GVHS Sample Questions
for the
Algebra 1 Keystone Exam

A) Word Problems Using Systems of Equations

B) Probability and Statistics Warm-up Problems

C) Linear Functions, Domain and Range

D) Inequalities and Systems

E) Scatter Plots

F) Systems of Inequalities

G) Polynomials

H) Data Analysis

I) Radical Practice

J) Linear Equations

Practice for... Solving Systems with WP
CC 9-12 A CED.2
CC 9-12 A CED 3
CC 9-12 A REI.5
CC 9-12 A REI 12

1)	A model for the number of pounds of kiwis consumers are willing to buy, called the demand, is given by $q = -400p + 1500$, where p is the price per pound and q is the quantity in pounds. The amount of kiwis producers are willing to supply is given by $q = 200p$. Find the price for kiwis when supply and demand are equal..
2)	Owners of a coffee shop purchased 60 pounds of Guatemalan coffee beans and 90 pounds of Nicaraguan coffee beans. The total purchase price was $180. The next week they purchased 80 pounds of Guatemalan coffee and 20 pounds of Nicaraguan coffee, and the cost was $100. Write and solve a system of equations to find the cost per pound for both the Guatemalan and Nicaraguan coffee beans.
3)	A boat takes 6.5 hours to make a 70-mile trip upstream and 5 hours on the 70-mile return trip. Let v be the speed of the boat in still water, and c be the speed of the current. The upstream speed of the boat is $v - c$ and the downstream boat speed is $v + c$. **a.** Write two equations, one for the upstream part of the trip and one for the downstream part, relating boat speed, distance, and time. **b.** Solve the equations in part **a** for the speed of the current. Round your answer to the nearest tenth of a mile per hour and show your work. **c.** How long would it take the boat to travel the 70 miles if there were no current? Round your answer to the nearest minute and show your work.
4)	Students are raising money for a field trip by selling scented candles and specialty soap. The candles cost $0.75 each and will be sold for $1.75, and the soap costs $1.25 per bar and will be sold for $3.25. The students need to raise at least $200 to cover their trip costs. **a.** Write an inequality that relates the number of candles c and the number of bars of soap s to the needed income. **b.** The wholesaler can supply no more than 80 bars of soap and no more than 140 candles. Graph the inequality from part **a** and these constraints, using number of candles for the vertical axis. **c.** What does the shaded area of your graph represent?

Sam needs to make a long-distance call from a pay phone. With his prepaid phone card, he will be charged $1.00 to connect and $0.50 per minute. If he places a collect call with the operator he will be charged $3.00 to connect and $0.25 per minute. In how many minutes will the phone card and the collect call cost the same?

A 5 min

B $5\frac{1}{3}$ min

C 8 min

D 16 min

The Marathon

Bethany and Calista are sisters who both run marathons. Today they are racing against each other in the same marathon. Because there are thousands of people racing, Bethany and Calista are assigned random starting positions. Bethany starts at the starting line, while Calista starts a half-mile behind the starting line.

Calista runs one mile in 12 minutes, while Bethany runs one mile in 15 minutes. So, although Calista starts behind Bethany, she hopes to pass her sister at some point during the race.

Let x represent the amount of time in hours that Bethany or Calista run and let y represent distance after the starting line in miles.
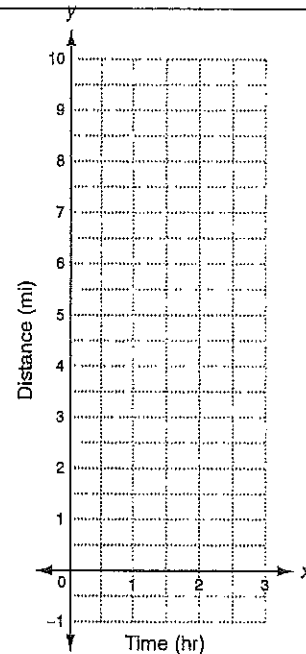
1. The rate or speed at which someone runs is frequently stated in miles per hour.

    a. What is Bethany's speed in miles per hour? _____

    b. What is Calista's speed in miles per hour? _____

2. Write a linear equation in slope-intercept form that describes...

    a. Bethany's distance as a function of time. _____

    b. Calista's distance as a function of time. _____

3. On the grid above, graph the system of equations that you wrote for question 2.

4. Use your graph to estimate...

    a. who is in the lead after 15 minutes (0.25 hour). _____

    b. the time when Calista will catch up to Bethany. _____

    c. how far after the starting line the sisters catch up to each other. _____

    d. who is in the lead after 2 hours if each sister keeps running at a steady pace. _____

5. Use substitution or elimination to solve the system of equations that you wrote for question 2. Interpret the solution in terms of this problem.

