

## Warm Up

**Complete 46-48 in your EOG packet!**

The measures of the angles of a triangle are  $50^\circ$ ,  $35^\circ$ , and  $95^\circ$ . What is the measure of the largest exterior angle of the triangle?

$85^\circ$

$130^\circ$

$145^\circ$

$150^\circ$

## Warm Up

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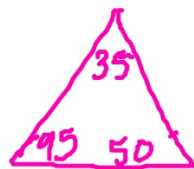
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$130^\circ$

$145^\circ$

$150^\circ$



$$\begin{array}{r} 95 \\ + 50 \\ \hline 145 \end{array}$$

Which scenario would **most likely** show a negative association between the variables?

the height of a tree,  $x$ , and the amount of time it takes to climb to the top of the tree,  $y$

the number of people in the mall,  $x$ , and the number of cars in the parking lot,  $y$

miles traveled in a car,  $x$ , and the amount of gasoline used,  $y$

time spent reading a book,  $x$ , and the number of pages left to read,  $y$

Which scenario would **most likely** show a negative association between the variables?

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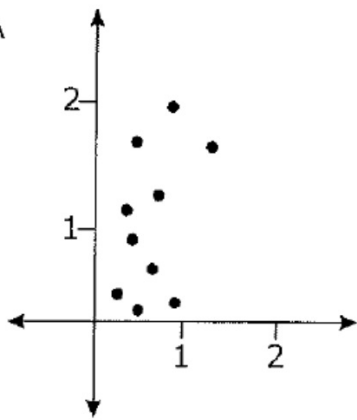
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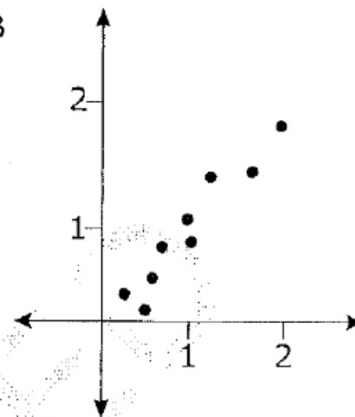


3 James is fitting the linear equation  $y = \frac{1}{2}x$  to a data set. Which scatterplot shows the data set that the linear equation would fit **best**?

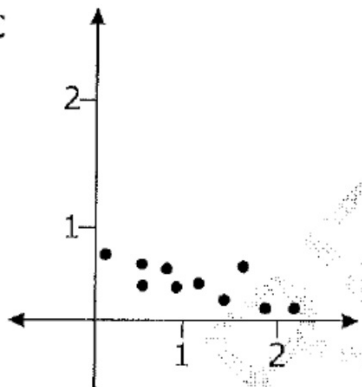
A



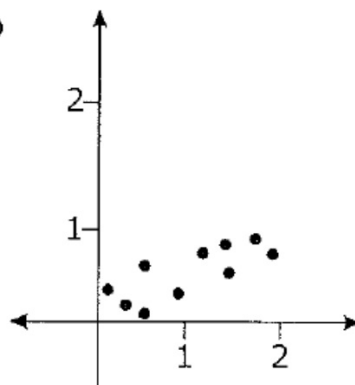
B



C



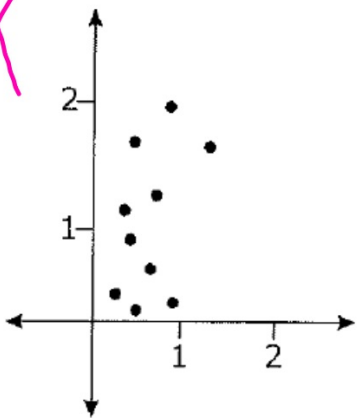
D



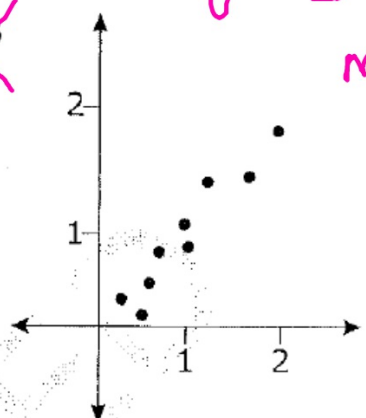
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~~A~~

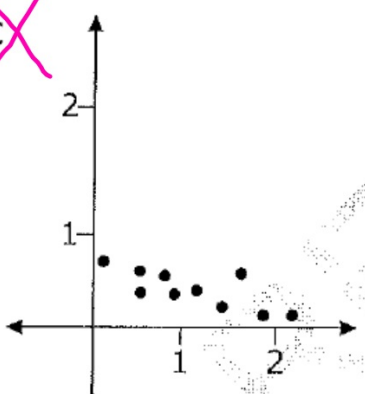


~~B~~

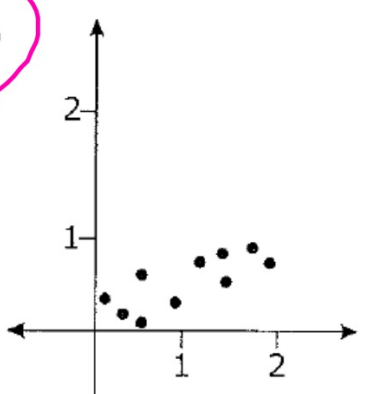


$y = \frac{1}{2}x + 0$   
 $m = \frac{\Delta y}{\Delta x} = \frac{1}{2}$   
 $\frac{1}{2} \uparrow$   
 $2 \rightarrow$

~~C~~



D



Determine if the following are functions... Write "function" or "not function" on the line.

