Name:_____

Test 5: Unit 7, 8, & 9 Constructed Response

MODULE 1 — Operations and Linear Equations & Inequalities

ASSESSMENT ANCHOR
A1.1.2   Linear Equations

Sample Exam Questions

Standard A1.1.2

Nolan has $15.00, and he earns $6.00 an hour babysitting. The equation below can be used to determine how much money in dollars (m) Nolan has after any number of hours of babysitting (h).

$$m = 6h + 15$$

A. After how many hours of babysitting will Nolan have $51.00?

hours: _____

Claire has $9.00. She makes $8.00 an hour babysitting.

B. Use the system of linear equations below to find the number of hours of babysitting after which Nolan and Claire will have the same amount of money.
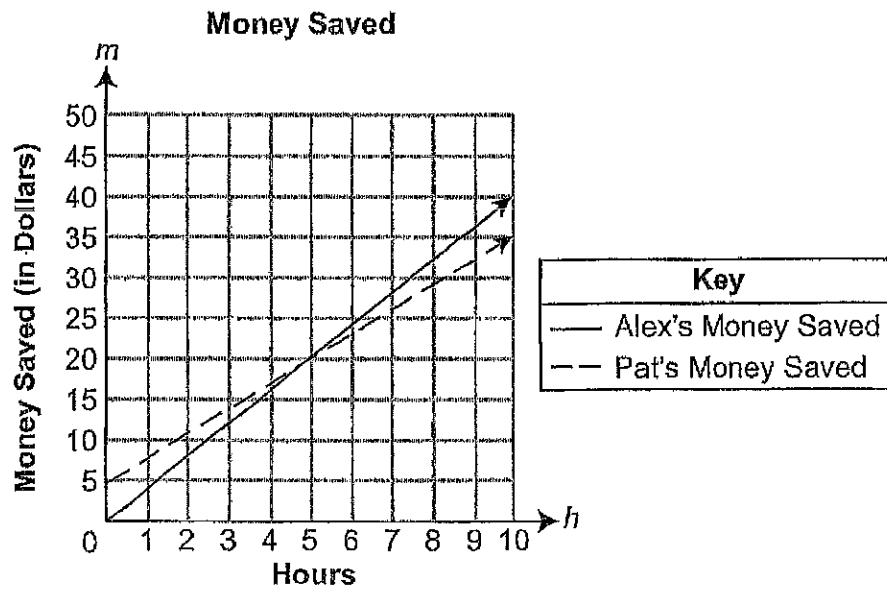
$$m = 6h + 15$$

$$m = 8h + 9$$

hours: _____

MODULE 1—Operations and Linear Equations & Inequalities

Continued. Please refer to the previous page for task explanation.

The graph below displays the amount of money Alex and Pat will each have saved after their hours of babysitting.

Money Saved

Key
—— Alex's Money Saved
– – Pat's Money Saved

C. Based on the graph, for what domain (*h*) will Alex have more money saved than Pat? Explain your reasoning.
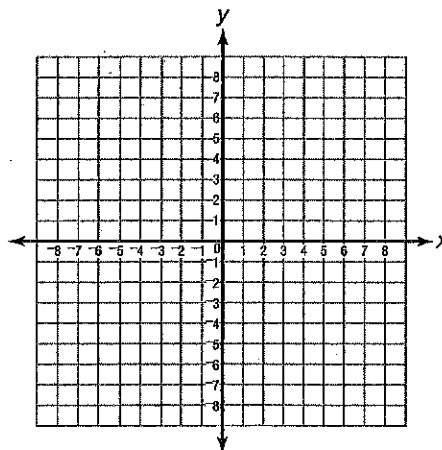
26. Here is a system of equations:

$$x + 4y = {}^-4$$

$$2x + 8y = 5$$

A. Solve this system by using elimination. Explain what your answer means.

_____

_____

B. Graph this system of equations.


C. Explain how the graph of the system relates to your answer to **Part A.**

_____

_____

16. Mr. Krasa shipped a box of math textbooks and novels to a colleague. Each math book weighed 2.5 pounds, and each novel weighed 1.25 pounds. There were a total of 18 books, with a total weight of 31.25 pounds.

A. Write a system of equations that models this scenario. Identify your variables.

B. Graph your system of equations on the coordinate grid. Let the horizontal axis represent the number of math books and let the vertical axis represent the number of novels.
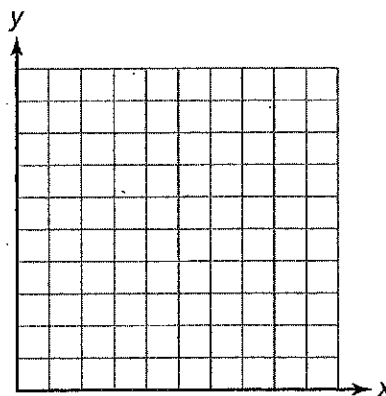
C. Describe two ways you can find the number of each type of book that Mr. Krasa shipped.

