Tennessee Comprehensive Assessment Program

TCAP

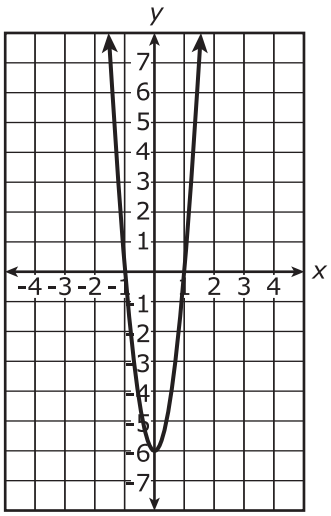
Math EOC Item Release
Algebra I

TN Department of Education

Item Information

Item Code:	TN514221	Grade Level:	Algebra I
Standard Code:	A1.A.APR.B.2	Position No:	1
Standard Text:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

The graph of $f(x)$ is shown.



Which statement about $f(x)$ is true?

A. The zero of $f(x)$ is -6.

B. The zero of $f(x)$ is 2.

C. The zeros of $f(x)$ are -1 and 1.

D. The zeros of $f(x)$ are -6 and 6.

Item Information

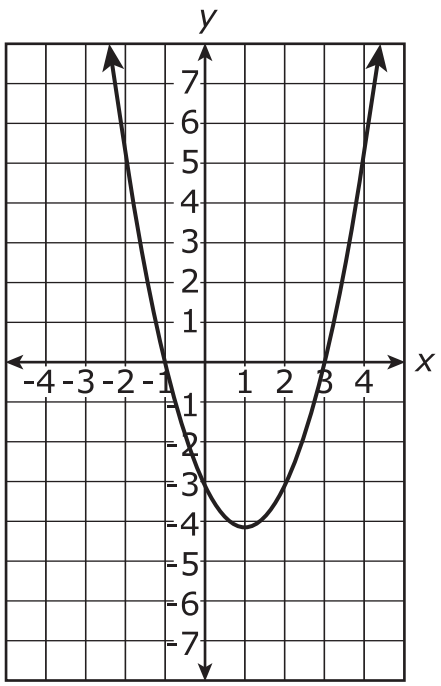
Item Code:	TN614281	Grade Level:	Algebra I
Standard Code:	A1.A.APR.B.2	Position No:	2
Standard Text:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	B,F	DOK Level: 2	Item Type: O

A polynomial function contains the factors x, $x - 3$, and $x + 1$.

Which graphs could represent the polynomial function?

Select **all** that apply.

A.



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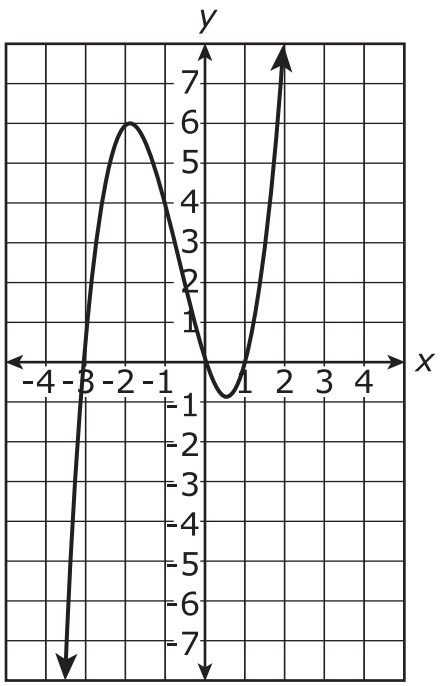

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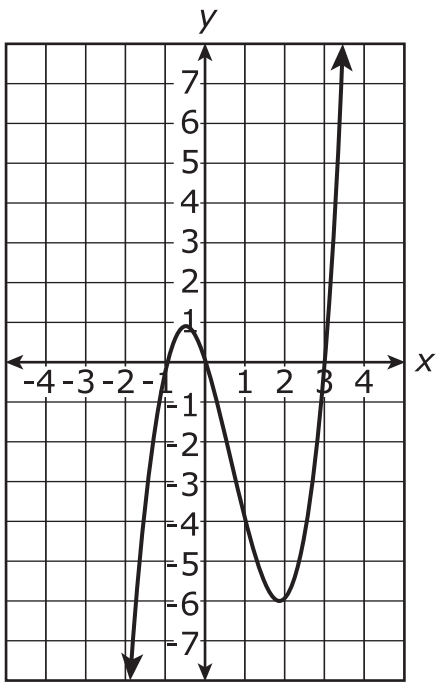
*(**Item 2**, continued from the previous page)*

B.



