ALGEBRA AND FUNCTIONS

The following ten California mathematics academic content standards from the Algebra and Functions strand are assessed on the CAHSEE by 17 test questions and are represented in this booklet by 40 released test questions. These questions represent only a few of the ways in which these standards may be assessed on the CAHSEE.

GRADE 7 — ALGEBRA AND FUNCTIONS	
Standard Set 1.0	**Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:**
1.1	Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).
1.2	Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$.
1.5	Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.
Standard Set 2.0	**Students interpret and evaluate expressions involving integer powers and simple roots:**
2.1	Interpret positive whole-number powers as repeated multiplication and negative whole-number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents.
2.2	Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent.
Standard Set 3.0	**Students graph and interpret linear and some nonlinear functions:**
3.1	Graph functions of the form $y = nx^2$ and $y = nx^3$ and use in solving problems.
3.3	Graph linear functions, noting that the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know that the ratio ("rise over run") is called the slope of a graph.
3.4	Plot the values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of the line equals the quantities.
Standard Set 4.0	**Students solve simple linear equations and inequalities over the rational numbers:**
4.1	Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results.
4.2	Solve multistep problems involving rate, average speed, distance, and time or a direct variation.

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Algebra and Functions

69. Which of the following inequalities represents the statement, "A number, x, decreased by 13 is less than or equal to 39"?

A $13 - x \geq 39$

B $13 - x \leq 39$

C $x - 13 \leq 39$

D $x - 13 < 39$

M03049

70. A shopkeeper has x kilograms of tea in stock. He sells 15 kilograms and then receives a new shipment weighing $2y$ kilograms. Which expression represents the weight of the tea he now has?

A $x - 15 - 2y$

B $x + 15 + 2y$

C $x + 15 - 2y$

D $x - 15 + 2y$

M00110

71. Divide a number by 5 and add 4 to the result. The answer is 9.

Which of the following equations matches these statements?

A $4 = 9 + \dfrac{n}{5}$

B $\dfrac{n}{5} + 4 = 9$

C $\dfrac{5}{n} = 4$

D $\dfrac{n + 4}{5} = 9$

M00050

72. At a local bookstore, books that normally cost b dollars are on sale for 10 dollars off the normal price. How many dollars does it cost to buy 3 books on sale?

A $3b - 10$

B $3b + 10$

C $3(b - 10)$

D $3(b + 10)$

M10375

73. Which system of equations represents the statements below?

> The sum of two numbers is ten. One number is five times the other.

A $\begin{cases} xy = 10 \\ y = 5x \end{cases}$

B $\begin{cases} xy = 10 \\ y = x + 5 \end{cases}$

C $\begin{cases} x + y = 10 \\ y = 5x \end{cases}$

D $\begin{cases} x + y = 10 \\ y = x + 5 \end{cases}$

M25231

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Algebra and Functions

74. If $n = 2$ and $x = \dfrac{1}{2}$, then

$n(4 - x) =$

A   1

B   3

C   7

D   10

M00034

75. If $h = 3$ and $k = 4$, then

$\dfrac{hk + 4}{2} - 2 =$

A   6

B   7

C   8

D   10

M00052

76. What is the value of $\left(3 + 5^2\right) \div 4 - (x + 1)$

when $x = 7$?

A -7

B -1

C   8

D   10

M12963
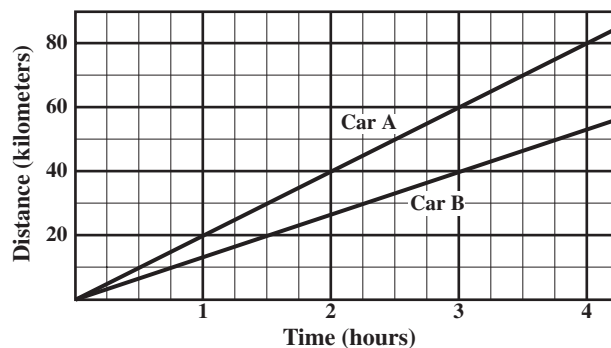
77. After three hours of travel, Car A is about how many kilometers ahead of Car B?