1	2	3	4
4	-2	5	-3

function

<u>X</u>	0	8	-2	6
<u>Y</u>	7	-2	8	1

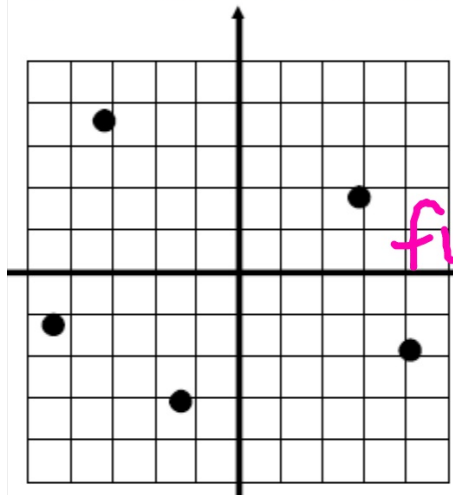
function

<u>X</u>	4	3	4
<u>Y</u>	6	-1	2

not a function

{ (6, 1), (4, 2), (6, -3), (2, 5) }

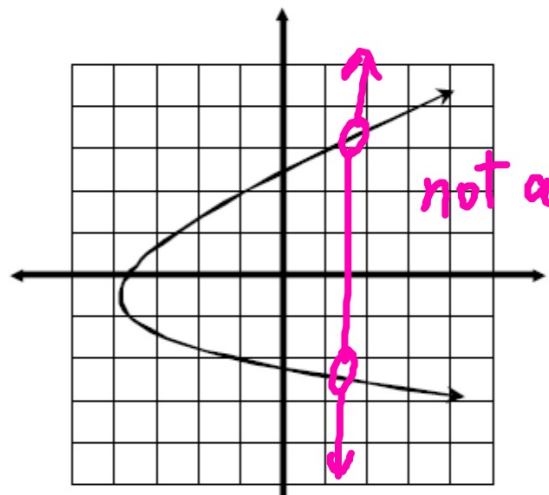
not a function



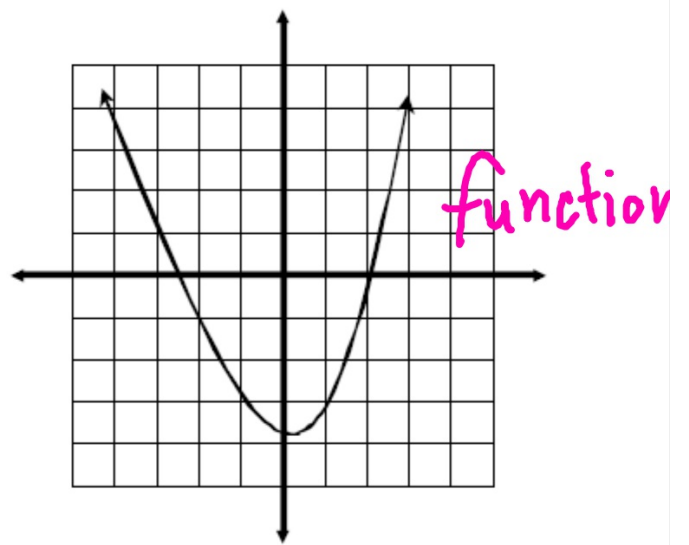
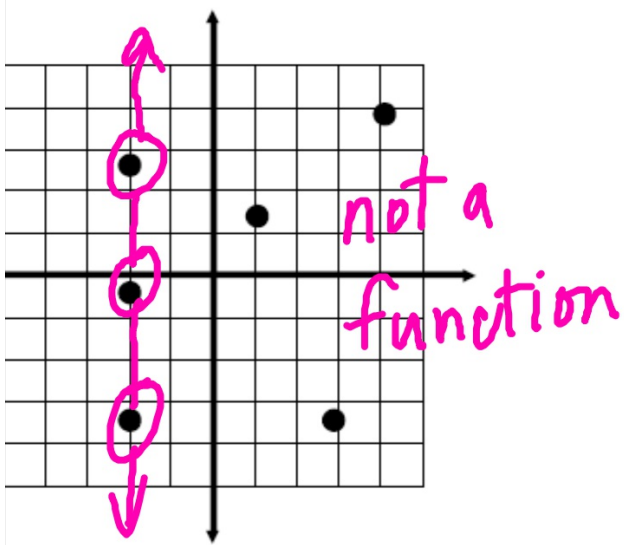
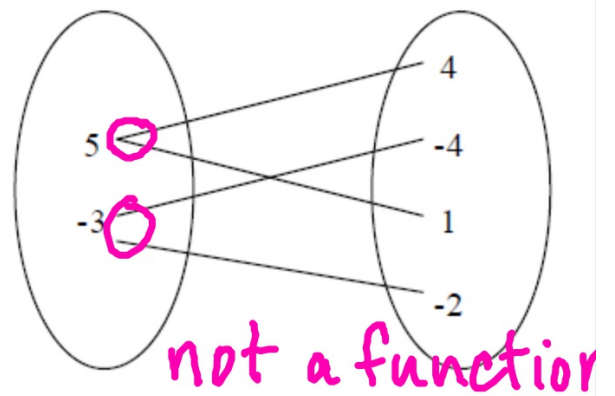
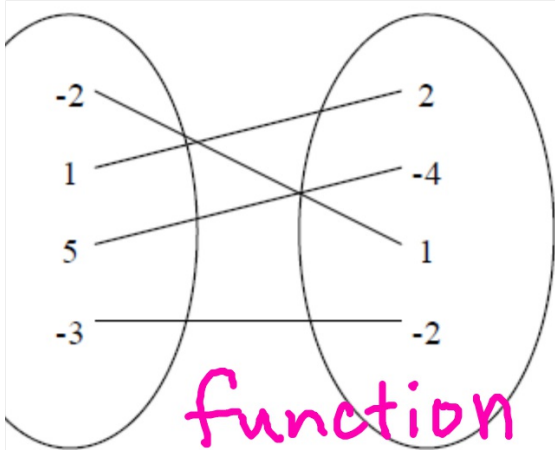
function