D. How many of each type of book was in the shipment?

25. Michael is playing a game. He has 12 points already and will earn 3 points for every goal he makes. The equation below represents the total points (p) he will earn, based on the number of goals (g) he makes.

$$p = 3g + 12$$

A. How many goals does Michael need to make to have a **total** of 66 points?

_____ points

Kensley earned enough points in the last game so that for every goal she makes, she will earn 4 points. She has 8 points at the end of the first round. Her total can be represented by $p = 4g + 8$.

B. Write and solve a system of equations that will show the number of goals that Kensley and Michael need to make to have the same **total number of points.**

_____

_____

_____

C. At how many goals will Kensley begin to outscore Michael?

_____

2.

Use the inequality $y < ^{-}3x + 4$ to complete the following sections.

A. Graph the inequality $y < ^{-}3x + 4$ on the coordinate plane below. Show all your work and explain why you did each step.
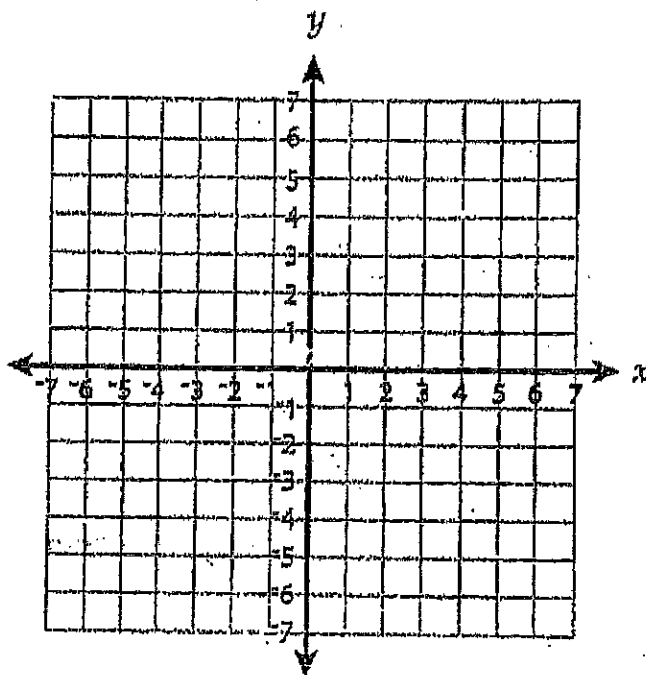
B. Explain how you could use your graph from part A to determine if the ordered pair (1, ⁻6) is a solution of the inequality.

C. Determine, using algebra, if the ordered pair (1, 6) is a solution of the inequality.
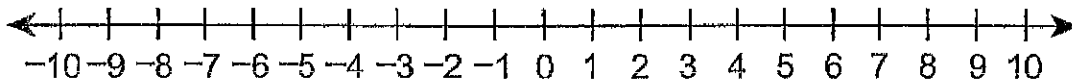
MODULE 1—Operations and Linear Equations & Inequalities

Standard A1.1.3

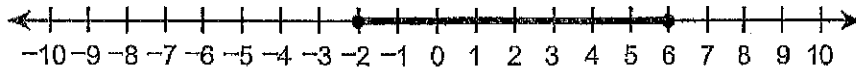David is solving problems with inequalities.

One of David's problems is to graph the solution set of an inequality.

A. Graph the solution set to the inequality $4x + 3 < 7x - 9$ on the number line below.

$$\longleftarrow \overset{|}{\underset{-10}{}}\ \overset{|}{\underset{-9}{}}\ \overset{|}{\underset{-8}{}}\ \overset{|}{\underset{-7}{}}\ \overset{|}{\underset{-6}{}}\ \overset{|}{\underset{-5}{}}\ \overset{|}{\underset{-4}{}}\ \overset{|}{\underset{-3}{}}\ \overset{|}{\underset{-2}{}}\ \overset{|}{\underset{-1}{}}\ \overset{|}{\underset{0}{}}\ \overset{|}{\underset{1}{}}\ \overset{|}{\underset{2}{}}\ \overset{|}{\underset{3}{}}\ \overset{|}{\underset{4}{}}\ \overset{|}{\underset{5}{}}\ \overset{|}{\underset{6}{}}\ \overset{|}{\underset{7}{}}\ \overset{|}{\underset{8}{}}\ \overset{|}{\underset{9}{}}\ \overset{|}{\underset{10}{}}\longrightarrow$$

David correctly graphed an inequality as shown below.