A   2

B   10

C   20

D   25

M00066

78. The cost of a long distance call charged by each of two telephone companies is shown on the graph below.
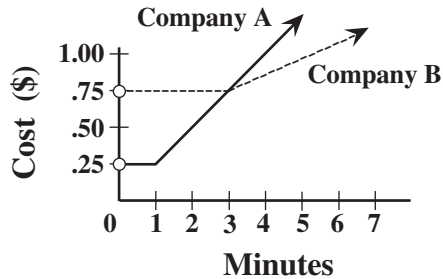
Company A is less expensive than Company B for—

A all calls.

B 3 minute calls only.

C calls less than 3 minutes.

D calls longer than 3 minutes.

M02840

79. The graph below compares the weight of an object on Earth to its weight on the Moon.

An Object's Weight on the Moon
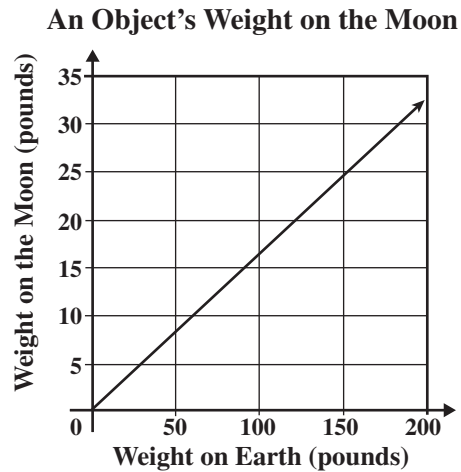
What is the approximate weight on the Moon of an astronaut who weighs 120 pounds on Earth?

A 15 pounds

B 20 pounds

C 25 pounds

D 30 pounds

M10668

— **29** —

80. Amy works as a computer consultant. She charges $30 per hour for her work. Which graph shows the relationship between the number of hours Amy works and the amount of money she charges for her work?
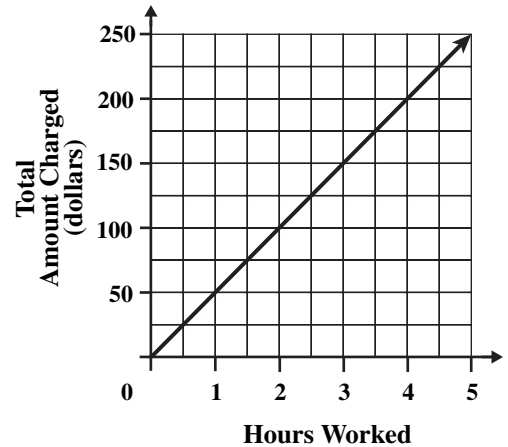
A

Total Amount Charged (dollars) vs Hours Worked

C

Total Amount Charged (dollars) vs Hours Worked

B

Total Amount Charged (dollars) vs Hours Worked

D
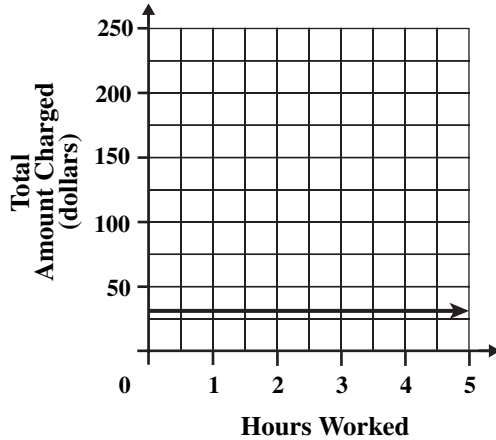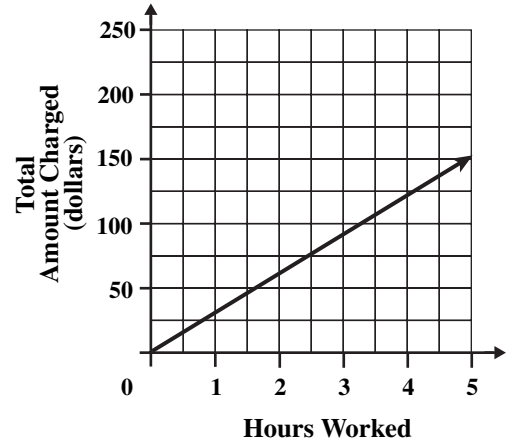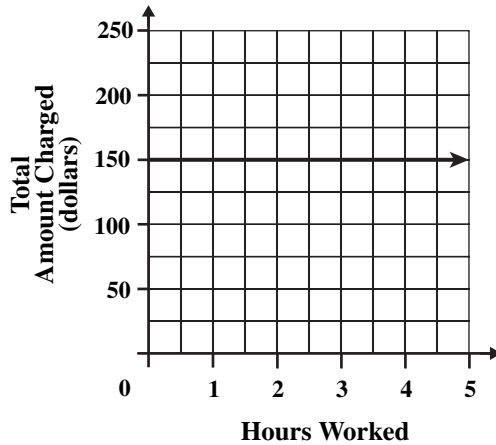
Total Amount Charged (dollars) vs Hours Worked