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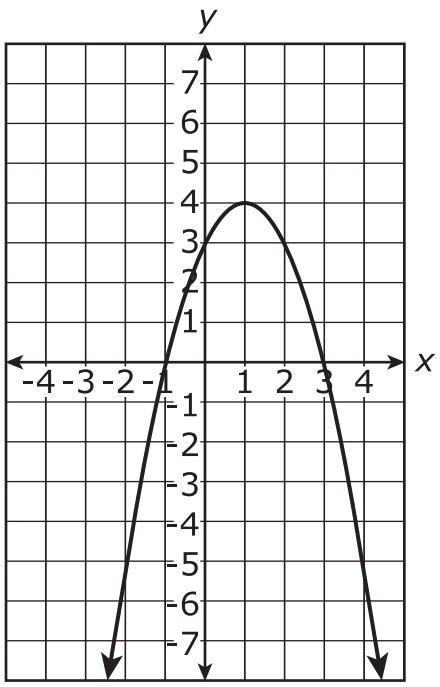

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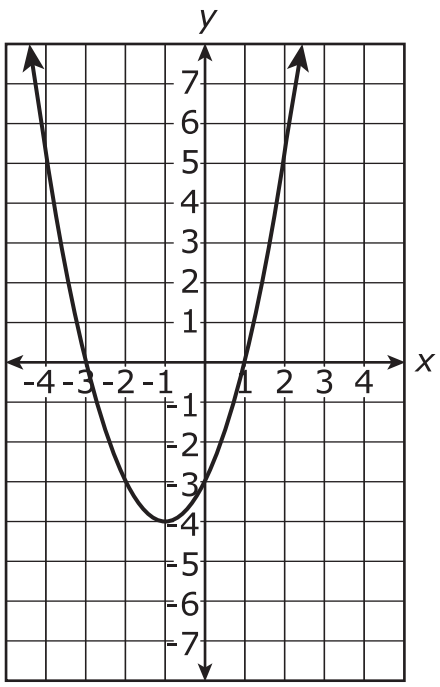

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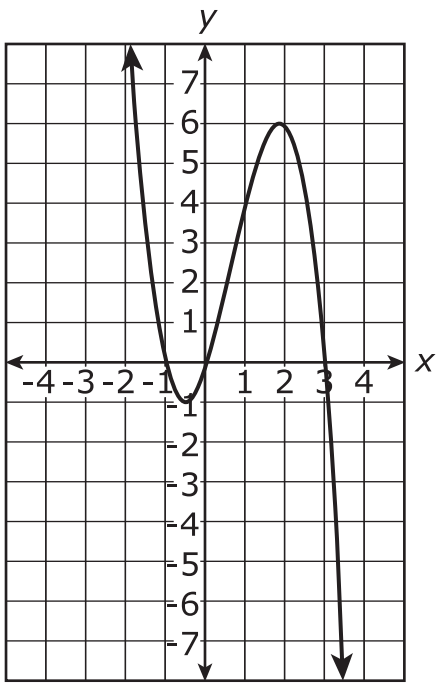


Item Information

Item Code:	TN015916	Grade Level:	Algebra I
Standard Code:	A1.A.SSE.A.1.b	Position No:	3
Standard Text:	Interpret complicated expressions by viewing one or more of their parts as a single entity.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	B	DOK Level: 3	Item Type: O

While shopping, Sofia finds a dress she likes at a discounted price. The price on the tag before the discount is p dollars. She must pay sales tax on the discounted price of the dress. Sofia calculates that she must pay $p - 0.1p + 0.05(0.9p)$ to buy the dress.

What does $0.9p$ represent?

A. the total amount that Sofia must pay to buy the dress

B. the price of the dress after the discount, but before adding sales tax

C. the price of the dress after adding sales tax, but before taking the discount

D. the amount of sales tax owed

Item Information

Item Code:	TN0002775	Grade Level:	Algebra I
Standard Code:	A1.A.SSE.A.2	Position No:	4
Standard Text:	Use the structure of an expression to identify ways to rewrite it.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

Which expression is equivalent to $(16x^2 - 9)$?

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

B. $\left(8x - \frac{9}{2}\right)^2$

C. $(4x - 3)(4x + 3)$

D. $(8x - 9)(2x + 1)$

Item Information

Item Code:	TN015934	Grade Level:	Algebra I
Standard Code:	A1.A.SSE.A.2	Position No:	5
Standard Text:	Use the structure of an expression to identify ways to rewrite it.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	A,C,E,F	DOK Level: 2	Item Type: O

Consider the expression shown.

$$4x^4 - 16$$

Which expressions are equivalent to the expression $4x^4 - 16$?

Select **all** that apply.

A. $4(x^4 - 4)$

B. $4(x^2 - 2)^2$

C. $(2x^2)^2 - (2^2)^2$

D. $(2x^2)^2 + (-2^2)^2$

E. $4(x^2 + 2)(x^2 - 2)$

F. $(2x^2 + 4)(2x^2 - 4)$

Item Information

Item Code:	TN015991	Grade Level:	Algebra I
Standard Code:	A1.A.SSE.B.3.a	Position No:	6
Standard Text:	Factor a quadratic expression to reveal the zeros of the function it defines.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	B	DOK Level: 2	Item Type: O

What are the zeros of the function defined by the expression $x^2 - 7x - 30$?