    _____

6. A marathon is 26.2 miles. Which sister do you think will cross the finish line first? Explain. _____

    _____
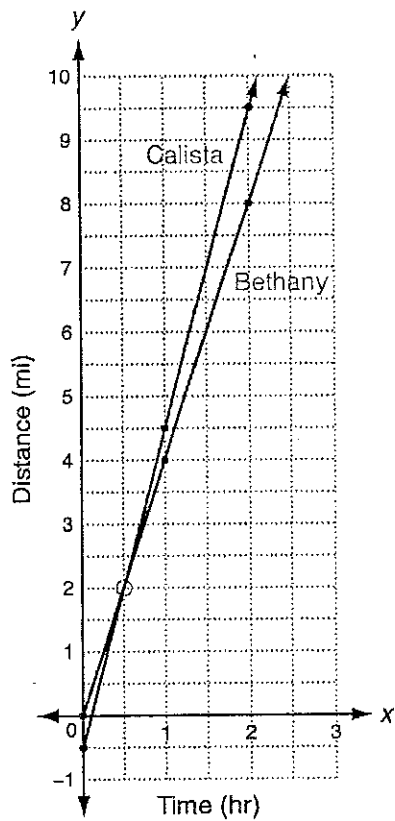
4. Bethany; 0.5 hr; 2 mi; Calista

5. (0.5, 2); After 0.5 hr, Calista catches up with Bethany 2 mi after the starting line.

6. Calista; On the graph, Calista's line is above Bethany's for every time past 0.5 hr, so Calista will always be ahead of Bethany after the first half-hour and will cross the finish line first.
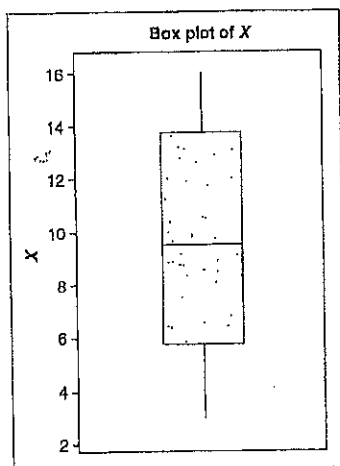
B

Keystone Probability and Statistics Warm-up Problems

1. Which of the following best describes the shape of this distribution?
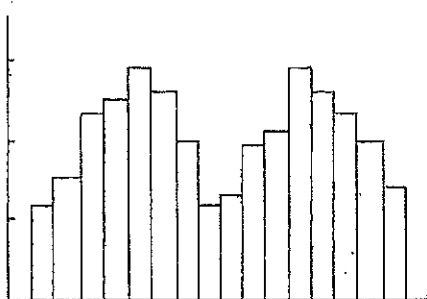
A. Normal   B. Bimodal   C. Skewed right   D. Skewed left   E. Uniform

2. Which of the following five-number summaries represents the box-and-whiskers plot below?

A. Min: 4; Q_1: 5.75; Med: 9.5; Q_3: 13.75; Max: 16; IQR: 8
B. Min: 3; Q_1: 5.75; Med: 10.5; Q_3: 13.75; Max: 16; IQR: 8
C. Min: 3; Q_1: 5.75; Med: 9.5; Q_3: 13.75; Max: 15; IQR: 8
D. Min: 3; Q_1: 5.75; Med: 9.5; Q_3: 13.75; Max: 16; IQR: 8
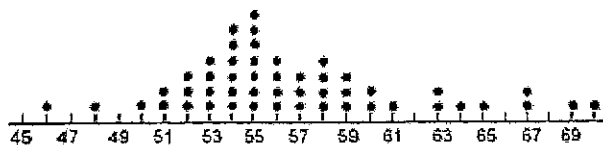E. Min: 3; Q_1: 5.75; Med: 9.5; Q_3: 13.75; Max: 16; IQR: 9

3. What is the probability that you and someone else in the classroom would choose the same number if asked to pick a number between 1 and 20?

