Student Name: _____

Missouri

DEPARTMENT OF ELEMENTARY & SECONDARY

EDUCATION ™

End-of-Course Assessment

Algebra I

Pre-Test

Directions to the Student

Today you will be taking Session I of the Missouri Algebra I Test. This is a test of how well you understand the course level expectations for Algebra I.

There are several important things to remember:

1 Read each question carefully and think about the answer. Then choose the answer that you think is best.

2 Make sure you clearly mark the correct choice in your test book.

3 If you do not know the answer to a question, skip it and go on. You may return to it later if you have time.

4 If you finish the test early, you may check over your work.

1. **A system of equations is graphed below.**
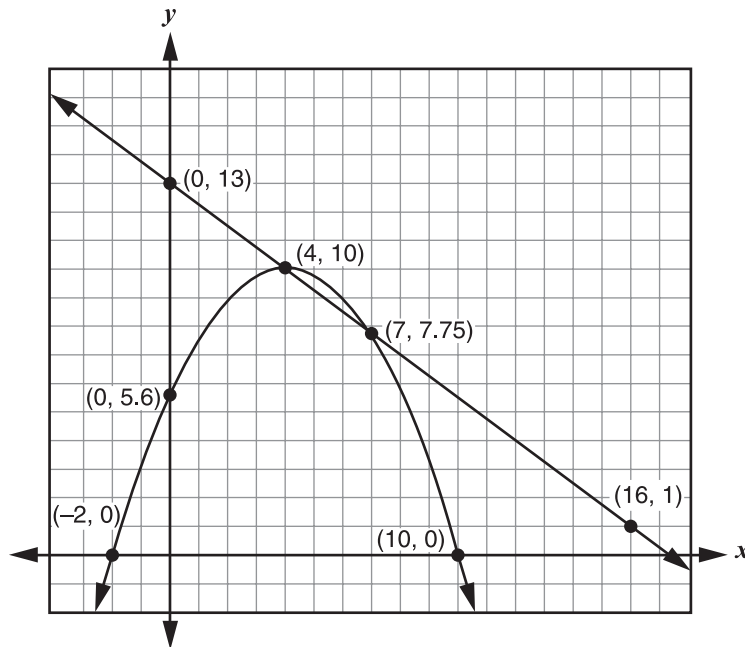
What are the solutions to the system?

A. (0, 5.6) and (0, 13)

B. (0, 13) and (16, 1)

C. (4, 10) and (7, 7.75)

D. (16, 1) and (10, 0)

2. **Which of the following are factors of the equation when written in factored form? Select <u>all</u> that apply.**

$$2a^2 + 8a - 15 = 3a - 3$$

A. $a - 4$

B. $a + 4$

C. $2a - 9$

D. $2a - 3$

E. $2a + 3$

F. $2a + 9$

3. Kelli recorded the amount of money she earned, *y*, for hours worked, *x*, in the table shown. Select the words that correctly complete the sentences.

Hours Worked (*x*)	Dollars Earned (*y*)
1	$15
3	$45
4	$60

The function is _____.

○ increasing

○ decreasing

The function is _____.

○ linear

○ quadratic

○ exponential

The *y*-intercept is _____.

○ (1, 15)

○ (0, 1)

○ (0, 0)

4. The table shows the distances that schools will travel to attend a field trip to the state capitol. School 7 has to travel 15 miles. If this outlier is added to the data, which is a true statement about how it changes the data in the table? Select <u>all</u> statements that apply.

Distances Traveled

School	Distance Traveled (miles)
School 1	425
School 2	150
School 3	400
School 4	380
School 5	200
School 6	380

A. The data is less spread.

B. The data is more spread.

C. Both the median and the mean change.

D. There is no change in the median and mean.

E. There is no change in the spread of the data.

F. The median stays the same, and the mean changes.

G. The median changes, and the mean stays the same.

Go On ▶

5. The formula for the area of a trapezoid is $A = \frac{1}{2}(b_1 + b_2)h$. Solve for b_1. Which equation is a correct value for b_1?

A. $b_1 = \dfrac{(2A - b_2)}{h}$

B. $b_1 = \dfrac{2A}{h} - b_2$

C. $b_1 = \dfrac{A}{2h} - b_2$

D. $b_1 = \dfrac{\frac{1}{2}A - b_2}{h}$

6.   The area, in square units, of a rectangle is represented by $6x^3 - 2x^2 + 4x$. If the width, in units, is $2x$, what is the length, in units?

Enter the expression that represents the length, in units, in the box.