A. 3 and -10

B. 10 and -3

C. 15 and 2

D. 15 and -2

Item Information

Item Code:	TN116067	Grade Level:	Algebra I
Standard Code:	A1.A.SSE.B.3.b	Position No:	7
Standard Text:	Complete the square in a quadratic expression in the form Ax^2 + Bx + C to reveal the maximum or minimum value of the function it defines.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	B	DOK Level: 2	Item Type: O

The spray of a fountain has a height, in feet, that can be modeled by the polynomial expression $-x^2 + 14x - 33$.

Which statement about the height of the spray is true?

A. The expression $-(x - 7)^2 + 16$ reveals a maximum height of 7 feet.

B. The expression $-(x - 7)^2 + 16$ revels a maximum height of 16 feet.

C. The expression $-(x - 7)^2 - 16$ reveals a maximum height of 7 feet.

D. The expression $-(x - 7)^2 - 16$ reveals a maximum height of 16 feet.

Item Information

Item Code:	TN0002776	Grade Level:	Algebra I
Standard Code:	A1.A.CED.A.1	Position No:	8
Standard Text:	Create equations and inequalities in one variable and use them to solve problems.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	A	DOK Level: 2	Item Type: O

Javier has a part-time job and saves $10 of his hourly pay for the purchase of a new laptop that costs $648. He has $80 saved already.

Which inequality represents the number of hours, x, Javier must work to buy the laptop?

A. $10x + 80 \geq 648$

B. $10x + 80 \leq 648$

C. $10 + 80x \geq 648$

D. $10 + 80x \leq 648$

Item Information

Item Code:	TN914348	Grade Level:	Algebra I
Standard Code:	A1.A.CED.A.2	Position No:	9
Standard Text:	Create equations in two or more variables to represent relationships between quantities; graph equations with two variables on coordinate axes with labels and scales.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	B	DOK Level: 3	Item Type: O

Jackson paints murals on walls. In order to paint one of his murals, he needs a rectangular area that is at least 4 feet wide and 3 feet high. The width and height have to increase by the same amount of feet, x.

Which equation represents all the possible areas for the rectangular murals?

A. $A = x^2 + 7x + 12$, where x is any real number

B. $A = x^2 + 7x + 12$, where x is any nonnegative real number

C. $A = 2x + 7$, where x is any real number

D. $A = 2x + 7$, where x is any nonnegative real number

Item Information

Item Code:	TN914359	Grade Level:	Algebra I
Standard Code:	A1.A.CED.A.3	Position No:	10
Standard Text:	Represent constraints by equations or inequalities and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	B	DOK Level: 2	Item Type: O

Larissa is on vacation and wants to rent a bicycle to explore the town. She pays a $10 flat fee and then $12 per hour for the rental.

If Larissa has $45 to spend, what is the greatest number of full hours she can rent the bicycle?

A. 1

B. 2

C. 3

D. 4

Item Information

Item Code:	TN315596	Grade Level:	Algebra I
Standard Code:	A1.A.CED.A.4	Position No:	11
Standard Text:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

A town is expanding the size of a square athletic field. The equation shown determines the building cost, y, in dollars, for every foot, x, added to the width of the athletic field.

$$y = (110.25)x^2$$

Which equation shows an equivalent equation rearranged to determine x in terms of y?

A. $x = 10.5\sqrt{y}$

B. $x = \frac{110.25}{\sqrt{y}}$

C. $x = \frac{\sqrt{y}}{10.5}$

D. $x = 110.25\sqrt{y}$

Item Information

Item Code:	TN214408	Grade Level:	Algebra I
Standard Code:	A1.A.REI.B.2	Position No:	12
Standard Text:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	B	DOK Level: 2	Item Type: O

Consider the linear equation.

$$2ax + 3b = -4ax - 9b$$

If the solution is $x = -1$, which statement is true about a and b?

A. $a = b$

B. $a = 2b$

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

D. $a = 6b$

Item Information

Item Code:	TN0002773	Grade Level:	Algebra I
Standard Code:	A1.A.REI.B.3.a	Position No:	13
Standard Text:	Use the method of completing the square to rewrite any quadratic equation in x into an equation of the form (x – p)^2 = q that has the same solutions. Derive the quadratic formula from this form.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	D	DOK Level: 2	Item Type: O

Which equation has the same solutions as $(x - 5)^2 = 9$?

A. $x^2 - 25 = 9$

B. $x^2 - 5x + 16 = 0$

C. $x^2 - 10x - 16 = 0$

D. $x^2 - 10x + 16 = 0$

Item Information

Item Code:	TN615626	Grade Level:	Algebra I
Standard Code:	A1.A.REI.B.3.b	Position No:	14
Standard Text:	Solve quadratic equations by inspection (e.g., for x^2 = 49), taking square roots, completing the square, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	D	DOK Level: 2	Item Type: O

Which equation has roots of ± 3?

