dfrac{1}{x} + \dfrac{x+4}{3x} = \dfrac{2x-6}{x}$

37) $\frac{1}{3b-6} - \frac{5}{3} = \frac{1}{b-2}$

38) $\frac{1}{3b-6} - \frac{b+2}{3b-6} = \frac{1}{b-2}$

39) $-3\sqrt[3]{24} - 2\sqrt[3]{6} - \sqrt[3]{3}$

40) $-\sqrt{27} - \sqrt{18} - 3\sqrt{2}$

Simplify.

41) $\left(3\sqrt{3} + \sqrt{5}\right)\left(3\sqrt{3} + 4\sqrt{5}\right)$

42) $\left(-\sqrt{5} + 2\sqrt{2}\right)\left(-5\sqrt{5} + 3\sqrt{2}\right)$

43) $\frac{9 - 9\sqrt{3}}{3 - \sqrt{2}}$

44) $\frac{5\sqrt{10} - \sqrt{2}}{-7 + \sqrt{6}}$

45) $\frac{4 + \sqrt{3}}{9 - \sqrt{6}}$

46) $\frac{3 + \sqrt{10}}{-1 + 10\sqrt{6}}$

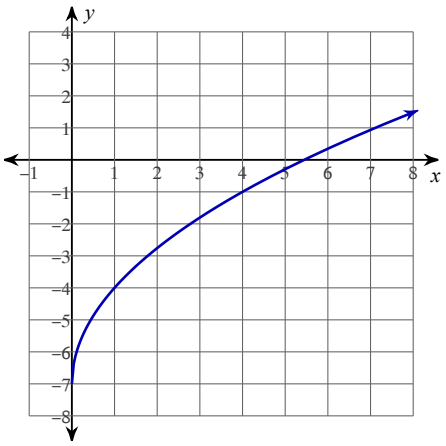
Write the equation of the graph that meets each criteria:

47) Parent function: $y = x^3$
Reflected about the x axis.
A vertical compression by a factor of .5
A vertical translation of 7 units up.
A horizontal translation of 2 units left.

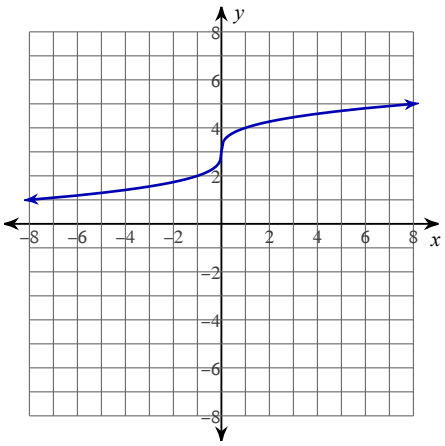
48) Parent function: $y = \sqrt{x}$
A vertical stretch by a factor of 2.
A reflection across the x axis.
A vertical translation of 2 units right.

Write the equation of each function below:

49)



50)



Find the inverse of each function.

51) $f(n) = \dfrac{-2 + \sqrt[5]{16n}}{2}$

52) $g(n) = -n^3 + 2$

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

54) $f(x) = 5 - \dfrac{7}{4}x$

Find the amount in each account given that it is compounded annually.

55) principal: $400
annual interest rate: 3.7%
time: 12 years

56) principal: $750
annual interest rate: 4.2%
time: 18 years

57) The value of a car decreases by 8% each year. If you purchased the car for $20,000, what would the car be worth after 6 years?

58) You have $650 that you can put into a savings account that accrues 3.5% annual interest. You want to save $1200. How long will it take for your account to reach this amount?

Find the amount in a continuously compounded account for the given conditions.

59) principal: $2000
annual interest rate: 3.1%
time: 5 years

60) principal: $600
annual interest rate: 2.6%
time: 4.5 years

61) A student wants to save $10,000 for college in 6 years. How much should be put into an account that pays 4.2% annual interest compounded continuously?