7. **Which student correctly solved this expression?**

$$x^{\frac{1}{3}} \cdot x^{\frac{1}{4}}$$

A. Jo says the answer is $x^{\frac{7}{12}}$ because the exponents should be added.

B. Kerrie says the answer is $x^{\frac{2}{7}}$ because the exponents should be added.

C. Alex says the answer is $x^{\frac{7}{12}}$ because the exponents should be multiplied.

D. Tracy says the answer is $x^{\frac{1}{12}}$ because the exponents should be multiplied.

8. **Which of the following is the <u>best</u> method for solving $x^2 + 2x + 3 = 0$?**

   A. factor

   B. inspection

   C. quadratic formula

   D. square root property

9. Which ordered pair(s) satisfy the function $f(x) = -x^2 + 2$?
    Select <u>all</u> that apply.

    A. $(-1, 1)$

    B. $(-1, -1)$

    C. $(-2, -2)$

    D. $(2, -2)$

    E. $(-2, 2)$

10. A residual is defined as the difference between the actual value of the dependent variable and the value predicted by the model. Which graph best represents a relationship that minimizes residuals?
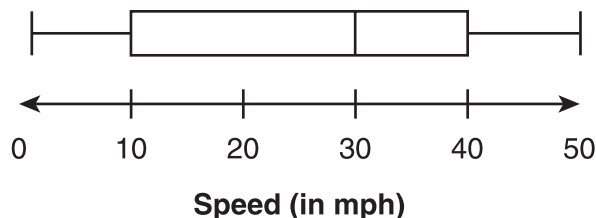
A.

B.

C.

D.
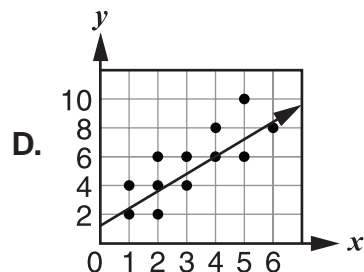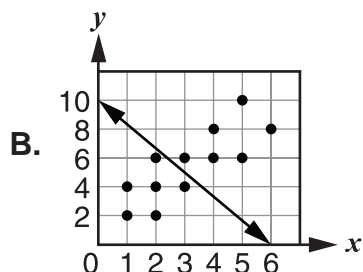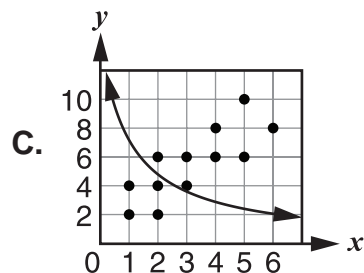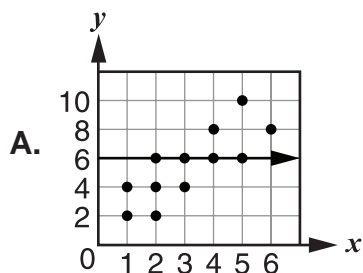
11. The ordered pairs in the table are possible solutions to the given equations.

Match each ordered pair to the equation for which it is a solution. Ordered pairs may be used more than once.

	$-2x + 5y = 10$	$y = 2(3)^x$	Neither
(−5, 0)			
(0, −5)			
(0, 2)			
(1, 6)			

12. A police department captured 30 speeds on radar and organized their data in the box plot shown.


Speed (in mph)

What can be inferred from the data? Select <u>all</u> that apply.

A. The mean is equal to the median.

B. The mean is probably less than 30 mph.

C. The mean is probably more than 30 mph.

D. If an officer captures an additional speed of 70 mph, the mean must change.

E. If an officer captures an additional speed of 70 mph, the median must change.
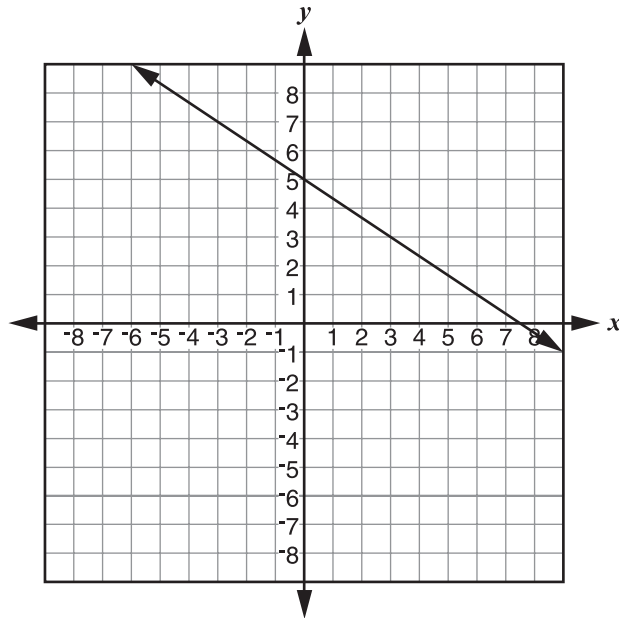
13. Which equation completes the square to create an equivalent to $x^2 + 10x + 13 = 0$ in the form of $(x - p)^2 = q$?