A. $(x - 3)^2 = 0$

B. $(x + 3)^2 = 0^2$

C. $(x - 0)^2 = 3$

D. $(x + 0)^2 = 3^2$

Item Information

Item Code:	TN415743	Grade Level:	Algebra I
Standard Code:	A1.A.REI.C.4	Position No:	15
Standard Text:	Write and solve a system of linear equations in context.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

At a county fair, Emily rides the Spinning Vortex three times and the Gravity Breaker twice, for a total of 14 tickets. Troy rides the Spinning Vortex twice and the Gravity Breaker three times, for a total of 16 tickets.

Roger plans to go on the Spinning Vortex four times and the Gravity Breaker five times. How many tickets will he need?

A. 8

B. 20

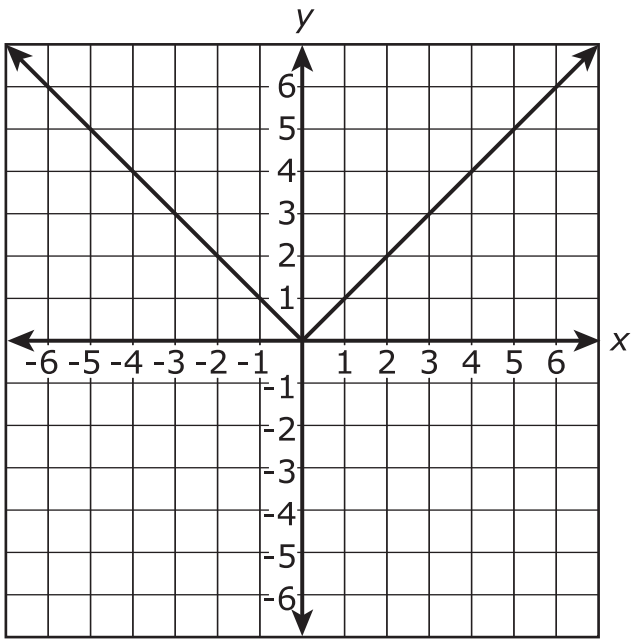
C. 28

D. 30

Item Information

Item Code:	TN916160	Grade Level:	Algebra I
Standard Code:	A1.F.BF.B.2	Position No:	16
Standard Text:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	D	DOK Level: 2	Item Type: O

The graph on the coordinate plane shows the function $f(x) = |x|$.



Which graph shows the graph of $f(x + 1) - 3$?

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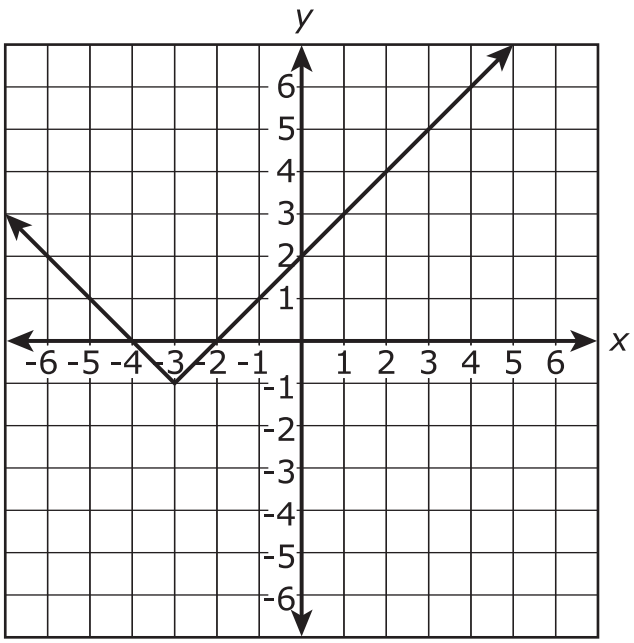
A.