A. 0.5   B. 0.05   C. 0.0025   D. 0.053   E. 0.005

4. What is the probability of rolling at least one 6 on a pair of dice?

A. 11/36   B. 1/3   C. 1/6   D. 1/15   E. 1/16
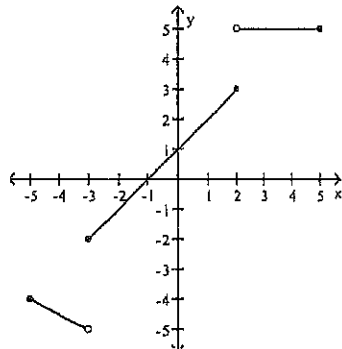
5. Find the mode and median in the following dot-plot:

C

<u>Keystone Practice Questions: Linear Functions, Domain and Range</u> .

1) The graph of a function is shown below:

Which value is not in the range?

A) -3   B) -1   C) 2   D) 5

2) The annual cost for tuition and fees at a four year college increased each of the four years you attended the school. The tuition and fees for each year were as follows: $5991, $6491, $6991, $7491.

The tuition and fees follow a pattern. Which expression can be used to determine the cost of tuition and fees for the number of years (n) you attended the college.

A) 5991n   B) 5491n + 500   C) 500n + 5491   D) 500(n + 5491)

3) A cleaning service charges an hourly fee plus a fixed starting price. The cost (C) in dollars to clean your house for a number of hours (h) is described by the function: $C = 10h + 50$.

Which statement is true?

A) The cost to clean your house for 2 hours is $60.

B) The cost to clean your house for 6 hours is $100.

C) Each hour costs $10 and the fixed starting price is $50.

D) Each hour costs $50 and the fixed starting price is $10.

4) Which graph shows y as a function of x?
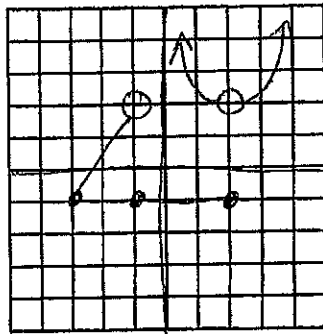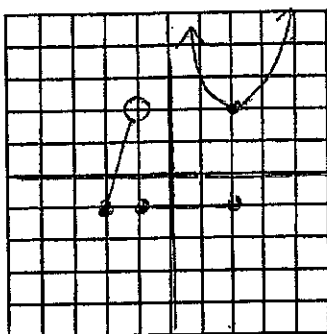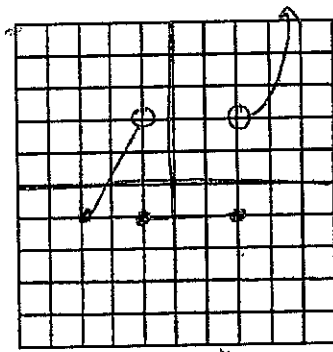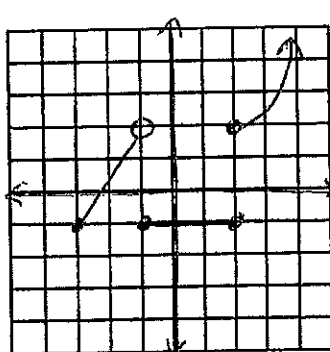
5) The table shows the amount of water y in a tank after x minutes have elapsed.

x (minutes)	2	4	6	8
y (gallons)	80	60	40	20

A) Write an equation to find the amount of water (y) in gallons after a given number of minutes (x).

B) Is water entering or leaving the tank?

C) How much water is in the tank after 3 minutes?

D) Find the slope and interpret its meaning.

E) Find the x-intercept and y-intercept and interpret their meaning.

