ATLANTA PUBLIC SCHOOLS
Making A Difference

# *Office of High Schools*
# *and*
# *Office of Mathematics & Science*

# End of the Year
# Final Exam Study Guide for

# Accelerated
# Mathematics 1


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# STANDARDS TO BE COVERED ON THE ACCELERATED MATHEMATICS 1 END OF YEAR FINAL EXAM

**MA1N1. Students will represent and operate with complex numbers.**

a. Write square roots of negative numbers in imaginary form.
b. Write complex numbers in the form $a + bi$.
c. Add, subtract, multiply, and divide complex numbers.
d. Simplify expressions involving complex numbers.

**MA1A3. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$ and $f(x) = a(x - h)^2 + k$.**

a. Convert between standard and vertex form.
b. Graph quadratic functions as transformations of the function $f(x) = x^2$.
c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.
d. Explore arithmetic series and various ways of computing their sums.
e. Explore sequences of partial sums of arithmetic series as examples of quadratic functions.

**MA1A4. Students will solve quadratic equations and inequalities in one variable.**

a. Solve equations graphically using appropriate technology.
b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.
c. Analyze the nature of roots using technology and using the discriminant.
d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.

**MA1A5. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.**

a. Write absolute value functions as piecewise functions.
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.

**MA1G4. Students will understand the properties of circles.**

a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.
b. Understand and use properties of central, inscribed, and related angles.
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.
d. Justify measurements and relationships in circles using geometric and algebraic properties.

**MA1G5. Students will find and compare the measures of spheres.**

a. Use and apply surface area and volume of a sphere.
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.

**MA1D5. Students will determine an algebraic model to quantify the association between two quantitative variables.**

a. Gather and plot data that can be modeled with linear and quadratic functions.
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and .eyeballing..
c. Understand and apply the processes of linear and quadratic regression for curve fitting using appropriate technology.

**Name:** _____ **Class:** _____ **Date:** _____ **ID: A**

# Accelerated Mathematics 1 End of Year Final Exam Study Guide

**Multiple Choice**
*Identify the choice that best completes the statement or answers the question.*

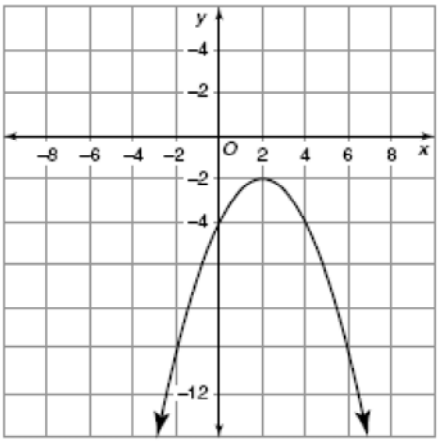
____ 1. Which statement describes the transformations of the basic function $y = x^2$ that would produce the graph of the function $y = -x^2 + a$, if $a > 0$?

a. A shift left by 1 unit and then a shift up by $a$ units.
b. A flip over the $x$-axis and a shift up by $a$ units.
c. A shift right by 1 unit and then a shift down by $a$ units.
d. A flip over the $x$-axis and a shift down by $a$ units.

____ 2. Which is the factored form of $6x^2 - 13x + 5$?

a. $(3x - 5)(2x + 1)$
b. $(3x - 5)(2x - 1)$
c. $(6x - 1)(x + 5)$
d. $(6x + 5)(x - 1)$

____ 3. How many real roots does the quadratic function shown in the graph have?




a. 0
b. 1
c. 2
d. 3

____ 4. What is the solution to the equation $3x^2 + x + 1 = 0$?

a. $x = \frac{1}{6} \pm \frac{\sqrt{13}}{6}$

b. $x = -\frac{1}{6} \pm \frac{\sqrt{11}}{6} i$

c. $x = -\frac{1}{6} \pm \frac{\sqrt{13}}{6} i$

d. $x = \frac{1}{6} \pm \frac{\sqrt{11}}{6}$

____ 5. Solve the equation $-3x^2 + 4x - 6 = 0$.

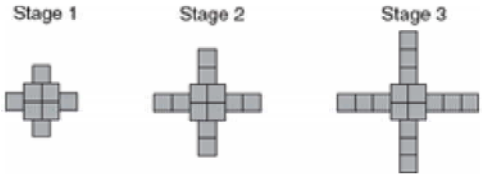
a. $x = \frac{4 \pm \sqrt{56}i}{3}$

b. $x = \frac{4 \pm \sqrt{64}i}{3}$

c. $x = \frac{-4 \pm \sqrt{14}i}{3}$

d. $x = \frac{-2 \pm \sqrt{14}i}{3}$

____ 6. The figures show the first three stages of a pattern that was made using blocks. Write an explicit formula for the sequence that represents the number of blocks *n* in any stage of the pattern.




a. $a_n = 8(n-1) + 4$

b. $a_n = 4(n-1) + 4$

c. $a_n = 4(n-1) + 8$

d. $a_n = 8(n-1) + 16$

____ 7. What is the solution to the equation $-x^2 + 2x = 6$?

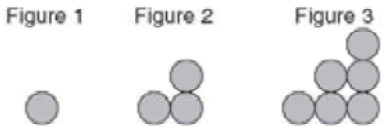
a. $x = 1 \pm \sqrt{5i}$

b. $x = 1 \pm 2\sqrt{5}$

c. $x = 1 \pm \sqrt{7}$

d. $x = -1 \pm \sqrt{26}$

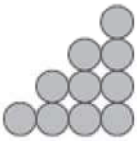
____ 8. The first three figures of a pattern are shown. Which diagram represents the fourth figure?




a.

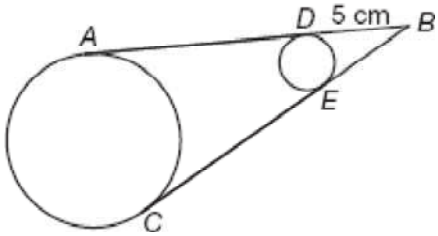
b.

c.



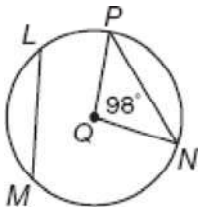
d.

____ 9. In the following figure, $\overline{AB}$ and $\overline{CB}$ are tangent to both circles. The measure of $\overline{AB}$ is 15 centimeters. What is the measure of $\overline{CE}$?




a. 5 centimeters
b. 7 centimeters
c. 9 centimeters
d. 10 centimeters

____ 10. In the following figure $Q$ is the center and $\overline{LM} \cong \overline{NP}$. What is the measure of $\overset{\frown}{LM}$?




a. 49°
b. 98°
c. 120°
d. 138°

____ 11. If the diameter of a sphere increases by a factor of 2, by what factor does the volume of the sphere increase?

a. 2
b. 4
c. 8
d. 16

____ 12. The volume of a sphere is 322 cubic centimeters. What is the approximate circumference of a great circle on the sphere?

a. 15.9 centimeters
b. 26.7 centimeters
c. 31.8 centimeters
d. 13.4 centimeters

____ 13. The manager of a fruit market is having a sale on grapes. If a customer buys less than two pounds of grapes, they cost \$2 per pound. If a customer buys at least two pounds of grapes but less than four pounds of grapes, they cost \$1.50 per pound. If a customer buys four pounds of grapes or more, they cost \$1.25 per pound.