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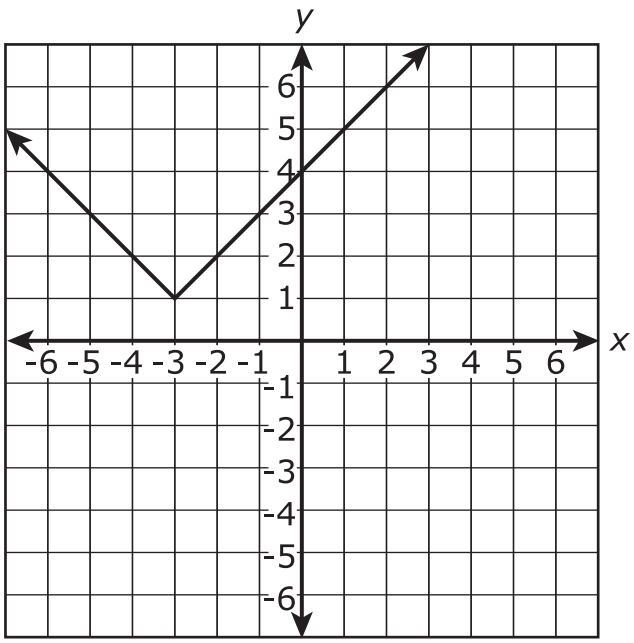
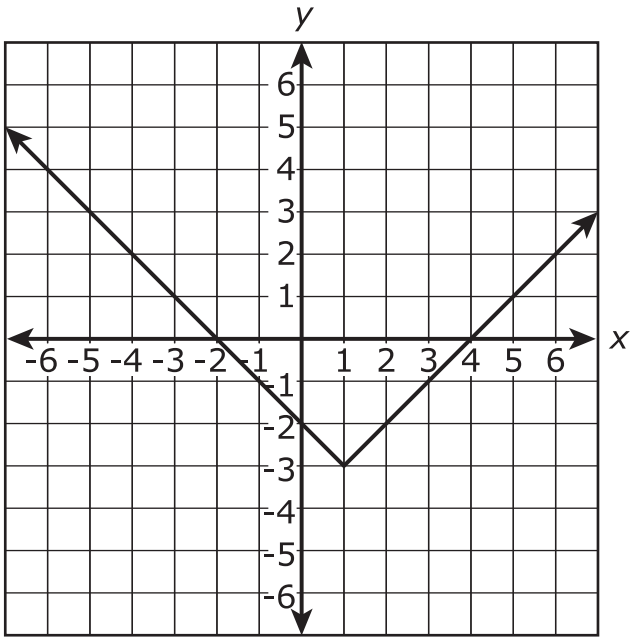
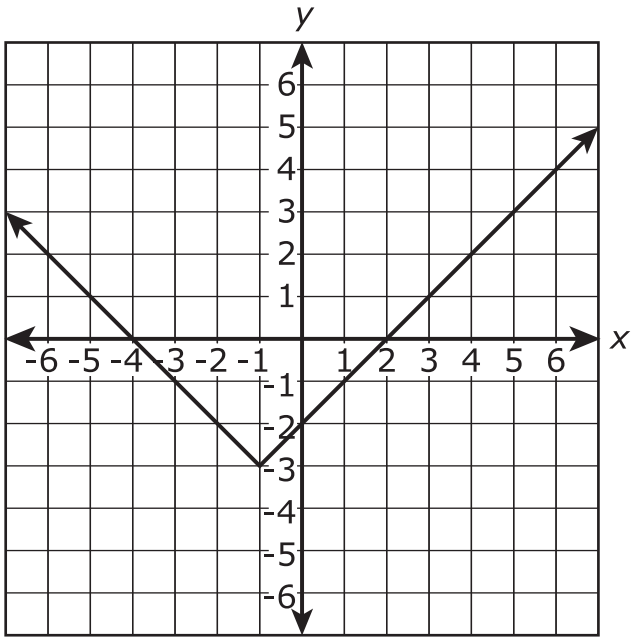


B.



D.



Item Information

Item Code:	TN0002772	Grade Level:	Algebra I
Standard Code:	A1.F.IF.B.4	Position No:	17
Standard Text:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

A child throws a penny upward out of a window and watches it fall to the ground. The function $f(t) = -16t^2 + t + 10$ represents the penny's distance in feet above the ground t seconds after the penny is thrown.

Approximately how many seconds does it take the penny to hit the ground?

A. 0.03

B. 0.76

C. 0.82

D. 1.32

Item Information

Item Code:	TN553666	Grade Level:	Algebra I
Standard Code:	A1.F.IF.C.6.b	Position No:	18
Standard Text:	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	A	DOK Level: 2	Item Type: O

A mail-order coffee company sells coffee beans for $10 per pound.

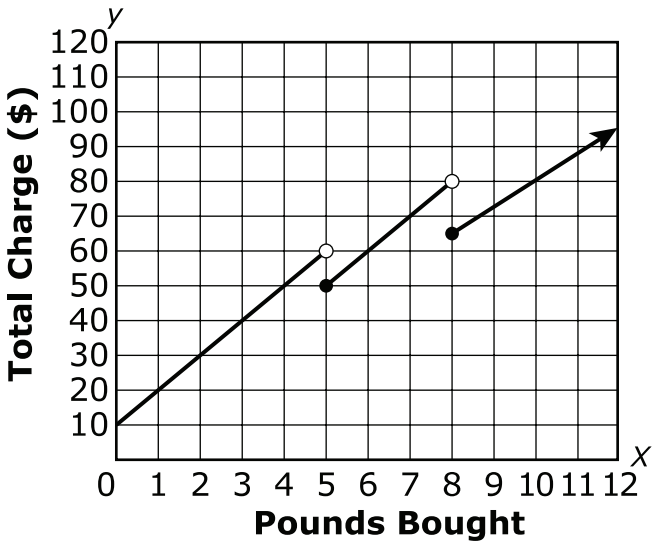
It charges $10 shipping for orders weighing less than 5 pounds.