D

1. Vu has $10 and earns $8 per hour tutoring.

a) Write an equation to model Vu's money (m)

b) After how many tutoring hours will Vu have $106?

Albert has $9 and makes $14 per hour tutoring.

c) Writ e an equation to model Albert's money (m)

d) Using the equations written in a) and c) use the system of linear systems to find the number of hours of tutoring after which Vu and Albert will have the same amount of money.

The height of 1 cup is 5 inches. The height of 4 stacked cups is 12 inches.

2.

5 inches   12 inches
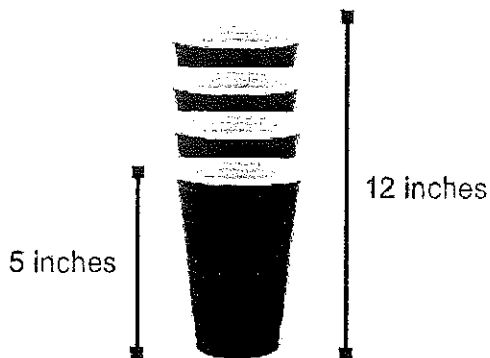
a. Write an equation using x and y to find the height of a stack of cups based on any number of cups.
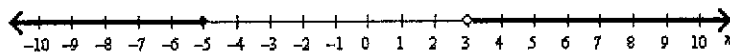
b. Describe what the x and the y variables represent.

c. What is the height in inches of as stack of 12 cups?

3. Write the compound inequality that models the given situation.

Tyler works at Chik-Fil-A and earns $7.50 per hour. His paycheck from week to week is no less than $150 and no more than $225.

4. Write the compound inequality shown by the given graph below.

5. The math club has $600 to spend on supplies. The club spend $115 on a TI-84 silver edition. New pocket protectors cost $5 each. The inequality $115 + 5p \le 600$ can be used to determine the number of new pocket protectors (p) that the club can purchase. Which statement about the number of pocket protectors that can be purchased is true?
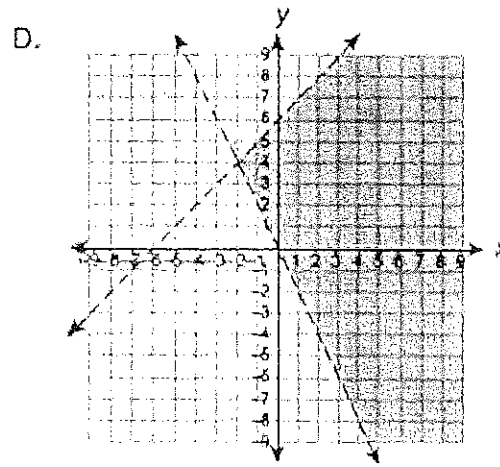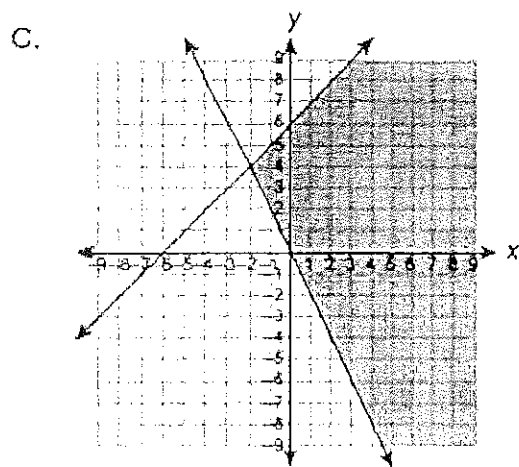
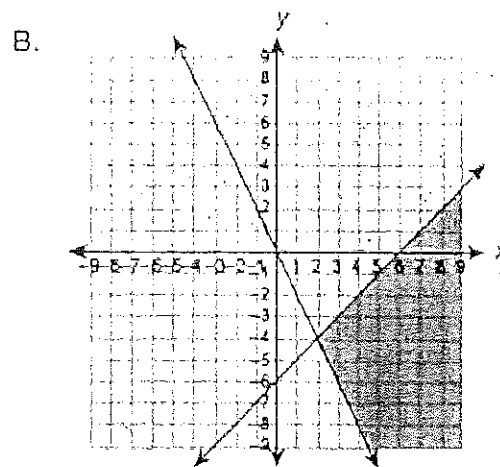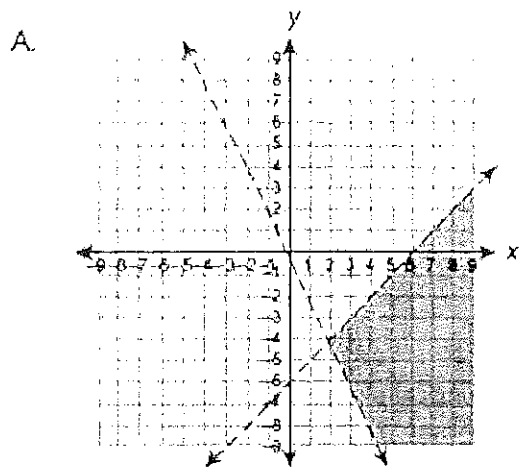A. The team can purchase 97 pocket protectors