$$\longleftarrow \overset{|}{\underset{-10}{}}\ \overset{|}{\underset{-9}{}}\ \overset{|}{\underset{-8}{}}\ \overset{|}{\underset{-7}{}}\ \overset{|}{\underset{-6}{}}\ \overset{|}{\underset{-5}{}}\ \overset{|}{\underset{-4}{}}\ \overset{|}{\underset{-3}{}}\ \overset{|}{\underset{-2}{}}\ \overset{\bullet}{\underset{-1}{}}\ \overset{\bullet}{\underset{0}{}}\ \overset{\bullet}{\underset{1}{}}\ \overset{\bullet}{\underset{2}{}}\ \overset{\bullet}{\underset{3}{}}\ \overset{\bullet}{\underset{4}{}}\ \overset{\bullet}{\underset{5}{}}\ \overset{\bullet}{\underset{6}{}}\ \overset{|}{\underset{7}{}}\ \overset{|}{\underset{8}{}}\ \overset{|}{\underset{9}{}}\ \overset{|}{\underset{10}{}}\longrightarrow$$

The inequality David graphed was written in the form $7 \le \underline{\quad ? \quad} \le 9$.

B. What is an expression that could be put in place of the question mark so that the inequality would have the same solution set as shown in the graph?
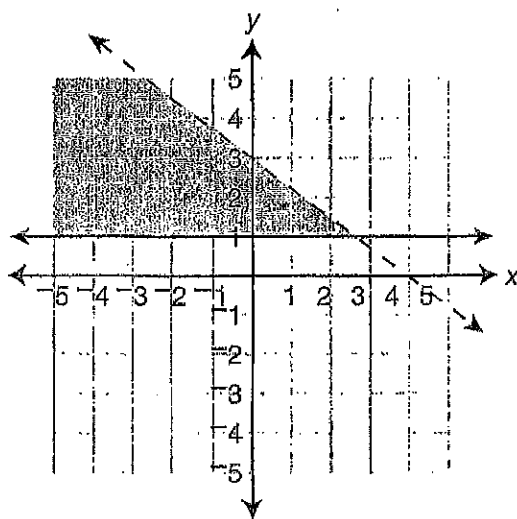
$7 \le \underline{\hspace{3cm}} \le 9$

MODULE 1—Operations and Linear Equations & Inequalities

Continued. Please refer to the previous page for task explanation.

The solution set to a system of linear inequalities is graphed below.

C. Write a system of 2 linear inequalities which would have the solution set shown in the graph.

linear inequality 1: _____

linear inequality 2: _____

MODULE 1 — Operations and Linear Equations & Inequalities

ASSESSMENT ANCHOR
A1.1.3   Linear Inequalities

Sample Exam Questions
Standard A1.1.3

An apple farm owner is deciding how to use each day's harvest. She can use the harvest to produce apple juice or apple butter. The information she uses to make the decision is listed below.

- A bushel of apples will make 16 quarts of apple juice.
- A bushel of apples will make 20 pints of apple butter.
- The apple farm can produce **no more than** 180 pints of apple butter each day.
- The apple farm harvests **no more than** 15 bushels of apples each day.

The information given can be modeled with a system of inequalities. When x is the number of quarts of apple juice and y is number of pints of apple butter, two of the inequalities that model the situation are $x \geq 0$ and $y \geq 0$.

A.   Write 2 more inequalities to complete the system of inequalities modeling the information.

inequalities: _____   _____

B.   Graph the solution set of the inequalities from **part A** below. Shade the area that represents the solution set.
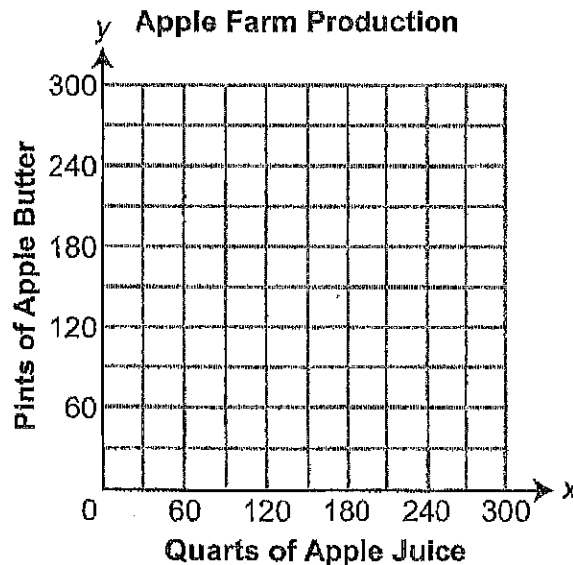
Apple Farm Production

(y-axis: Pints of Apple Butter — 60, 120, 180, 240, 300)
(x-axis: Quarts of Apple Juice — 0, 60, 120, 180, 240, 300)

MODULE 1—Operations and Linear Equations & Inequalities

Continued. Please refer to the previous page for task explanation.

The apple farm makes a profit of $2.25 on each pint of apple butter and $2.50 on each quart of apple juice.

C.   Explain how you can be certain the maximum profit will be realized when the apple farm produces 96 quarts of apple juice and 180 pints of apple butter.