Orders weighing 5 pounds or more have free shipping.

Orders weighing 8 pounds or more are discounted by 20%.

Which graph represents the total charge, including shipping, for orders of different numbers of pounds of coffee?

A.



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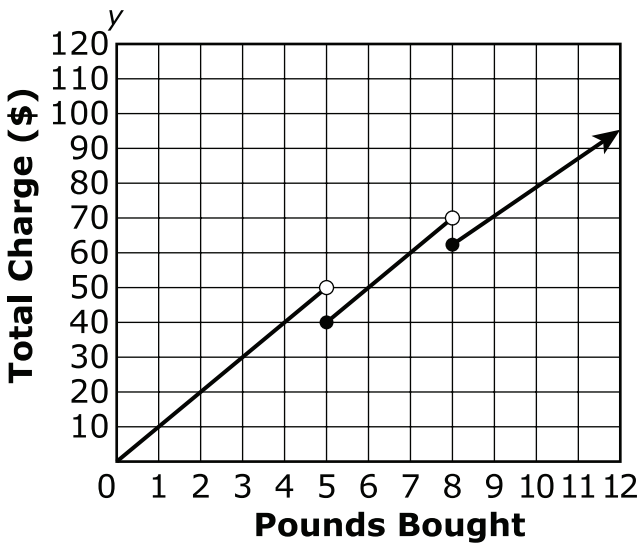

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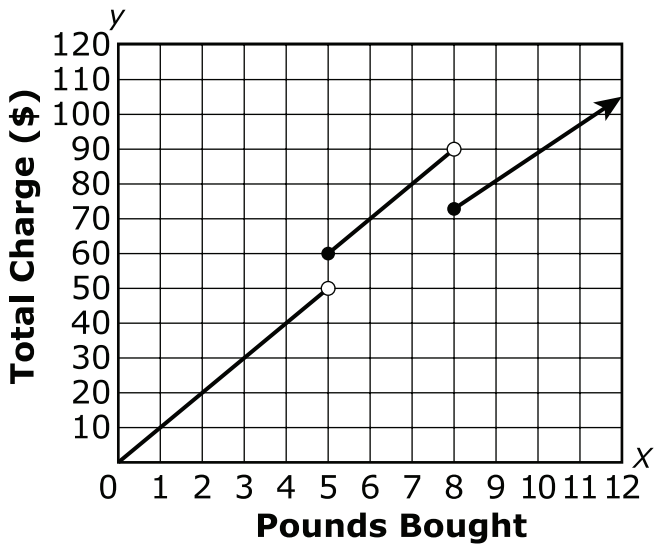
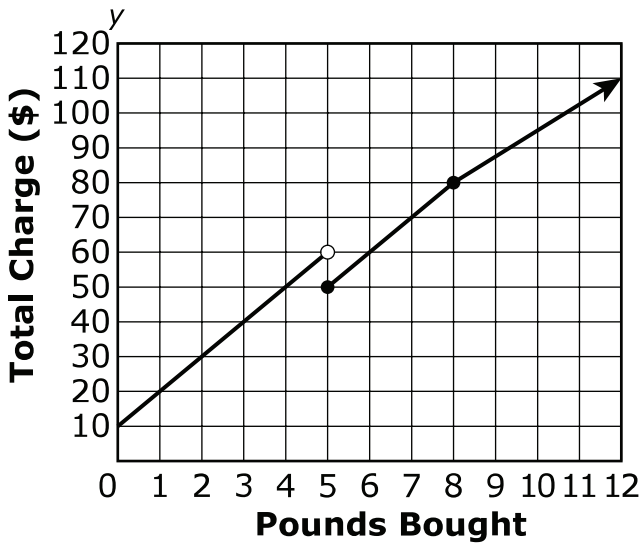
B.



D.



Item Information

Item Code:	TN453833	Grade Level:	Algebra I
Standard Code:	A1.F.IF.C.8	Position No:	19
Standard Text:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	C,E	DOK Level: 2	Item Type: O

Ezra bought a new motorcycle three years ago. The value of his motorcycle, v, in dollars, t years after the purchase, can be determined by the following equation.

$$v = 10{,}400(0.82)^t$$

Gina purchased a motorcycle at the same time. The value of Gina's motorcycle at the end of each year is shown in the table.

Years Since Purchase	Value
0	$8,000
1	$6,800
2	$5,780
3	$4,913

Which statements comparing the values of the two motorcycles are true?

Select **all** that apply.