A. $(x - 5)^2 = 12$

B. $(x + 5)^2 = 12$

C. $(x + 5)^2 = 25$

D. $(x - 5)^2 = 25$

14. **Which of the equations are represented by the graph shown? Select all that apply.**
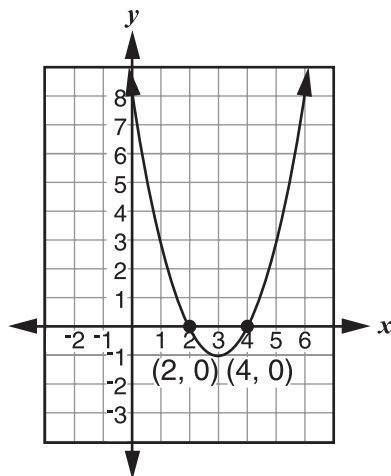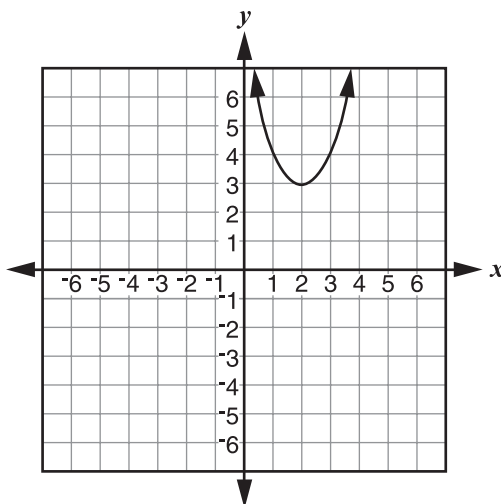

A. $y = (x - 2)(x - 4)$

B. $y = (x - 3)^2 - 1$

C. $y = (x - 3)^2 + 1$

D. $y = x^2 - 6x + 8$

E. $y = x^2 + 6x + 8$

15. **The graph of a linear equation is shown.**

What equation represents the graph shown? In the box, enter an equation that represents the graph.
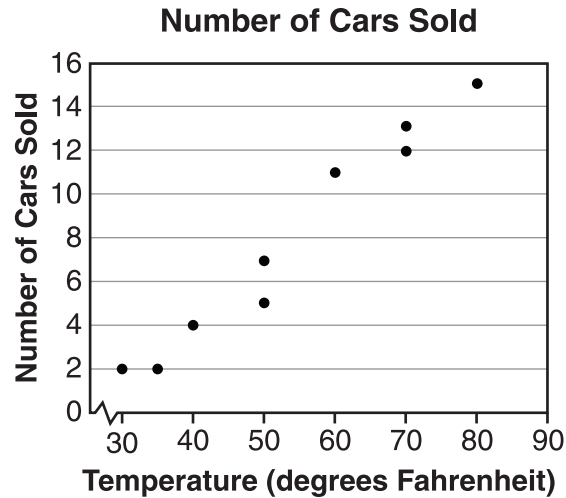
16. The quadratic function *f(x)* is shown in the graph below.

If the graph of *f(x)* is moved left 4 units and down 2 units, what would be the equation for the new graph in vertex form?

A. $f(x) = (x - 4)^2 - 2$

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

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

D. $f(x) = (x + 2)^2 + 1$

Go On ▶

17. A car sales business is analyzing the number of cars sold and the average daily high temperature. The data is shown on the graph below.

Number of Cars Sold

**Which statement is correct based on the data?**

A. The temperature gives no indication of car sales.

B. If the temperature is 50, the amount of car sales will definitely be 4 cars.

C. The higher temperature is correlated to higher car sales and causes the car sales to increase.

D. The higher temperature is correlated to higher car sales, but does not necessarily cause the car sales to increase.

18. Select the graph that shows the solutions to the system of linear inequalities.

$$y \leq 2x - 2$$
$$y > -4x + 4$$

A.

C.

B.