{ (5, 8), (3, -2), (-2, -5), (0, 0) }

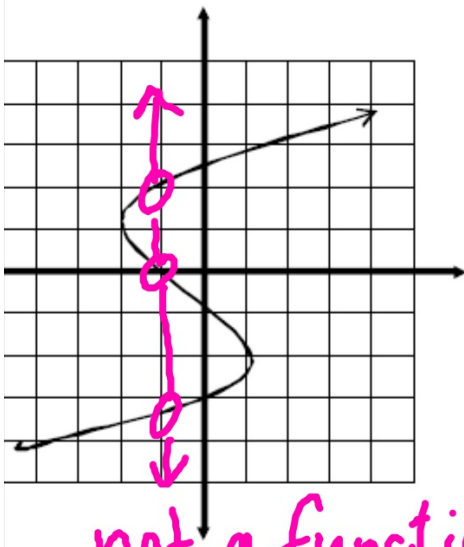
function



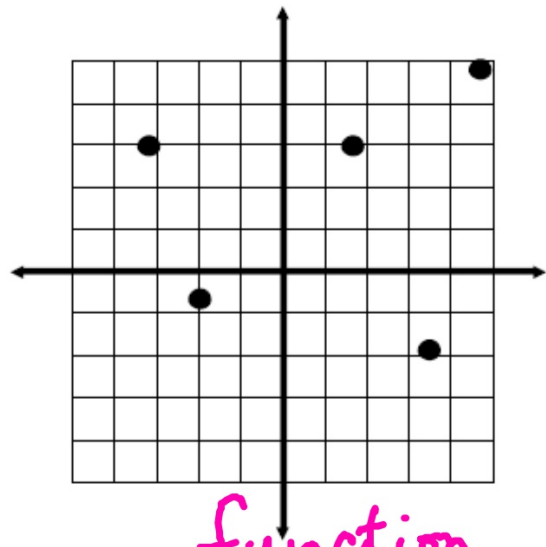
not a function







not a function



function

$\{(5, 5), (4, 4), (3, 3), (2, 2)\}$

function

$\{(0, 2), (0, 4), (0, 6), (0, 8)\}$

not a function

1)  $(-1, -3), (5, 6)$

$m = \frac{3}{2}, (5, 6)$   
x y

$y = mx + b$

$6 = \frac{3}{2}(5) + b$

$6 = \frac{15}{2} + b$

$\frac{12}{2} - \frac{15}{2} = b$

$-\frac{3}{2} = b$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-3)}{5 - (-1)} = \frac{6 + 3}{5 + 1} = \frac{9}{6} = \frac{3}{2}$