Which piecewise function describes the amount a customer pays for $x$ pounds of grapes?

a. $f(x) = \begin{cases} 2x & \text{for } 0 \le x < 2 \\ 3.5x & \text{for } 2 \le x < 4 \\ 4.75x & \text{for } x \ge 4 \end{cases}$

c. $f(x) = \begin{cases} 2x & \text{for } 0 < x \le 2 \\ 1.5x & \text{for } 2 < x \le 4 \\ 1.25x & \text{for } x > 4 \end{cases}$

b. $f(x) = \begin{cases} 2x & \text{for } 0 \le x < 2 \\ 1.5x & \text{for } 2 \le x < 4 \\ 1.25x & \text{for } x \ge 4 \end{cases}$

d. $f(x) = \begin{cases} 2x & \text{for } 0 < x \le 2 \\ 3.5x & \text{for } 2 < x \le 4 \\ 4.75x & \text{for } x > 4 \end{cases}$

____ 14. For the given piecewise function, what is the rate of change of the function for $-2 \le x < 0$?

$$y = \begin{cases} \frac{1}{3}x \text{ for } -5 \le x < -2 \\ \frac{2}{3}x \text{ for } -2 \le x < 0 \\ x \quad \text{for } 0 \le x < -2 \\ \frac{4}{3}x \text{ for } 0 \le x < 2 \\ \frac{5}{3}x \text{ for } 2 \le x < 5 \end{cases}$$

a. $\frac{4}{3}$

b. $\frac{3}{2}$

c. $-\frac{3}{2}$

d. $\frac{2}{3}$

____ 15. Use your calculator to determine the linear regression line for the data in the table, where the distance a basketball is thrown from the net is a function of the percentage of baskets made.

| Distance from Net (in feet) | Percentage of Baskets Made |
|---|---|
| 4 | 0.30 |
| 8 | 0.22 |
| 12 | 0.15 |
| 16 | 0.11 |
| 20 | 0.05 |

a. $y = -0.08x + 4$

b. $y = 0.3x + 4$

c. $y = -0.02x + 0.35$

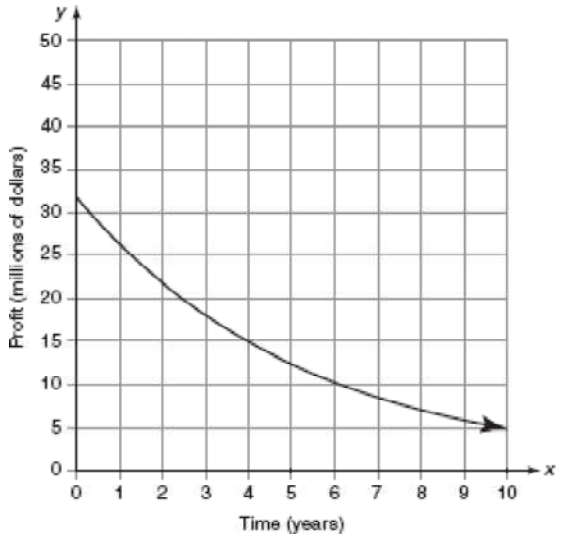
d. $y = 0.35x - 0.02$

____ 16. Use your calculator to determine the Pearson correlation coefficient *r* of the linear regression line for the data in the table. Round your answer to four decimal places.

| *x* | *y* |
|---|---|
| 0 | –2 |
| 5 | 1 |
| –2 | 8 |
| –11 | –14 |
| 12 | 5 |

a. 0.7055
b. 0.4978
c. –0.9629
d. 0.7036

____ 17. The following graph models a company's profit in millions of dollars over a ten-year period. What does the *y*-intercept represent in the context of the problem?

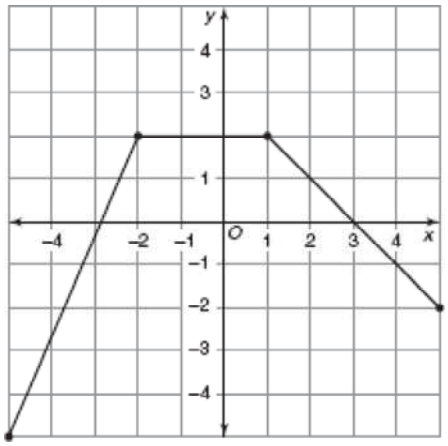



a. The *y*-intercept represents the maximum profit for the company over the ten-year period.
b. The *y*-intercept represents the minimum profit for the company over the ten-year period.
c. The *y*-intercept represents the company's profit at the start of the ten-year period.
d. The *y*-intercept represents the year in which the company made a maximum profit.

____ 18. What general form does an exponential regression equation have?

a. $y = mx + b$
b. $y = ax^2 + bx + c$
c. $y = a(b)^x$
d. $y = x^3 + b^x$

____ 19. Which function models the following graph?




a. $f(x) = \begin{cases} \frac{3}{7}x + \frac{20}{3}, & -5 \le x \le -2 \\ 2 & -2 < x \le 1 \\ x + 3, & 1 < x \le 5 \end{cases}$

b. $f(x) = \begin{cases} \frac{7}{3}x + 2, & -5 \le x < 2 \\ 2, & x = 2 \\ -x + 2, & 2 > x \ge -2 \end{cases}$

c. $f(x) = \begin{cases} \frac{7}{3}x + \frac{20}{3}, & 1 < x \le 5 \\ 2, & -2 < x \le 1 \\ -x + 3, & -5 \le x \le -2 \end{cases}$

d. $f(x) = \begin{cases} \frac{7}{3}x + \frac{20}{3}, & -5 \le x \le -2 \\ 2, & -2 < x \le 1 \\ -x + 3, & 1 < x \le 5 \end{cases}$

____ 20. What general form does a linear regression equation have?

a. $y = mx + b$
b. $y = ax^2 + bx + c$
c. $y = a(b)^x$
d. $y = x^3 + b^x$

**Completion**
*Complete each statement.*

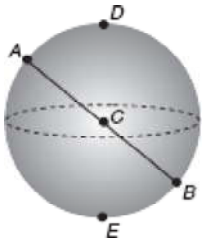
21. A quadratic function whose discriminant is positive has _____ real root(s).

22. A quadratic function whose discriminant is negative has _____ real root(s).

23. A quadratic function whose discriminant is zero has _____ real root(s).

**Matching**

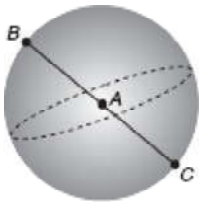
**In the following questions, match each term with the part that describes it on the diagram.**




a. circle *C*
b. segment *AB*
c. segment *AC*
d. points *D* and *E*
e. point *C*

____ 24. great circle

**In the following questions, match the part of the diagram with the term that describes it.**




a. center
b. radius
c. diameter
d. antipodes
e. great circle

____ 25. segment *AB*

____ 26. circle *A*

**Short Answer**

27. The length of a rectangular garden is 10 feet longer than its width.

**a.** How long is the garden if its width is 38 feet?

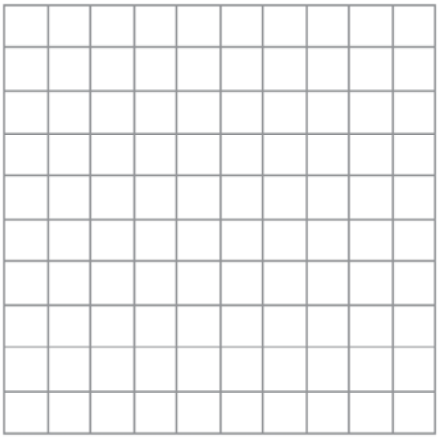
**b.** What would the area of the garden be if the garden was 45 feet long?

**c.** Assign a variable to the width of the garden and write an expression for the length of the garden in terms of its width.

**d.** Write the equation for the area of the garden in terms of its width.

**e.** Complete the table below. Then graph the area of the garden as a function of the width of the garden.

| **Width of Garden** | **Area of Garden** |
|---|---|
| **feet** | **square feet** |
| 5 | |
| 10 | |
| 15 | |
| 20 | |
| 25 | |



**f.** Use the graph to approximate the width of the garden if the area of the garden is 3000 square feet.

28. Solve the equation $3x^2 + 7x - 20 = 0$ by factoring.

29. Convert the quadratic function $f(x) = -x^2 + 10x + 1$ to vertex form.

30. The width of a rectangular frame is 2 inches shorter than its length.

**a.** How wide is the frame if the length is 14 inches?

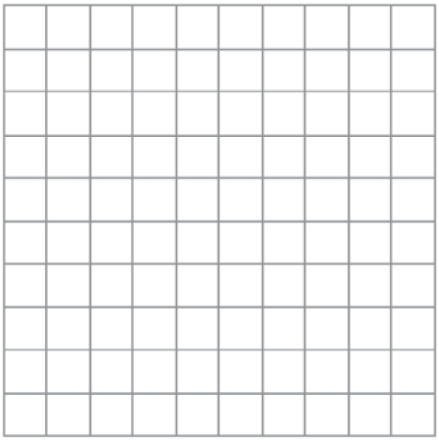
**b.** What would the area of the frame be if the frame is 7 inches wide?