D.
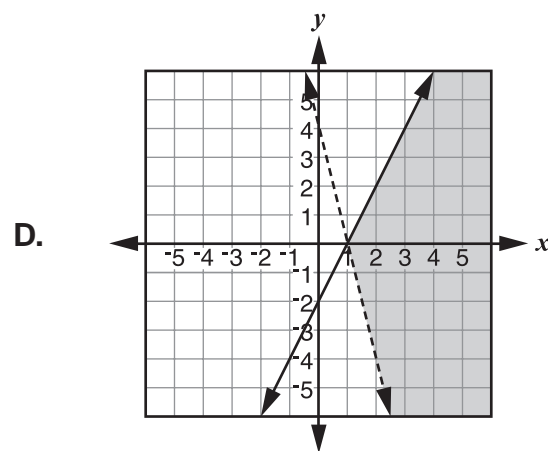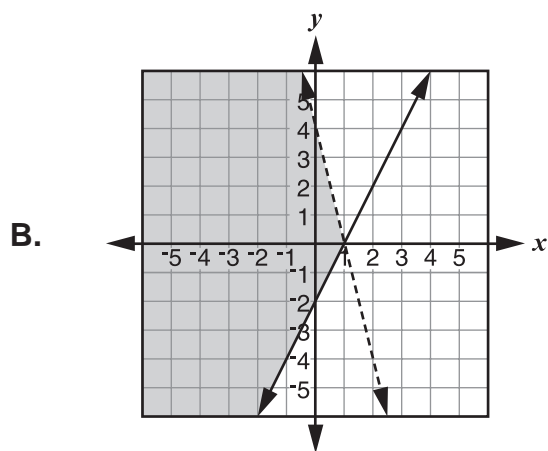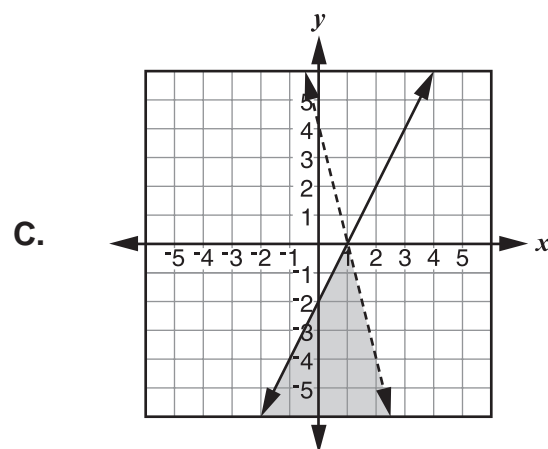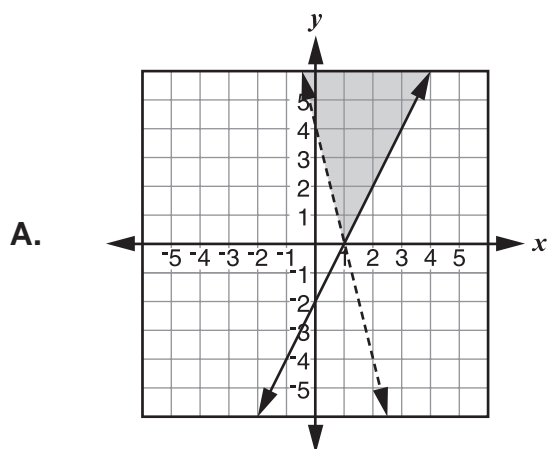
19. The following question has two parts. First, answer Part A. Then, answer Part B.

   Riley needs to save $300 for a computer. She gets an allowance of $10 a week and has already saved $75.

   Part A

   How many weeks, x, until Riley will have enough money to buy the computer? Select the correct symbol to model the situation.

   300 ___ $10x + 75$

   - ◯ >
   - ◯ <
   - ◯ =

   Part B

   What is the value that is a solution to the situation in Part A?

   A. 20
   B. 21
   C. 22
   D. 23

20. The following function was used to calculate the profit generated by selling T-shirts.

    Let $f(x) = 15x - 25$ represent the profit function and x represent the number of T-shirts sold. Which statement is true of $f(200)$?

