# FSA Algebra I

# End-of-Course

# Review Packet

# Answer Key

## Algebra

## and

## Modeling

# FSA Algebra 1 EOC Review

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# FSA Algebra 1 EOC Review

MAFS.912.A-APR.1.1 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| adds two polynomials with integral coefficients, including adding when multiplying a constant to one or both polynomials using the distributive property is required | adds and subtracts polynomials, including adding or subtracting when one or both polynomials is multiplied by a monomial or binomial, with a degree no greater than 1 | completes an informal argument on closure; applies multiple operations (excluding division) when simplifying polynomials | explains closure for polynomials |

1. What is the product of the following expression?

$$(3x + 6)^2$$

   A. $6x^2 + 12$
   B. $9x^2 + 36$
   C. $9x^2 + 18x + 36$
   D. $9x^2 + 36x + 36$

2. What is the product of the following expression?

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

   A. $2x^3 + x - 5$
   B. $2x^3 + 2x - 10$
   C. $2x^3 + 2x^2 - 5x$
   D. $2x^3 + 2x^2 - 10x$

3. Which is the simplified form of this expression?
$$(2x + 3)(x - 6) - 2x^2 + 3x + 30$$

   A. $4x^2 - 6x + 12$
   B. $-2x^2 + 6x + 27$
   C. $-6x - 12$
   D. $-6x + 12$

4. In the diagram below, the dimensions of the large rectangle are $(3x - 1)$ by $(3x + 7)$ units. The dimensions of the cut-out rectangle are $x$ by $2x + 5$ units. Which choice expresses the area of the shaded region, in square units?
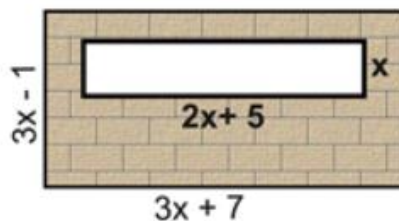


   A. $x^2 + 23x - 7$
   B. $x^2 + 13x - 7$
   C. $7x^2 + 23x - 7$
   D. $7x^2 + 13x - 7$

5. Given $ax^2 + bx + c = 2(1.2x + 0.3)(x - 0.5) + (0.5x^2 + 2.5x - 1.3)$.

What are the values of $a$, $b$, and $c$?

$a = $ [ 2.9 ]

$b = $ [ 1.9 ]

$c = $ [ -1.6 ]

6. Which expression is equivalent to $2(3g - 4) - (8g + 3)$?

A. $-2g - 1$
B. $-2g - 5$
C. $-2g - 7$
D. $-2g - 11$

7. Which expression is equivalent to $(2x^2 + 3)(x + 4)$?

A. $2x^3 + 12$
B. $2x^2 + 11x + 12$
C. $2x^3 + 6x^2 + 4x + 12$
D. $2x^3 + 8x^2 + 3x + 12$

8. Under what operations is the system of polynomials NOT closed?

A. Addition
B. Subtraction
C. Multiplication
D. Division

# FSA Algebra 1 EOC Review

MAFS.912.A-CED.1.1 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| writes or chooses a one-variable linear equation or inequality in a real-world context | writes or chooses a simple exponential (no horizontal or vertical translation) or a simple quadratic equation | writes an exponential equation with a horizontal or vertical translation or a quadratic equation; identifies the meaning of the variables | employs the modeling cycle when writing an equation |

1. There are 60 students going on a field trip to the chocolate factory. The students are from three different classes. Mrs. Hooper's class has 24 students and Mr. Gomez's class has 18 students. Which of the equalities correctly describes the students and could be used to solve for how many students are from Mr. Anderson's class? (Let A = the number of students in Mr. Anderson's class.)

   A. $A + 18 = 24$
   B. $A + A + A = 60$
   C. $60 - 18 = A - 24$
   D. $24 + 18 + A = 60$

2. The ages of three friends are consecutively one year apart. Together, their ages total 48 years. Which equation can be used to find the age of each friend (where $a$ represents the age of the youngest friend)?

   A. $3a = 48$
   B. $a(a + 1)(a + 2) = 48$
   C. $a + (a - 1) + (a - 2) = 48$
   D. $a + (a + 1) + (a + 2) = 48$

   a) What are the ages of the friends?

   A. $16, 17, 18$
   B. $15, 16, 17$
   C. $14, 15, 16$
   D. $17, 18, 19$

3. Student council is renting a tent for $350 for an upcoming student fair. Each student attending the fair will pay $0.50. All other attendees will pay $2.25 each. If 200 students attend the fair, which inequality can be used to determine the number of "other" attendees, $a$, needed to cover the cost of the tent?

   A. $(0.50)(200) - 2.25a \geq 350.00$
   B. $(0.50)(200) + 2.25a \geq 350.00$
   C. $0.50a - (2.25)(200) \geq 350.00$
   D. $0.50a + (2.25)(200) \geq 350.00$

4. A farmer has a rectangular field that measures 100 feet by 150 feet. He plans to increase the area of the field by 20%. He will do this by increasing the length and width by the same amount, x. Which equation represents the area of the new field?

   A. $(100 + 2x)(150 + x) = 18,000$
   B. $2(100 + x) + 2(150 + x) = 15,000$
   C. $(100 + x)(150 + x) = 18,000$
   D. $(100 + x)(150 + x) = 15,000$

5. A heart shaped chocolate box is composed of one square and two half circles. The total number of chocolates in the box is calculated by adding the area of a square given by $4x^2$ and the area of a circle approximated by $3x^2$. The company plans to add a small additional box for a promotional campaign containing one row $(2x)$ of chocolates. If the total combined heart shape and small box contain 69 chocolates, which of these equations could be utilized to solve for the number of chocolates in the small box $(2x)$?

   A. $4x^2 + 3x^2 + 2x = 69$
   B. $4x^2 - 3x^2 + 2x = 69$
   C. $4x^2 + 3x^2 - 2x = 69$
   D. $4x^2 - 3x^2 - 2x = 69$

6. An internet business sells U.S. flags for $16.95 each, plus $2.50 shipping per flag. Shipping is free, however, on orders where more than $100.00 of flags are purchased. Which correctly shows the number of flags f that must be purchased to get free shipping?

