

Do All Work on Separate piece of paper

Date _____ Period _____

Divide with long division.

1) $(k^3 + 4k^2 - 14k - 5) \div (k - 2)$

2) $\frac{p^3 - 5p^2 + 7p - 3}{p^2 - 4}$

Divide.

3) $(b^3 + 4b^2 - 9) \div (b + 4)$

4) $(n^4 - 55n^2 + 36n + 49) \div (n - 7)$

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

5) $(b^3 + 5b^2 - 26b - 16) \div (b + 8)$

State the number of roots for each equation.

6) $x^3 - 1 = 0$

7) $x^4 - x^2 - 20 = 0$

State the POSSIBLE rational zeros for each function.

8) $f(x) = 9x^3 + 24x^2 + 12x - 7$

9) $f(x) = 2x^3 + x^2 - 20x - 25$

A polynomial function with rational coefficients has the follow zeros. Find all additional zeros.

10) $2 + \sqrt{10}, 2 + 3i$

11) $3 + 2\sqrt{2}, -i$

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

12) $5, -1 - 2i$

13) $0, 3, -5$

14) $4, \sqrt{10}$

15) $5, -2i$

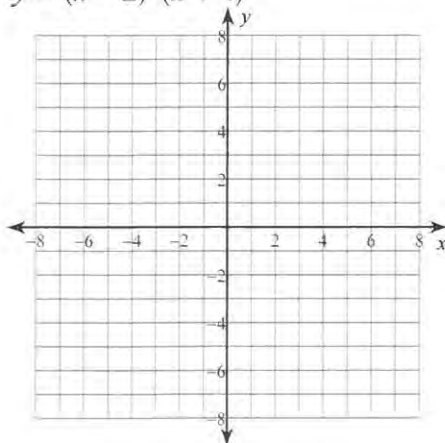
State the possible rational zeros for each function. Then find all zeros.

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

17) $f(x) = x^3 + x^2 - 5x - 5$

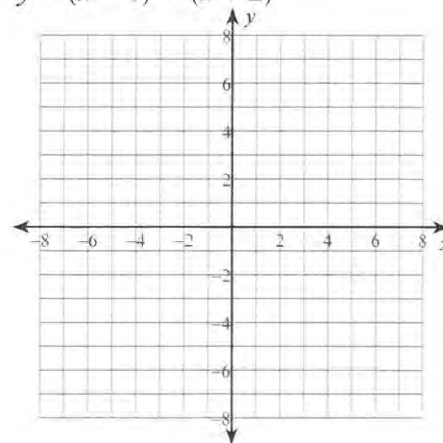
- 18) Graph the equation. Identify the x intercepts and their multiplicity. Describe if the graph bounces off or goes through at each intercept.

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

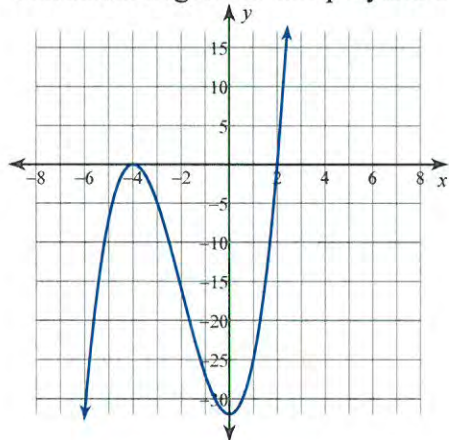


- 19) Graph the equation. Identify the x intercepts and their multiplicity. Describe if the graph bounces off or goes through at each intercept.

