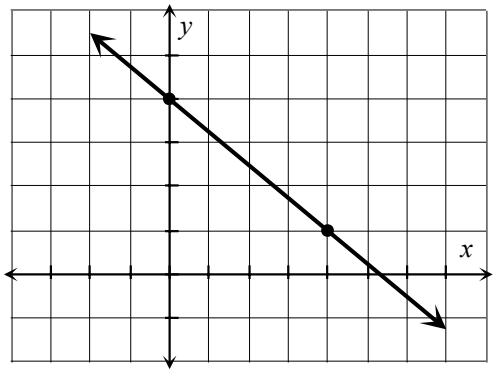
Equation Review

1. Solve the equations.
   a. $3(x-6)=6(x+4)$
   b. $2x-(3x+5)=2(x+5)$
   c. $2(2x-3)+4(x-3)=4(2x+5)$
   d. $2(2m-2)+6=4m+2$

2. Solve the equation and check your solution. Do not change the fractions to decimals.
   a. $\frac{2}{3}x+2\frac{1}{6}=\frac{1}{2}x$
   b. $\frac{2}{5}x+\frac{7}{10}=2x-\frac{4}{5}$

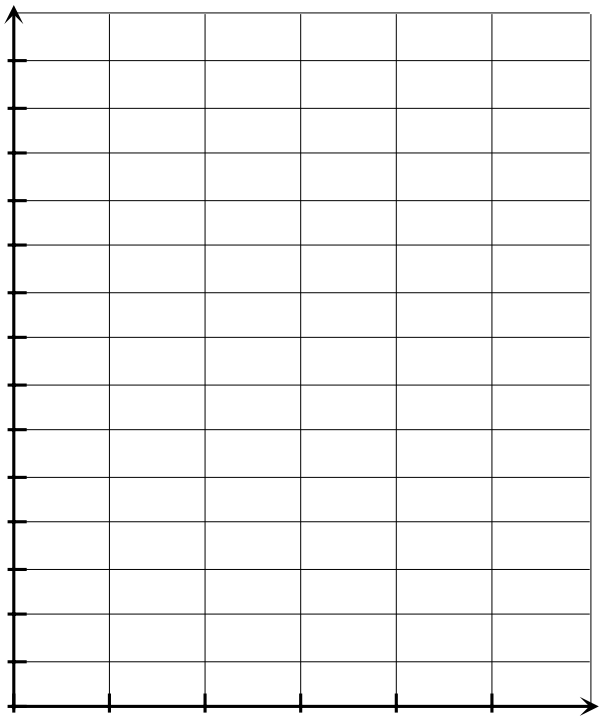
3. Find the slope of the line from the graph.



4. Determine the slope and *y*-intercept for each equation:
   a. $-x+5y=20$
   b. $y+3=4(x+5)$

Review Questions for Unit 5

5. A local ice cream shop keeps track of how much ice cream they sell versus the temperature on that day. The following table shows the temperature and ice cream sales for 12 days. Make scatterplot of the data and then draw a trend line that you feel best fits the data points. Label and scale the axes appropriately.



Temperature (° C)	Ice Cream Sales ($)
14.2	215
16.4	325
11.9	185
15.2	332
18.5	406
22.1	522
19.4	412
25.1	614
23.4	544
18.1	421
22.6	445
17.2	408

a. What is the independent variable in the problem?

b. What is the dependent variable in the problem?

c. Find an equation for the trend line. You may use the regression feature on your calculator if you choose. Round the parameters to the nearest 0.1

d. What is the slope of the trend line? What does the slope represent in the context of the problem?

e. What is the *y*-intercept of the trend line? What does the *y*-intercept represent in the context of the problem?

f. Describe the strength and direction of the correlation in the scatterplot.

g. Use your equation to predict the total ice cream sales when the temperature is 21.3 °C. Is this an example of interpolation or extrapolation? Explain.

h. Use your equation to determine the temperature if the sales were $450.