   A. $16.95f = 100$
   B. $16.95f > 100$
   C. $19.45f > 100$
   D. $16.95f + 2.50 > 100$

7. A scientist is studying wildlife. She estimates the population of bats in her state to be 270,000. She predicts the population to grow at an average annual rate of 2.9%.
   Using the scientist's prediction, create an equation that models the population of bats, $y$, after $x$ years.
   $$y = 270000(1.029)^x$$

8. Sandy programmed a website's checkout process with an equation to calculate the amount customers will be charged when they download songs.
   The website offers a discount. If one song is bought at the full price of $1.29, then each additional song is $.99. State an equation that represents the cost, $C$, when $s$ songs are downloaded.
   $$C = 1.29 + 0.99(s - 1) \quad \text{or} \quad C = 0.99s + 0.30$$

9. Ian is borrowing $1000 from his parents to buy a notebook computer. He plans to pay them back at the rate of $60 per month. Ken is borrowing $600 from his parents to purchase a snowboard. He plans to pay his parents back at the rate of $20 per month.
   a) Write an equation that can be used to determine after how many months the boys will owe the same amount.
   $$1000 - 60x = 600 - 20x$$

   b) Determine algebraically and state in how many months the two boys will owe the same amount. State the amount they will owe at this time.
   $$x = 10 \ months$$

   c) Ian claims that he will have his loan paid off 6 months after he and Ken owe the same amount. Determine and state if Ian is correct. Explain your reasoning.
   *Ian will not be paid off 6 months after he and Ken owe the same amount. He will still owe money. Six months after 10 is 16 months, and $y = 1000 - 60(16) = 1000 - 960 = 40$. He will still owe $40 at 16 months, so he is not paid off.*

MAFS.912.A-REI.2.3 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| solves linear equations (with variable on one side and simple benchmark fractions as the coefficient; may require the use of the distributive property and adding like terms) and inequalities (with a variable on one side and positive coefficient that may include a simple benchmark fraction as the coefficient) in one variable | solves linear equations and inequalities in one variable, where the variable is included on both sides of the equal sign or inequality, that require up to three steps to isolate the variable with rational coefficients | solves linear equations in one variable, including equations where one coefficient is represented by a letter and requires up to three steps to isolate the variable; solves compound inequalities in one variable | solves linear equations and inequalities in one variable, including equations with coefficients represented by letters that require up to four steps to isolate the variable |

1. Solve for $x$:  $3(2x - 1) - 10 = 8 + 5x$

   A. $-7$
   B. $-3$
   C. $19$
   D. $21$

2. Solve for $x$:  $4(x + 5) = 3(x - 2) - 2(x + 2)$

   A. $x = -1$
   B. $x = -4$
   C. $x = -6$
   D. $x = -10$

3. Solve:  $3(x + 3) > 4(x - 4)$

   A. $x > 25$
   B. $x < 25$
   C. $x > -7$
   D. $x < -7$

4. Solve the following inequality for $b$, showing all of your work carefully and completely.
$$4b - 12 - 5b < 9b + 8$$

   $-2 < b \text{ or } b > -2$

5. What is the value of $x$ in the equation $\frac{3}{4}x + 2 = \frac{5}{4}x - 6$?

   A. -16
   B. 16
   C. -4
   D. 4

6. Fred solved the equation $8(3x - 7) = -6(x + 7) + 4$ as shown.

| Given | $8(3x - 7) = -6(x + 7) + 4$ |
|---|---|
| Step 1 | $24x - 56 = -6x - 42 + 4$ |
| Step 2 | $24x - 56 = -6x + 46$ |
| Step 3 | $30x = 102$ |
| Step 4 | $x = \dfrac{17}{5}$ |

Fred made an error between Step 1 and Step 2.

**Part A**: Explain the error Fred made.

*Instead of adding 4 to –42, Fred added 4 to 42*

**Part B**: What is the correct solution to the original equation?

*The solution to the original equation is $x = \dfrac{3}{5}$*

MAFS.912.A-CED.1.4 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| solves a literal linear equation in a real-world context for a variable whose coefficient is 1 | solves a literal equation that requires two procedural steps | solves a literal equation that requires three procedural steps | solves a literal equation that requires four procedural steps |

1. The formula for simple interest plus starting principal, where $A$ = amount, $P$ = principal, $r$ = interest rate per period, and $t$ = time, is given below.

$$A = P + Prt$$

   Which could be used to find the time, $t$, if the amount, principal, and interest are known?

   A. $A - P - Pr = t$

   B. $\frac{A-P}{Pr} = t$

   C. $\frac{A-Pr}{P} = t$

   D. $\frac{A}{P+rt} = t$

2. A line is represented by the equation $3x + 2y = 4$. What is another way to represent the same line?

   A. $y = -\frac{3}{2}x + 2$

   B. $y = \frac{3}{2}x + 2$

   C. $y = \frac{3}{2}x + 4$

   D. $y = -\frac{3}{2}x + 4$

3. If $k = am + 3mx$, the value of $m$ in terms of $a$, $k$ and $x$ can be expressed as

   A. $m = \frac{k}{a+3x}$

   B. $m = \frac{k-3mx}{a}$

   C. $m = \frac{k-am}{3x}$

   D. $m = \frac{k-a}{3x}$

4. A formula is expressed as $D = a(2 + kt)$. Express $k$ in terms of $D$, $a$ and $t$.

   A. $k = \dfrac{D}{a} - 2t$

   B. $k = D - 2at$

   C. $k = \dfrac{D-2a}{at}$

   D. $k = \dfrac{D-2a}{t}$

5. Tim was asked to solve the equation for $x$. His solution is shown below.

   Start:   $kx = my - mx$

   Step 1:  $kx + mx = my$

   Step 2:  $x(k + m) = my$

   Step 3:  $x = \dfrac{my}{k+m}$

   In which step did Tim make his first mistake when solving the equation?

   A. Step 1
   B. Step 2
   C. Step 3
   D. Tim did not make a mistake.

6. Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula $P_1V_1 = P_2V_2$. When the formula is solved for $P_2$, the result is

   A. $P_1V_1V_2$

   B. $\dfrac{V_2}{P_1V_1}$

   C. $\dfrac{P_1V_1}{V_2}$

   D. $\dfrac{P_1V_2}{V_1}$

MAFS.912.A-CED.1.2 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---------|---------|---------|---------|
| writes or chooses a two-variable linear equation for a real-world context with integral coefficients | writes or chooses a system of linear equations or writes a single equation that has at least three variables with integral coefficients | writes a system of linear equations or writes a single equation that has at least three variables; correctly identifies the meaning of the variables | employs the modeling cycle when writing equations that have two variables |

1. Kesha is planning to rent a van for her trip to Mt. Rainier. Two of her friends each rented the same type of van from the same car rental company last week. This is what they told her:

   John: "The cost of my rental was $240. The company charged me a certain amount per day and a certain amount per mile. I had the rental for five days and I drove it 200 miles."

   Katie: "The cost of my rental was only $100. I drove it for 100 miles and had it for two days."

   Kesha plans to get the same type of van that John and Katie had from the same car rental company. Kesha estimated her trip would be 250 miles, and she would have the vehicle for four days.
   Let $C$ = cost, $M$ = miles, and $D$ = days
   Which equation could Kesha use to figure out how much her rental would cost?

   A. $C = 40.00M + 0.20D$
   B. $C = 40.00D + 0.20M$
   C. $C = 20.00M + 0.40D$
   D. $C = 20.00D + 0.40M$

2. Eddie's Towing Company charges $40 to hook a vehicle to the truck and $1.70 for each mile the vehicle is towed. Which equation best represents the relationship between the number of miles towed, $m$, and the total charges, $c$?