B. The minimum number of pocket protectors that can be purchased is 115.

C. The maximum number of new pocket protectors that can be purchased is 115.

D. The math club can purchase 115 new pocket protectors, but this number is neither the maximum or

    the minimum.

F

1. A system of inequalities is shown below.

$$y < x - 6$$
$$y > -2x$$

A.

B.

C.

D.

2. Mr. Andretti always drives between 45 and 60 miles per hour on his commute. The distance he travels can be represented in the system of inequalities below, where x is the number of minutes he drives and y is the number of miles he has driven.

$$y > 0.75x$$
$$y < x$$

Which of the following is a true statement?

A. When the number of minutes he's driven (x) is 60, the miles he has driven (y) is between 15 and 60.
B. When the number of minutes he's driven (x) is 40, the miles he has driven (y) is between 30 and 40.
C. When the number of miles he's driven (y) is 24, the time he has driven (x) is between 24 and 32.
D. When the number of miles he's driven (y) is 36, the time he has driven (x) is between 27 and 36.

3. Graph the solution set to $-2x + 7 \leq 4x + 13$ on the number line.

4. Graph the solution set to $0 < 2x + 6 \leq 10$ on the number line below.
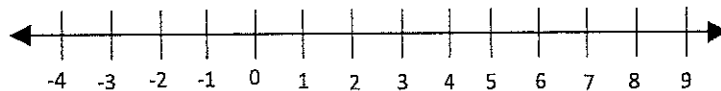
5. Giuseppe correctly graphed an inequality on the number line as shown below.
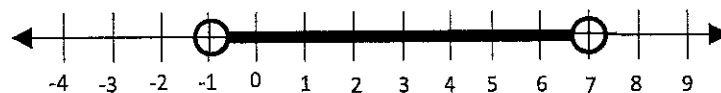
The inequality Giuseppe graphed was in the form $-10 < \underline{\quad ? \quad} < 6$.

What is an expression that can be put in place of the question mark so that the inequality would have the same solution set as shown on the graph?

G

Polynomials

1) A Halloween attraction charges $52 for each day pass and $95 for each night pass. Last October, 86 day passes were sold and 1,245 night passes were sold. What is the **closest estimate** of the total amount of money paid for the passes last October?

   A. $120,000
   B. $130,000
   C. $140,000
   D. $150,000

2) A polynomial expression is shown below.

$$\left(mx^3 - 1 \right)\left(2x^6 + 3x^3 + 2 \right) - \left(6x^9 + 4x^3 \right)$$

   The expression is simplified to $7x^6 - x^3 - 2$. What is the value of m?

   A. -6
   B. -3
   C. 3
   D. 6

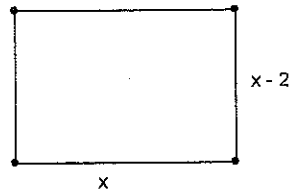3) When the expression $x^4 - x^2 - 12$ is factored completely, which is one of its factors?