62) A man wants to save 1 million dollars for his retirement fun over a period of 35 years. If he makes no additional deposits, how much should be put into an account that pays 2.7% annual interest compounded continuously?

Evaluate each expression.

63) $\log_7 49$

64) $\log_7 \frac{1}{343}$

65) $\ln e$

66) $\log_{16} 2$

Expand each logarithm.

67) $\log_4 \left(a^3 \cdot b\right)^5$

68) $\log_3 \left(z^2\sqrt{x}\right)$

69) $\log_7 \left(\frac{x^6}{y}\right)^4$

70) $\log_2 \frac{x^2}{y^4}$

Solve each equation.

71) $625^{-3x} = 125^{3x}$

72) $243^{-2x-2} = 27^{2x}$

Solve each equation. Write final answers using log base 10.

73) $5^{5x} - 1 = 46$

74) $20^{b+3} - 4 = 34$

Find a positive and a negative coterminal angle for each given angle.

75) $-18°$

76) $15°$

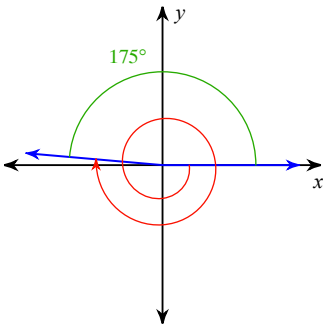
Find a coterminal angle between 0° and 360°.

77) $-495°$

78) $370°$

Find the measure of each angle.

79)



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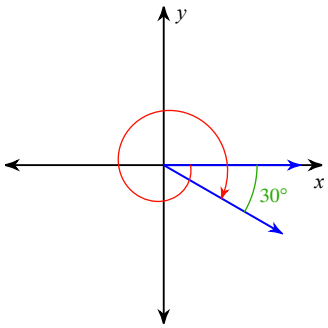


Find the exact value of each trigonometric function.

81) $\cos -150°$

82) $\cos 300°$

83) $\tan 0°$

84) $\tan -150°$

85) $\tan 0$

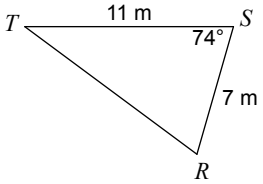
86) $\cos \pi$

87) $\sin \frac{5\pi}{6}$

88) $\cos \frac{\pi}{3}$

Find the area of each triangle to the nearest tenth.

89)



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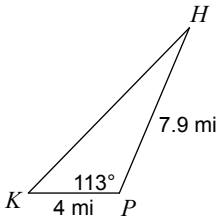
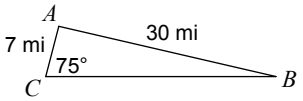
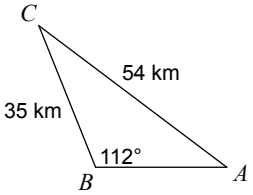


Find each measurement indicated. Round your answers to the nearest tenth.