   A. $c = 40 + 1.70$
   B. $c = 40 + 1.70m$
   C. $c = 40m + 1.70$
   D. $c = 40m + 1.70$

3. The local deli charges a fee for delivery. On Monday, they delivered two dozen bagels to an office at a total cost of $8. On Tuesday, three dozen bagels were delivered at a total cost of $11. Which system of equations could be used to find the cost of a dozen bagels, $b$, if the delivery fee is $f$?

   A. $b + 2f = 8$
      $b + 3f = 11$
   B. $2b + f = 8$
      $b + 3f = 11$
   C. $b + 2f = 8$
      $3b + f = 11$
   D. $2b + f = 8$
      $3b + f = 11$

4. Max purchased a box of green tea mints. The nutrition label on the box stated that a serving of three mints contains a total of 10 Calories.

   a) On the axes below, graph the function, $C$, where $C(x)$ represents the number of Calories in $x$ mints.
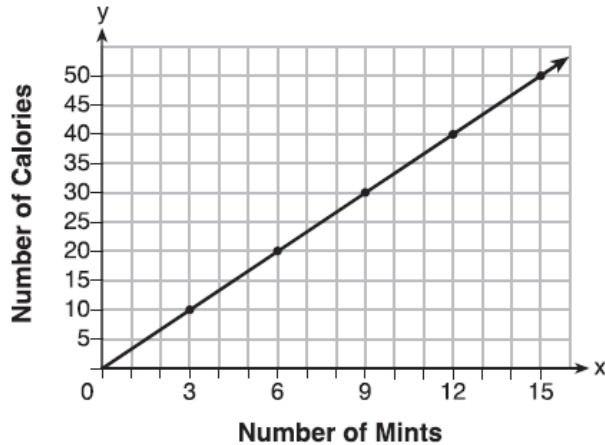


   **Number of Mints**

   b) Write an equation that represents $C(x)$.
$$C(x) = \frac{10}{3}x$$

   c) A full box of mints contains 180 Calories. Use the equation to determine the total number of mints in the box.

   $54 \ min$

5. A shipping company charges $1.20 times the sum, $s$, of the length, width, and height of a package to be shipped. All dimensions are measured in inches. The company also charges $3.00 for processing the package to be shipped. On the line below, write an equation that the shipping company can use for determining the cost, $C$, for shipping any package.

   Equation: $C(x) = 1.2s + 3$

6. A construction company spends $w$ weeks extending an existing road. The existing road is 5 miles long. Each week the company completes 0.2 miles of the extension. Which equation models the total length $(L)$ of the road over time?

   A. $L = 0.22 + 5$
   B. $L = 0.22 - 5$
   C. $w = 0.22 + 5$
   D. $w = 0.22 - 5$

# FSA Algebra 1 EOC Review

MAFS.912.A-REI.3.5 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| identifies an equivalent system of two equations in two variables that has a multiple of one of the equations of the original system | identifies an equivalent system that has a sum of the original as one of the equations and a multiple of the other | identifies systems that have the same solutions | justifies why multiple equivalent systems would have the same solution |

1. The Smith Family Reunion and the Jones Family Reunion both include a visit to a family friendly amusement park in Florida. The Smith family pays $ 882.00 for passes for 10 adults and 18 children. The Jones family pays $ 951.00 for passes for 11 adults and 19 children. Which equation below can be used to solve for the price of the adult and child admissions?

   A. $882 + 951 = (10A + 11A) + (18C + 19C)$
   B. $882 - 951 = (10A - 11A) + (18C - 19C)$
   C. $882 = 10A - 18C; 951 = 11A - 19C$
   D. $882 = 10A + 18C; 951 = 11A + 19C$

2. Which system of equations has the same solution as the system below?

$$2x + 2y = 16$$
$$3x - y = 4$$

   A. $2x + 2y = 16$
      $6x - 2y = 4$

   B. $x + y = 16$
      $3x - y = 4$

   C. $2x + 2y = 16$
      $6x - 2y = 8$

   D. $6x + 6y = 48$
      $6x + 2y = 8$

3. Without solving the systems, explain why the following systems must have the same solution.

   System (a): $4x - 5y = 13$
   $\qquad\qquad 3x + 6y = 11$

   System (b): $8x - 10y = 26$
   $\qquad\qquad x - 11y = 2$

   *All terms of system B are two times the terms of system A.*

4. Which pair of equations could not be used to solve the following equations for $x$ and $y$?

$$4x + 2y = 22$$
$$-2x + 2y = -8$$

   A. $4x + 2y = 22$
      $2x - 2y = 8$

   B. $12x + 6y = 66$
      $6x - 6y = 24$

   C. $4x + 2y = 22$
      $-4x + 4y = -16$

   D. $8x + 4y = 44$
      $-8x + 8y = -8$

MAFS.912.A-REI.3.6 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| solves a system of linear equations approximately when given a graph of the system; solves a system of equations using elimination in the form of ax + by = c and dx + ey = f with integral coefficients, where only one equation requires multiplication; solves a simple system of equations that require substitution | explains whether a system of equations has one, infinitely many, or no solutions; solves a system of equations by graphing or substitution (manipulation of equations may be required) or elimination in the form of ax + by = c and dx + ey = f, where multiplication is required for both equations | solves a system of equations with rational coefficients by graphing, substitution, or elimination; interprets solutions in a real-world context | [intentionally left blank] |

1. Sandy has a total of 35 coins in her money jar. If Sandy's jar contains only nickels and dimes and the value of all the coins is $2.50, how many nickels does Sandy have?

   A. 5
   B. 15
   C. 20
   D. 30

2. The enrollment at High School R has been increasing by 20 students per year. Currently High School R has 200 students attending. High School T currently has 400 students, but its enrollment is decreasing in size by an average of 30 students per year. If the two schools continue their current enrollment trends over the next few years, how many years will it take the schools to have the same enrollment?

   A. $4\ years$
   B. $5\ years$
   C. $10\ years$
   D. $20\ years$

3. What is the solution for the system of equations?
$$y = 2x - 3$$
$$4x - 3y = 31$$

   A. $(-11, -25)$
   B. $(-11, -19)$
   C. $(11, 19)$
   D. $(14, 25)$

4. What is the $y$-coordinate in the solution for the system of linear equations below?
$$-3x + 2y = 6$$
$$4x - y = 2$$

   A. $-6$
   B. $1$
   C. $2$
   D. $6$

5. In attempting to solve the system of equations $y = 3x - 2$ and $6x - 2y = 4$, John graphed the two equations on his graphing calculator. Because he saw only one line, John wrote that the answer to the system is the empty set. Is he correct? Explain your answer.

   *No. Check students' explanations*.