27. Solve these problems involving inequalities.

A. Solve this inequality for a: $6(3 - a) < {}^-4(2a + 2)$

B. Graph your solution to **Part A** on the number line.
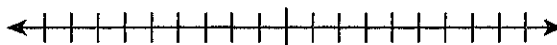
C. Graph the following system on the coordinate plane.

$$y \geq {}^-2x - 4$$

$$y < x + 3$$

STOP
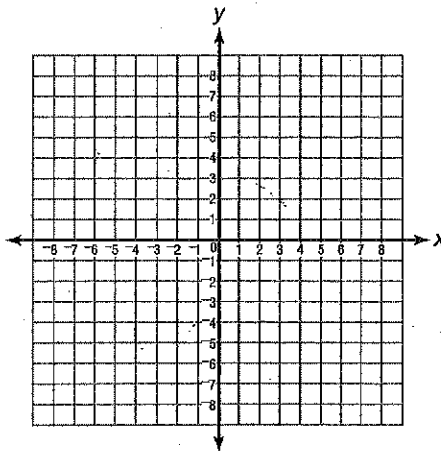
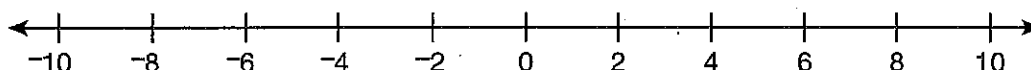**27.** Solve the following problems involving inequalities.

A. Solve this inequality and graph the solution set on the number line.

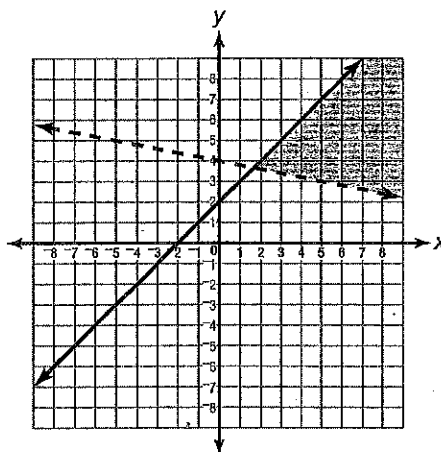$$3(x - 5) - 8x \geq 10x + 75$$
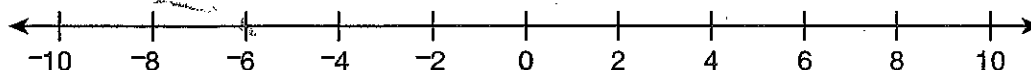
B. Solve this compound inequality and graph the solution set on the number line.

$$-7 \leq 2x + 9 < 15$$

C. A solution set for a system of inequalities is graphed on the coordinate plane below.

Write the system of linear inequalities that has this solution set.

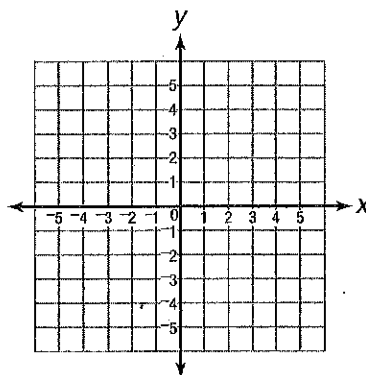inequality 1: _____

inequality 2: _____

STOP

16. A relation is described as follows: each output value (y) is the product of the input value (x) and 2.

A. Complete the table for this relation.

x	-2	-1	0	1
y				

B. Is the relation a function? Explain.

_____

_____

_____

C. Graph this relation on the coordinate grid, not only for the values in the table, but for **all** values in the domain that correspond to the points on this grid.

D. Write an equation that represents this relation.

_____

_____

_____

MODULE 2—Linear Functions and Data Organizations

Standard A1.2.2

Ahava is traveling on a train.

The train is going at a constant speed of 80 miles per hour.

A. How many hours will it take for the train to travel 1,120 miles?

hours: _____

Ahava also considered taking an airplane. The airplane can travel the same 1,120 miles in 12 hours less time than the train.

**B.** What is the speed of the airplane in miles per hour (mph)?

speed of the airplaine: _____ mph

Continued. Please refer to the previous page for task explanation.

Ahava is very concerned about the environment. The graph below displays the carbon dioxide (CO_2), in metric tons, for each traveler on an airplane and each traveler on a train.