6. The following data represent the number of text messages sent in one day by a group of students:

[3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 39, 40, 56]

a. To the nearest 0.1 what is the mean number of text messages sent by the students?

b. What is the mode number of text messages sent by the students?

c. What is the median number of text messages sent by the students?

d. What is the range in the number of text messages sent by the students?

e. What is the interquartile range (IQR) for the number of text messages sent by the students?

f. Which number text messages appears to be an outlier? Use the 1.5*IQR rule to check to see if there are any outliers.

g. If the outlier is eliminated which statistic will change more, the mean or median? Explain.

7. The local summer fair charges $10 per person. If a person buys more than 25 tickets at once, the person is only charged $7.50 a person.

    a. Complete the table below to indicate the total cost based on the number of people entering the summer fair.

Number of People	5	10	15	20	25	30	35	40	45	50
Total Cost										

    b. Create a piecewise function to describe the relationship in the cost per person and the number of people attending the summer fair.

Review Questions for Unit 6

Solve problems 27–29 algebraically using either substitution or elimination.

8. Meryl Streep is the most nominated performer of all time with numerous nominations for Best Actress and Best Supporting Actress. Kathryn Hepburn has been nominated for Best Actress almost as many times as Meryl Streep. Meryl Streep has $\frac{7}{6}$ the number of Best Actress nominations that Kathryn Hepburn has. Together they have 26 nominations for Best Actress.

    How many times has Meryl Streep & Kathryn Hepburn been nominated for Best Actress?

9. Each summer households that heat with oil need to decide if they should buy the oil they think they will need for the coming winter season or whether they should just pay for each delivery they get it in the fall, winter and early spring. (In the winter, oil prices usually go up quite a bit.).

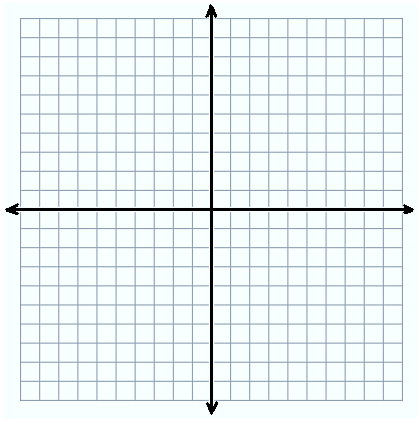
   In the summer of 2012, the Baldwins contacted two oil companies. Both required that a customer have a burner protection plan (pays for the annual furnace cleaning and service calls) if they plan to pre-buy oil. Meyer Oil Company charges $287 for a burner protection plan and $3.499 per gallon for pre-bought oil. Emerald Oil Company charges $275 for a burner protection plan and $3.519 per gallon for pre-bought oil.

   a. How many gallons of pre-bought oil would the Baldwins need to purchase in order to have both plans cost the same amount of money?

   b. In April 2013, the Baldwins realized they had used all 815 gallons they had pre-purchased in July 2012. They had decided to go with the Meyer Oil Company. Had they made the correct decision that July? Explain.

10. Together a 20-ounce Pepsi and a 20-ounce Coke have 134 grams of sugar. A 20-ounce Coke has 4 fewer grams of sugar than a 20-ounce Pepsi. How many grams of sugar are in a 20-ounce Pepsi? How many grams of sugar are in a 20-ounce Coke?

11. Solve the system by graphing: $2x - 3y = -24$
    $x + 6y = 18$



12. Solve each system by any method. (Graphing, substitution or elimination)

a. $2x + 3y = -5$
$3x - 2y = 12$

b. $y = \frac{1}{2}x + 8$
$2x - y = -14$

Review Questions for Unit 7

13. Identify which table could represent a linear function, which table and exponential function, and which table neither. Explain your reasoning. If it is linear or exponential write the equation.

a.

x	*y*
0	20
3	13
6	6
9	–1

b.