**c.** Assign a variable to represent the length of the frame. Then write an expression for the width of the frame as a function of the length of the frame.

**d.** Write an equation for the area of the frame in terms of its length.

**e.** Complete the table below. Then graph the area of the frame as a function of the length of the frame.

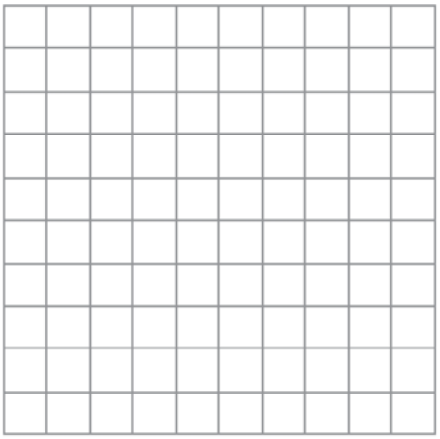
| **Length of Frame** | **Area of Frame** |
|---|---|
| **inches** | **square inches** |
| 2 | |
| 4 | |
| 6 | |
| 8 | |
| 10 | |



**f.** Use the graph to approximate the length of the frame if the area of the frame is 224 square inches.

**g.** What is the area of the frame when the length of the frame is 1 inch? Does this make sense? Explain.

31. Determine the vertex of the function $f(x) = -x^2 - 6x + 2$. Then graph the function and describe the transformations of the basic function that produce the graph of the given function.



**Use the discriminant to determine whether the function has one real root, two real roots, or no real roots. Then find the root(s), if possible.**

32. $y = 3x^2 + 14x - 24$

33. Use the Quadratic Formula to solve the equation $4x^2 = 3x - 1$.

34. Use the roots method to solve the inequality $11x + 2 \le x^2$.

**Write a recursive and an explicit formula that represents the *n*th term of each arithmetic sequence.**

35. $21, 15, 9, 3, \ldots$

36. Use the Quadratic Formula to solve the equation $3x^2 + 2x = -8$.

37. Use the case method to solve the inequality $2x^2 + 9x + 4 < 0$.

**Use the Quadratic Formula to solve the equation.**

38. $f(x) = 3x^2 + 5x + 7$

**Use the Quadratic Formula to solve the inequality.**

39. $-8 + x > -3x^2$

**Perform the indicated operation.**

40. $(3 + 6i) - (7 + 4i)$

41. $(3+2i)(5-3i)$

42. $f(x) = 3x^2 - x + 1$

43. $f(x) = 9x^2 + 12x + 4$

44. Evaluate the expression $\sqrt{3+4i}$. Then check your answer.

**Use the Quadratic Formula to find the root(s) of the function.**

45. $f(x) = -x^2 + 5x + 36$

46. $f(x) = 2x^2 - 2x + 13$

47. $f(x) = 4x^2 + 28x + 49$

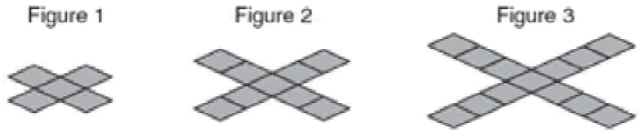
48. $f(x) = -2x^2 + 3x - 4$

**Calculate the sum of each series.**

49. $204,\ 216, 228, 240, \ldots, S_{18}$

50. $103, 111, 119, 127, \ldots, S_{25}$

51. The following figures are the first three figures of a pattern of tiles. The pattern continues for a total of 50 figures.

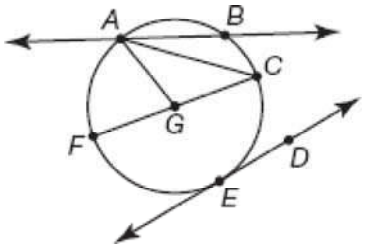



**a.** Write an explicit formula in simplest terms that you can use to calculate the number of tiles in any of the figures in the sequence that makes up the pattern.

**b.** Write the sum of the first *n* terms of the sequence as a quadratic function.

**c.** Use the function in part (b) to calculate the total number of tiles used to create all 50 figures of the sequence

**Use the following figure to answer the following questions (52-54).**

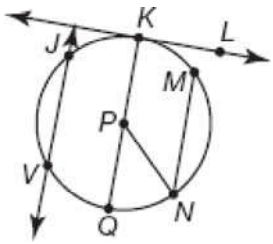



52. Name a diameter of the circle.

53. Name a secant of the circle.

54. Name a tangent of the circle and identify its point of tangency.

**Use the following figure to answer the following questions (55-57).**

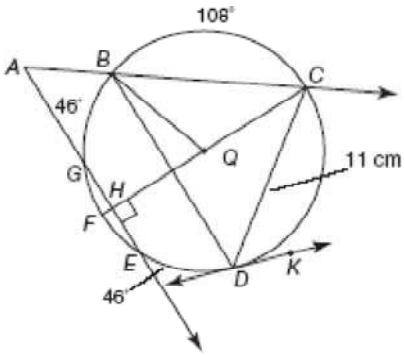



55. What is the center of the circle?

56. Name a radius of the circle.

57. Name a chord of the circle that is not a diameter.

**Use the following diagram to find the measures of the angles, arcs, and segments named in the following question. Write your answers in the table provided and explain how you found your answers.**




$Q$ is the center of the circle.

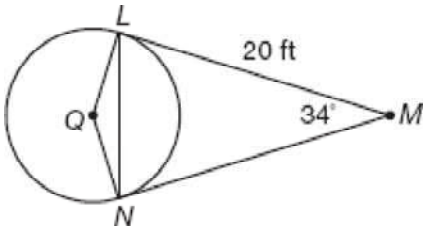
$\overline{BC} \cong \overline{CD}$

$GE = 8$ cm

58.

| Angle, arc, or segment | Measure | Explanation |
|---|---|---|
| $\overset{\frown}{FDC}$ | | |

**Use the following diagram for the following question.**



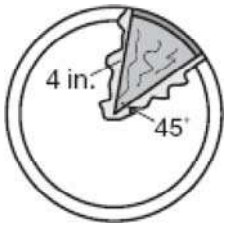

$Q$ is the center of the circle.

$\overline{LM}$ is tangent to circle $Q$ at point $L$.

$\overline{NM}$ is tangent to circle $Q$ at point $N$.

59. What is the measure of $\overline{NM}$? Use a complete sentence to explain how you found your answer.

60. An ice cream shop serves slices of ice cream pie. When a customer orders a slice, the decorator pipes icing all around the slice of pie on the plate so that it looks nice. The decorator has enough icing in her piping bag to pipe 32 inches of icing. Three customers just ordered a slice of ice cream pie. Does the decorator have enough icing in her piping bag for all three slices? Use 3.14 for $\pi$ and explain how you found your answer.




61. The diameter of a beach ball is about 11 times the diameter of a tennis ball. The surface area of the tennis ball is approximately 20 square inches. What is the approximate surface area of the beach ball? Show all your work.