MAFS.912.A-REI.4.12 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---------|---------|---------|---------|
| identifies a solution region when the graph of a linear inequality is given | graphs solutions of the system of two linear inequalities and identifies the solution set as a region of the coordinate plane that satisfies both inequalities; if the form is written in ax + by < c format, then a, b, and c should be integers | verifies ordered pairs as being a part of the solution set of a system of inequalities | justifies why an ordered pair is a part of a solution set |

1. Which system of inequalities describes the graph?
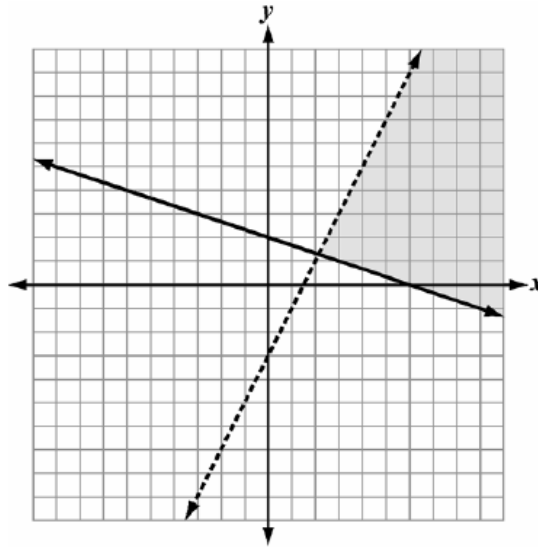


A. $y < 2x - 3$
$y \geq -\dfrac{1}{3}x + 2$

B. $y \leq 2x - 3$
$y > -\dfrac{1}{3}x + 2$

C. $y > 2x - 3$
$y \leq -\dfrac{1}{3}x + 2$

D. $y \geq 2x - 3$
$y < -\dfrac{1}{3}x + 2$

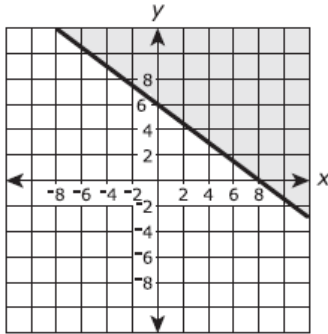2. Which quadrant will be completely shaded by the graph of the inequality $y < 3x$ ?

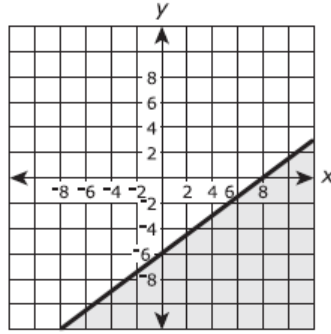A. Quadrant I
B. Quadrant II
C. Quadrant III
D. Quadrant IV

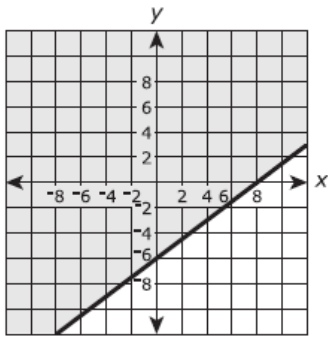3. Which is a graph of the solution set of the inequality $3x - 4y \leq 24$
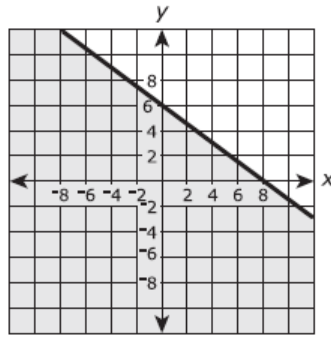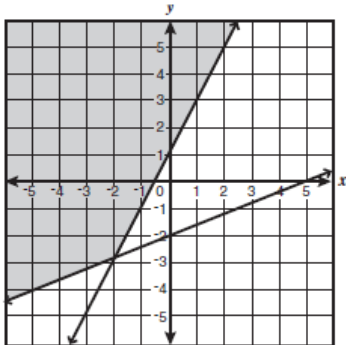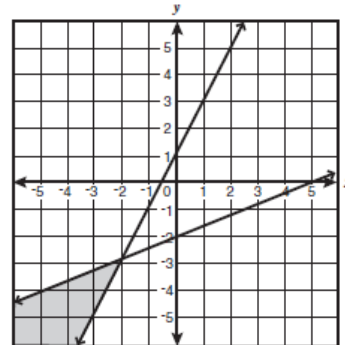
A.



B.



C.



D.



4. Which graph best represents the solution to this system of inequalities? $\begin{cases} 2x \geq y - 1 \\ 2x - 5y \leq 10 \end{cases}$
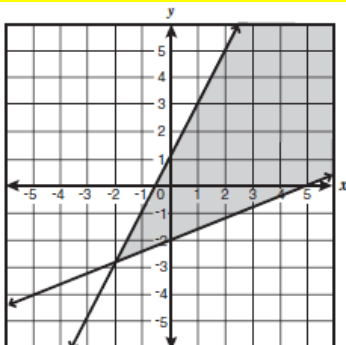
A.
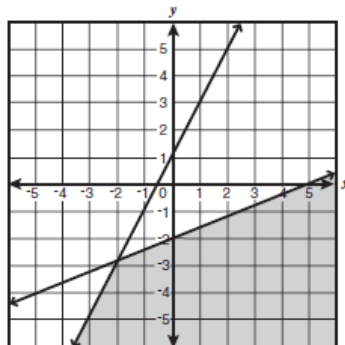


B.



C.



D.

5. Without graphing, which point is a solution to the system below?

$$2y < -12x + 4$$

$$y < -6x + 4$$

A. $\left(1, \frac{1}{2}\right)$

B. $(0, 6)$

C. $\left(-\frac{1}{2}, 5\right)$

D. $(-3, 2)$

MAFS.912.A-CED.1.3 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| identifies constraints that are constant values or simple linear equations/inequalities in a real-world context | identifies variables; writes constraints as a system of linear inequalities or linear equations | models constraints using a combination of linear equations/inequalities; interprets solutions as viable or nonviable based on the context | employs the modeling cycle when writing constraints |

1. On the day of the field trip, each teacher must call the parents of any student who has not returned a permission slip. All of Mr. Gomez's students returned their permission slips, so he did not have to make any calls. Mrs. Hooper and Mr. Anderson had to call a total of eight parents. Mrs. Hooper needed to call two more students than Mr. Anderson. Which set of equations correctly describes the phone calls made? (Let H = Mrs. Hooper's calls and A = Mr. Anderson's calls.)

   A. $H + A = 8; H = A + 2$
   B. $H + A = 8; A = H + 2$
   C. $H + A = 2; H = A + 8$
   D. $H + A = 2; A = H + 8$

2. In a basketball game, Marlene made 16 fields goals. Each of the field goals were worth either 2 points or 3 points, and Marlene scored a total of 39 points from field goals.

   **Part A**

   Let $x$ represent the number of two-point field goals and $y$ represent the number of three-point field goals. Which equations can be used as a system to model the situation? Select **ALL** that apply.

   - [ ] $x + y = 16$
   - [ ] $x + y = 39$
   - [ ] $2x + 3y = 16$
   - [ ] $2x + 3y = 39$
   - [ ] $3x + 2y = 16$
   - [ ] $3x + 2y = 39$

   **Part B**

   How many three-point field goals did Marlene make in the game? Enter your answer in the box.