$y = mx + b$

$m = \frac{3}{2}, b = -\frac{3}{2}$

$y = \frac{3}{2}x - \frac{3}{2}$

2)  $m = -3, (3, -5)$

$y = mx + b$

$-5 = -3(3) + b$

$-5 = -9 + b$

$4 = b$

$y = -3x + 4$

3)  $2x - 3y + 6 = 0$

$-3y = -2x - 6$

$\frac{-3y}{-3} = \frac{-2x}{-3} - \frac{6}{-3}$

$y = \frac{2}{3}x + 2$

$m = \frac{2}{3}, b = 2$

4)  $4y + 2x = -8$

$4y = -2x - 8$

$y = -\frac{1}{2}x - 2$

$m = -\frac{1}{2}, b = -2$

## Word Problems

①  $(2, 49), (6, 39)$

x - hours  
y - temp.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{39 - 49}{6 - 2} = \frac{-10}{4} = -\frac{5}{2}$$

$$y = mx + b$$

$$y = -\frac{5}{2}x + 54$$

$$m = -\frac{5}{2}, (2, 49)$$

$$y = mx + b$$

$$49 = -\frac{5}{2}(2) + b$$

$$49 = -5 + b$$

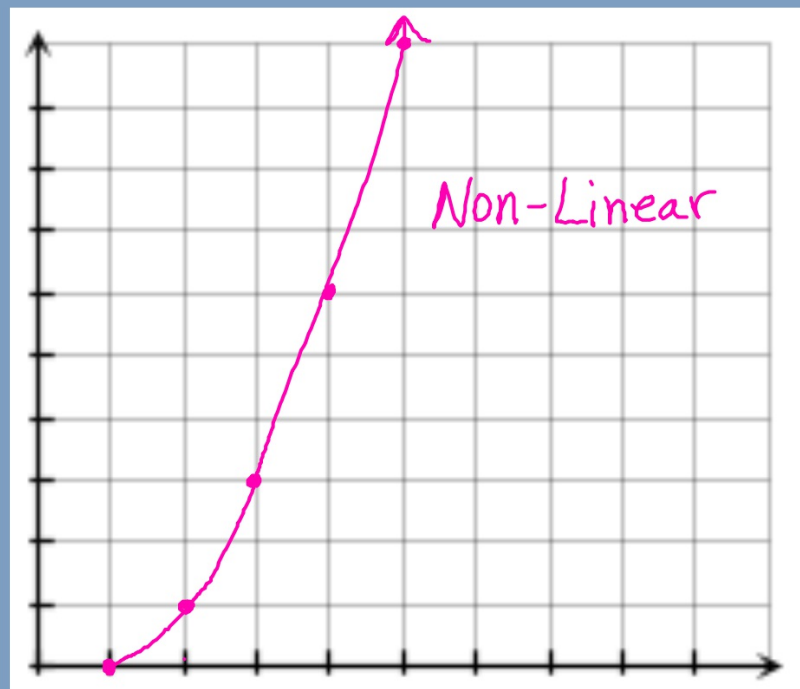
$$54 = b$$

②  $\frac{98.88}{24} = \$4.12$

$$24x = 48 + 50.88$$

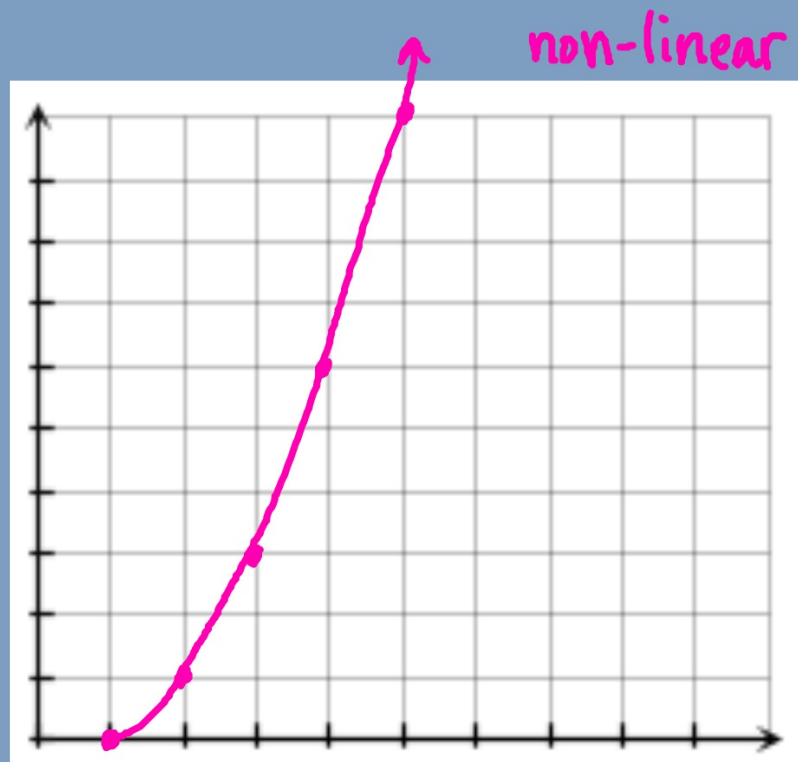
Plot the points from the given table. State whether the graph represents a linear function.

<b>x</b>	1	2	3	4	5
<b>y</b>	0	1	3	6	10



Plot the points from the given table. State whether the graph represents a linear function.

<b>x</b>	1	2	3	4	5
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Which of these are linear and which are non - linear?  
How do you know?