**Write each absolute value function as a piecewise function.**

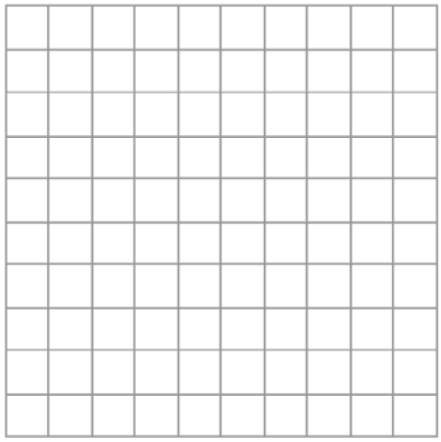
62. $f(x) = |x + 7| - 2$

63. $f(x) = -0.2|2x + 1|$

64. With 60 days left in the year, the owner of a gym decides to offer a discount for people who sign up early for a gym membership for next year. If a person signs up within 10 days or less, they will receive 20% off their annual membership fee. If a person signs up after 10 days but on or before the 30th day, they will receive 10% off their annual membership fee. People who sign up after that will receive 5% off their annual membership fee. At the start of next year, the discount period will expire, and everyone will pay the regular annual membership fee of $1100.

**a.** Write a piecewise function for the amount paid for a gym membership on the *x*th day of the discount period.

**b.** Graph the function.



**c.** How much would a person pay for an annual membership on the 3rd day of the discount period?

**d.** How much would a person pay for an annual membership on the 55th day of the discount period?

**Write each absolute value function as a piecewise function.**

65. $f(x) = |x - 11| + 4$

**Use this information to answer the following questions (66-67).**

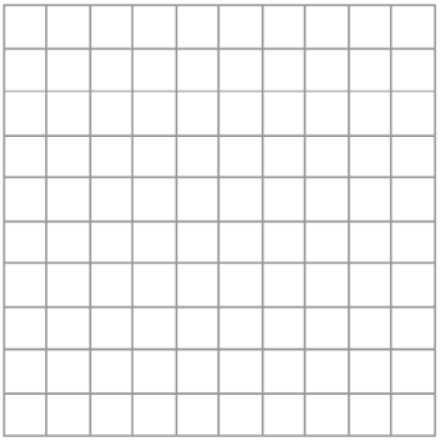
An office manager needs to order supplies for the office. The price of pens varies depending on the number of pens that she orders. The following are the different prices of the pens.

- For an order of less than 25 pens, each pen costs $1.10.
- For an order of at least 25 pens but less than 50 pens, each pen costs $0.90.
- For an order of 50 or more pens but less than 100 pens, each pen costs $0.75.
- For an order of 100 pens or more, each pen costs $0.65.

Write a piecewise function for the cost of an order of $x$ pens.

66. How much would an order of 30 pens cost?

67. Graph $f(x)$ for $0 \le x < 120$.



**Rewrite each absolute value function as a piecewise function.**

68. $f(x) = -|2x - 5|$

**Use this information to answer the following questions (68-71).**

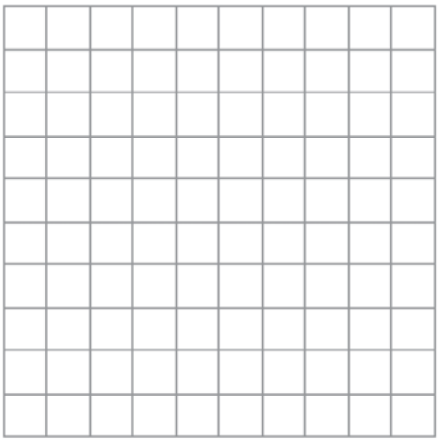
A water storage tank is in the shape of a sphere with a radius of 8 feet. Water flows into the tank through a pipe at a rate of 6 cubic feet per minute, and water can flow out of the tank through another pipe at the same rate.

Suppose that the tank is completely full, and it must be emptied for use and then refilled. The entire process of emptying the full tank and then filling it again is considered a cycle. How long is one complete cycle?

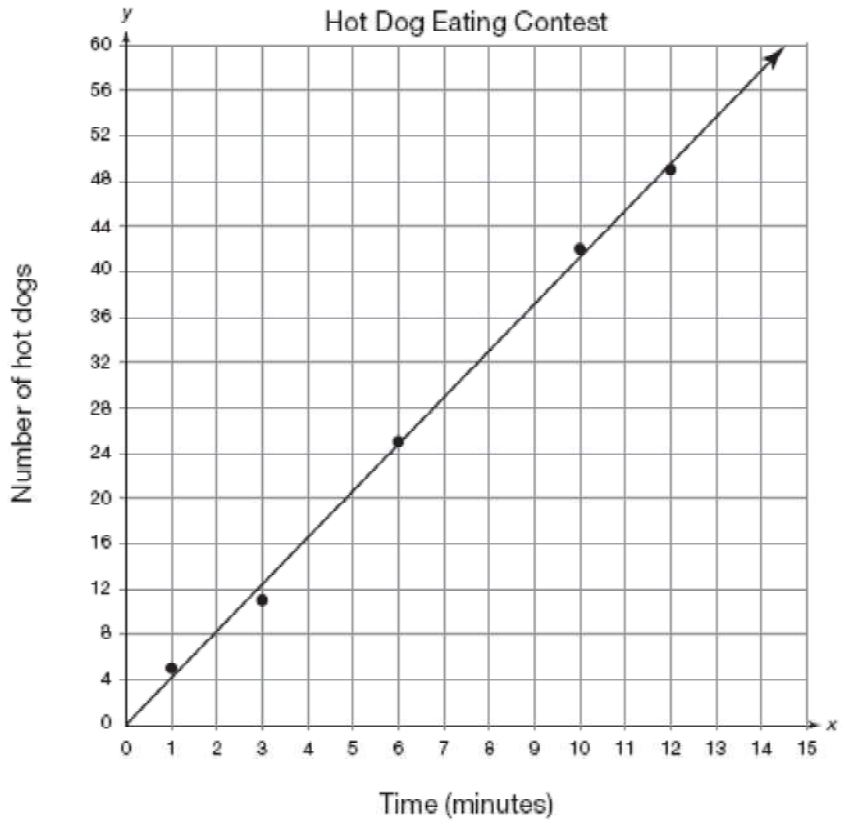
69. Define a piecewise function for the amount of water in the tank during one complete cycle.

70. Define an absolute value function for the amount of water in the tank during one complete cycle.

71. Graph the function.



**Use the graph to answer the following question.**




Write the equation of the line of best fit shown in the graph. Show all your work. Be sure to define the variables and include units.

72. Use the line of best fit to predict the number of hot dogs that can be eaten in 14 minutes.

**Use the data in the table and the information provided to answer the following question (73).**

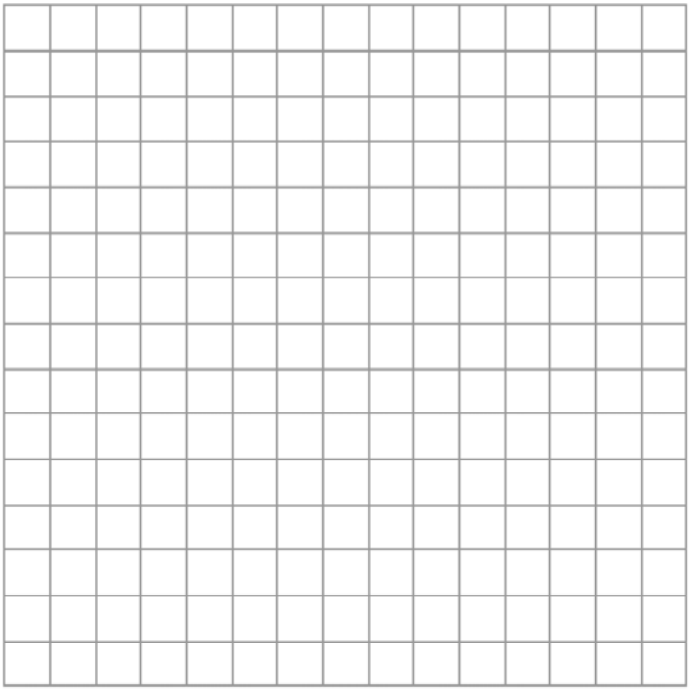
A scientist wonders if you can predict a person's weight at 30 years based on the person's weight at 1 year. She uses some medical files to collect the data in the table.

| Weight at 1 Year | Weight at 30 Years |
|---|---|
| pounds | pounds |
| 21 | 124 |
| 25 | 128 |
| 23 | 130 |
| 24 | 132 |
| 20 | 125 |
| 15 | 122 |
| 25 | 135 |
| 21 | 130 |
| 17 | 128 |
| 24 | 132 |

Write the ordered pairs from the table that show the weight at 30 years as a function of the weight at 1 year.