   7

3. Justin plans to spend $20 on sports cards. Regular cards cost $3.50 per pack and foil cards cost $4.50 per pack. Which inequality shows the relationship between the number of packs of regular cards ($r$) and the number of packs of foil cards ($f$) Justin can afford to buy?

    A. $3.5f + 4.5r \leq 20$
    B. $3.5r + 4.5f \leq 20$
    C. $3.5f + 4.5r \geq 20$
    D. $3.5r + 4.5f \geq 20$

4. The amount of profit, $p$, you earn by selling knives, $k$, can be determined by: $p = 200k - 500$

    a) Determine the constraints on profit and the constraints on the number of knives sold.
    $$p > 500$$

    b) What happens to your profit as you sell more knives?
    Your profit will increase

    c) Is it possible to make a $14,000 profit? Explain.
    No, you cannot sell half of a knife, 72.5

5. Two friends went to a restaurant and ordered one plain pizza and two sodas. Their bill totaled $15.95. Later that day, five friends went to the same restaurant. They ordered three plain pizzas and each person had one soda. Their bill totaled $45.90.
    Write and solve a system of equations to determine the price of one plain pizza.

    $$\begin{cases} x + 2y = 15.95 \\ 3x + 5y = 45.90 \end{cases}$$
    $$x = \$12.05$$

MAFS.912.A-REI.1.1 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| chooses the correct justifications for the steps in a two-step equation, ax + b = c | chooses the correct justifications for the steps in an equation of the form a(bx +c) = d or ax + b = cx + d, where a, b, c, and d are integers | explains and justifies the steps in an equation of the form a(bx +c) = d or ax + b = cx + d, where a, b, c, and d are rational numbers | explains and justifies the steps in an equation of the form a(bx +c) = d(ex +f) , where a, b, c, d, e, and f are rational numbers |

1. State the missing steps and reasons to this solution of $3(x + 4) = 18$.

   a) $3(x + 4) = 18$

   b) $3x + 12 = 18$                     Distributive Property

   c) $3x + 12 - 12 = 18 - 12$

   d) $3x + 0 = 18 - 12$

   e) $3x = 18 - 12$

   f) $3x = 6$                             Simplify

   g) $\frac{3x}{3} = \frac{6}{3}$

   h) $1x = \frac{6}{3}$

   i) $x = \frac{6}{3}$

   j) $x = 2$

2. John's solution to an equation is shown below.

   Given:      $x^2 + 5x + 6 = 0$

   Step 1:     $(x + 2)(x + 3) = 0$

   Step 2:     $x + 2 = 0$ or $x + 3 = 0$

   Step 3:     $x = -2$ or $x = -3$

   Which property of real numbers did John use for **Step 2**?

   A. multiplication property of equality
   B. zero product property of multiplication
   C. commutative property of multiplication
   D. distributive property of multiplication over addition

3. Which equations illustrate the zero property of multiplication? Select **ALL** that apply.

☐    $\frac{1}{3} \cdot 3 - 3 = 4$

☐    $\frac{1}{2} + 2 - 2 = \frac{1}{2}$

☐    $0 \cdot \frac{1}{9} \cdot 9 = 0$

☐    $x - 5 + 5 = x$

☐    $0 \cdot (9 + 3) = 0$

For questions 4 and 5, use the solution to the equation $3(x - 9) = 12$ below.

Start:        $3(x - 9) = 12$

Step 1:      $3x - 27 = 12$

Step 2:      $3x - 27 + 27 = 12 + 27$

Step 3:      $3x = 39$

Step 4:      $x = 13$

4. In Step 1, the multiplication property of equality was applied.

    ☐ True

    ☐ False

5. In Step 3, the addition property of equality was applied.

    ☐ True

    ☐ False

6. Use the steps in the table to answer the question.

| initial equation | $3(x + 2)^2 + 6x - x = 25x + 7x$ |
|---|---|
| step 1 | $3(x + 2)^2 + 5x = 32x$ |
| step 2 | $3(x + 2)^2 = 27x$ |
| step 3 | $(x + 2)^2 = 9x$ |
| step 4 | $x^2 + 4x + 4 = 9x$ |
| step 5 | $x^2 - 5x + 4 = 0$ |

The table shows the first 5 steps used to solve an equation.

Which statement is an incorrect explanation of one step in the process?

A. From step 4, apply the subtraction property of equality to $x^2 + 4x + 4$ and $9x$ to get $x^2 - 55 + 4 = 0$.
B. From step 3, apply the distributive property to $(x + 2)^2$ to get $x^2 + 4x + 4$ in step 4.
C. From step 2, apply the distributive property to $3(x + 2)^2$ and 27 to get $(x + 2)^2 = 9x$ in step 3.
D. From step 1, apply the subtraction property of equality to $5x$ and $32x$ to get $3(x + 2)^2 = 27x$ in step 2.

# FSA Algebra 1 EOC Review

MAFS.912.A-REI.2.4 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| solves quadratic equations of the form $x^2 + c = d$, where $c$ and $d$ are rational numbers by simple inspection or by taking square roots | solves quadratic equations of the form $x^2 + bx + c = d$, where $b$, $c$, and $d$ are integers by completing the square, factoring, or using the quadratic formula; validates why taking the square root of both sides when solving a quadratic will yield two solutions | solves quadratic equations of the form $x^2 + bx + c = d$, where $a$, $b$, $c$, and $d$ are integers and $b/a$ is an even integer; recognizes that a quadratic can yield nonreal solutions and that the quadratic formula is used to find complex solutions; completes steps in the derivation of the quadratic formula | determines if a quadratic will yield complex solutions; derives the quadratic formula |

1. What is the solution set of the equation $(x - 2)(x - a) = 0$?

   A. $-2$ and $a$
   B. $-2$ and $-a$
   C. 2 and $a$
   D. 2 and $-a$

2. Janice is asked to solve $0 = 64x^2 + 16x - 3$ . She begins the problem by writing the following steps:

   Line 1 $\quad 0 = 64x^2 + 16x - 3$

   Line 2 $\quad 0 = B^2 + 2B - 3$

   Line 3 $\quad 0 = (B + 3)(B - 1)$

   Use Janice's procedure to solve the equation for $x$. Explain the method Janice used to solve the quadratic equation.

   $0 = (B + 3)(B - 1)$
   $0 = (8x + 3)(8x - 1)$
   $x = -\frac{1}{3}, \frac{1}{8}$
   *Janice substituted B for $8x$, resulting in a simpler quadratic. Once factored, Janice substituted $8x$ for B*

3. Which value of $x$ is a solution to the equation $13 - 36x^2 = -12$?

   A. $\frac{36}{25}$
   B. $\frac{25}{36}$
   C. $-\frac{6}{5}$
   D. $-\frac{5}{6}$

4. The method of completing the square was used to solve the equation $2x^2 - 12x + 6 = 0$. Which equation is a correct step when using this method?