Carbon Footprint

Key	
——	Traveler on an airplane
- - -	Traveler on a train
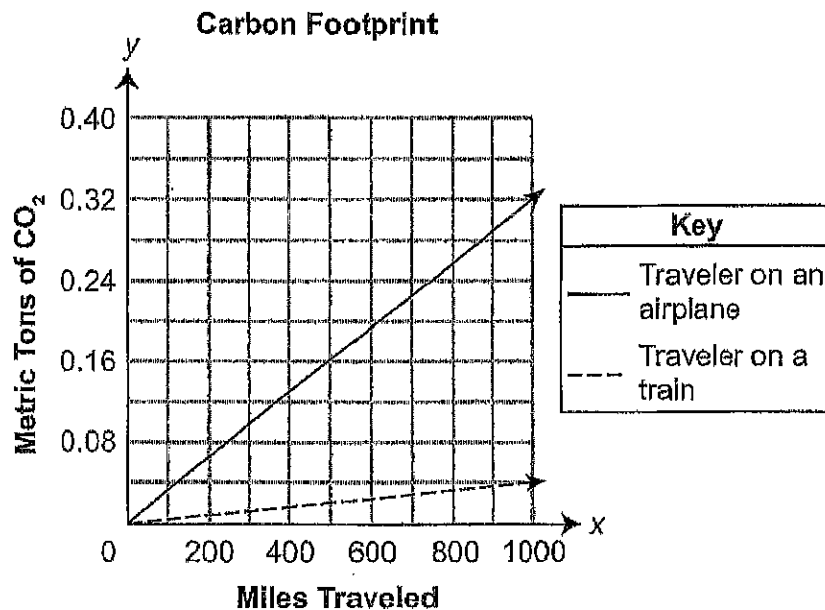
C. What is the equation to find the metric tons of CO_2 produced (y) by a traveler on an airplane for miles traveled (x)?

equation: _____

MODULE 2—Linear Functions and Data Organizations

Continued. Please refer to the previous page for task explanation.

On another trip, Ahava traveled to her destination on a train and returned home on an airplane. Her total carbon footprint for the trip was 0.42 metric tons of CO_2 produced.

D. How far, in miles, is Ahava's destination from her home?

miles: _____

CONSTRUCTED-RESPONSE ITEMS

11. Albert sells baseball programs at a stadium. The function $m(x) = 2.50x$ represents the total amount of money collected, in dollars, for selling x baseball programs.
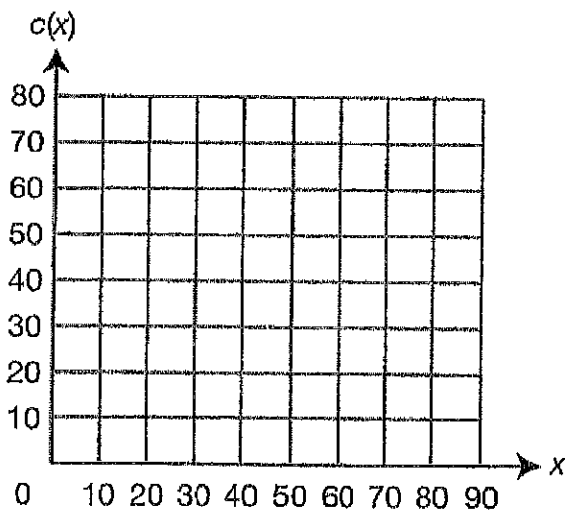
A. Fill in the table with the amounts of money collected for selling baseball programs.

Albert's Revenue

Baseball Programs Sold	Money Collected ($)
150	
175	
197	

The cost, in dollars, to print up x programs for each game is represented by the function $c(x) = 0.50x + 40$.

B. On the grid below, draw a line that contains the coordinate points of the cost to print up x programs for each game.

Go to the next page to finish question 11.

11. **_Continued._** Please refer to the previous page for task explanation.

In addition to his hourly wage, Albert earns a bonus when the amount of money collected is greater than the cost to print the total number of programs he sold. His bonus is equal to $\frac{1}{2}$ of the difference between the amount of money collected, $m(x) = 2.50x$, and the cost, $c(x) = 0.5x + 40$.

C. How much money does Albert earn ás a bonus when he sells 309 baseball programs? Show all of your work. Explain why you did each step.

MODULE 2—Linear Functions and Data Organizations

**ASSESSMENT ANCHOR
A1.2.1   Functions**

Sample Exam Questions

Standard A1.2.1

Hector's family is on a car trip.

When they are 84 miles from home, Hector begins recording their distance driven (d), in miles, after h hours in the table below.

Distance by Hour

Time in Hours (h)	Distance in Miles (d)
0	84
1	146
2	208
3	270

The pattern continues.

> **A.** Write an equation to find the distance driven (d), in miles, after a given number of hours (h).

Continued. Please refer to the previous page for task explanation.