M21619

Algebra and Functions

81. $x^3 y^3 =$

  A $9xy$

  B $(xy)^6$

  C $3xy$

  D $xxxyyy$

M02879

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82. What does x^5 equal when $x = -2$?

  A -32

  B -10

  C $-\dfrac{1}{32}$

  D 32

M12857

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83. Which of the following is equivalent to $(6x - 2)(6x - 2)(6x + 2)$?

  A $(6x - 2)^3$

  B $(6x + 2)^3$

  C $2(6x - 2)(6x + 2)$

  D $(6x - 2)^2(6x + 2)$

M12845

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84. $\sqrt{4x^4} =$

  A 2

  B $2x$

  C $4x$

  D $2x^2$

M03067

85. Simplify the expression shown below.

$$\left(6a^4bc\right)\left(7ab^3c\right)$$

  A $13a^4b^3c$

  B $13a^5b^4c^2$

  C $42a^4b^3c$

  D $42a^5b^4c^2$

M02109

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86. Which expression is equivalent to $7a^2b \cdot 7bc^2$?

  A $14a^2b^2c^2$

  B $49a^2bc^2$

  C $49a^2b^2c^2$

  D $343a^2b^2c^2$

M12872

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87. Which expression is equal to $\sqrt{100a^2}$?

  A $10a$

  B $50a$

  C $10a^2$

  D $50a^2$

M20646

— **31** —

88. Which of the following is the graph of $y = \dfrac{1}{4}x^2$?

A

C

B

D
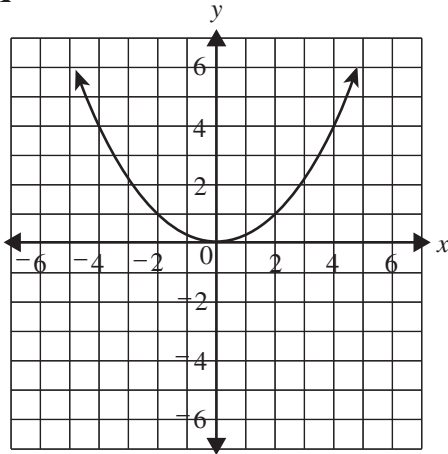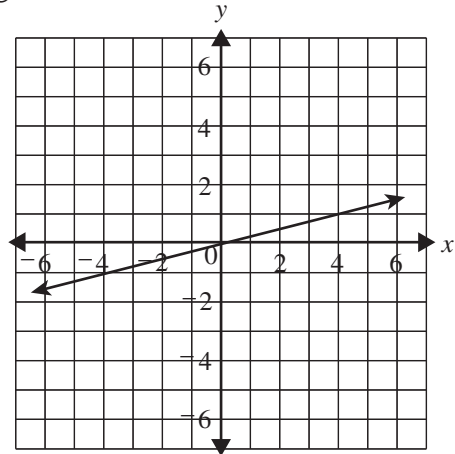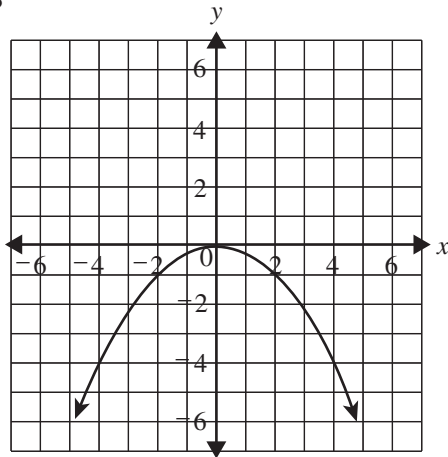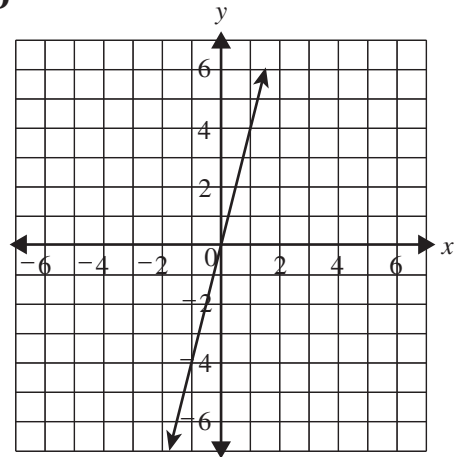
M03210