   A. $(x - 3)^2 = 6$
   B. $(x - 3)^2 = -6$
   C. $(x - 3)^2 = 3$
   D. $(x - 3)^2 = -3$

5. An equation is shown.

$$2x^2 - 5x - 3 = 0$$

What values of $x$ make the equation true?

$x =$ 3

$x =$ -0.5

6. Shannon and Jermaine are solving quadratic equations. This table shows their work.

| Steps | Shannon | Jermaine |
|---|---|---|
| initial equation | $x^2 - 6x + 5 = 12$ | $x^2 + 2x - 29 = 2x + 7$ |
| step 1 | $x^2 - 6x = 7$ | $x^2 + 2x - 36 = 2x$ |
| step 2 | $x^2 - 6x + 9 = 16$ | $x^2 - 36 = 0$ |
| step 3 | $(x - 3)^2 = 16$ | $(x - 18)(x + 18) = 0$ |
| step 4 | $x - 3 = \pm 4$ | $x - 18 = 0$ or $x + 18 = 0$ |
| step 5 | $x = \pm 7$ | $x = 18$ or $x = -18$ |

Both Shannon and Jermaine have errors in their work. Write a clear explanation of each student's error. Provide the correct solutions for both equations.

**Shannon**

Correct solution(s): $x = 7; x = -1$

Explanation of error: *Shannon's error is after step 4. She should have separated the equations out such that* $x - 3 = 4$ *or* $x - 3 = -4$. *Then solve both for* $x$. *Therefore,* $x = 7$ *or* $x = -1$.

**Jermaine**

Correct solution(s): $x = 6; x = -6$

Explanation of error: *Jermaine's error is after step 2. He should have taken the square root of 36 instead of dividing it by 2. Step 3 could be* $(x - 6)(x + 6) = 0$ *which gives* $x - 6 = 0$ *or* $x + 6 = 0$. *Therefore,* $x = 6$ *or* $x = -6$.

MAFS.912.A-REI.4.11 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| determines an integral solution for f(x) = g(x) given a graph or a table of a linear, quadratic, or exponential function, in a mathematical or real-world context | determines a solution to the nearest tenth for f(x) = g(x) given a graph or a table | completes an explanation on how to find an approximate solution to the nearest tenth for f(x) = g(x) given a graph or a table | explains how to find an approximate solution to the nearest tenth for f(x) = g(x) given a graph or a table and justifies why the intersection of two functions is a solution to f(x) = g(x) |

1. The system $5y = 8x + 8$ and $7y = -8x + 16$ is graphed as shown. Which choice is the point of intersection?
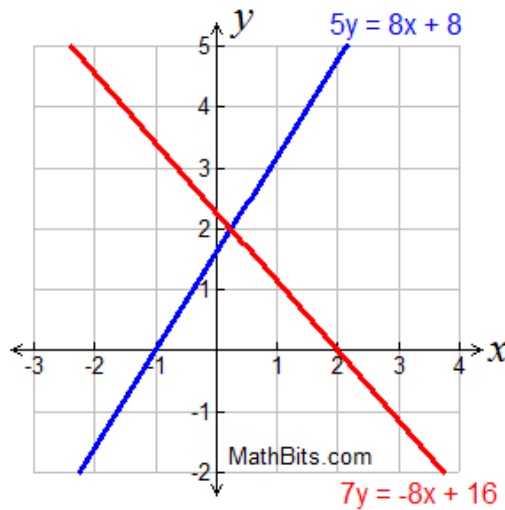
A. $\left(\frac{1}{2}, 2\right)$

B. $\left(\frac{1}{3}, 2\right)$

C. $\left(\frac{1}{4}, 2\right)$

D. $\left(\frac{1}{8}, 2\right)$
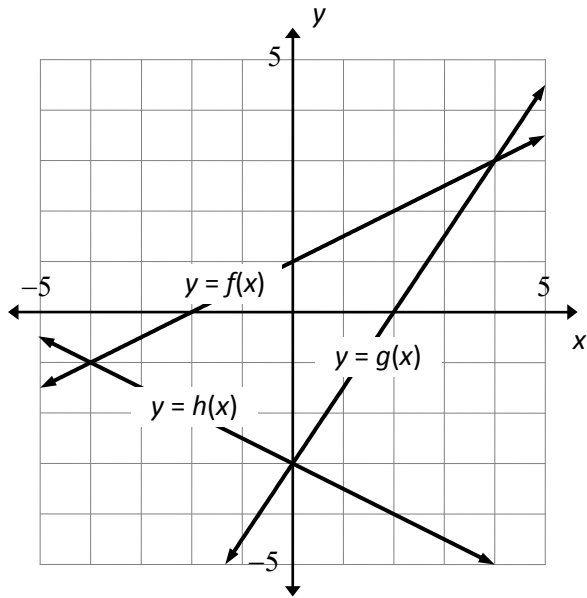
2. At which point do the two equations $3x + 5 = y + 4x$ and $y = x^2$ intersect?
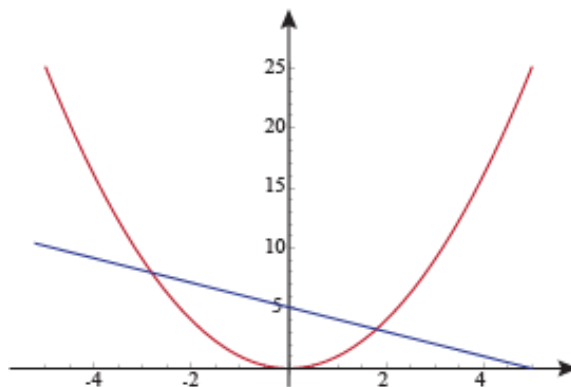
A. $(1.8, 3.2)$

B. $(-2.8, 7.8)$

C. $(0, 5)$

D. *Both (A) and (B)*

3. Use the graph below:



If $f(x_1) = g(x_1)$ and $g(x_2) = h(x_2)$ , what is $f(x_1) + g(x_2)$ ?