Create a scatter plot of the ordered pairs on the given grid to show the relationship between weight at 1 year and weight at 30 years. First, choose your bounds and intervals. Be sure to label your graph clearly.

| Variable Quantity | Lower Bound | Upper Bound | Interval |
|---|---|---|---|
| | | | |
| | | | |

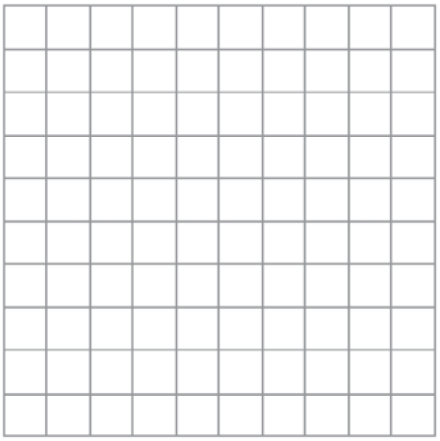


Use a ruler to draw the line that best fits the data in the graph. Then, determine the equation of the line that you drew. Be sure to define the variables and to include the units.

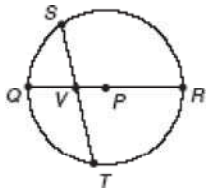
73. Use your equation from 1 to predict the weight of a person at age 1 if their weight at age 30 is 160 pounds. Does this seem reasonable?

**Sketch a scatter plot of each set of data. Determine whether a linear, quadratic, exponential, or cubic regression equation best fits the data. Then use your graphing calculator to determine this regression equation for the data set.**

74. (0.5, 1), (1, 0.5), (1.5, 0.2), (–2, 2), (–4, 3), (3, – 0.5), (–0.2, 1), (5, – 1.5)



75. In circle $P$, $m\overset{\frown}{QS} = 51°$ and $m\overset{\frown}{RT} = 96°$. Find $m\angle SVR$. Explain your reasoning.



# Accelerated Mathematics 1 End of Year Final Exam Study Guide
# Answer Section

**MULTIPLE CHOICE**

1. ANS: B PTS: 1 REF: Ch1.L7 STA: MM2A3b
   TOP: Standard Test
2. ANS: B PTS: 1 REF: Ch1.L4 STA: MM2A4b
   TOP: Standard Test
3. ANS: A PTS: 1 REF: Ch2.L1 STA: MM2A3c
   TOP: Standard Test
4. ANS: B PTS: 1 REF: Ch2.L5
   STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b TOP: Standard Test
5. ANS: D PTS: 1 REF: Ch2.L5
   STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b TOP: Standard Test
6. ANS: C PTS: 1 REF: Ch2.L8 STA: MM2A3e
   TOP: Standard Test
7. ANS: A PTS: 1 REF: Ch2.L5
   STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b TOP: Standard Test
8. ANS: C PTS: 1 REF: Ch2.L8 STA: MM2A3e
   TOP: Standard Test
9. ANS: D PTS: 1 REF: Ch5.L5 STA: MM2G3a
   TOP: Standard Test
10. ANS: B PTS: 1 REF: Ch5.L4 STA: MM2G3a
    TOP: Standard Test
11. ANS: C PTS: 1 REF: Ch6.L4 STA: MM2G4b
    TOP: Standard Test
12. ANS: B PTS: 1 REF: Ch6.L2 STA: MM2G4a
    TOP: Standard Test
13. ANS: B PTS: 1 REF: Ch10.L3 STA: MM2A1b
    TOP: Standard Test
14. ANS: D PTS: 1 REF: Ch10.L3 STA: MM2A1b
    TOP: Standard Test
15. ANS: C PTS: 1 REF: Ch11.L4 STA: MM2D2b | MM2D2c
    TOP: Standard Test
16. ANS: A PTS: 1 REF: Ch11.L4 STA: MM2D2b | MM2D2c
    TOP: Standard Test
17. ANS: C PTS: 1 REF: Ch12.L1 STA: MM2D2c
    TOP: Standard Test
18. ANS: C PTS: 1 REF: Ch12.L3
    STA: MM2D2a | MM2D2b | MM2D2c | MM2D2d TOP: Standard Test
19. ANS: D PTS: 1 REF: Ch12.L2
    STA: MM2D2a | MM2D2b | MM2D2c | MM2D2d TOP: Standard Test
20. ANS: A PTS: 1 REF: Ch12.L2
    STA: MM2D2a | MM2D2b | MM2D2c | MM2D2d TOP: Standard Test

**COMPLETION**

21. ANS: two

    PTS: 1 REF: Ch2.L3 STA: MM2A3a | MM2A3b | MM2A4c
    TOP: Mid Ch Test
22. ANS: no

    PTS: 1 REF: Ch2.L3 STA: MM2A3a | MM2A3b | MM2A4c
    TOP: Mid Ch Test
23. ANS: one

    PTS: 1 REF: Ch2.L3 STA: MM2A3a | MM2A3b | MM2A4c
    TOP: Mid Ch Test

**MATCHING**

24. ANS: A PTS: 1 REF: Ch6.L1 STA: MM2G4a | MM2G4b
    TOP: Pre Test
25. ANS: B PTS: 1 REF: Ch6.L1 STA: MM2G4a | MM2G4b
    TOP: Post Test
26. ANS: E PTS: 1 REF: Ch6.L1 STA: MM2G4a | MM2G4b
    TOP: Post Test

**SHORT ANSWER**

27. ANS:

**a.** The length of the garden would be $38 + 10 = 48$ feet.

**b.** The width of the garden would be $45 - 10 = 35$ feet. So, the area of the garden would be $45 \cdot 35 = 1575$ square feet.

**c.** Let $w$ represent the width of the garden. Then $w + 10$ represents the length of the garden.

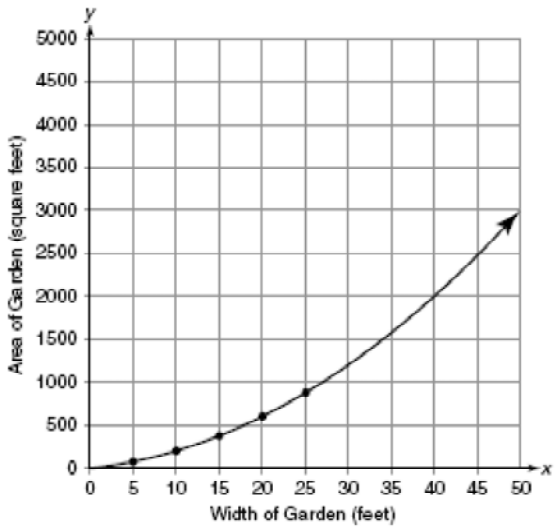
**d.** $A = lw$

$A = (w + 10)w$

$A = w^2 + 10w$

**e.**

| Width of Garden | Area of Garden |
|---|---|
| feet | square feet |
| 5 | 75 |
| 10 | 200 |
| 15 | 375 |
| 20 | 600 |
| 25 | 875 |




**f.** If the area of the garden is 3000 feet, then the width of the garden is 50 feet.

PTS: 1 REF: Ch1.L1 STA: MM2A3c TOP: Pre Test

28. ANS:

$3x^2 + 7x - 20 = 0$

$(3x - 5)(x + 4) = 0$

$3x - 5 = 0$ or $x + 4 = 0$

$3x = 5$ or $x = -4$

$x = \frac{5}{3}$ or $x = -4$

PTS: 1 REF: Ch1.L4 STA: MM2A4b TOP: Post Test

29. ANS:

$x = -\frac{b}{2a} = -\frac{10}{2(-1)} = 5$

$f(5) = -(5)^2 + 10(5) + 1 = 26$

Vertex: (5, 26)

Vertex form: $f(x) = -(x - 5)^2 + 26$

PTS: 1 REF: Ch1.L6 STA: MM2A3a TOP: Post Test

30. ANS:

**a.** The width of the frame would be $14 - 2 = 12$ inches.

**b.** The length of the frame would be $7 + 2 = 9$ inches. So, the area of the frame would be $7 \cdot 9 = 63$ square inches.