1.  $y = x^2 - 2x$

2.  $y = \frac{1}{3}x - 2$

3)  $A = \pi r^2$

4)  $y = -2x^2 + 3$

5.  $5x + 3y = 0$

6.  $y - 4x = -5$

7.  $y = \sqrt{x + 9}$

8.  $y = 3^x - 2$

9.  $y = x^3 - x^2$

10)  $y = 0.25 + 0.5(x - 2)$

Which of these are linear and which are non-linear?  
How do you know?

1.  $y = x^2 - 2x$  NL

2.  $y = \frac{1}{3}x - 2$  L

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How you can determine if a function is linear just by looking at its data table.

<b>x</b>	5	4	3	2	1
<b>y</b>	0	-1	-2	-3	-4



How you can determine if a function is linear just by looking at its data table.

constant rate of change

		-1	-1	-1	-1
x	5	4	3	2	1
y	0	-1	-2	-3	-4
		-1	-1	-1	-1

$m = \frac{\Delta y}{\Delta x} = \frac{-1}{-1} = 1$

$m = 1$

Linear

**Is this a linear or non-linear function? If linear, write a function(equation) to relate the independent and dependent variables.**

A boat company charges \$100 to rent a boat for 1 day plus an additional fee of \$10 an hour.

**Is this a linear or non-linear function? If linear, write a function(equation) to relate the independent and dependent variables.**

A boat company charges  $\$100$  to rent a boat for 1 day plus an additional fee of  $\$10$  an hour.  
*y-int.*  
*per*  
*Slope*

$$y = 10x + 100$$

Linear

A car company charges a \$35 fee to use their vehicle. They also charge an additional \$.25 per mile (m). Write a function that models the total cost (c) of taking a passenger to the airport.

M =

$$C = 35 + .25m$$

C =

Equation

Draw a graph

Jacqueline is saving for an iPhone. She starts off with \$25 that her parents gave her. She plans to deposit \$30 per month from her babysitting jobs.

- a. Write an equation to represent how much money Jacqueline has saved.
- b. What does  $x$  represent?
- c. What does  $y$  represent?
- d. Draw a graph to represent how much money Jacqueline has saved.
- e. When will she have enough to buy an iPhone that cost \$695?

You are flying a helicopter on a really hot day. At 6,000 feet, your engines fail. The instruments say that you are losing 400 vertical feet for every horizontal mile. Given this information,  $x$  represents each horizontal mile and  $y$  represents the total distance traveled.

a. What does  $x$  represent?

\_\_\_\_\_

b. What does  $y$  represent?

\_\_\_\_\_

c. What is the slope?

\_\_\_\_\_

d. What is the  $y$ -intercept?

\_\_\_\_\_

Circle the data table that represents this scenario.

<b>X</b>	<b>Y</b>
400	6,000
800	12,000
1,200	18,000

<b>X</b>	<b>Y</b>
1	5,600
2	5,200
3	4,600

<b>X</b>	<b>Y</b>
0	6,000
10	2,000
20	-2,000

A restaurant wants to buy paper plates in bulk so they want to join a wholesaler (like Sam's Club). There are three stores they could join.

Store A charges a membership fee of \$100 and then \$25 per bulk package of paper plates.

Store B charges a membership fee of \$50 and then \$30 per bulk package of paper plates.

Store C charges a membership fee of \$200 and then \$20 per bulk package of paper plates.

Write an equation for each store.

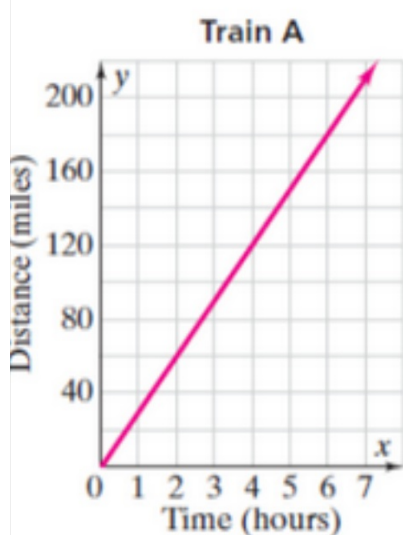
Which store has the cheapest rate for packages of paper plates?

Which store has the highest membership fee?

Which store would give the overall cheapest price if the restaurant needs to buy 2 packs, 5 packs and 10 packs of paper plates.



Three trains (A, B, and C) leave a train station at the same time. The graph shows the relationship between time and distance for Train A.