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

4) Simplify $\dfrac{-2x^3 + 4x^2 + 16x}{-2x^3 + 18x^2 - 40x}, x \neq 0, 4, 5$

   A. $\dfrac{2}{9}x^2 - \dfrac{2}{5}x$

   B. $x^3 + \dfrac{2}{9}x^2 - \dfrac{2}{5}x$

   C. $\dfrac{x+4}{x-5} \quad \dfrac{x-2}{x-4}$

   D. $\dfrac{x+2}{x-5}$

5) Shawn creates a rectangular garden with a width that is 2 meters shorter than its length, as shown below.

A. Write a polynomial expression, in simplified form, that represents the area of the garden.

B. Shawn adds a fence 3 feet from the edges of the garden. Write a polynomial expression, in simplified form, that represents the **total area** enclosed by the fence.

C. Shawn is unhappy with his fence, so he decides to put a fence with a different distance from the garden around the garden. The total area of the new fence and garden is $x^2 + 6x + 8$. Determine the new distance. Show all work. Explain why you did each step.

Keystone Practice – Data Analysis
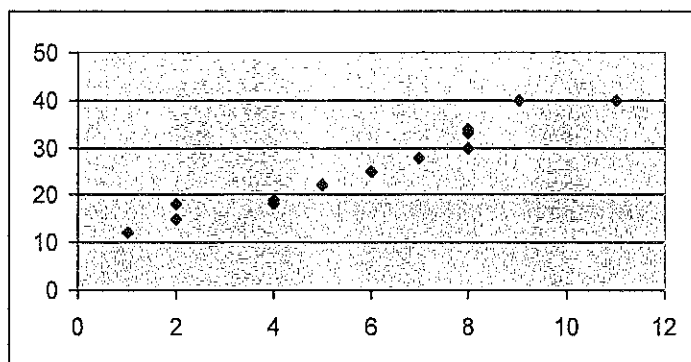
1) Which regression equation **best fits** the above data?

A) $y = \frac{1}{2}x + 5$ B) $y = \frac{1}{2}x + 10$ C) $y = \frac{5}{2}x + 10$ D) $y = \frac{5}{2}x + 15$

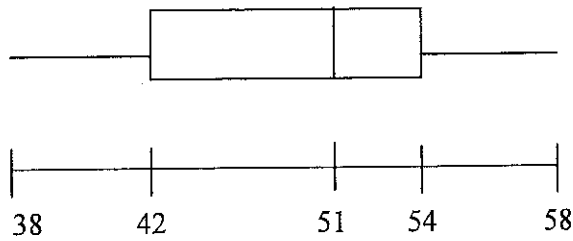| Year	Number of Calculators Sold (in millions)
1995	432
1996	446
1997	460
1998	474

2) The above relationship is linear. Predict the number of calculators sold in 2012.

A) 642
B) 656
C) 670
D) 684

38   42   51   54   58

3) Using the above box and whisker, what is the median for the data?

    A) 51
    B) 20
    C) 48
    D) 58

4) Using the above box and whisker, what is the best estimate of the percentage of the data less than 42?

    A) 10%
    B) 25%
    C) 33%
    D) 50%

1	3,4,7
2	0,0,0,3,6
3	6,6,8,9
4	3,5,9
5	2,3,8

5) What is the range for the above stem and leaf?

    A) 20
    B) 36
    C) 45
    D) 58

I

Radical Practice

For the expression: $\sqrt{5x}$, what value of x should the expression be further simplified?

a. $x = 2$

b. $x = 10$

c. $x = 11$

d. $x = 13$

For the expression: $\sqrt{34x}$, what value of x should the expression be further simplified?

a. $x = 5$

b. $x = 7$

c. $x = 13$

d. $x = 17$

Find the least common multiple (LCM) for the two polynomials that follow.

$300ab^2c$ $500a^2bc^3$

a. $100abc$

b. $100a^2b^2c$

c. $100a^3b^3c^4$

d. $1500abc$

e. $1500a^2b^2c^3$

Find the least common multiple (LCM) for the two polynomials that follow.