**c.** Let $x$ represent the length of the frame. Then $x - 2$ represents the width of the frame.

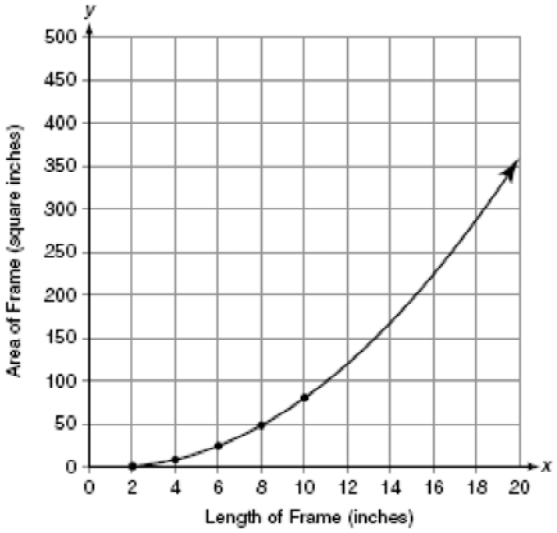
**d.** $A = lw$

$A = x(x - 2)$

$A = x^2 - 2x$

**e.**

| Length of Frame | Area of Frame |
|---|---|
| inches | square inches |
| 2 | 0 |
| 4 | 8 |
| 6 | 24 |
| 8 | 48 |
| 10 | 80 |




**f.** If the area of the frame is 224 square inches, then the length of the frame is 16 inches.

**g.** When the length of the frame is 1 inch, the area is −1 square inches. This value does not make sense because you cannot have a negative area. The reason this value does not exist is because when the length is 1, the width would be 2 inches shorter than the length, or $1 - 2 = -1$ inch, and a width of this value does not exist.

PTS: 1 REF: Ch1.L1 STA: MM2A3c TOP: Mid Ch Test

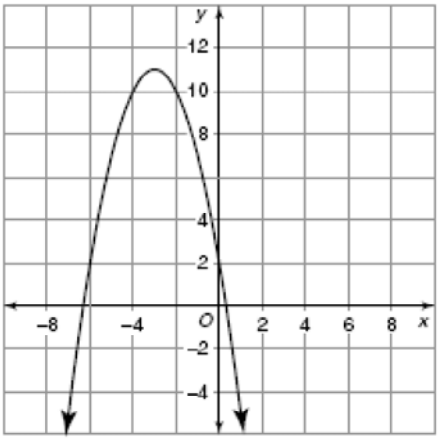
31. ANS:

Vertex: $x = -\frac{b}{2a} = -\frac{-6}{2(-1)} = -3$

$f(-3) = -(-3)^2 - 6(-3) + 2 = 11$

$(-3, 11)$

Flip the basic function over the $x$-axis, and shift 3 units left and 11 units up.




PTS: 1 REF: Ch1.L7 STA: MM2A3b TOP: End Ch Test

32. ANS:

$b^2 - 4ac = 14^2 - 4(3)(-24) = 484$

two real roots

$x = \frac{-14 \pm \sqrt{484}}{2(3)} = \frac{-14 \pm 22}{6}$

$x = \frac{4}{3}, x = -6$

PTS: 1 REF: Ch2.L3 STA: MM2A3a | MM2A3b | MM2A4c
TOP: Pre Test

33. ANS:

$4x^2 - 3x + 1 = 0$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 4,\ b = -3,\ c = 1$

$x = \dfrac{3 \pm \sqrt{(-3)^2 - 4(4)(1)}}{2(4)}$

$x = \dfrac{3 \pm \sqrt{-7}}{8} = \dfrac{3 \pm \sqrt{7i}}{8}$

$x = \dfrac{3}{8} + \dfrac{\sqrt{7}}{8}\,i, x = \dfrac{3}{8} - \dfrac{\sqrt{7}}{8}\,i$

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: Pre Test

34. ANS:

$-x^2 + 11x + 2 \le 0$

$a = -1,\ b = 11,\ c = 2$

$x = \dfrac{-11 \pm \sqrt{11^2 - 4(-1)(2)}}{2(-1)}$

$x = \dfrac{-11 \pm \sqrt{129}}{-2}$

$x \approx -0.179$ or $x \approx 11.179$

Try: $-1, 0, 12$

$-(-1)^2 + 11(-1) + 2 = -10$, which is less than 0

$-(0)^2 + 11(0) + 2 = 2$, which is greater than 0

$-(12)^2 + 11(12) + 2 = -10$, which is less than 0

Solution: $x \le \dfrac{-11 + \sqrt{129}}{-2}$ or $x \ge \dfrac{-11 - \sqrt{129}}{-2}$

PTS: 1 REF: Ch2.L6 STA: MM2A4d TOP: Pre Test

35. ANS:

Recursive: $a_n = a_{n-1} - 6,\ a_1 = 21$

Explicit: $a_n = -6(n-1) + 21$

PTS: 1 REF: Ch2.L7 STA: MM2A3d TOP: Pre Test

36. ANS:

$3x^2 + 2x + 8 = 0$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 3, b = 2, c = 8$

$x = \dfrac{-2 + \sqrt{2^2 - 4(3)(8)}}{2(3)}$

$x = \dfrac{-2 \pm \sqrt{-92}}{6} = \dfrac{-2 \pm 2i\sqrt{23}}{6}$

$x = -\dfrac{1}{3} + \dfrac{\sqrt{23}}{3}\,i, x = -\dfrac{1}{3} - \dfrac{\sqrt{23}}{3}\,i$

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: Post Test

37. ANS:

$(2x + 1)(x + 4) < 0$

Case 1: First factor is positive and second factor is negative.

$2x + 1 > 0$ and $x + 4 < 0$

$x > -0.5$ and $x < -4$

So, no solution

Case 2: First factor is negative and second factor is positive.

$2x + 1 < 0$ and $x + 4 > 0$

$x < -0.5$ and $x > -4$

So, $-4 < x < -0.5$

Solution: $-4 < x < -0.5$

PTS: 1 REF: Ch2.L6 STA: MM2A4d TOP: Post Test

38. ANS:

$a = 3, b = 5, c = 7$

$x = \dfrac{-5 \pm \sqrt{5^2 - 4(3)(7)}}{2(3)}$

$x = \dfrac{-5 \pm \sqrt{-59}}{6}$

No solution

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: Mid Ch Test

39. ANS:

$3x^2 + x - 8 > 0$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 3,\ b = 1,\ c = -8$

$x = \dfrac{-1 \pm \sqrt{1^2 - 4(3)(-8)}}{2(3)}$

$x = \dfrac{-1 \pm \sqrt{97}}{6}$

$x \approx 1.475,\ x \approx -1.808$

Try: $-2, 0, 2$

$3(-2)^2 + (-2) - 8 = 2$, which is greater than 0

$3(0)^2 + (0) - 8 = -8$, which is less than 0

$3(2)^2 + (2) - 8 = 6$, which is greater than 0

Solution: $x > -\dfrac{1}{6} + \dfrac{\sqrt{97}}{6}$ or $x < -\dfrac{1}{6} - \dfrac{\sqrt{97}}{6}$