B. Hector also kept track of the remaining gasoline. The equation shown below can be used to find the gallons of gasoline remaining (g) after distance driven (d), in miles.
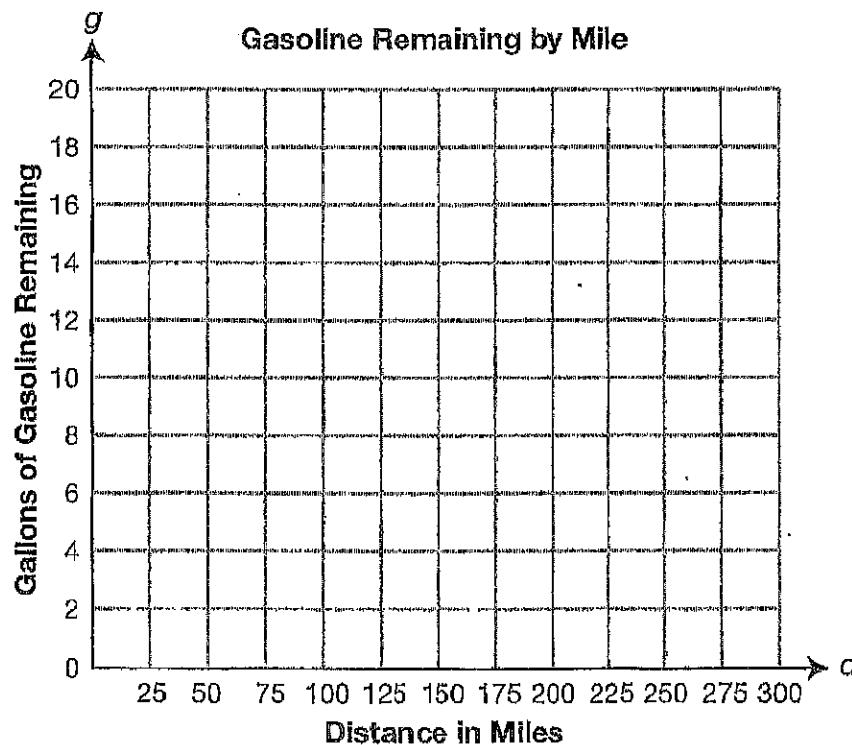
$$g = 16 - \frac{1}{20}d$$

Use the equation to find the missing values for gallons of gasoline remaining.

Gasoline Remaining by Mile

Distance in Miles (d)	Gallons of Gasoline Remaining (g)
100	
200	
300	

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

Gasoline Remaining by Mile

Continued. Please refer to the previous page for task explanation.

D. Explain why the slope of the line drawn in **part C** must be negative.

Read the problem. Write your answer for each part.

1. Vic and Eva buy used cars at the same time. Vic buys a car with 10,000 miles on it. He drives an average of 100 miles a week. The equation below can be used to determine how many miles, m, will be on the car after any number of weeks of driving, w.

$$m = 100w + 10,000$$

A In how many weeks will Vic's car have 12,000 miles on it?

Answer: _____

Eva buys a car with 7,000 miles on it. She drives an average of 400 miles a week.

B Use the system of equations below to find in how many weeks Vic's and Eva's cars will have the same number of miles on them.

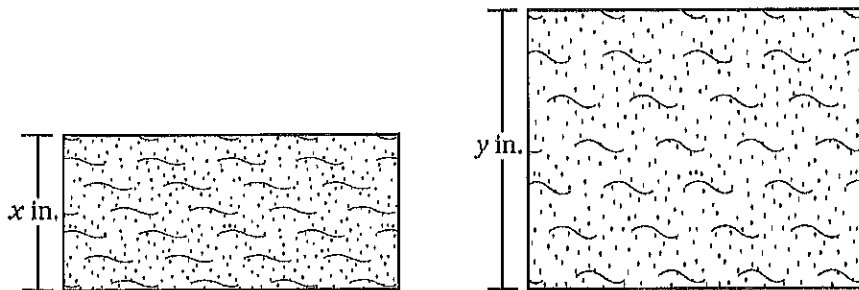$$\begin{cases} m = 100w + 10,000 \\ m = 400w + 7,000 \end{cases}$$

Answer: _____

C How many miles, m, will the cars have on them when the number of weeks, w, is the same? Use the system of equations from **part B.** Show how you found your answer.

Answer: _____

Read the problem. Write your answer for each part.

4. Rosalina has two sizes of bricks to use to build a wall, as shown below.

If Rosalina stacks 3 small bricks and 2 large bricks, the total height is 26 inches. If she stacks 5 small bricks and 3 large bricks, the total height is 41 inches. Rosalina wrote the system of equations shown below to represent this situation.

$$\begin{cases} 3x + 2y = 26 \\ 5x + 3y = 41 \end{cases}$$

A To solve the system, Rosalina's first step was to multiply both sides of the first equation by 3. What algebraic property justifies that step?

Answer: _____

B Complete Rosalina's work and solve the system of equations. Show and explain each step of your work.

C Explain what the solution to the system of equations means in this situation.

Read the problem. Write your answer for each part.

5. Ms. Chen is buying a printer for her computer. She needs to choose between two different brands, the Voltroxx printer and the Inkwest printer. For whichever printer she buys, she will also need to buy ink cartridges. Information about the two printers is shown in the table below.