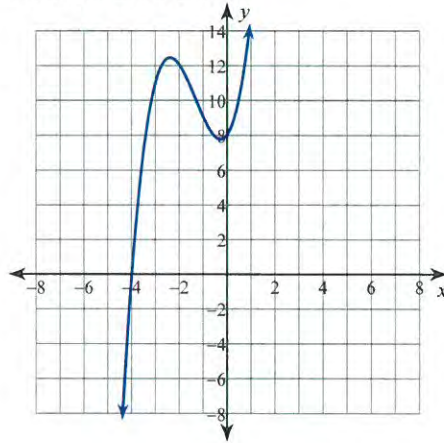
$$y = (x - 1)^2 \cdot (x + 2)^2$$



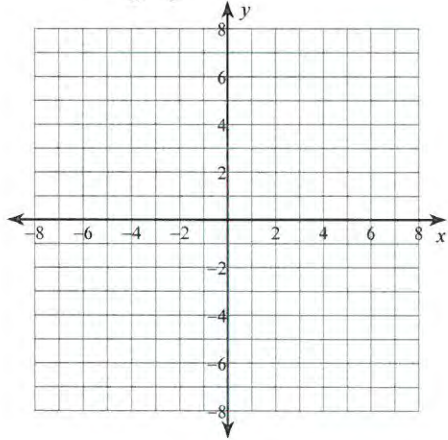
- 20) Given the graph below, identify the zeroes and their multiplicity. Based on the zeroes, what factors do you know and what is the minimum degree of this polynomial.



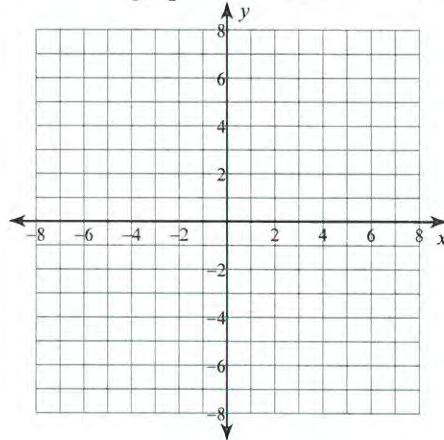
- 21) Given this graph of $y = x^3 + 4x^2 + 2x + 8$, find all the zeroes.



- 22) Sketch a graph of an even function.



- 23) Sketch a graph of an odd function.



- 24) Determine algebraically if each polynomial function is even, odd, or neither.
 $y = x^3 + x - 1$

- 25) Determine algebraically if each polynomial function is even, odd, or neither.
 $y = 2x^4 + 3x^2 - 12$

Simplify.

26) $\sqrt[3]{54}$

27) $\sqrt{112x^4y^4}$

28) $\sqrt[3]{48m^4n^3}$

29) $-5\sqrt{32u^2v}$

30) $3\sqrt{6} + 2\sqrt{6} + 2\sqrt{8}$

31) $3\sqrt{2} - 3\sqrt{20} - 3\sqrt{18}$

32) $\sqrt{5}(5\sqrt{10} + 5)$

33) $(\sqrt{3} + 5)(4\sqrt{3} - 3)$

34) $\frac{2\sqrt{6}}{\sqrt{50}}$

35) $\frac{2}{5 + 3\sqrt{2}}$

36) $\frac{-4 + 3\sqrt{5}}{5 + \sqrt{2}}$

Write each expression in exponential form.

37) $\sqrt{6x}$

38) $(\sqrt[4]{3x})^5$

Write each expression in radical form.

39) $(4m)^{\frac{1}{3}}$

40) $x^{-\frac{4}{5}}$

Simplify.

41) $(x^6)^{\frac{3}{2}}$

42) $(64r^2)^{\frac{3}{2}}$

43) $(25n^2)^{\frac{3}{2}}$

44) $(100a^4)^{\frac{1}{2}}$

45) $2x^2y^{\frac{5}{3}} \cdot 2x^2y^4$

46) $a^{\frac{3}{2}}b^{\frac{1}{4}} \cdot 3a \cdot 4ab^{\frac{2}{3}}$

Solve each equation. Remember to check for extraneous solutions.