    A. It results in 15 and means that 15 T-shirts were sold.

    B. It results in 15 and means that $15 was made in profit.

    C. It results in 2,975 and means that 2,975 T-shirts were sold.

    D. It results in 2,975 and means that $2,975 was made in profit.

Go On ▶

21. **Graph the inequality 5y < 3x − 15.**
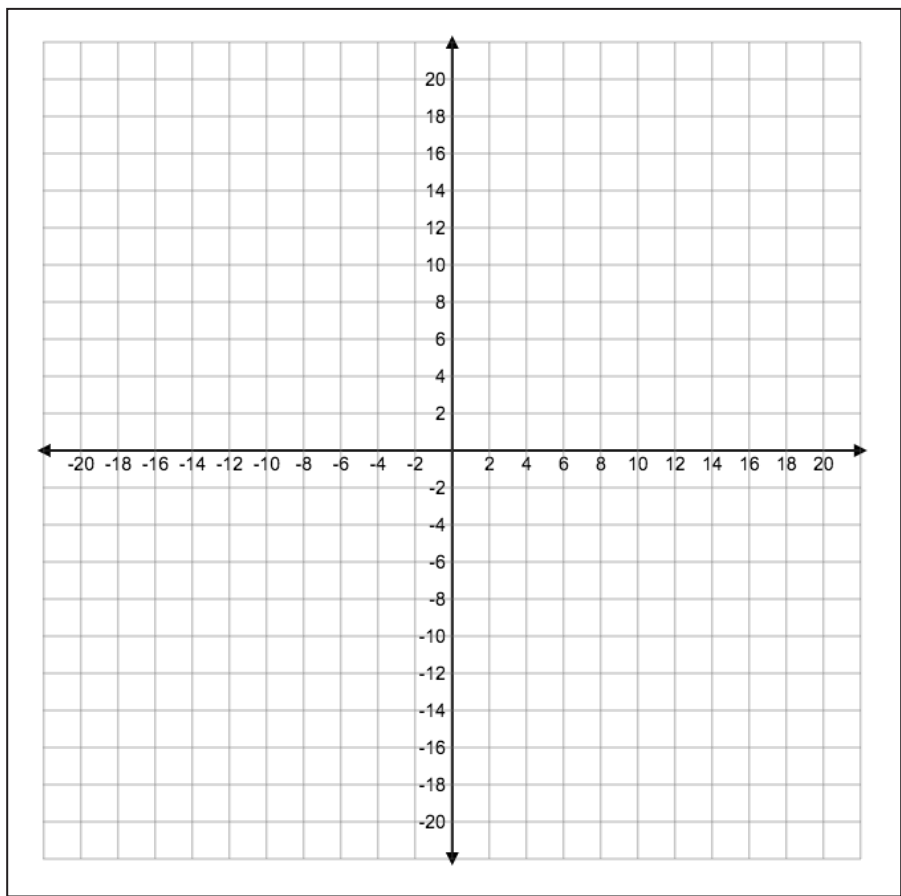
22.   **Which of the following relations represent functions? Select _all_ that apply.**

A.

Input   Output

A   14

     15

B

     16

C   17

B.

x	−2	−1	0	1	2
y	3	3	3	3	3

C.

D. $f(x) = 3x + 1$

E.
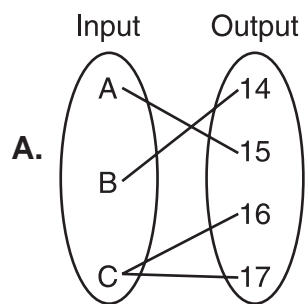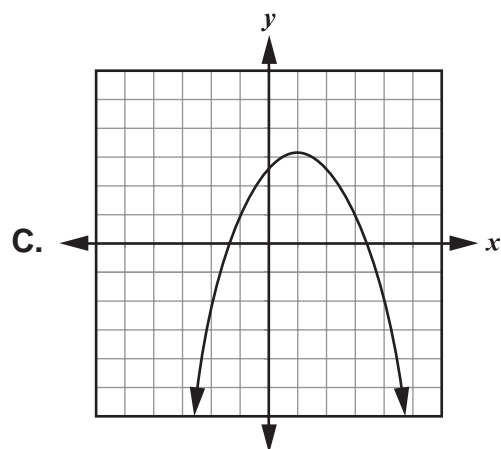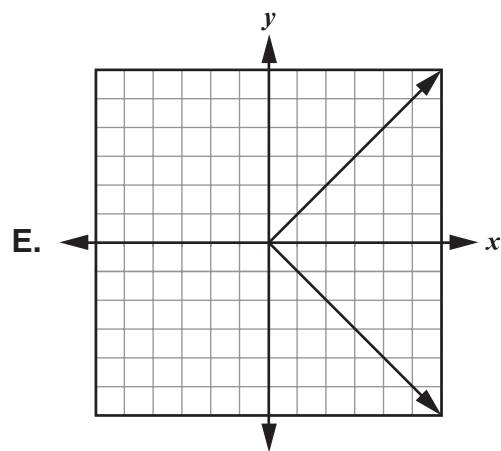
23. A student graphs $f(x) = x^2$ and then graphs $g(x) = x^2 + 5$.

   Select the word that correctly completes the sentence.

   The graph of $g(x)$ will be shifted _____ 5 units from the graph of $f(x)$.