A. The value of both motorcycles decreases by the same percentage each year.

B. The value of Gina's motorcycle decreases by a greater percentage each year than Ezra's.

C. The value of Ezra's motorcycle decreases by a greater percentage each year than Gina's.

D. The purchase price of Gina's motorcycle is greater than the purchase price of Ezra's.

E. The purchase price of Ezra's motorcycle is greater than the purchase price of Gina's.

Item Information

Item Code:	TN653874	Grade Level:	Algebra I
Standard Code:	A1.F.LE.A.1.b	Position No:	20
Standard Text:	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	D	DOK Level: 2	Item Type: O

Which situation can be modeled by a linear function?

A. The cost of living in a particular city doubles every 10 years.

B. Repeat customers of a neighborhood restaurant receive a coupon for $10 off a purchase of $100.

C. A real estate developer plans to increase the number of businesses in a shopping district by 15%.

D. The employees at a local hardware store earn a $2-per-hour wage increase every year they work for the store.

Item Information

Item Code:	TN954070	Grade Level:	Algebra I
Standard Code:	A1.F.LE.A.3	Position No:	21
Standard Text:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	B,C,E	DOK Level: 2	Item Type: O

Tameka is comparing two savings plans. With Plan 1, Tameka starts with $500 and adds $500 every two months. With Plan 2, Tameka starts with $500 and adds 50% more every two months. The tables show the growth of the plans over several months. Amounts are rounded to the nearest whole dollar.

(This item continues on the next page.)

*(**Item 21**, continued from the previous page)*

Savings Plan 1		
Month	**Amount Added**	**Total Savings**
0		$500
2	$500	$1000
4	$500	$1500
6	$500	$2000
8	$500	$2500
10	$500	$3000
12	$500	$3500

Savings Plan 2		
Month	**Amount Added**	**Total Savings**
0		$500
2	$250	$750
4	$375	$1125
6	$563	$1688
8	$844	$2532
10	$1266	$3798
12	$1899	$5697

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*(**Item 21**, continued from the previous page)*

Which statements comparing the plans are true?

Select **all** that apply.

A. Plan 1 shows linear growth and Plan 2 shows quadratic growth.

B. Plan 1 shows linear growth and Plan 2 shows exponential growth.

C. For the first six months, Plan 1 provides more money than Plan 2.

D. Because the average rate of change for Plan 1 is constant, Plan 1 eventually provides more money than Plan 2.

E. The average rate of change for Plan 2 always increases, so Plan 2 eventually provides more money than Plan 1.

Item Information

Item Code:	TN654108	Grade Level:	Algebra I
Standard Code:	A1.F.LE.B.4	Position No:	22
Standard Text:	Interpret the parameters in a linear or exponential function in terms of a context.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	A	DOK Level: 1	Item Type: O

The cost of renting a car from Big Cars includes an administration fee and a fee for each mile driven. This is modeled by $f(x) = 0.23x + 30$.

What is the cost per mile?

A. $0.23

B. $0.53

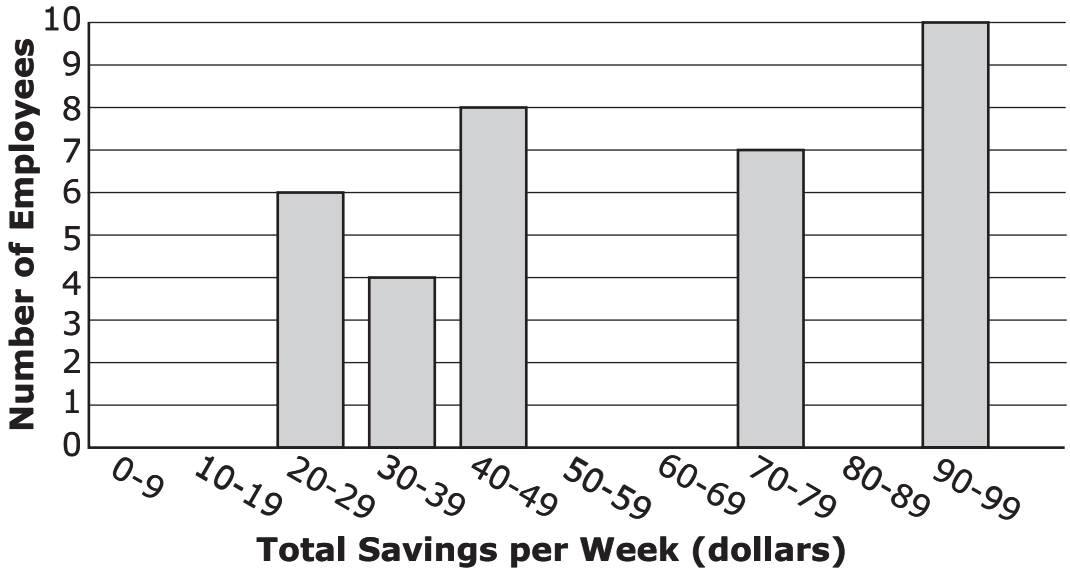
C. $30.00

D. $30.23

Item Information

Item Code:	TN948321	Grade Level:	Algebra I
Standard Code:	A1.S.ID.A.1	Position No:	23
Standard Text:	Represent single or multiple data sets with dot plots, histograms, stem plots (stem and leaf), and box plots.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

The histogram represents the amount of money employees put into a savings account.