x	*y*
0	0
2	2
4	6
6	12

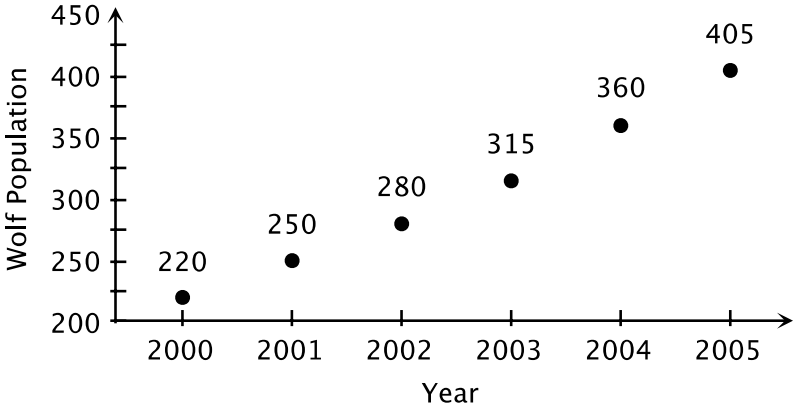
c.

x	*y*
0	40
1	20
2	10
3	5

14. In the last century western gray wolves were placed on the endangered species list. But after a few years the population began to grow again. Biologists believe that the population fits an exponential model of the form $P = ab^t$ where P is the population of wolves and t is the number of years since 2000.

    a. Use the data in the table below (which gives the wolf population in the state of Michigan) and the graph to estimate values of the parameters a and b. You may use a graphing calculator if you choose.

Year	Wolf Population
2000	220
2001	250
2002	280
2003	315
2004	360
2005	405



    b. Use your model to predict the wolf population in the year 2010.

15. Lamar's uncle gave him $500 and told him to save it to buy a car when he is old enough to drive. He put the money in a savings account that pays 4% interest compounded annually. He wanted to know how much interest he would earn after 3 years. So he found the value by calculating $500 \cdot (0.04)^3 = 0.032$. He was amazed that he would earn only slightly more than 3 cents! What went wrong? Explain his error and calculate the amount of interest correctly.

16. From approximately 1947 to 1977, General Electric Company (GE) discharged PCBs from its capacitor manufacturing plants at Hudson Falls and Fort Edward into the Hudson River. It was only many years later that the Environmental Protection Agency (EPA) reached an agreement with GE to start cleaning up the river. In the meantime, the EPA monitored fish in the river to determine the level of PCBs. The concentration (in mg/kg) of PCBs in brown bullheads was found to be modeled by the function $y = 62 \cdot 0.927^x$ where *x* is the number of years since 1980.

    a. What does 62 represent in the context of this problem?

    b. What does 0.927 represent in the context of this problem?

    c. By approximately what percent did the concentration of PCBs decay each year?

    d. What was the concentration of PCBs in 2002 when the cleanup began?

    e. If they had never started cleaning up the river, what would the concentration of PCBs be in 2013?

17. The value of a government bond, in dollars, is given by the function $y = 1000 \cdot 1.06^x$ where *x* is the number of years the bond has been held.

    a. How much was the bond originally worth?

    b. What is the annual rate of interest?