   ○ up

   ○ down

   ○ right

   ○ left

24. Draw a line from each function type to the function shown in each table.

x	$f(x)$
−3	8
−2	4
−1	2
0	1

x	$g(x)$
−1	3
0	1
1	1
2	3

x	$h(x)$
2	4
3	$\frac{9}{2}$
4	5
5	$\frac{11}{2}$

x	$k(x)$
−2	$\frac{1}{4}$
−1	$\frac{1}{2}$
0	1
1	2

exponential decay ○   ○ $f(x)$

exponential growth ○   ○ $g(x)$

linear ○   ○ $h(x)$
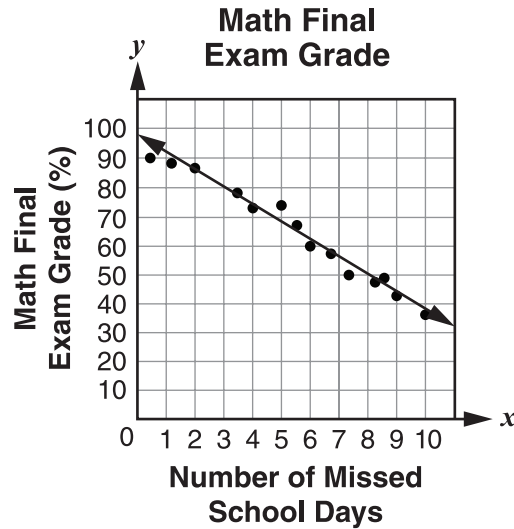
quadratic ○   ○ $k(x)$

Go On ▶

25. Which of the following statements describe the linear model shown? Select <u>all</u> that apply.

Math Final Exam Grade

A. The number of days missed has no correlation to a student's final exam grade.

B. A student with perfect attendance is expected to score approximately 98% on the math final.

C. A student with perfect attendance is expected to score approximately 38% on the math final.

D. For each day a student is absent, that student's final exam score is expected to decrease approximately 6 percentage points.

E. For every sixth day a student is absent, that student's final exam score is expected to decrease approximately 1 percentage point.

26. Compare $f(x) = x^2 - 2x - 3$ and $g(x)$. Function $g(x)$ is shown below.

x	$g(x)$
0	3
1	0
2	−1
3	0
4	3

Match the property with its corresponding function. A property may match one function, both functions, or neither function.

	Function $f(x)$	Function $g(x)$	Neither Function
Minimum of −1			
Minimum of −4			
Zero at −1			
Zero at 1			
Zero at 2			
Zero at 3			

Go On ▶

27. **Which tables represent linear functions? Select all that apply.**

A.

x	y
1	−2
2	−5
3	−8
4	−11
5	−14

D.

x	y
1	81
2	27
3	9
4	3
5	1

B.

x	y
1	2
2	4
3	8
4	16
5	32

E.

x	y
1	1.5
2	3.0
3	4.5
4	6.0
5	7.5

C.

x	y
1	17
2	21
3	25
4	29
5	33

F.

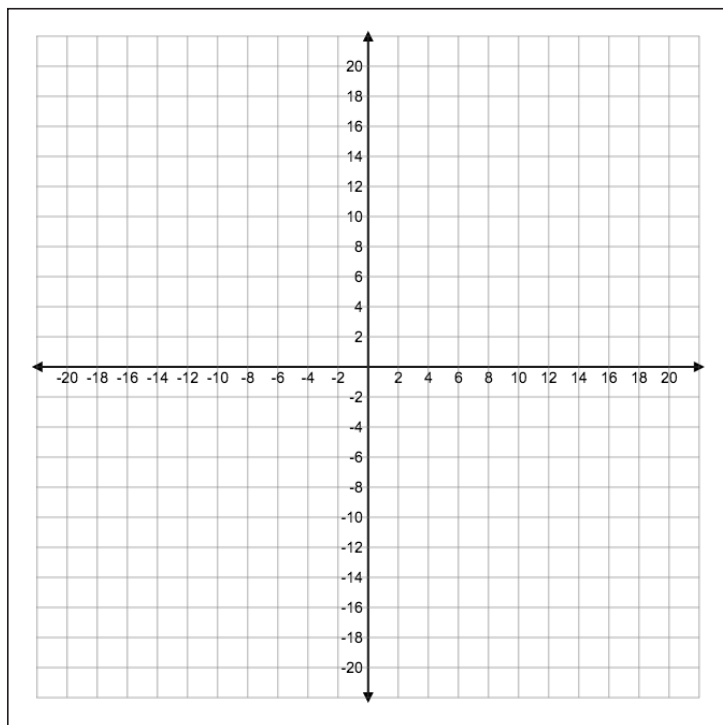| x	y
1	6
2	9
3	14
4	21
5	30

28. The following question has two parts. First, answer Part A. Then, answer Part B.

Johnathan is trying to solve the system of equations:

$$\begin{cases} y = -2x + 3 \\ y = \frac{1}{2}x - 2 \end{cases}$$

Part A

Graph the system of equations.