89. Which of the following could be the graph of $y = x^3$?

A
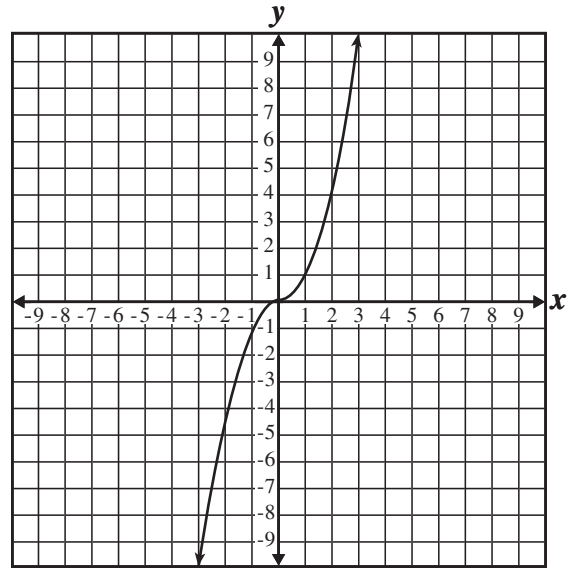

C

B

D

M02200

— **33** —
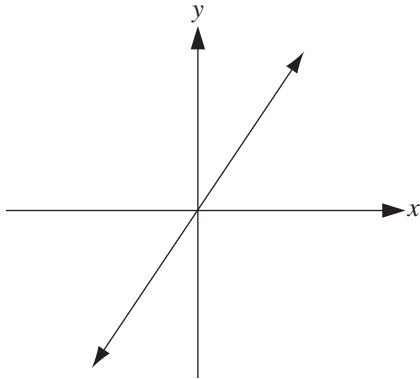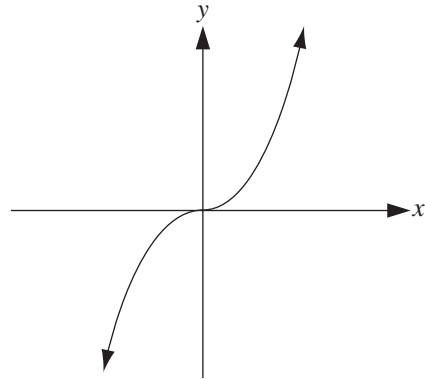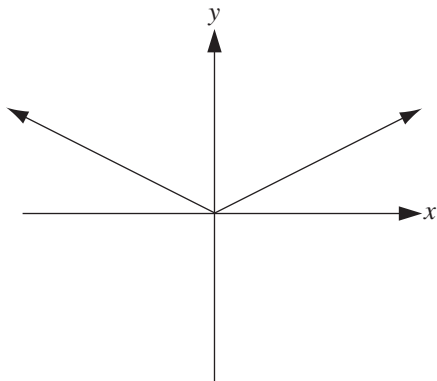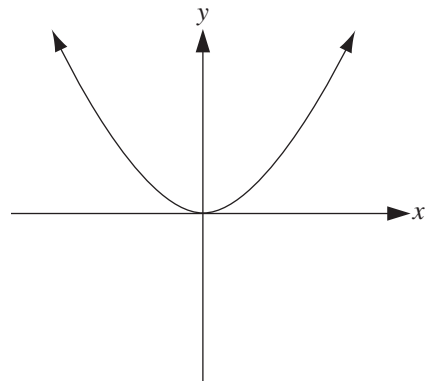
90. **Which graph represents the function** $y = -x^2$ **?**