Which data set could be represented by the histogram?

A. {25, 35, 45, 75,95}

B. {0, 0, 6, 4, 8, 0, 0, 7, 0, 10}

C. {20, 20, 20, 25, 25, 25, 30, 30, 35, 35, 40, 40, 40, 40, 45, 45, 45, 45, 70, 70, 70, 70, 70, 70, 70, 90, 90, 90, 95, 95, 95, 95, 95, 95, 95}

D. {25, 25, 25, 30, 30, 30, 35, 35, 40, 40, 45, 45, 45, 45, 50, 50, 50, 50, 75, 75, 75, 75, 75, 75, 75, 95, 95, 95, 100, 100, 100, 100, 100, 100, 100}

Item Information

Item Code:	TN348179	Grade Level:	Algebra I
Standard Code:	A1.S.ID.C.6	Position No:	24
Standard Text:	Use technology to compute and interpret the correlation coefficient of a linear fit.		
Reporting Category:	3: Functions and Interpreting Data		
Calculator:	Y		
Correct Answer:	D	DOK Level: 2	Item Type: O

Suppose the correlation coefficient between husbands' and wives' ages is found to be 0.95. What conclusion can you make about the relationship between their ages based on the correlation coefficient?

A. Ninety-five percent of husbands are older than their wives.

B. Husbands are, on average, 0.95 years older than their wives.

C. The average difference in a husband and his wife's age is 0.95.

D. The ages of husbands and their wives have a strong association.

Algebra I to Integrated Math Courses Standard Crosswalk

The Tennessee Academic Standards for Mathematics are grouped by conceptual category — not by course — to allow for two approaches. The traditional approach consists of three courses: Algebra I, Geometry, and Algebra II. The integrated approach also consists of three courses: Integrated Math I, Integrated Math II, and Integrated Math III. Both pathways include the same content standards. Across the three courses, students in the traditional pathway will study the same content as students in the integrated pathway. The two pathways will provide the same entry point and the same exit point in the content standards. Because of limitations in the item bank for integrated pathway courses, only operational items from the traditional pathway assessments can be publicly released at this time. In order to provide assessment resources applicable to both pathways, the released items from traditional pathway assessments have been linked to standards in the integrated pathways. The table below lists the released items from the designated traditional pathway course, the standards they assess in that course, and the corresponding standards in the integrated pathway courses.

Algebra 1 To Integrated Math Courses			
Sequence	Item Code	Algebra 1 Standard	Int Math Standard
1	TN514221	A1.A.APR.B.2	M3.A.APR.A.2
2	TN614281	A1.A.APR.B.2	M3.A.APR.A.2
3	TN015916	A1.A.SSE.A.1.b	M1.A.SSE.A.1b
4	TN0002775	A1.A.SSE.A.2	M2.A.SSE.A.2
5	TN015934	A1.A.SSE.A.2	M2.A.SSE.A.2
6	TN015991	A1.A.SSE.B.3.a	M2.A.SSE.B.3a
7	TN116067	A1.A.SSE.B.3.b	M2.A.SSE.B.3b
8	TN0002776	A1.A.CED.A.1	M1.A.CED.A.1
9	TN914348	A1.A.CED.A.2	M2.A.CED.A.2
10	TN914359	A1.A.CED.A.3	M1.A.CED.A.3
11	TN315596	A1.A.CED.A.4	M2.A.CED.A.3
12	TN214408	A1.A.REI.B.2	M1.A.REI.A.1
13	TN0002773	A1.A.REI.B.3.a	M2.A.REI.B.2a
14	TN615626	A1.A.REI.B.3.b	M2.A.REI.B.2b
15	TN415743	A1.A.REI.C.4	M1.A.REI.B.2
16	TN916160	A1.F.BF.B.2	M2.F.BF.B.2
17	TN0002772	A1.F.IF.B.4	M2.F.IF.A.2
18	TN553666	A1.F.IF.C.6.b	M2.F.IF.B.4b
19	TN453833	A1.F.IF.C.8	M1.F.IF.C.7
20	TN653874	A1.F.LE.A.1.b	M1.F.LE.A.1b
21	TN954070	A1.F.LE.A.3	M1.F.LE.A.3
22	TN654108	A1.F.LE.B.4	M1.F.LE.B.4
23	TN948321	A1.S.ID.A.1	M1.S.ID.A.1
24	TN348179	A1.S.ID.C.6	M1.S.ID.C.6