PTS: 1 REF: Ch2.L6 STA: MM2A4d TOP: Mid Ch Test

40. ANS:

$(3 + 6i) - (7 + 4i) = (3 - 7) + (6i - 4i)$

$= -4 + 2i$

PTS: 1 REF: Ch2.L4 STA: MM2N1c TOP: End Ch Test

41. ANS:

$(3 + 2i)(5 - 3i) = 15 - 9i + 10i - 6i^2$

$= 15 + i + 6$

$= 21 + i$

PTS: 1 REF: Ch2.L4 STA: MM2N1c TOP: End Ch Test

42. ANS:

$a = 3,\ b = -1,\ c = 1$

$b^2 - 4ac = (-1)^2 - 4(3)(1)$

$= -11$

no real roots

PTS: 1 REF: Ch2.L3 STA: MM2A3a | MM2A3b | MM2A4c
TOP: End Ch Test

43. ANS:

$a = 9,\ b = 12,\ c = 4$

$b^2 - 4ac = 12^2 - 4(9)(4)$

$= 0$

1 real root

PTS: 1 REF: Ch2.L3 STA: MM2A3a | MM2A3b | MM2A4c
TOP: End Ch Test

44. ANS:

$\sqrt{3+4i} = a + bi$

$3 + 4i = a^2 + 2abi + b^2 i^2$

$3 + 4i = (a^2 - b^2) + 2abi$

$3 = a^2 - b^2$ and $4i = 2abi$

$\frac{4i}{2bi} = \frac{2abi}{2bi}$

$\frac{2}{b} = a$

$3 = \left(\frac{2}{b}\right)^2 - b^2$

$3 = \frac{4}{b^2} - b^2$

$3b^2 = 4 - b^4$

$b^4 + 3b^2 - 4 = 0$

$a = 1,\ b = 3,\ c = -4$

$b^2 = \frac{-3 \pm \sqrt{3^2 - 4(1)(-4)}}{2(1)} = \frac{-3 \pm \sqrt{25}}{2}$

$b^2 = 1,\ b^2 = -4$; $b$ is a real number, so $b^2 = 1$.
$b = \pm 1$

$a = \frac{2}{b} = \frac{2}{\pm 1} = \pm 2$

$\sqrt{3+4i} = 2 + i, -2 - i$

Check:

$(2+i)^2 = 4 + 4i + i^2 = 3 + 4i$

$(-2-i)^2 = 4 + 4i + i^2 = 3 + 4i$

PTS: 1 REF: Ch2.L4 STA: MM2N1c TOP: End Ch Test

45. ANS:
$a = -1,\ b = 5,\ c = 36$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(-1)(36)}}{2(-1)}$$

$$x = \frac{-5 \pm \sqrt{169}}{-2} = \frac{-5 \pm 13}{-2}$$

$x = -4,\ x = 9$

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: End Ch Test

46. ANS:
$a = 2,\ b = -2,\ c = 13$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(2)(13)}}{2(2)}$$

$$x = \frac{2 \pm \sqrt{-100}}{4} = \frac{2 \pm 10i}{4}$$

$x = \frac{1}{2} + \frac{5}{2}i, x = \frac{1}{2} - \frac{5}{2}i$

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: End Ch Test

47. ANS:
$a = 4, b = 28, c = 49$

$$x = \frac{-28 \pm \sqrt{28^2 - 4(4)(49)}}{2(4)}$$

$$x = \frac{-28 \pm \sqrt{0}}{8}$$

$x = -\frac{7}{2}$

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: End Ch Test

48. ANS:
$a = -2, b = 3, c = -4$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(-2)(-4)}}{2(-2)}$$

$$x = \frac{-3 \pm \sqrt{-23}}{-4} = \frac{-3 \pm \sqrt{23}\,i}{-4}$$

$$x = \frac{3}{4} + \frac{\sqrt{23}}{4}\,i, x = \frac{3}{4} - \frac{\sqrt{23}}{4}\,i$$

PTS: 1 REF: Ch2.L5 STA: MM2N1a | MM2N1b | MM2N1d | MM2A4b
TOP: End Ch Test

49. ANS:
$a_n = d(n-1) + a_1$

$a_{18} = 12(18-1) + 204 = 408$

$$S_n = \frac{n(a_1 + a_n)}{2}$$

$$S_{18} = \frac{18(204 + 408)}{2} = 5508$$

PTS: 1 REF: Ch2.L7 STA: MM2A3d TOP: End Ch Test

50. ANS:
$a_n = d(n-1) + a_1$

$a_{25} = 8(25-1) + 103 = 295$

$$S_n = \frac{n(a_1 + a_n)}{2}$$

$$S_{25} = \frac{25(103 + 295)}{2} = 4975$$

PTS: 1 REF: Ch2.L7 STA: MM2A3d TOP: End Ch Test

51. ANS:
**a.** $a_n = 4(n-1) + 5 = 4n + 1$

**b.** $S_n = \frac{n(a_1 + a_n)}{2}$, $a_1 = 5$, $a_n = 4n + 1$

$$S_n = \frac{n(5 + 4n + 1)}{2} = \frac{n(4n + 6)}{2} = \frac{4n^2 + 6n}{2} = 2n^2 + 3n$$

**c.** $S_{50} = 2(50)^2 + 3(50) = 5150$

PTS: 1 REF: Ch2.L8 STA: MM2A3e TOP: End Ch Test

52. ANS:
A diameter of the circle is $\overline{FC}$.

PTS: 1 REF: Ch5.L1 STA: MM2G3a | MM2G3b | MM2G3c | MM2G3d
TOP: Pre Test

53. ANS:
A secant of the circle is $\overleftrightarrow{AB}$.

PTS: 1 REF: Ch5.L1 STA: MM2G3a | MM2G3b | MM2G3c | MM2G3d
TOP: Pre Test

54. ANS:
A tangent of the circle is $\overleftrightarrow{ED}$, and its point of tangency is point $E$.

PTS: 1 REF: Ch5.L1 STA: MM2G3a | MM2G3b | MM2G3c | MM2G3d
TOP: Pre Test

55. ANS:
The center of the circle is point $P$.

PTS: 1 REF: Ch5.L1 STA: MM2G3a | MM2G3b | MM2G3c | MM2G3d
TOP: Post Test

56. ANS:
A radius of the circle is $\overline{PN}$ (or $\overline{PQ}$ or $\overline{PK}$).

PTS: 1 REF: Ch5.L1 STA: MM2G3a | MM2G3b | MM2G3c | MM2G3d
TOP: Post Test

57. ANS:
A chord of the circle that is not a diameter is $\overline{MN}$ (or $\overline{JV}$).

PTS: 1 REF: Ch5.L1 STA: MM2G3a | MM2G3b | MM2G3c | MM2G3d
TOP: Post Test

58. ANS:

| Angle, arc, or segment | Measure | Explanation |
|---|---|---|
| $\overset{\frown}{\text{FDC}}$ | 180° | The measure of a semicircle is 180°. |

PTS: 1 REF: Ch5.L2 STA: MM2G3b TOP: End Ch Test

59. ANS:
The measure of $\overline{NM}$ is 20 feet, because if two tangent segments to a circle are drawn from the same point outside the circle, then the tangent segments are congruent.

PTS: 1 REF: Ch5.L5 STA: MM2G3a TOP: End Ch Test

60. ANS:

Arc length: $L = \frac{45°}{360°}(2\pi)(4)$

$\approx 3.14$

The total distance around one slice of pie is $3.14 + 4 + 4 = 11.14$ inches.

The decorator will need $3(11.14) = 33.42$ inches of icing to decorate all three slices of pie. She only has enough icing to pipe 32 inches of icing. So, she does not have enough icing in her piping bag for all three slices.

PTS: 1 REF: Ch5.L7 STA: MM2G3c TOP: Cumulative Test

61. ANS:

If the diameter of the beach ball is 11 times the diameter of the tennis ball, then the radius of the beach ball is 11 times the radius of the tennis ball. Let $r$ represent the radius of the tennis ball. Then $11r$ represents the radius of the beach ball. The surface area of the tennis ball can be represented as $4\pi r^2$ and the surface area of the beach ball can be represented as $4\pi(11r)^2$, or $484\pi r^2$.

This means that the surface area of the beach ball is $\frac{484\pi r^2}{4\pi r^2} = 121$ times the surface area of the tennis ball.

So, the surface area of the beach ball is approximately $20 \cdot 121 = 2420$ square inches. (In short, when the radius increases by a factor of 11, the surface area increases by a factor of $11^2$, or 121.)