47) $-1 = \sqrt{2x-6} - 3$

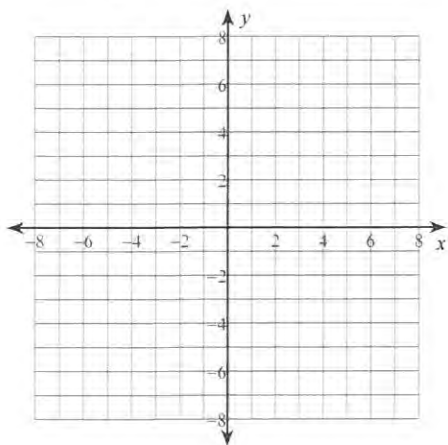
48) $\sqrt{-8-m} = \sqrt{2m+22}$

49) $\sqrt{7n-3} = n+1$

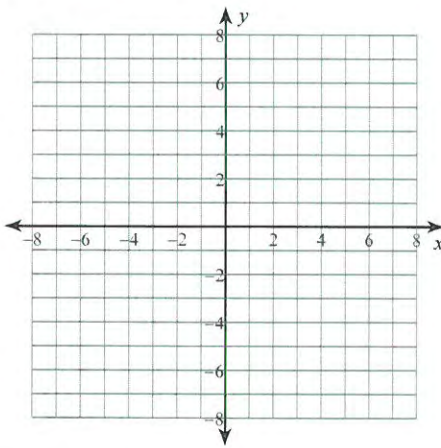
50) $r = \sqrt{2r-9} + 6$

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

51) $y = \frac{1}{2}\sqrt{x}$

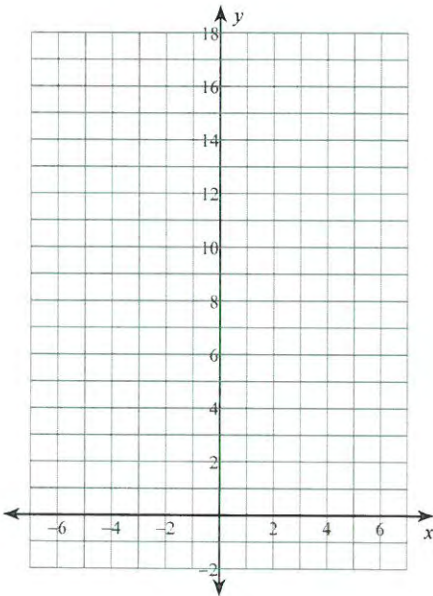


$$52) y = \sqrt[3]{x-3} - 1$$

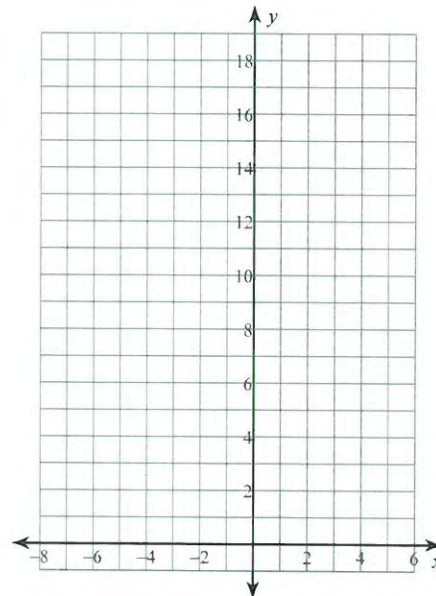


Sketch the graph of each function. Identify the domain and range.

$$53) y = 3 \cdot 2^x - 2$$

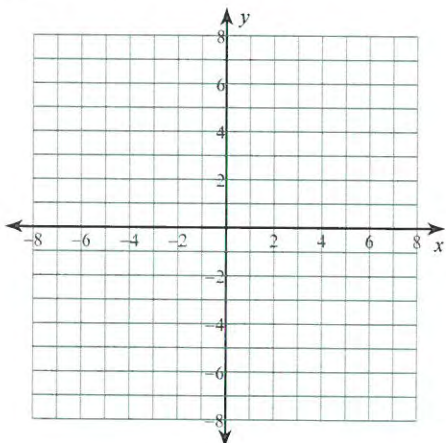


$$54) y = \frac{1}{4} \cdot \left(\frac{1}{3}\right)^{x+1} - 1$$



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

$$55) y = \log_2(x-1) + 5$$



A2 Semester 2 review. You must show all work in a SEPARATE PIECE OF PAPER. You may use a graphing calculator except for problems with a *.**