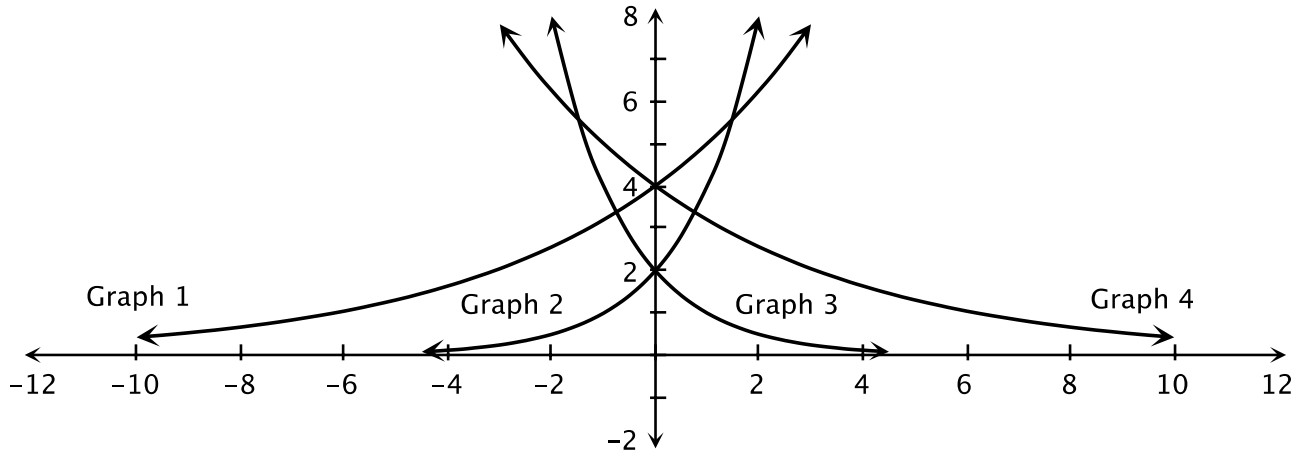
    c. Approximately how many years will it take the original investment to double in value?

18. A business discovered that their kitchen has been infested with fruit flies! The owner keeps a record of the number of flies and finds they are growing exponentially, doubling every week. Here are the data he has collected.

Number of weeks since flies were discovered	Number of fruit flies in the kitchen
0	10
1	20
2	40
3	80

How many flies will there be in 6 weeks? In 7.5 weeks?

19. Identifying Graphs



In the graph above, each curve represents a function of the form $y = a \cdot b^x$.
The parameter a takes on one of these values: 2 or 4.
The parameter b takes on one of these values: 0.5, 0.8, 1.25, or 2.

For each graph, identify the values of a and b:

Graph #1 a = _____ b = _____

Graph #2 a = _____ b = _____

Graph #3 a = _____ b = _____

Graph #4 a = _____ b = _____

Review Questions for Unit 8

For these questions you may use the quadratic formula.

Quadratic Formula

Solutions to the equation $ax^2 + bx + c = 0$ are given by the formula: $x = -\frac{b \pm \sqrt{b^2 - 4ac}}{2a}$.

20. The graph of $y = x^2$ is shown as the thicker curve.

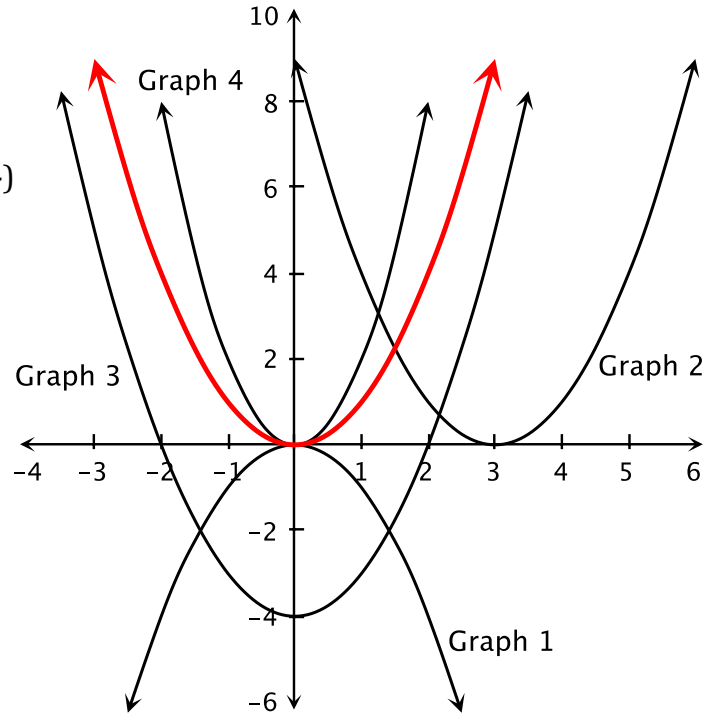
    Match each of the other graphs (#1 – #4) with its function rule.