A.  −3
B.  0
C.  3
D.  4

For questions 4and 5, use the table below.

| $x$ | -4 | -3 | -2 | -1 | 0 | 1 |
|---|---|---|---|---|---|---|
| $f(x)$ | -23 | -10 | -3 | -2 | -7 | -18 |
| $g(x)$ | -13 | -11.5 | -10 | -8.5 | -7 | -5.58 |

4. $f(x) = g(x)$ at $(0, -7)$

☐  True
☐  False

5. $f(x) = g(x)$ somewhere on the interval $-3 < x < -2$.
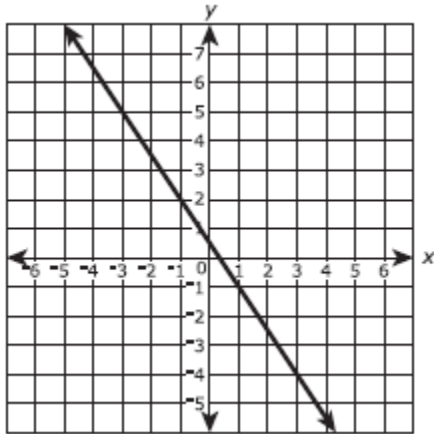
☐  True
☐  False

MAFS.912.A-REI.4.10 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---------|---------|---------|---------|
| distinguishes between coordinates that are solutions to linear equations in two variables and those that are not | distinguishes between coordinates that are solutions to equations in two variables (quadratic or exponential) and those that are not | recognizes that a graph is the set of all the solutions of a given equation | justifies that a graph is the set of all the solutions of an equation |

1. The ordered pairs $(20, -29.5), (21, -31)$, and $(22, -32.5)$ are points on the graph of a linear equation. Which of the following graphs show all of the ordered pairs in the solution set of this linear equation?
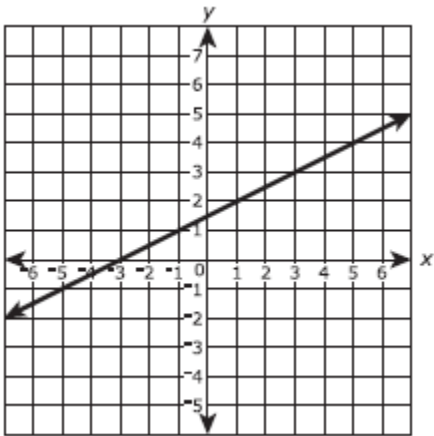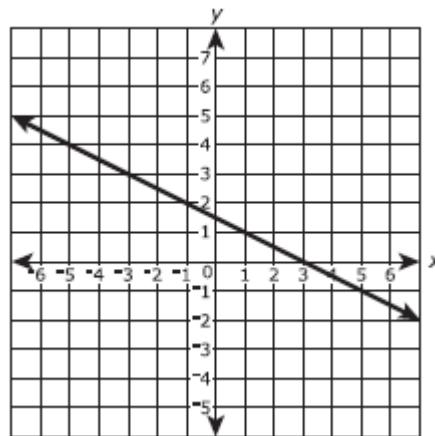
A.



B.
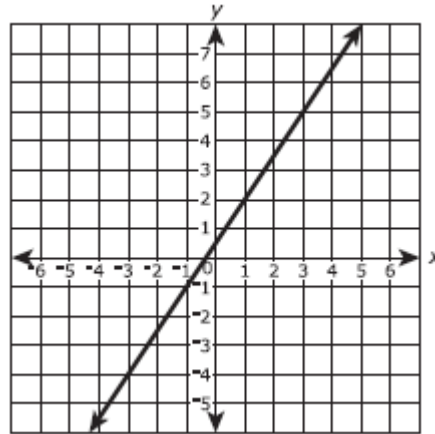


C.



D.



2. Dr. Math thinks he knows more than you about what is true and false world just because he's a doctor. He says that the equation $y = 17x + 1$ also includes the point $(1, 8)$. Is Dr. Math right or wrong?

A. He's right
B. He's wrong
C. We need more information before we can say if he's right or wrong
D. None of the above

3. You talk on the phone $y$ minutes on day $x$ of every month according to the equation $y = 2x + 1$. The cell phone company claims you talked 12 minutes on the phone on the fourth day of the month. Are they right?

   A. Yes, you did talk on the phone for 12 minutes on the fourth of the month
   B. No, you talked on the phone for 7 minutes on the fourth of the month
   C. No, you talked on the phone for 9 minutes on the fourth of the month
   D. No, you talked on the phone for 15 minutes on the fourth of the month


4. The speed of a snowboarder from uphill to downhill can be modeled using the equation $y = x^2 + 1$ where $x$ is in minutes. The snowboarder's speed at time 0 is 1 and is 2 at time 1. The snowboarder claims that this proves his speed increases linearly. Is he right?

   A. Yes, because two points are needed to define a line
   B. No, because the equation is not linear
   C. No, because the two points have positive values only
   D. No, because it does not cross the $x$-axis


5. Which point is NOT on the graph represented by $y = -x^2 - 2x + 8$?

   A. (-4, 0)
   B. (-1, 9)
   C. (2, 0)
   D. (4, 0)


6. An equation is shown.

$$y = \frac{1}{2}x + \frac{3}{4}$$

   Select All of the points that are solution to the equation above.

   ☐ $\left(0, \frac{1}{2}\right)$

   ☐ $\left(0, \frac{3}{4}\right)$

   ☐ $\left(\frac{3}{4}, 0\right)$

   ☐ $\left(\frac{3}{4}, \frac{1}{2}\right)$

   ☐ $\left(\frac{1}{2}, 1\right)$

# FSA Algebra 1 EOC Review

MAFS.912.A-SSE.2.3 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| uses properties of exponents (one operation) and identifies the new base of an exponential function; explains the properties of the $a$ in $y = ab^x$ in a real-world context | factors the difference of two squares with a degree of 2 and trinomials with a degree of 2 and explains the properties of the zeros; completes the square when the leading coefficient is 1 and explains the properties of the maximum or minimum; uses the properties of exponents and names the new rate | factors the difference of two squares with a common integral factor, trinomials with a common integral factor and a leading coefficient having more than four factors and explains the properties of the zeros; completes the square when the leading coefficient is greater than 1 and explains the properties of the maximum or minimum; transforms exponential functions that have more than one operation and explains the properties of expression | explains the differences between equivalent forms and why an equivalent form would provide the required property |

1. The director of a play must decide how much to charge per ticket. If tickets cost c dollars each, a total of (755c) people will attend the play. Which ticket price will generate the most income?

   A. $1.00
   B. $7.50
   C. $15.00
   D. $20.50

2. Which of these shows the following expression factored completely?
$$6x^2 + 15x - 36$$

   A. $(2x - 3)(x + 4)$
   B. $(6x + 9(x - 4)$
   C. $3(2x - 3)(x + 4)$
   D. $3(2x + 3)(x - 4)$

3. If $f(x) = 2x^2 - 8x + 9$, which statement regarding the vertex form of $f(x)$ is true?

   A. In vertex form, $f(x) = 2(x - 2)^2 + 1$ and therefore has a minimum value of 1.
   B. In vertex form, $f(x) = 2(x - 2)^2 + 1$ and therefore has a minimum value of 2.
   C. In vertex form, $f(x) = 2(x - 2)^2 + 4.5$ and therefore has a minimum value of 4.5.
   D. In vertex form, $f(x) = 2(x - 2)^2 + 4.5$ and therefore has a minimum value of 2.