PRINTER COMPARISON

Brand of Printer	Cost of Printer	Cost of Ink Cartridges
Voltroxx	$50	$30 each
Inkwest	$80	$27 each

A Write a system of linear equations that relates Ms. Chen's total cost to the number of cartridges needed.

Answer: _____

B What is the solution to this system of equations? Show your work.

Answer: _____

C What does the solution to this system of equations represent in the context of the problem?

Read the problem. Write your answer for each part.

3. The annual expenses of a non-profit organization must satisfy the inequality below, where x = millions of dollars.

$$2(x - 5) \geq 6(x - 3)$$

A Graph the solution set to this inequality on the number line below.
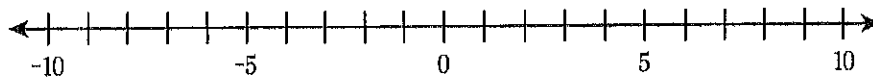
B The annual contributions that the organization hopes to collect next year are represented by the inequality that is graphed below, where x = millions of dollars.
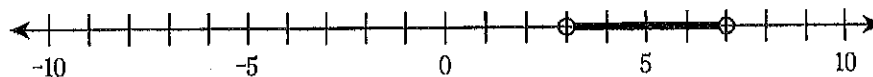
The inequality has the form $7 < \underline{\hspace{1cm}} < 15$. What expression belongs on the blank line so that the inequality has the solution graphed above?

Answer: _____

C The solution set to a system of linear inequalities is graphed
   below.
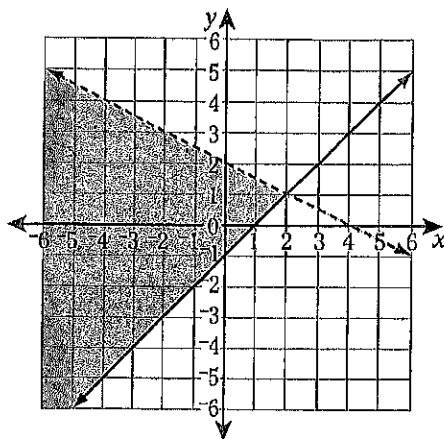
Write a system of two linear inequalities that would have the
solution set shown in the graph.

Answer: _____
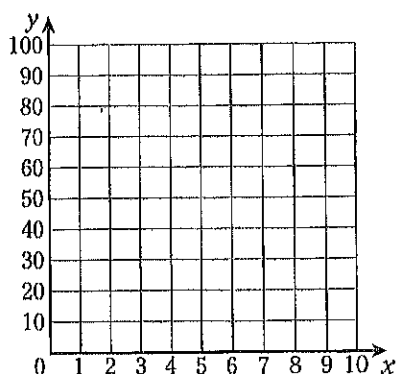
Read the problem. Write your answer for each part.

4. Michele is a photographer. She sells framed photographs for $100 each and greeting cards for $5 each. The materials for each framed photograph cost $30, and the materials for each greeting card cost $2. Michele can sell up to 8 framed photographs and 40 greeting cards each week, but this week she has only $200 to spend on materials. Michele hopes to earn a profit of at least $400 this week after paying for materials.

Let x = the number of framed photographs and y = the number of greeting cards Michele will make and sell this week. Two of the inequalities that model this situation are $x \leq 8$ and $y \leq 40$.

A Write two more inequalities to complete the system of inequalities modeling the situation.

   Answers: _____ and _____

B Graph the solution set to your system of inequalities on this coordinate plane. Shade the area that represents the solution set.

C Michele plans to make and sell 5 framed photographs and 25 greeting cards. Is that a solution to the system of inequalities? If so, is it the solution that will produce the **most** profit? Explain your answers.
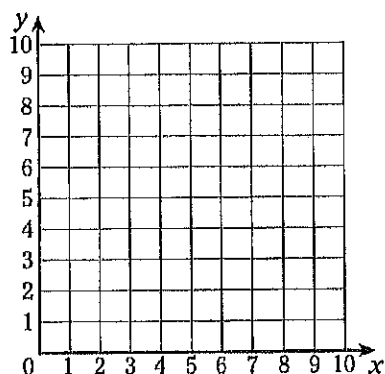
Read the problem. Write your answer for each part.

5. A band sells CDs for $8 each and T-shirts for $15 each. Sarah wants to buy some CDs and T-shirts as gifts for her friends, but she can spend a total of $75 at most.

A Write an inequality using x and y variables to represent this situation.

Answer: _____

B Explain what the variables x and y represent in your inequality.

C Graph your inequality on this coordinate plane. Shade the area that represents the solution set.

D Provide two different solutions to your inequality.

Answer: _____ and _____

Read the problem. Write your answer for each part.

1. During the summer, Kaleighna mows lawns to earn money. She keeps track of the number of lawns she mows and how many hours it takes her each day for five days. The table below shows her data for one week.