    a. $y = x^2 - 4$

    b. $y = 2x^2$

    c. $y = -x^2$

    d. $y = (x - 3)^2$



21. Find the *x*- and *y*-intercepts of the graph of $y = (2x - 3)(x + 7)$.

22. Write each function in factored form:

    a. $f(x) = x^2 - 5x - 24$

    b. $f(x) = x^2 - 9x + 20$

c. $f(x) = 4x^2 + 27x + 35$

d. $f(x) = 6x^3 + 32x^2 + 10x$

23. Write each function in standard form:

a. $f(x) = -(x+1)^2 + 5$

b. $f(x) = \frac{1}{2}(x-4)^2 - 8$

c. $f(x) = (x+3)(x-3)$

d. $f(x) = (3x-1)(x+3)$

24. A quarterback throws a football down field to a receiver. The path of the football is given by the equation $h = -0.05x^2 + x + 6$ where *h* is the height of the ball and *x* is the distance from where the ball is thrown. Both *h* and *x* are measured in feet.

a. What is the maximum height of the ball?

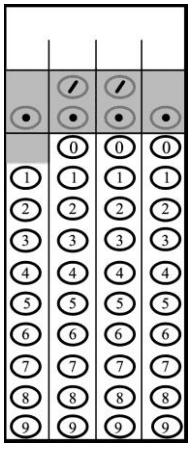
b. How high was the ball when it was thrown?

c. If no one catches the ball how far away will it be when it hits the ground?

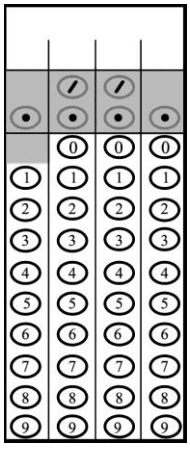
Miscellaneous Review

25.

The box plot above summarizes the resting heart rates, in beats per minute, of the members at a gym. What is the range of resting heart rates?



26. Rajeev has $175 that he earned from his summer job. He puts the money in an account that yields 4% interest compounded annually. Assume that Rajeev does not make any other deposits or withdrawals from his account. After how many years from the time he deposited the money will Rajeev have at least $200 in his account?



27. Ricardo has two types of assignments for his class. The number of mini assignments, m, he has is 1 fewer than twice the number of long assignments, l, he has. If he has 46 assignments in total, which of the following systems of equations can be used to correctly solve for m and l?

a. $\begin{cases} m = 2l - 1 \\ m + l = 46 \end{cases}$

b. $\begin{cases} m = 2l - 1 \\ m = l + 46 \end{cases}$

c. $\begin{cases} l = 2m - 1 \\ m + l = 46 \end{cases}$

d. $\begin{cases} l = 2m - 1 \\ m = l + 46 \end{cases}$

28. What is the sum of $3b(b-4)$ and $6(b-8)$?

a. $3b(1-2b-16)$

b. $3b(b-2-16)$

c. $3(b^2-2b-16)$

d. $3(b^2-2-16b)$

Simplify: (Positive exponents only)

29. $\dfrac{x^{15}y^{13}z^2}{xy^4z^2}$

30. $\left(-10x^{11}y^{15}z\right)^2$

31. $(a^7)(a^{11}b^3c)^4$

32. $\left(\dfrac{40xyz}{2a^4b^3xdewf}\right)^0$

33. $x^{-12}y^{-15}$ **34.** $\left(x^{-14}y^{10}\right)\left(x^{-8}y^{-12}\right)$ **35.** $\dfrac{21a^4b^{-5}c^7}{7a^2b^4c^9}$

36. $(4y^7y^8)^3$ **37.** $\dfrac{60xyz^7}{-10x^2y^6z^{10}}$

38. $(x^{15}y^6)(x^7y)$ **39.** $(9g^5)^2$ **40.** $(5c^3t^2)(-6ct^{-2})(c^{-5}t)$

Add or Subtract:

41. $(19x^2+12x+12)+(7x^2+10x+13)$ 42. $(4x^2-6x+7)+(-19x^2-15x-18)$

43. $(20x^2+15x+13)+(-19x^2+17x+5)$ 44. $(9x^6-4x^5)+(10x^5-15x^4+14)$

45. $(9x^2+12)+(7x^2+10x+13)$ 46. $(5x^6+9x^3-6x)+(-9x^6-20x^2-6x)$

47. $(17x^2 + 7x - 14) - (-6x^2 - 5x - 18)$

48. $(-18x^2 + 4x - 16) - (15x^2 + 4x - 13)$

Multiply:

49. $2x(4x^2)$

50. $17x^2(2x^5)$

51. $-3x^3(4x^2)$

52. $-12x^2(-2x)$

53. $4(x+2)$

54. $-3(2x^2+1)$

55. $6(x^2+2x+7)$

56. $4x(1-x)$

57. $-x^2(x+5)$

58. $3x^2(4x^3 - 5x + 10)$

59. $(a-5)(a-3)$

60. $(n-3)(n-1)$

61. $(b-6)(b+3)$

62. $(y-8)(y+11)$

63. $(x-6)(x-1)$

64. $(3x+2)(x-1)$

65. $(3a+1)(2a-5)$

66. $(5x-1)(6x+4)$

67. $(x^2+3)(x+5)$

68. $(2y-1)(5+y)$

69. $(2a-3)^2$

70. $(x-4)^2$

71. $(3x-4)^2$

72. $2(x-3)(x+1)$ 73. $3(x+3)(2x-1)$ 74. $3(x+2)(4-x)$

75. $(x+2y)(x+5y)$ 76. $(3m-n)(2m-n)$

Factor:

77. $34a-17$ 78. $8a^2-4a$ 79. $11x+44x^2y$

80. $16y^2+8y$ 81. $14xz-18xz^2$ 82. $25a^2b^2+30ab^3$

83. $36p^2q^2-12pq$ 84. $3x^3y+9xy^2+36xy$ 85. $12ax+20bx+32cx$

86. x^2+5x+6 87. $x^2+12x+35$ 88. $x^2-8x+15$

89. $x^2-24x+144$ 90. $x^2-16x+55$ 91. $x^2+5x-24$

92. $x^2-7x-30$ 93. $x^2+12x+36$ 94. $x^2+16x-36$

95. $x^2-6x-16$ 96. $25x^2-30x+9$ 97. x^2-16

98. x^2-64 99. x^2-81

100. $2m^2 - 24m + 40$

101. $2x^2 - 3x - 14$

102. $4y^2 - 18y + 14$

103. $3x^2 - 13x + 12$

104. $10r^2 - 11r - 6$

105. $12x^2 + 13x - 4$

106. $5a^2 - 14a - 3$

107. $3y^2 - 27y + 24$

108. $15x^2 - 10x - 5$

Solve:

100. $(x+8)(x-8)=0$

110. $(x-6)(x+10)=0$

111. $(x-5)(x-11)=0$

112. $(3x+4)(x+5)=0$

113. $(x-12)(x+7)=0$

114. $(2x-5)(3x+7)=0$

Solve by factoring:

115. $x^2+3x-40=0$

116. $x^2-100=0$

117. $x^2+13x+42=0$

118. $x^2-22x+105=0$

119. $x^2+7x+10=0$

120. $x^2-6x-16=0$

Quadratic Formula

Solutions to the equation $ax^2 + bx + c = 0$ are given by the formula: $x = -\frac{b \pm \sqrt{b^2-4ac}}{2a}$.

Solve by using the **quadratic formula**:

121. $x^2+3x+2=0$

122. $4x^2-8x-1=0$

123. $x^2+11x+18=0$

124. $x^2+2x-14=0$

125. $x^2-10x+25=0$

126. $x^2+3x+7=0$

Solve each equation any way you want. Show your work.

127. $x^2-3x+2=0$

128. $x^2-5x+4=0$