Train C

Time (hours)	Distance (miles)
3	105
6	210
9	315
12	420

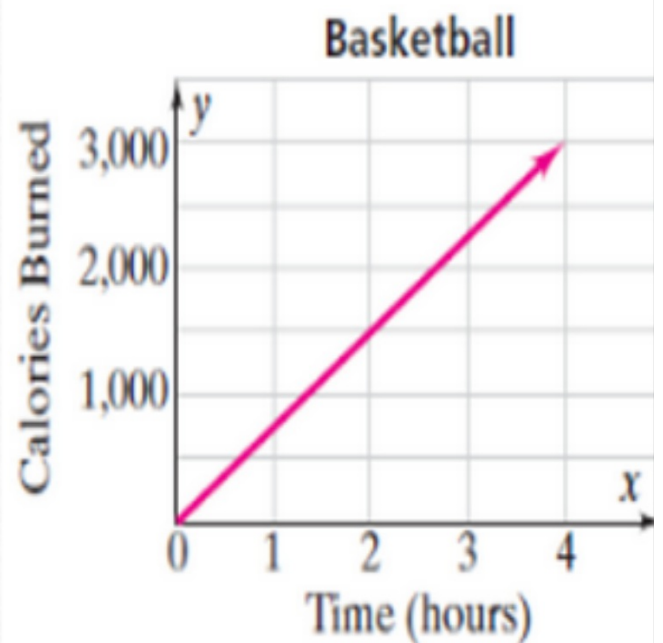


1. What is the slope of the graph?
2. What does the slope represent?
3. Compare the speed of Train C to the speeds of Train A and Train B.

Train B:  $y = 45x$



The equation  $y = 11x$  represents the calories Jake burns when cross-country skiing, where  $x$  is time in minutes and  $y$  is the number of calories. The graph shows the calories he burns while playing basketball. Which activity burns calories at a faster rate? *Explain.*



bowling alley offers different birthday party packages:

Package A is represented by the function  $c = 7p + 5$  where  $c$  is the total cost and  $p$  is the number of people.

Package B is represented in the table.



1. Compare the functions.
2. If 12 people attend the birthday party, which package will cost less and by how much?

Package B	
Number of People	Total Cost \$
1	12.50
2	19.00
3	25.50
4	32.00

Bobby went with Gold's Gym, the membership fee would have been \$30 but only \$2 per exercise class

- c. Fill in the table provided with this new information (as done above).
- d. Plot the ordered pairs on the graph above.**
- e. Which of the two gyms would cost more in the long run?

<b>c</b>	<b>T</b>
2	
4	
8	
10	

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### Intro to Multistep Equations in Context

Professor Botano is gathering data on the growth rate of a certain new hybrid seed. He spilled coffee on his clipboard and destroyed most of the data, but he DID remember that the seed had been growing at a constant rate throughout his observations. Help him reconstruct the data.



- ❶ Figure out the missing values for Professor Botano's table below:

# of days since seed was planted	0	2	3	4	6	8
Height of seedling (in inches)				7	12	



- ❷ What is the plant's daily growth rate? \_\_\_\_\_
- ❸ What is a possible explanation for the number in the height spot on day 0? \_\_\_\_\_
- ❹ Write a function for the height of the seedling in terms of days (use  $h$  for height and  $d$  for days): \_\_\_\_\_
- ❺ Determine and explain the **domain** and **range** of your function.

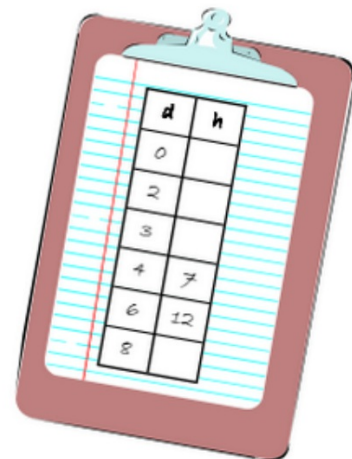
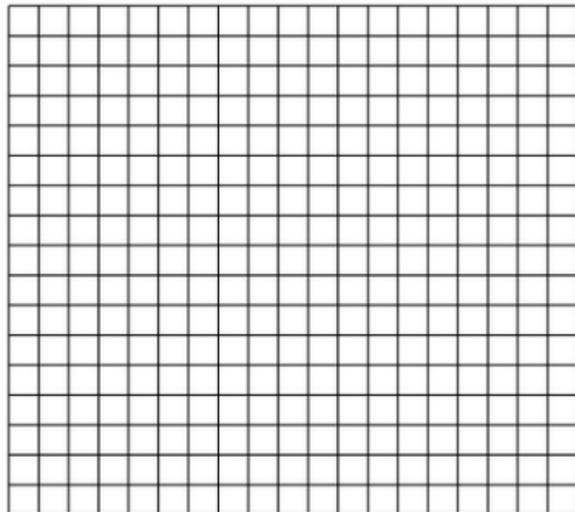
④ **Think, show, and interpret!**

How tall was the plant on **day 1**?

When will the plant be **20 inches** tall?

- ⑦ Use this grid to create your best possible line graph that shows the height of the plant in terms of days.

*Professor Botano's Hybrid Seed Study: an Analysis of Height over Time*



# THE PLANT PROBLEM

Name Teacher's Key

## Intro to Multistep Equations in Context

Professor Botano is gathering data on the growth rate of a certain new hybrid seed. He spilled coffee on his clipboard and destroyed most of the data, but he DID remember that the seed had been growing at a constant rate throughout his observations. Help him reconstruct the data.