56. Let $f(x) = 16 - x^2$ and $g(x) = 4 - x$. Find $f(x) - g(x)$.

57. Let $f(x) = 1 - x^2$ and $g(x) = 1 - x$. Find $f(x) \cdot g(x)$.

58. Let $r(x) = 2x$ and $s(x) = x^3 - 3$. Find $s(r(2))$.

59. Let $r(x) = x^2 - 3$ and $s(x) = x^3 - 6$. Find $r(s(-1))$.

Let $f(x) = (x - 3)^2$ and $g(x) = -\frac{2}{x}$. **Perform the indicated operation.**

60. $f(g(x))$

61. $g(f(x))$

62. Find the inverse of the relation $(1, 7), (2, 5), (3, 3), (4, 1)$.

63. Find an equation for the inverse of the relation $y = 5x - 3$.

64. Write an equation for the inverse of the relation $y = 18x - 7$.

Find the inverse of the function.

65. $f(x) = \frac{3}{4}x^3 - 1$

66. The amount of money, A , accrued at the end of n years when a certain amount, P , is invested at a compound annual rate, r , is given by $A = P(1 + r)^n$. If a person invests \$250 in an account that pays 10% interest compounded annually, find the balance after 15 years.

67. Write an exponential function to model the situation. Then estimate the value of the function after 5 years (to the nearest whole number).

A population of 290 animals that increases at an annual rate of 9%.

68. Find the value of \$1000 deposited for 8 years in an account paying 8% annual interest compounded semiannually.

69. Find the value of \$1000 deposited for 10 years in an account paying 6% annual interest compounded monthly.

70. Write an exponential function to model the situation. Then estimate the value of the function after 5 years (to the nearest whole number).
A population of 390 animals that decreases at an annual rate of 11%.
71. A company had a total debt of \$320,000 in 1980. Between 1980 and 1987 it was able to reduce its debt 15% each year. Approximate the company's debt in 1987 to the nearest \$1000.

Simplify:

72. $\frac{7e^{19}}{35e^6}$
73. Evaluate to three decimal places. $e^{1.35}$
74. Use the formula $A = Pe^{rt}$. If \$5500 is deposited in an account at the bank and earns 9% annual interest, compounded continuously, what is the amount in the account, rounded to the nearest dollar, after 6 years?
75. Marion decides to invest \$6000 at 5% interest compounded continuously. Find the value of the investment after seven years.
76. The population of Plymouth, Indiana in t years can be modeled by the function $P(t) = 17,200e^{0.017t}$.
- Is the population of Plymouth increasing or decreasing? How fast is the population of Plymouth increasing or decreasing? Explain.
 - What is the population of Plymouth now? Predict the population of Plymouth in 20 years.
77. Write the equation $\log_{243} 729 = \frac{6}{5}$ in exponential form.
78. ***Evaluate without using a calculator. $\log_2 16$
79. ***Evaluate without using a calculator. $\log_7 \frac{1}{49}$
80. ***Evaluate $\ln e^{-4}$.
81. Condense the expression. $\frac{1}{2} \log_5 16 - 3 \log_5 x + 4 \log_5 y$
82. Expand the expression. $\ln \frac{2x}{y^4}$
83. Condense the expression. $\frac{1}{5} \log_3 32 - 2 \log_3 x + \frac{1}{2} \log_3 y$

Use the change-of-base formula to evaluate the expression.

84. $\log_4 7$

85. $\log_3 5$

86. Solve for x . Round to four decimal places: $e^{-3x} = 7.1$

87. Solve. $6^{-0.2x} - 3 = 7$

Solve the equation. Check for extraneous solutions.

88. $\log_4 (x + 3) = -2$

89. $\log_4 (x + 6) + \log_4 x = 2$

Solve the equation. Check for extraneous solutions.

90. $\ln(x + 7) = \ln(3x - 5)$

91. $\log_2 (-x) + \log_2 (x + 12) = 5$

92. A lunch menu consists of 4 different kinds of sandwiches, 4 different kinds of soup, and 6 different drinks. How many choices are there for ordering a sandwich, a bowl of soup, and a drink?

Evaluate the factorial expression.

93. $10!$

Find the number of permutations.