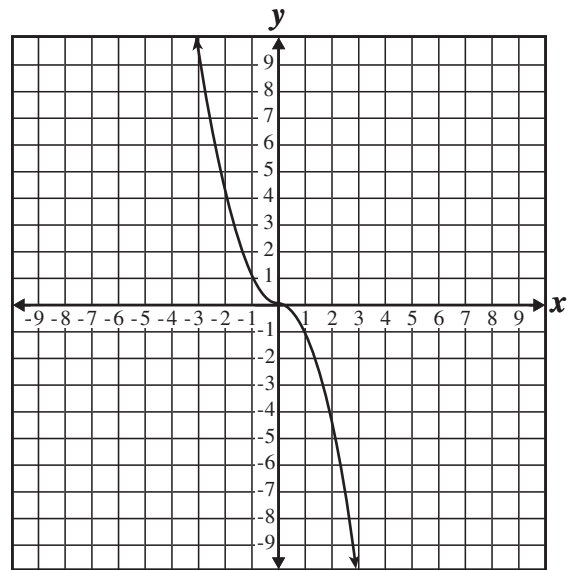A

C

B
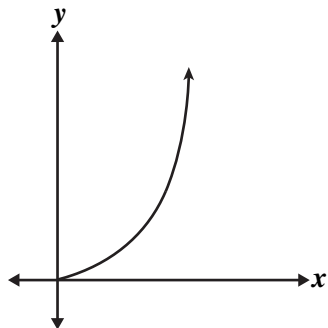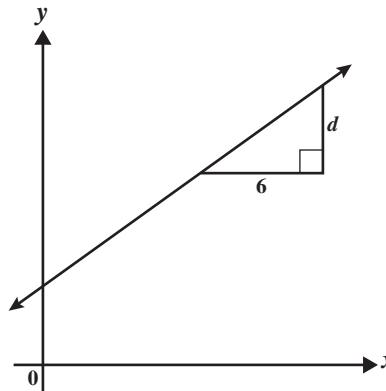

D
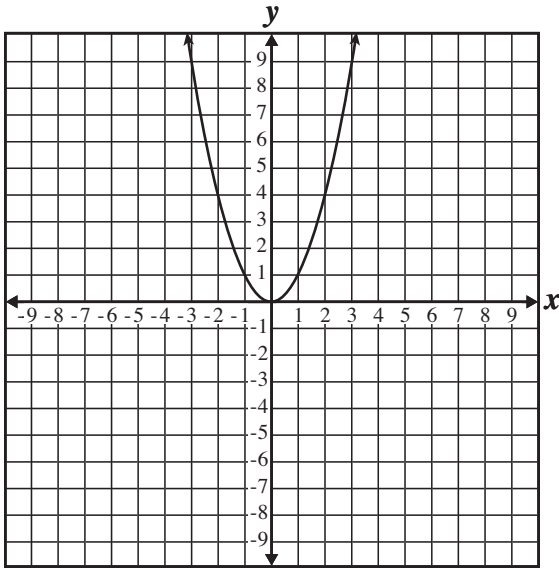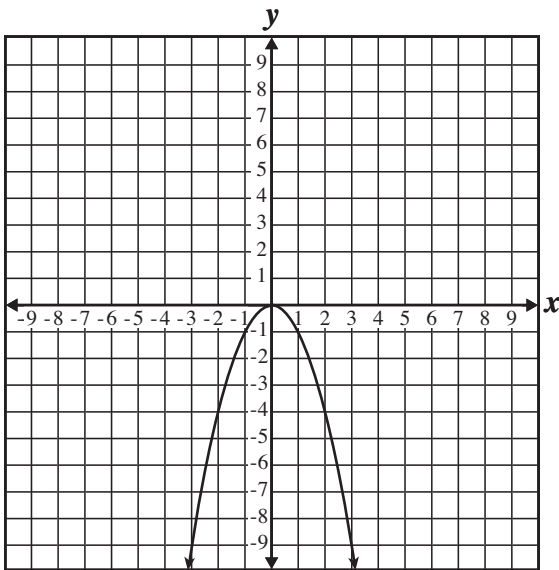
M13623