$108xy^2$ $27xyz$

a. $27xy$

b. $108xyz$

c. $108xy^2z$

d. $2916xyz$

e. $2916x^2y^3z$

For the expression $5\sqrt{7x}$,which value of x makes the expression equivalent to $15\sqrt{21}$.

a. $x = 3$

b. $x = 9$

c. $x = 27$

d. $x = 225$

For the expression $3\sqrt{38x}$, which value of x makes the expression equivalent to $6\sqrt{19}$.

a. $x = \dfrac{1}{2}$

b. $x = 2$

c. $x = 3$

d. $x = 6$

Simplify $3\left(3\sqrt{27}\right)^{-1}$.

a. $-243\sqrt{3}$

b. $-54\sqrt{3}$

c. $\dfrac{\sqrt{3}}{3}$

d. $\dfrac{\sqrt{3}}{9}$

Simplify $4\left(2\sqrt{16}\right)^{-2}$.

a. -256

b. $-\dfrac{1}{64}$

c. $\dfrac{1}{32}$

d. $\dfrac{1}{16}$

Linear Equations

J

You are driving home from the football stadium. After traveling 12 miles, you begin to record your distance driven (d), in miles, after m minutes. The results are in the table below.

Distance by Minute

| Time in minutes (m)	Distance in miles (d)
0	12
5	15
10	18
15	21

The pattern continues until you arrive at home.

A. Write an equation to find your distance traveled (d), in miles, after a given number of minutes (m).

B. You also keep track of the remaining gasoline. The equation shown below can be used to find the gallons of gasoline remaining (g) based on your distance from home (d) in miles.

$$g = 15 - \frac{1}{15}d$$

Distance traveled (d)	Gallons of Gasoline Remaining (g)
24	
27	
30	

C. Draw the graph of the line formed by the points in the table from Part B.

Gasoline Remaining by Mile
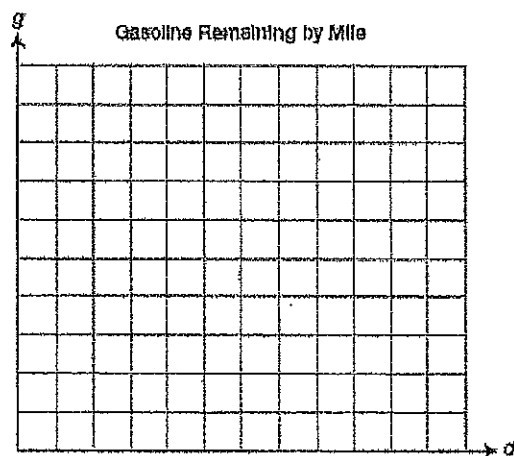
D. Explain why the slope of the line drawn in Part C must be negative.

Mike's Pizza sells large pizzas. The amount charged for each large pizza (p) is based on the cost of the pizza plain plus an additional charge for each topping (t). This is represented by the equation below.

$$p = 7 + 0.75t$$

What does the number 0.75 represent in the equation?

   A. The number of toppings
   B. The cost of the plain pizza (no toppings)
   C. The additional cost for each topping
   D. The cost of the pizza with one topping

A graph of a linear equation is shown below.
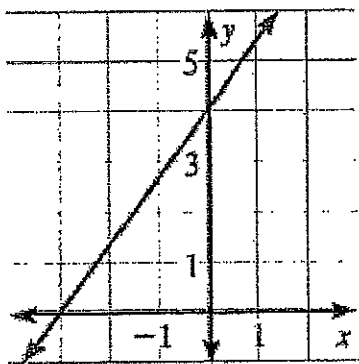
Which equation describes the graph?

   A. $y = \dfrac{4}{3}x - 3$

   B. $y = \dfrac{3}{4}x + 4$

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

   D. $y = \dfrac{3}{4}x - 3$

Last weekend, Sally and her neighborhood friends set up a lemonade stand. Sally's mom gave the kids a small donation to help out, but the rest of their money was earned from selling cups of lemonade.

Cups of Lemonade Sold	Total Money ($)
10	22
15	24.50
20	27
25	29.50

A. Write a linear equation, in slope-intercept form, to represent the total amount of money made at the lemonade stand (y) based on the number of cups sold (x).

B. How much does each cup of lemonade cost? What part of the equation tells you this?

C. How many cups of lemonade need to be sold in order to have a total of $45 earned?

D. How much money did Sally's mom give the kids before they began selling the lemonade? What part of the equation tells you this?