Figure out the missing values for Professor Botano's table below:

# of days since seed was planted	0	2	3	4	6	8
Height of seedling (in inches)	-3	2	4.5	7	12	17



What is the plant's daily growth rate? 5 inches every 2 days  
or 2.5 inches/day

What is a possible explanation for the number in the height spot on day 0?

-3 probably means it is three inches below the surface

Write a function for the height of the seedling in terms of days (use  $h$  for height and  $d$  for days):  $h = 2.5d - 3$

Determine and explain the domain and range of your function.

domain:  $d \geq 0$ , but also a reasonable maximum should be considered... perhaps  $d \leq 10$ ?  
You probably shouldn't predict too far into the future when dealing with scientific experiments!

range: assuming  $0 \leq d < 10$ , then range would be  $-3 \leq h < 22$

Think, show, and interpret!

How tall was the plant on day 1?

$$d=1, \text{ so } h = 2.5(1) - 3$$

$$h = -0.5$$

The seedling was still  $\frac{1}{2}$ " under the surface on day 1!

When will the plant be 20 inches tall?

$$h=20, \text{ so } 20 = 2.5d - 3$$

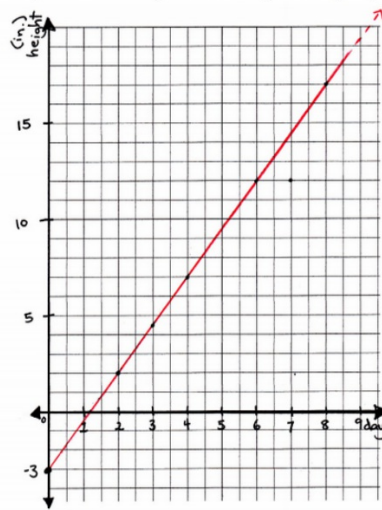
$$\frac{23}{2.5} = \frac{2.5d}{2.5}$$

$$d = 9.2$$

9.2 days after planting would be 4:48 AM on day #9!

Use this grid to create your best possible line graph that shows the height of the plant in terms of days.

Professor Botano's Hybrid Seed Study: an Analysis of Height over Time



careful placement of axes + scale ensure that the graph fills the grid



# Homework

1. Smart Student Learning Center charges students a registration fee of \$25, plus an hourly rate of \$30 for after-school tutoring. Brilliant Student Learning Center charges students for after-school tutoring based on the table below.

Brilliant Student Learning Center

Hours of Tutoring ( $x$ )	Total Cost ( $y$ )
1	\$45
3	\$115
5	\$185
7	\$255

If a student needs 4 hours of tutoring, which statement is true?

- A. Smart Student Learning Center charges \$5 more than Brilliant Student Learning Center.
- B. Brilliant Student Learning Center charges \$5 more than Smart Student Learning Center.
- C. Smart Student Learning Center charges \$35 more than Brilliant Student Learning Center.
- D. Brilliant Student Learning Center charges \$35 more than Smart Student Learning Center.

2. Use Function S and Function T to answer the question.

Function S		Function T
$x$	$y$	$y = 4x + 6$
-6	-4	
-2	2	
2	8	
6	14	

Which statement is true about the Functions S and T?

- A. The slope of Function S is equal to the slope of Function T.
- B. The slope of Function S is steeper than the slope of Function T.
- C. The slope of Function S is not as steep as the slope of Function T.
- D. The relationship between the slopes of Functions S and T cannot be determined.

3. Mermaid Swimming Club uses the equation  $w = 25h + 40$  to calculate the total cost,  $w$ , of  $h$  hours of swim lessons. Dolphin Swimming Club uses the table below to calculate the cost of swimming lessons for its customers.

Hours ( $h$ )	Total Cost ( $w$ )
2	\$110
4	\$155
6	\$200

For 7 hours of swimming lessons, which club is less expensive and by how much?

- A. Dolphin Swimming Club, by \$2.50
- B. Mermaid Swimming Club, by \$2.50
- C. Dolphin Swimming Club, by \$7.50
- D. Mermaid Swimming Club, by \$7.50

4. Pizza Village uses the equation  $y = 1.10x + 9$  to calculate the cost of a cheese pizza with  $x$  additional toppings. The table below shows the cost of cheese pizza from Mama Mia's based on the number of additional toppings.

Number of Toppings	Total Cost
3	\$11.75
5	\$14.25
8	\$18.00

Which statement is true?

- A. Mama Mia's charges \$2.82 more per topping than Pizza Village.
- B. Pizza Village charges \$2.82 more per topping than Mama Mia's.
- C. Mama Mia's charges \$0.15 more per topping than Pizza Village.
- D. Pizza Village charges \$0.15 more per topping than Mama Mia's.