94. ${}_5P_3$

95. Find the number of distinguishable permutations of the letters LUCKY.

96. How many different permutations are there for the letters in the word "minimum"?

97. From a group of eight boys and three girls, a boy and a girl will be selected to attend a conference. In how many possible ways can the selection be made?

Find the number of combinations.

98. ${}_{10}C_2$

99. You own 7 pairs of jeans and are taking 6 of them on vacation. In how many ways can you choose 6 pairs of jeans from the 7?
100. A four-person committee is chosen at random from a group of 15 people. How many different committees are possible?
101. Five friends play a game. Each person writes his or her name on a piece of paper, and the papers are randomly redistributed. Find the probability that each person gets back his or her own name.
102. In a class of 25 students, 18 have brown eyes. If two students are chosen at random, which expression will calculate the probability that both have brown eyes?
- a. $\frac{{}^{18}P_2}{{}^{25}P_2}$ b. $\frac{{}^7C_2}{{}^{18}C_2}$ c. $\frac{{}^{18}C_2}{{}^{25}C_2}$ d. $\frac{{}^7C_2}{{}^{25}C_2}$
103. A jar contains 10 blue marbles, 4 red marbles, and 8 white marbles. What are the odds of drawing a blue marble from the bag?
104. A bag contains seven green marbles and one red marble. The marbles are randomly selected one at a time. What are the odds in favor of picking the red marble?
105. Find the probability $P(4 \text{ or } 3)$ when a fair die is rolled.
106. Four cards are randomly selected from a standard 52-card deck. What is the probability of getting 4 hearts or 4 numbers less than 6 (count aces as 1)?
107. A bag contains 7 red balls numbered 1, 2, 4, 5, 6, 7, 10 and 3 white balls numbered 3, 8, 9. If a ball is drawn at random, what is the probability the ball is
- a. red or odd-numbered
b. white or even-numbered?
108. Of 100 students, 23 are taking Calculus, 29 are taking French, and 12 are taking both Calculus and French. If a student is picked at random, what is the probability that the student is taking Calculus or French?
109. If you draw one card at random from a deck of 15 cards numbered 1 through 15, inclusive, what is the probability that the number you draw is divisible by 7 and even?
110. Six balls numbered from 1 to 6 are placed in an urn. One ball is selected at random. Find the probability that it is NOT number 3.
111. A drawer contains 10 red socks, 6 white socks, and 8 blue socks. Without looking, you draw out a sock, return it, and draw out a second sock. What is the probability that the first sock is blue and the second sock is white?
- A jar contains 21 green marbles and 30 yellow marbles. One marble is drawn at random and the color noted. It is then returned to the jar, mixed in, and another marble is drawn at random.**
112. Find the probability that both marbles are green.

113. Find the probability that both marbles are yellow.
114. Find the probability that one marble of each color is obtained.
115. A bag contains 3 red marbles and 5 purple marbles. One marble is drawn at random and not replaced. Then a second marble is drawn at random. What is the probability that the first marble is purple and the second one is red?
116. The cars on a dealer's lot are distributed as follows.

	Full Size	Mid-Size	Compact	Sub-Compact
American	12	18	15	5
Japanese	9	21	12	6
European	8	12	6	4

For a single car chosen at random from the cars on this dealer's lot, let A be the event that the car chosen is American and B be the event that the car chosen is compact.

- For a single car selected from this dealer's lot, find $P(A)$ and $P(A|B)$.
 - Are A and B independent events? Explain.
 - Estimate the probability that the next three cars sold from this lot are compact American cars?
 - Are the sales in part (c) independent or dependent events? Explain.
117. The table shows the results of a survey of college students. Find the probability that a student's first class of the day is a humanities class, given the student is male. Round to the nearest thousandth.

First Class of the Day for College Students

	Male	Female
Humanities	70	80
Science	50	80
Other	60	70

118. The probability that a city bus is ready for service when needed is 84%. The probability that a city bus is ready for service and has a working radio is 67%. Find the probability that a bus chosen at random has a working radio given that it is ready for service. Round to the nearest tenth of a percent.