91. Which equation BEST represents the part of the graph shown below?

  A $y = 1.75x$

  B $y = 1.75x^2$

  C $y = -1.75x$

  D $y = -1.75x^2$

M10760

93. The slope of the line shown below is $\dfrac{2}{3}$.
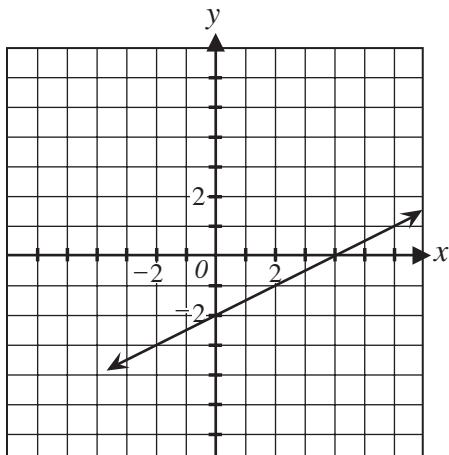

What is the value of *d*?

  A   3

  B   4

  C   6

  D   9

M02078

92. What is the slope of the line shown in the graph above?

  A -2

  B $-\dfrac{1}{2}$

  C $\dfrac{1}{2}$

  D   2

M02556

94. **What is the equation of the graph shown below?**
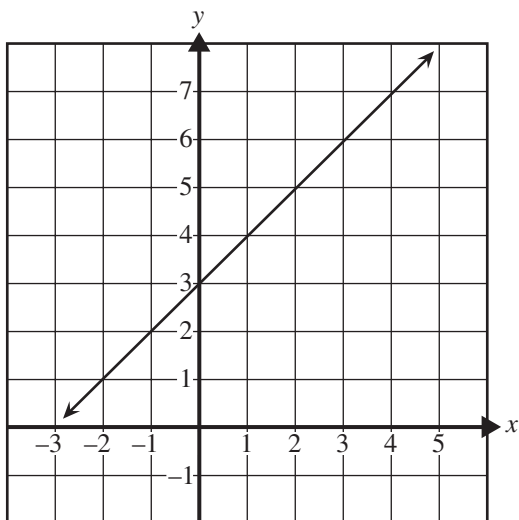
A $y = x - 1$

B $y = x + 1$

C $y = x + 3$

D $y = x - 3$

M02035

95. **What is the slope of the line below?**
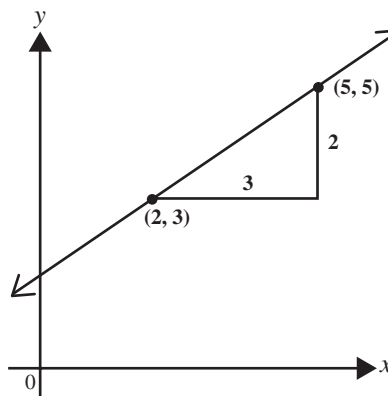
A $-\dfrac{3}{2}$

B $-\dfrac{2}{3}$

C $\dfrac{2}{3}$

D $\dfrac{3}{2}$

M02077

96. **Mario drives 1500 miles every month. Which line plot correctly represents Mario's total miles driven over a period of six months?**