Part B
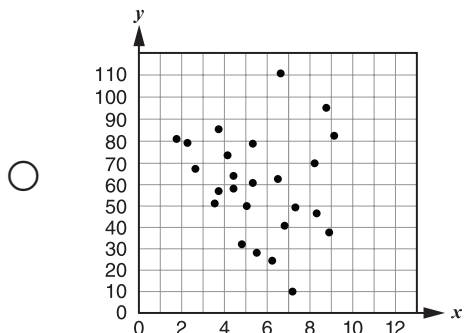
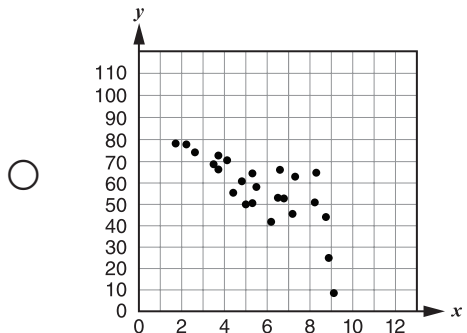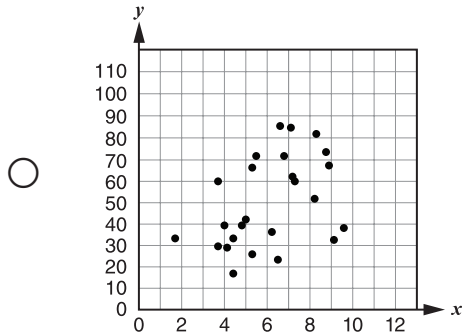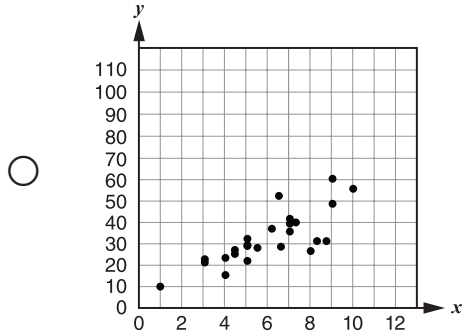What is the solution to the system?

Solution: (⬚ , ⬚)

29. The following scatterplots show relationships between two variables. Draw a line from the correct correlation coefficient to each graph.

$r = 0.80$ ○

$r = 0.43$ ○

$r = -0.14$ ○

$r = -0.76$ ○

STOP ●

Directions to the Student

Today you will be taking Session II of the Missouri Algebra I Test. This is a test of how well you understand the course level expectations for Algebra I.

There are several important things to remember:

1 Read the performance event carefully and think about how to answer the question.

2 Show all of the work that you did to answer the question with a number 2 pencil. If a box is provided, make sure all of your work is in the box. If a line is provided to write your answer on, be sure your answer is on the line.

3 If you do not know the answer to a question, skip it and go on. You may return to it later if you have time.

4 If you finish the test early, you may check over your work.

5 Write or mark your answers directly in your test book with a number 2 pencil.

Go On ▶

Tony moved to a new house and wants to install a pool and landscape the yard. He will hire a company to manage the landscaping. Tony is considering hiring Company A or Company B.

Company A's and Company B's landscaping costs are shown in the tables below.

Company A

Yard Size (ft²)	Cost ($)
300	7.50
980	24.50
1,200	30.00
2,000	50.00

Company B

Yard Size (ft²)	Cost ($)
400	16.00
900	23.50
1,100	26.50
1,500	32.50

1. Tony is reseeding the front lawn. The lawn covers 2,500 square feet and grass seed is \$15.98 for each 7-pound bag. Each pound of grass seed covers 150 square feet. How much will it cost to reseed the lawn? Show all work. Enter the cost and work in the box.

2. The following question has three parts. First, answer Part A. Second, answer Part B. Then, answer Part C.

Compare the landscaping costs between Company A and Company B. Let *c* represent landscaping cost, in dollars, and *s* the yard size, in square feet.

Part A

Write an equation to model what it would cost if Company A was hired. Enter the correct equation in the box.

Part B

Write an equation to model what it would cost if Company B was hired. Enter the correct equation in the box.

Part C

Which company would cost Tony the least amount to landscape 2,500 square feet? Explain your answer. Enter the correct answer and explanation in the box.

3. **At how many square feet will both companies cost the same amount? Enter the answer in the box.**

☐ square feet

4. Tony is installing a rectangular pool in the backyard. The pool needs to have a length of 10 feet more than the width. The backyard is a square shape with each of the sides measuring 5 feet more than 3 times the width of the pool. Write an expression for the area surrounding the pool after the pool is installed. Show your work. Enter the correct expression and work in the box.