4. Which expression is equivalent to $x^4 - 12x^2 + 36$?
   A. $(x^2 - 6)(x^2 - 6)$
   B. $(6 - x^2)(6 + x^2)$
   C. $(x^2 + 6)(x^2 + 6)$
   D. $(x^2 + 6)(x^2 - 6)$

5. What number should be added to both sides of the equation to complete the square in $x^2 + 8x = 17$?

   A. 4
   B. 16
   C. 29
   D. 49

6. If $(x - 7)$ is a factor of $2x^2 - 11x + k$, what is the value of $k$?

   A. -21
   B. -7
   C. 7
   D. 28

7. In the equation $y = (x - 2)^2$, the minimum value occurs when $x$ is

   A. -2
   B. 2
   C. -4
   D. 4

8. A computer application generates a sequence of musical notes using the function $f(n) = 6(16)^n$, where $n$ is the number of the note in the sequence and $f(n)$ is the note frequency in hertz. Which function will generate the same note sequence as $f(n)$?

   A. $g(n) = 12(2)^{4n}$
   B. $h(n) = 6(2)^{4n}$
   C. $p(n) = 12(4)^{2n}$
   D. $k(n) = 6(8)^{2n}$

MAFS.912.A-SSE.1.1 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---------|---------|---------|---------|
| interprets coefficients or terms of exponential and quadratic expressions in a real-world context | interprets factors of exponential and quadratic expressions | interprets more than one part of an expression | given an interpretation, chooses the correct part of the expression |

1. Combined estimates for Etosha National Park and the Northwestern Population

| Year | Base Year | Estimated Number of Elephants |
|------|-----------|-------------------------------|
| 1998 | 3 | 3,218 |
| 2000 | 5 | 3,628 |
| 2002 | 7 | 3,721 |
| 2004 | 9 | 3,571 |

The elephant population in northwestern Namibia and Etosha National Park can be predicted by the expression $2,649(1.045)^b$, where b is the number of years since 1995.

What does the value 2,649 represent?

A. the predicted increase in the number of elephants in the region each year
B. the predicted number of elephants in the region in 1995
C. the year when the elephant population is predicted to stop increasing
D. the percentage the elephant population is predicted to increase each year

2. A store manager begins each shift with the same total amount of money. She keeps $200 in a safe and distributes the rest equally to the 5 cashiers in the store. This situation can be represented by the function $y = \frac{(x-200)}{5}$. What does the variable $x$ represent in this situation?

A. The total amount of money the manager has at the beginning of a shift
B. The total amount of money the manager has at the end of a shift
C. The amount of money each cashier has at the beginning of a shift
D. The amount of money each cashier has at the end of a shift

3. A satellite television company charges a one-time installation fee and a monthly service charge. The total cost is modeled by the function $y = 40 + 90x$. Which statement represents the meaning of each part of the function?

A. $y$ is the total cost, $x$ is the number of months of service, $90 is the installation fee, and $40 is the service charge per month.
B. $y$ is the total cost, $x$ is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.
C. $x$ is the total cost, $y$ is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.
D. $x$ is the total cost, $y$ is the number of months of service, $90 is the installation fee, and $40 is the service charge per month.

4. A ball was thrown upward into the air. The height, in feet, of the ball above the ground $t$ seconds after being thrown can be determined by the expression $-16t^2 + 40t + 3$. What is the meaning of the 3 in the expression? Select the correct answer.

   A. The ball takes 3 seconds to reach its maximum height.
   B. The ball takes 3 seconds to reach the ground.
   C. The ball was thrown from a height of 3 feet.
   D. The ball reaches a maximum height of 3 feet.

5. Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?

   A. exponential growth and 12%
   B. exponential growth and 88%
   C. exponential decay and 12%
   D. exponential decay and 88%

6. A car leaves Albany, NY, and travels west toward Buffalo, NY. The equation $D = 280 - 59t$ can be used to represent the distance, $D$, from Buffalo after $t$ hours. In this equation, the 59 represents the

   A. car's distance from Albany
   B. speed of the car
   C. distance between Buffalo and Albany
   D. number of hours driving

7. Juan buys peaches and grapefruit at the store. He writes the equations shown to model the relationship between the number of pounds of peaches, $p$, and the number of pounds of grapefruit, $g$, that he buys.
$$p + g = 2.5$$
$$1.58p + 1.09g = 3.46$$
   What is the total number of pounds of peaches and grapefruit that Juan buys?

   | 2.5 | *pounds* |

8. Omar deposited d dollars into a savings account y years ago. Now he is going to use a portion of the money in his savings account to buy a bicycle. This expression can be used to find the percentage of the money in the savings account that Omar will use for the bicycle.
$$\frac{342}{d(1.03)^y} \times 100$$
   What is the meaning of the denominator in the expression?

   A. the amount Omar will pay for the bicycle
   B. the amount in Omar's savings account now
   C. the yearly interest rate for the savings account
   D. the amount originally deposited in the savings account

MAFS.912.A-SSE.1.2 EOC Practice

| Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|
| works with expressions with only monomial factors and chooses the correct equivalent forms of a trinomial whose leading coefficient is 1 | factors the difference of two squares with a degree of 2, trinomials with a degree of 2 whose leading coefficient has no more than 4 factors | factors the difference of two squares with a common integral factor, trinomials with a common integral factor and a leading coefficient with more than four factors | factors the difference of two squares with a degree of 4 with or without a common integral factor, and a polynomial with a degree of 3 and a leading coefficient of 1 |

1. Students were asked to write a trinomial that could not be factored using integers.

Pat Wrote:   $x^2+3x-10$

Sam wrote:   $x^2+x-12$

Mel wrote:   $x^2+2x-1$

Lee wrote:   $x^2+2x-3$

Which student followed the given directions?

A. Pat
B. Sam
C. Mel
D. Lee

2. Identify **ALL** the factors of this polynomial when it is factored completely.

$$27x^2 - 153x + 90$$

- ☐ 3
- ☐ 9
- ☐ $x - 5$
- ☐ $x + 5$
- ☐ $3x - 2$
- ☐ $3x + 2$
- ☐ $3x - 15$
- ☐ $9x + 6$

3. Which expression is equivalent to $16x^2 - 36$?

A. $4(2x - 3)(2x - 3)$
B. $4(2x + 3)(2x - 3)$
C. $(4x - 6)(4x - 6)$
D. $(4x + 6)(4x - 6)$

4. Four expressions are shown below.

 I $\quad 2(2x^2 - 2x - 60)$

 II $\quad 4(x^2 - x - 30)$

 III $\quad 2(x + 6)(x - 5)$

 IV $\quad 4x(x - 1) - 120$

 The expression $4x^2 - 4x - 120$ is equivalent to

 A. I and II, only
 B. II and IV, only
 C. I, II, and IV
 D. II, III, and IV

5. Which of these shows the following expression factored completely?

$$6x^2 - 13x + 5$$

 A. $(3x - 1)(2x + 5)$
 B. $(3x - 5)(2x - 1)$
 C. $(3x - 1)(2x - 5)$
 D. $(3x - 5)(2x + 1)$

6. Select all the expressions that are equivalent to $9x^4 - y^2$.

☐ $(3x^2 - y)^2$

☐ $(3x^2)^2 - (y)^2$

☐ $9(x^2)^2 - (y)^2$

☐ $(9x^2)^2 - (y)^2$

☐ $(3x^2 + y)(3x^2 - y)$