A

C

B

D
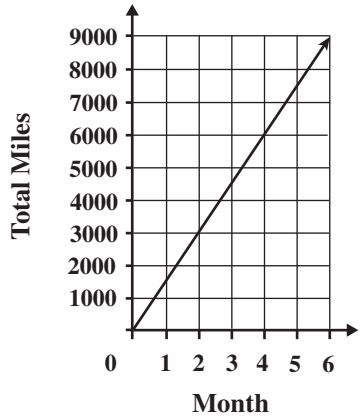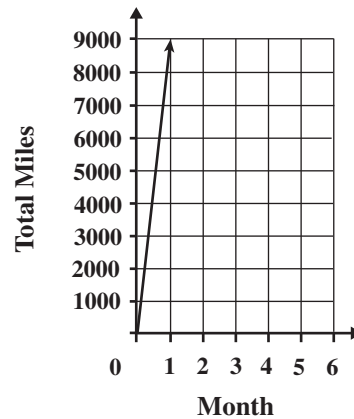
M11652

97. The graph below shows Francine's electric bill for 4 different months. What is the price per kilowatt-hour of Francine's electricity?
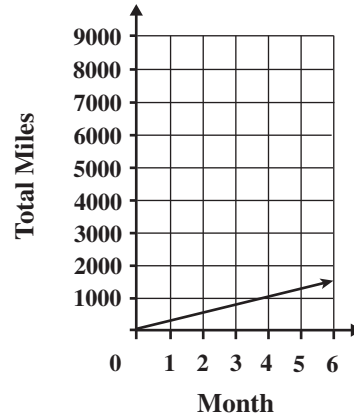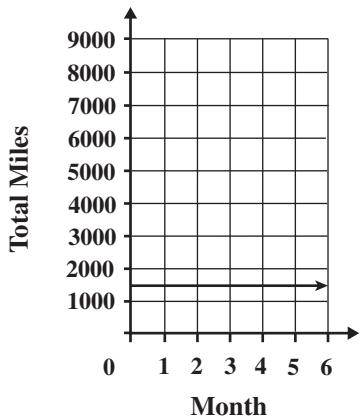
Monthly Electric Bill
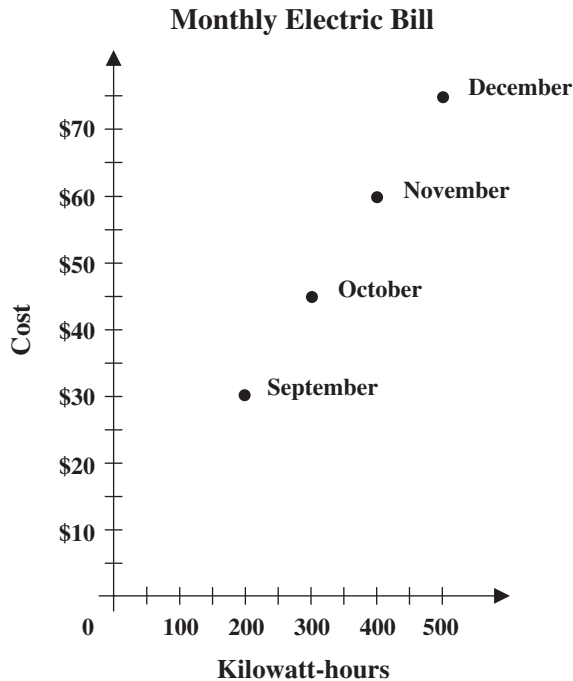
A $0.15

B $0.30

C $1.50

D $6.67

M02681

98. A grocery store sells 2 cans of soup for $1.50. If this relationship is graphed with the number of cans on the *x*-axis and the cost on the *y*-axis, what is the slope of the graph in dollars per can?

A 0.33

B 0.75

C 1.33

D 1.50

M11336

99. In the inequality $2x + \$10{,}000 \geq \$70{,}000$, *x* represents the salary of an employee in a school district. Which phrase most accurately describes the employee's salary?