Number of Lawns	4	2	2	3	1
Number of Hours	3	5	2	5	1

A Graph the points from the table above. Label each axis.
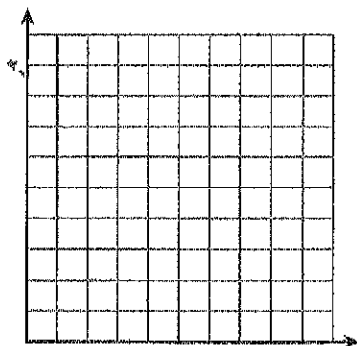
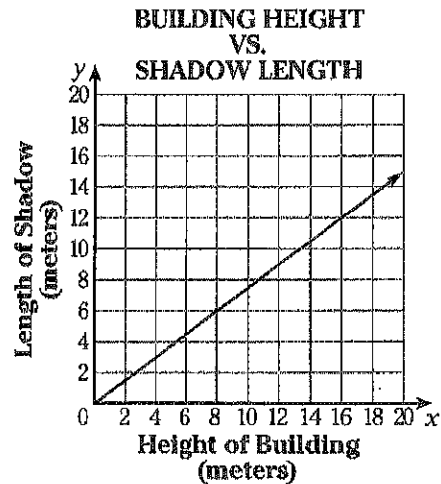B Identify the domain and range of the data. Name the values and what they represent.

Domain: _____

Range: _____

C Explain how you know whether or not this relation is a function.

Read the problem. Write your answer for each part.

3. The graph shows how the length of a building's shadow at a certain time of day is related to the height of the building.

**BUILDING HEIGHT
VS.
SHADOW LENGTH**

A Does this graph describe a function? Explain why or why not.

B Write an equation to describe the relationship shown in the graph.

Answer: _____

C Explain the meaning of the variables in your equation.

D According to your equation, if a building is 160 meters tall, what would be the length of its shadow?

Answer: _____

CONSTRUCTED-RESPONSE ITEM

13. John spends $94 to buy packages of cleaning supplies for a camp. He buys
t packages of towels; each package is $6 and contains 8 towels. He also buys
s packages of soap; each package is $4 and contains 10 bars of soap. John buys
20 packages of cleaning supplies altogether.

> **A.** Write a system of two equations to represent the packages of cleaning
> supplies John buys.

> **B.** How many packages of towels does John buy?

Go to the next page to finish question 13.

13. *Continued.* Please refer to the previous page for task explanation.

C. Explain why it would **not** be possible for John to buy exactly 16 bars of soap.

CONSTRUCTED-RESPONSE ITEM

14. At an archery competition, archers get 7 points for each arrow that lands in the bull's-eye and 4 points for each arrow that lands in the ring surrounding the bull's-eye. No points are awarded for arrows that miss both of these areas.

During the competition, Kelly had 41 arrows land in either the bull's-eye or the ring surrounding the bull's-eye. She scored a total of 206 points. To represent her performance, she wrote the system of linear equations shown below.

$$x + y = 41$$
$$4x + 7y = 206$$

A. What does the *y*-variable represent in Kelly's system of linear equations?

y-variable: _____

B. How many points did Kelly score during the competition for her arrows that landed in the ring surrounding the bull's-eye?

_____ points

Go to the next page to finish question 14.

14. *Continued.* Please refer to the previous page for task explanation.

A second archer, Deshaun, had 12 arrows that landed in either the bull's-eye or the ring surrounding the bull's-eye. He scored a total of 72 points.

C. Write a system of two linear equations to represent Deshaun's performance. Let *x* and *y* have the same representation as they did in Kelly's system of linear equations in **part A**.

equation 1: _____

equation 2: _____

A third archer, Lou, wrote a system of linear equations to represent his performance of scoring a total of 100 points. He solved the system of linear equations and found that the solution was (6, 8).

D. Explain how you know that Lou made a mistake in solving his system of equations.

CONSTRUCTED-RESPONSE ITEM

14. Tom and Sally are at a carnival. At this carnival, participants earn tickets while playing different games. The tickets can then be turned in for prizes. Tom earns 5 tickets each time he plays the ring toss and 3 tickets each time he plays the fishing game. Sally earns 3 tickets each time she plays the ring toss and 4 tickets each time she plays the fishing game.

Tom needs to earn at least 15 tickets for the prize he wants. Sally needs to earn more than 12 tickets for the prize she wants.

A. Write a system of two linear inequalities to model the number of tickets Tom and Sally need to earn based on the number of times each plays the ring toss (x) and the number of times each plays the fishing game (y).

Tom: _____

Sally: _____

Go to the next page to finish question 14.

14. *Continued.* Please refer to the previous page for task explanation.

B. What is the **least** number of times Sally needs to play only the ring toss in order to have enough tickets for the prize she wants?

_____ times

Tom decides to play the ring toss only 1 time. After that, he will play the fishing game.

C. What is the **least** number of times Tom needs to play the fishing game in order to have enough tickets for the prize he wants?

_____ times