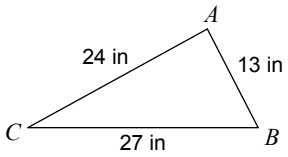
91) Find $m\angle B$



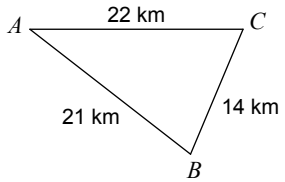
92) Find $m\angle A$



93) Find $m\angle B$

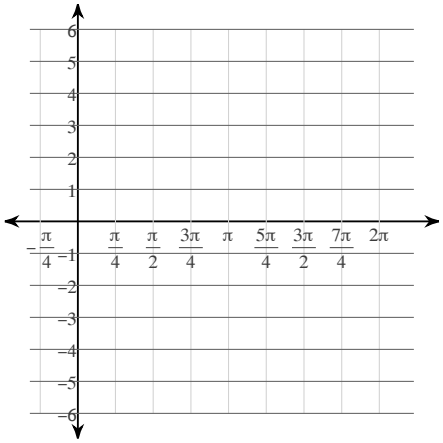


94) Find $m\angle C$

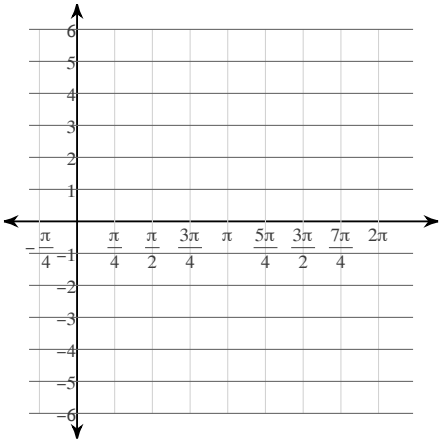


Graph each function using radians. Then state the domain and range.

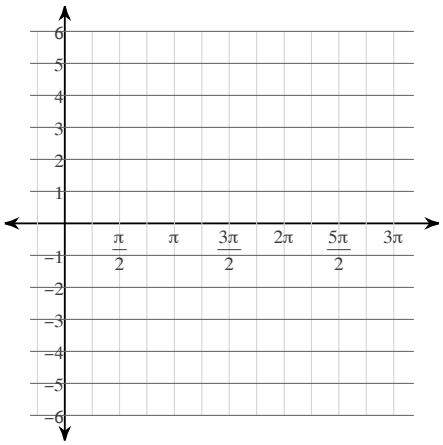
95) $y = \frac{1}{2} \cdot \cos 4\theta$



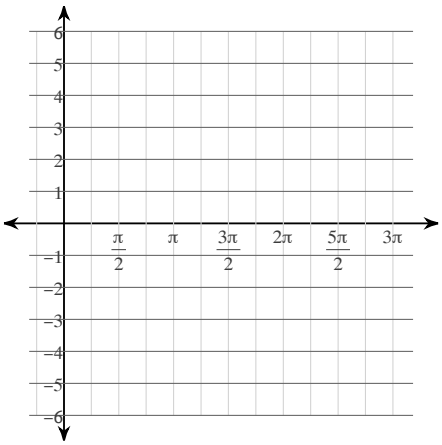
96) $y = \frac{1}{2} \cdot \sin 4\theta$



97) $y = 3\sin\left(\theta - \frac{\pi}{4}\right) + 2$



98) $y = 3\cos\left(\theta + \frac{3\pi}{2}\right) - 2$



For each sequence, state if it is arithmetic, geometric, or neither.

99) $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \frac{3}{32}, \frac{3}{64}, \ldots$

100) $-3, -\frac{9}{4}, -\frac{9}{5}, -\frac{3}{2}, -\frac{9}{7}, \ldots$

101) $39, 42, 45, 48, 51, \ldots$

102) $-\frac{13}{9}, -\frac{7}{9}, -\frac{1}{9}, \frac{5}{9}, \frac{11}{9}, \ldots$

Evaluate each series.

103) $\sum_{k=1}^{6} (30 - k^2)$

104) $\sum_{n=1}^{6} (40 - n)$

105) $\sum_{n=1}^{7} n(n-2)$

106) $\sum_{k=1}^{5} (2k^2 - 3)$

Evaluate each arithmetic series described.

107) $11 + 17 + 23 + 29\ldots,\ n = 13$

108) $28 + 38 + 48 + 58\ldots,\ n = 15$

Evaluate each geometric series described.

109) $-1 - 3 - 9 - 27\ldots,\ n = 9$

110) $-3 + 6 - 12 + 24\ldots,\ n = 9$

Determine if each geometric series converges or diverges. If it converges, find the sum.

111) $3 + 9 + 27 + 81\ldots$

112) $5 - 1 + \frac{1}{5} - \frac{1}{25}\ldots$

113) $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8}\ldots$

114) $3 - 6 + 12 - 24\ldots$

Find the explicit formula.

115) $15, 5, -5, -15, \ldots$

116) $3, -197, -397, -597, \ldots$

117) $-4, -20, -100, -500, \ldots$

118) $2, -8, 32, -128, \ldots$