A At least $30,000

B At most $30,000

C Less than $30,000

D More than $30,000

M02621

100. Solve for *x*.

$$2x - 3 = 7$$

A -5

B -2

C 2

D 5

M02771

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Algebra and Functions

101. Solve for *n*.

$$2n + 3 < 17$$

A $n < 2$

B $n < 3$

C $n < 5$

D $n < 7$

M02040

102. The owner of an apple orchard ships apples in boxes that weigh 2 kilograms (kg) when empty. The average apple weighs 0.25 kg, and the total weight of a box filled with apples is 12 kg. How many apples are packed in each box?

A 14

B 40

C 48

D 56

M10327

103. Brad bought a $6 binder and several packs of paper that cost $0.60 each. If his total was $13.20, how many packs of paper did Brad buy?

A 2

B 6

C 12

D 22

M12223

104. A piece of pipe 54 inches in length is cut into two pieces as shown in the diagram below.
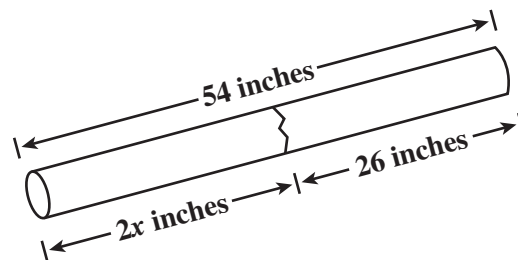
What is the value of *x*?

A 3

B 14

C 27

D 40

M12175

105. Stephanie is reading a 456-page book. During the past 7 days she has read 168 pages. If she continues reading at the same rate, how many more days will it take her to complete the book?

A 12

B 14

C 19

D 24

M00380

106. Robert's toy car travels at 40 centimeters per second (cm/sec) at high speed and 15 cm/sec at low speed. If the car travels for 15 seconds at high speed and then 30 seconds at low speed, what distance would the car have traveled?

A 1050 cm

B 1200 cm

C 1425 cm

D 2475 cm

M10748

— 39 —

107. Sara can ride her bicycle 3 miles in 15 minutes. At this rate, how many miles can she ride her bicycle in 50 minutes?

  A   5

  B   10

  C   15

  D   20

M12177

108. Lisa typed a 1000-word essay at an average rate of 20 words per minute. If she started typing at 6:20 p.m. and did not take any breaks, at what time did Lisa finish typing the essay?

  A   6:40 p.m.

  B   6:50 p.m.

  C   7:00 p.m.

  D   7:10 p.m.

M13652

Algebra and Functions

Question Number	Correct Answer	Standard	School Year of Exam
69	C	7AF1.1	2001–2002
70	D	7AF1.1	2001–2002
71	B	7AF1.1	2000–2001
72	C	7AF1.1	2005–2006
73	C	7AF1.1	2007–2008
74	C	7AF1.2	2002–2003
75	A	7AF1.2	2000–2001
76	B	7AF1.2	2006–2007
77	C	7AF1.5	2001–2002
78	C	7AF1.5	2000–2001
79	B	7AF1.5	2004–2005
80	C	7AF1.5	2005–2006
81	D	7AF2.1	2001–2002
82	A	7AF2.1	2003–2004
83	D	7AF2.1	2004–2005
84	D	7AF2.2	2001–2002
85	D	7AF2.2	2000–2001
86	C	7AF2.2	2004–2005
87	A	7AF2.2	2007–2008
88	A	7AF3.1	2002–2003
89	C	7AF3.1	2000–2001
90	B	7AF3.1	2006–2007
91	B	7AF3.1	2005–2006
92	C	7AF3.3	2001–2002
93	B	7AF3.3	2001–2002
94	C	7AF3.3	2000–2001
95	C	7AF3.3	2000–2001
96	A	7AF3.4	2006–2007
97	A	7AF3.4	2003–2004
98	B	7AF3.4	2007–2008
99	A	7AF4.1	2001–2002
100	D	7AF4.1	2001–2002
101	D	7AF4.1	2000–2001
102	B	7AF4.1	2003–2004
103	C	7AF4.1	2005–2006
104	B	7AF4.1	2007–2008
105	A	7AF4.2	2001–2002
106	A	7AF4.2	2003–2004
107	B	7AF4.2	2004–2005
108	D	7AF4.2	2006–2007