# THE CAR PROBLEM

Name \_\_\_\_\_

## Multistep Equations in Context

Suppose the Allmans want to rent a convertible for the day. They have a choice of two rental companies:

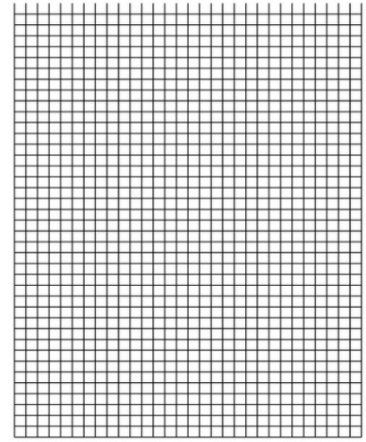
- A one-day rental at **Nifty Car Rental** costs \$30 plus 60 cents per mile.
- A one-day rental at **Shazam Car Rental** costs \$55 but only charges 35 cents per mile.



- 6 Use your functions and tables to make your best possible comparison graph that represents the costs for both companies.



## Nifty vs Shazam Car Rental Comparisons



- 1 Make a good data table:

# of miles driven									
<b>Nifty</b>									
Total Cost (\$)									
<b>Shazam</b>									
Total Cost (\$)									

- 2 Write a function for each car rental company that expresses the total cost in terms of the number of miles driven. (Use  $C$  for cost and  $m$  for miles.)

**Nifty Car Rental**

**Shazam Car Rental**

- 3 If the Allmans drive 225 miles, which company would be a better deal? Explain.

- 3 If the Allmans drive 225 miles, which company would be a better deal? Explain.

- 4 If the Allmans only have \$80 to spend, which company would be a better deal? Explain.

- 6 At what number of miles will the two companies cost the same? \_\_\_\_\_

Circle the place on the graph that verifies this.

Then use your functions to **prove your solution** with an algebraic method.

# THE CAR PROBLEM

Name Teacher's Key

## Multistep Equations in Context

Suppose the Allmans want to rent a convertible for the day.

They have a choice of two rental companies:

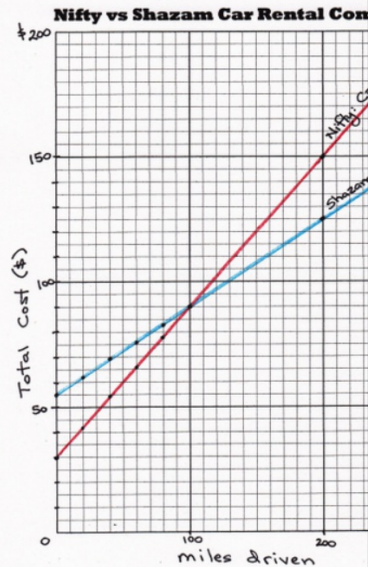
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- A one-day rental at **Shazam Car Rental** costs \$55 but only charges 35 cents per mile.



- 6 Use your functions and tables to make your best possible comparison graph that represents the costs for both companies.



— Nifty  
— Shazam



- 1 Make a good data table: *Think about domain when setting up a table and try to ensure a wide spread*

# of miles driven	0	20	40	60	80	100	200	300	400
<b>Nifty</b>									
Total Cost (\$)	30	42	54	66	78	90	150	210	270
<b>Shazam</b>									
Total Cost (\$)	55	62	69	76	83	90	125	160	195

- 2 Write a function for each car rental company that expresses the total cost in terms of the number of miles driven. (Use  $C$  for cost and  $m$  for miles.)

**Nifty Car Rental**

$$C = 30 + 0.60m$$

**Shazam Car Rental**

$$C = 55 + 0.35m$$

- 3 If the Allmans drive 225 miles, which company would be a better deal? Explain.

<u>Nifty</u>	<u>Shazam</u>	Shazam is cheaper
$C = 30 + 0.60(225)$	$C = 55 + 0.35(225)$	
$C = \$165$	$C = \$133.75$	

- 4 If the Allmans only have \$80 to spend, which company would be a better deal? Explain.

<u>Nifty</u>	<u>Shazam</u>	Nifty allows more miles for \$80
$80 = 30 + 0.60m$	$80 = 55 + 0.35m$	
$m = 83\frac{1}{3}$ miles	$m = 71\frac{2}{7}$ miles	

- 6 At what number of miles will the two companies cost the same? 100 miles

Circle the place on the graph that verifies this. When will Nifty's Cost = Shazam's Cost? Then use your functions to **prove your solution with an algebraic method.**

$$\text{When: } 30 + .6m = 55 + .35m$$

$$-30 \quad -.35m \quad -30 \quad -.35m$$

$$\frac{0.25m}{0.25} = \frac{25}{0.25}$$

$$m = 100 \text{ mile}$$

- 7 Which car rental company should the Allman's choose and why?

Unless they plan on staying around town, I would say Shazam is a better bet. Even if they end up driving a little less than 100 miles, they only stand to lose a few bucks... but if they choose Nifty and go over 100 they could spend a lot more in the end.