Session	Item	Type	MLS Code	Answer	Point(s)	Point Breakdown
1	1	MC	A1.REI.B.4	C	1	
1	2	MS	A1.SSE.A.2	B, D	1	• 1 point for 2 correct answers
1	3	MC	A1.IF.B.3	increasing, linear, (0,0)	2	• 2 points for 3 correct answers • 1 point for 2 correct answers • 0 points for 1 or 0 correct answers
1	4	MS	A1.DS.A.3	B, F	1	• 1 point for 2 correct answers
1	5	MC	A1.CED.A.4	B	1	
1	6	SA	A1.APR.A.2	3x^2-x+2	1	
1	7	MC	A1.NQ.A.1	A	1	
1	8	MC	A1.REI.A.2.C	C	1	
1	9	MS	A1.IF.A.1.B	1, 3, 4	2	• 2 points for 3 correct • 1 point for 3 correct and 1 incorrect • 1 point for 2 correct and no incorrect answers • 0 points for all other scenarios
1	10	MC	A1.DS.A.5.A	D	1	
1	11	MS	A1.REI.C.6	Letters = columns Numbers = rows A1,C2,A3,B3,B4	2	• 2 points for 5 correct answers • 1 point for 4 correct with 1 or 0 incorrect • 1 point for 3 correct with 0 incorrect • 0 points for all other scenarios
1	12	MS	A1.DS.A.1	B, D	1	• 1 point for 2 correct answers
1	13	MC	A1.REI.A.2.A	B	1	
1	14	MS	A1.SSE.A.3.A	A, B, D	2	• 2 points for 3 correct • 1 point for 3 correct and 1 incorrect • 1 point for 2 correct and no incorrect answers • 0 points for all other scenarios
1	15	SA	A1.CED.A.2	y=(-2/3)x+5 or equivalent equation	1	
1	16	MC	A1.BF.A.1	D	1	
1	17	MC	A1.DS.A.8	D	1	
1	18	MC	A1.REI.C.8	D	1	

Session	Item	Type	MLS Code	Answer	Point(s)	Point Breakdown
1	19	ESR	A1.CED.A.1	**Part A** < **Part B** D	2	**Part A** • 1 point for correct answer **Part B** • 1 point for correct answer **NOTE:** 1 point if in Part A student chose ">" and options A, B or C in Part B
1	20	MC	A1.IF.A.2	D	1	
1	21	CR	A1.REI.C.7	Dashed line graphed through the x-axis at 5 and through the y- axis at -3, and shading is below the line graphed	1	
1	22	MS	A1.IF.A.1.A	B, C, D	2	• 2 points for 3 correct • 1 point for 2 correct • 0 points if any incorrect • 0 points for all other scenarios
1	23	MC	A1.BF.A.1	Up	1	
1	24	MS	A1.LQE.A.3	Letters = left column Numbers = right column A1,B4,C3,D2	2	• 2 points for 4 correct matches • 1 point for 3 or 2 correct matches • 0 points for 1 or 0 correct matches
1	25	MS	A1.DS.A.6	B, D	1	• 1 point for 2 correct answers
1	26	MS	A1.IF.C.9	Letters = columns Numbers = rows B1,A2,A3,B4,C5,A6,B6	3	• 3 points for 7 correct • 2 points for 6 or 5 correct • 2 points for 7 or 6 correct and 1 incorrect • 1 point for 5 correct and 1 incorrect • 1 point for 4 or 3 correct • 0 points for all other scenarios
1	27	MS	A1.LQE.A.1.A	A, C, E	1	• 1 point for 3 correct answers
1	28	ESR	A1.REI.B.3	**Part A** $y=-2x+3$ and $y=(1/2)x-2$ **Part B** 2, -1	3	**Part A** (2 points total) • 2 points for correct graph • 1 point for 1 line graphed correctly • 0 points for incorrect graph **Part B** • 1 point for correct ordered pair • 0 points for incorrect ordered pair

Session	Item	Type	MLS Code	Answer	Point(s)	Point Breakdown
1	29	MS	A1.DS.A.7	Letters = left column Numbers = right column A1,B2,D3,C4	1	• 1 point for 4 correct answers
2	1	CR	A1.NQ.B.3.A		2	• 2 points for correct answer and correct work provided • 1 point for correct answer and incorrect work • 1 point for incorrect answer and correct work • points for incorrect answer and incorrect work
2	2	CR	A1.LQU.A.3	**Part A** c = 0.025s **Part B** c = 0.015s+10 **Part C** Company B because the fee is less expensive for company B ($47.50 vs $62.50)	4	**Part A** • 1 point for correct equation for company A **Part B** • 1 point for correct equation for company B **Part C** (2 points total) • 2 point for choosing correct company with a reason • 1 point for correct reason • 0 points for correct company with incorrect reason
2	3	SA	A1.CED.A.3	1000	1	
2	4	CR	A1.APR.A.1	$8x^2 + 20x + 25$	3	• 3 pts for writing a correct expression that shows the area of the backyard minus the area of the pool with correct work shown • 2 pts for writing a expression that shows the area of the backyard minus the area of the pool that includes an arithmetic error leading to an incorrect expression • 1pt for determining the area of the backyard and the area of the pool only • 0 points for all other scenarios