PTS: 1 REF: Ch6.L4 STA: MM2G4b TOP: Cumulative Test

62. ANS:

$$f(x) = \begin{cases} g(x) = -x - 9 & \text{for } x \le -7 \\ h(x) = x + 5 & \text{for } x > -7 \end{cases}$$

PTS: 1 REF: Ch10.L1 STA: MM2A1a TOP: Pre Test

63. ANS:

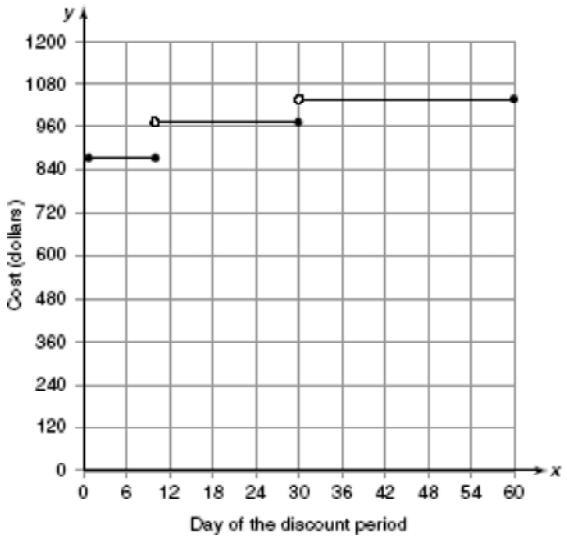
$$f(x) = \begin{cases} g(x) = 0.4x + 0.2 & \text{for } x \le -\frac{1}{2} \\ h(x) = -0.4x - 0.2 & \text{for } x > -\frac{1}{2} \end{cases}$$

PTS: 1 REF: Ch10.L1 STA: MM2A1a TOP: Pre Test

64. ANS:

**a.** $f(x) = \begin{cases} 880 & 1 \le x \le 10 \\ 990 & 10 < x \le 30 \\ 1045 & 30 < x \le 60 \end{cases}$

**b.**




**c.** A person would pay $880 for a membership on the 3rd day of the discount period.

**d.** A person would pay $1045 for a membership on the 55th day of the discount period.

PTS: 1 REF: Ch10.L4 STA: MM2A1c TOP: Pre Test

65. ANS:

$f(x) = \begin{cases} g(x) = -x + 15 & \text{for } x \le 11 \\ h(x) = x - 7 & \text{for } x > 11 \end{cases}$

PTS: 1 REF: Ch10.L1 STA: MM2A1a TOP: Post Test

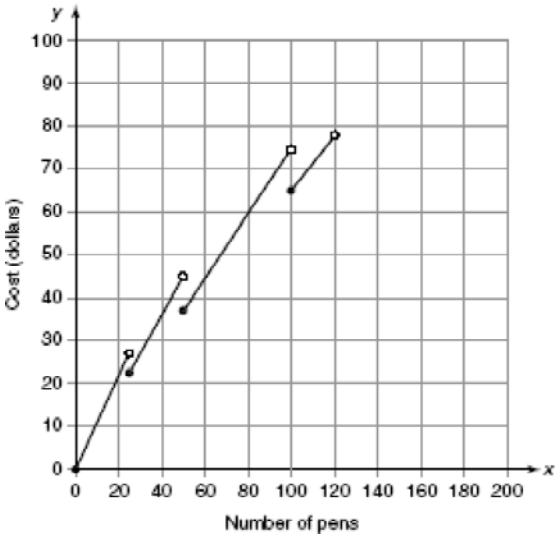
66. ANS:

$f(30) = 0.9(30) = 27$

An order of 30 pens would cost $27.

PTS: 1 REF: Ch10.L3 STA: MM2A1b TOP: Mid Ch Test

67. ANS:




PTS: 1 REF: Ch10.L3 STA: MM2A1b TOP: Mid Ch Test

68. ANS:

$$f(x) = \begin{cases} g(x) = 2x - 5 & \text{for } x \le \frac{5}{2} \\ h(x) = -2x + 5 & \text{for } x > \frac{5}{2} \end{cases}$$

PTS: 1 REF: Ch10.L1 STA: MM2A1a TOP: End Ch Test

69. ANS:

$$f(x) = \begin{cases} 6(357.44 - x) & x \in [0, 357.44) \\ 6(x - 357.44) & x \in [357.44, 714.88] \end{cases}$$

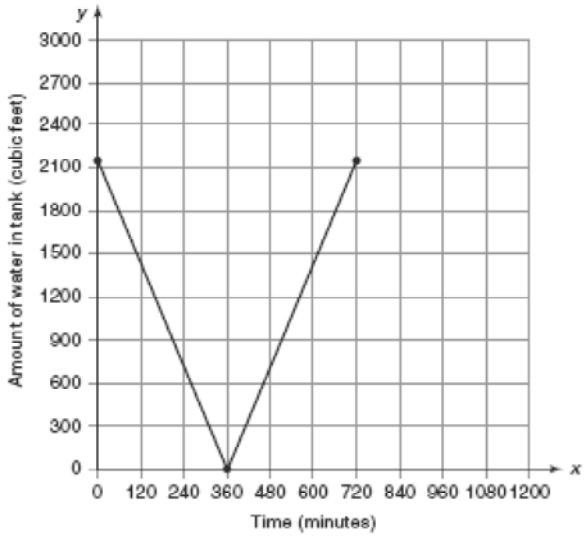
PTS: 1 REF: Ch10.L4 STA: MM2A1c TOP: End Ch Test

70. ANS:

$f(x) = 6|x - 357.44|$

PTS: 1 REF: Ch10.L4 STA: MM2A1c TOP: End Ch Test

71. ANS:




PTS: 1 REF: Ch10.L4 STA: MM2A1c TOP: End Ch Test

72. ANS:

$y = 4.12(14) = 57.68$

The number of hot dogs that can be eaten in 14 minutes would be about 58.

PTS: 1 REF: Ch11.L2 STA: MM2D2b | MM2D2c
TOP: Post Test

73. ANS:

$160 = 0.88x + 110$

$50 = 0.88x$

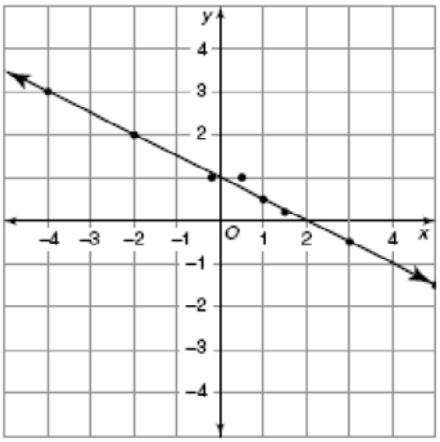
$56.8 \approx x$

The person's weight at 1 year old would be about 56.8 pounds.

This answer does not seem reasonable because a 1-year-old who weighs 56.8 pounds would be very rare.

PTS: 1 REF: Ch11.L1 STA: MM2D2a | MM2D2b
TOP: Mid Ch Test

74. ANS:




A linear regression equation appears to best fit the data.

Linear: $y = -0.50x + 1.01$

PTS: 1 REF: Ch12.L3 STA: MM2D2a | MM2D2b | MM2D2c | MM2D2d
TOP: End Ch Test

75. ANS:

Because $\overset{\frown}{QSR}$ is a semicircle, $m\overset{\frown}{QS} + m\overset{\frown}{SR} = 180°$.

So, $m\overset{\frown}{SR} = 180° - m\overset{\frown}{QS} = 180° - 51° = 129°$

Because $QTR$ is a semicircle, $m\overset{\frown}{QT} + m\overset{\frown}{RT} = 180°$.

So $m\overset{\frown}{QT} = 180° - m\overset{\frown}{RT} = 180° - 96° = 84°$

$m\angle SVR = \frac{1}{2}(m\overset{\frown}{SR} + m\overset{\frown}{QT}) = \frac{1}{2}(129° + 84°) = 106.5°$

So $m\angle SVR = 106.5°$.

PTS: 1 REF: Ch5.L3 STA: MM2G3b TOP: Cumulative Test