



G6-G7  
Basic

G7-G8  
Advanced

# Helping With Math

GRADES

**Data Collection & Representation Skill:  
Equation**

Suitable for students  
**aged 10-13**

## Remembering Dr. Seuss



**Dr. Seuss or Theodor Seuss Geisel** was an American writer and illustrator. He was well-known for his children's books which became famous for their nonsense words, playful rhymes, and unusual characters.



This pack is suitable for learners aged 10 to 13 years old or 6th to 8th grades. The content covers fact files and relevant basic and advanced activities of equation topics that aim to develop and strengthen the learners' data collection and representation skills.

**Equations** are mathematical statements composed of two algebraic expressions, showing the relationship of equality between those expressions.

- ★ He became famous and earned his household name when he published his book, *The Cat in the Hat* in 1975.
- ★ Dr. Seuss was best known for his books which help children learn reading like *One Fish Two Fish Red Fish Blue Fish*, *Green Eggs and Ham*, and *Hop and Pop*. He is also known for his cautionary books like *The Lorax* and the inspirational book, *Oh, The Places You'll Go!*



# DATA COLLECTION & REPRESENTATION

Before we discuss about data collection and representation, let us first define the meaning of data.

## WHAT IS DATA?

- ★ Data is the plural form of the Latin word “*datum*”, which means *something given*.
- ★ These are facts or numbers which are used to analyze information.
- ★ These are the information that we will need for the data collection and representation.



## WHAT IS DATA COLLECTION?

This is the process of gathering information that can be used to answer questions or evaluate results.

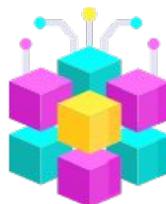
There are different ways to collect information, which are:

### 1. Primary Data Collection

- original form of data collected directly from its source

### 2. Secondary Data Collection

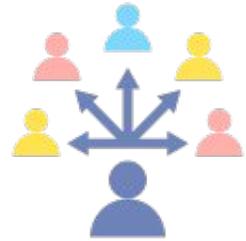
- data which are collected by another person other than the researcher



# DATA COLLECTION & REPRESENTATION

Primary Data Collection has two types:

1. Qualitative Collection Methods
2. Quantitative Collections Methods



**Qualitative collection methods** do not include any mathematical calculations in order to obtain data. This type of data collection is used in analyzing the quality and understanding the reason for something.

The types of qualitative collection methods are as follows:

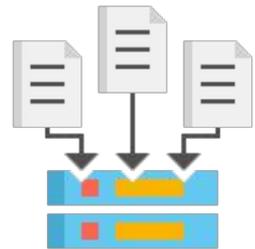
**Interviews**

**Questionnaires**

**Focus Groups**

**Observations**

**Document  
Review**



**Quantitative collection methods** express data in numerical form using either the traditional way or the online method. Arriving with results using this method need statistical or mathematical tools.

The different types of quantitative collection methods are:

**Probability  
Sampling**

**Surveys**

**Interviews**



## DATA COLLECTION & REPRESENTATION



**Secondary Data Collection** is readily available and does not need any special methods of collecting data or information, which makes it easy to do.

It may come either from internal or external sources:



1. **Internal Sources** - financial statements, company records, annual reports, employee information, etc.
2. **External Sources** - books, magazines, journals, census, topics from the internet

The purpose of collecting data is to find the answers when it is not obvious or when the answers are hard to find. It is important for children to understand the reason behind data collection.

Children must understand that data collection might be the best way to find solutions to problems. Knowing the purpose or reason behind collecting data will motivate them to eventually try it.

### WHAT IS DATA REPRESENTATION?

This is the method of analyzing the data that has been collected in a visual way for better understanding. It shows the relationship between facts, concepts, and ideas.

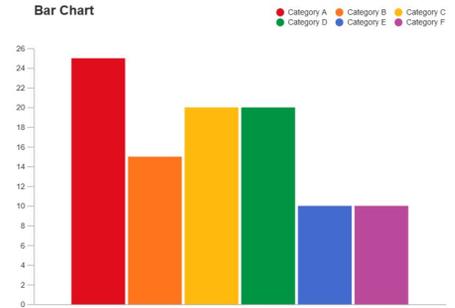
Data representation is one of the most fundamental ways of learning. Some ways to graphically show data are the following: *bar graph, frequency distribution table, histogram, pie chart, and line graph.*



# DATA COLLECTION & REPRESENTATION

## ★ BAR GRAPH

- This presents data visually using bars in a horizontal or vertical manner to compare the information.



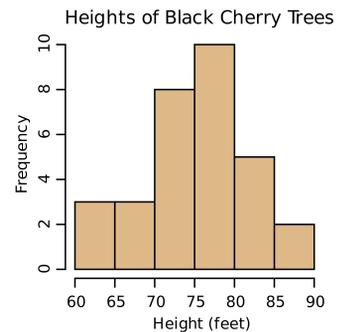
## ★ FREQUENCY DISTRIBUTION

- This is a method that is used to present raw data using tally marks.

Score (x)	Tally Marks	Frequency (f)
13		2
14		4
15		5
16		8
17		6
Total		25

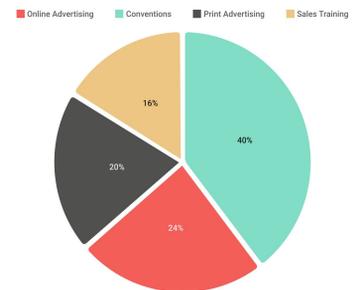
## ★ HISTOGRAM

- This also presents data using bars, but the information is condensed into ranges.



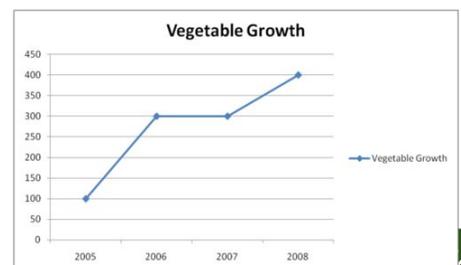
## ★ PIE CHART

- This is a method that divides a circle into sectors to represent the factors being measured.



## ★ LINE GRAPH

- This graph uses points and lines to show the change that occurred over time.



## DATA COLLECTION & REPRESENTATION

Data representation is important because it makes the data easier for us to comprehend by displaying it visually. In this way, it would not be difficult for us to find the trends or outliers in the gathered information.

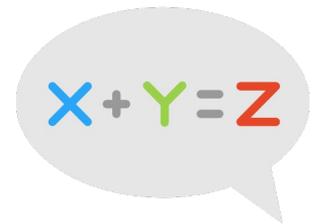
Data collection and representation are used in situations like:

- ★ **Medical study** - used to measure the health development, effectiveness of treatment, and the like
- ★ **Weather forecasts** - to predict future weather conditions
- ★ **Quality testing** - for products sold in the market
- ★ **Stock market** - to analyze information about the economy
- ★ **Consumer goods** - to track the supply and demand

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## EQUATIONS

- ★ These are mathematical statements that contain two mathematical expressions on both sides of an equal sign (=).
- ★ Mathematical expressions are combination of numbers wherein we use different operations, such as addition, subtraction, multiplication, and division.
- ★ Equations may be used to find the value of a missing variable.
- ★ If a statement has no equal sign, it is considered an expression.

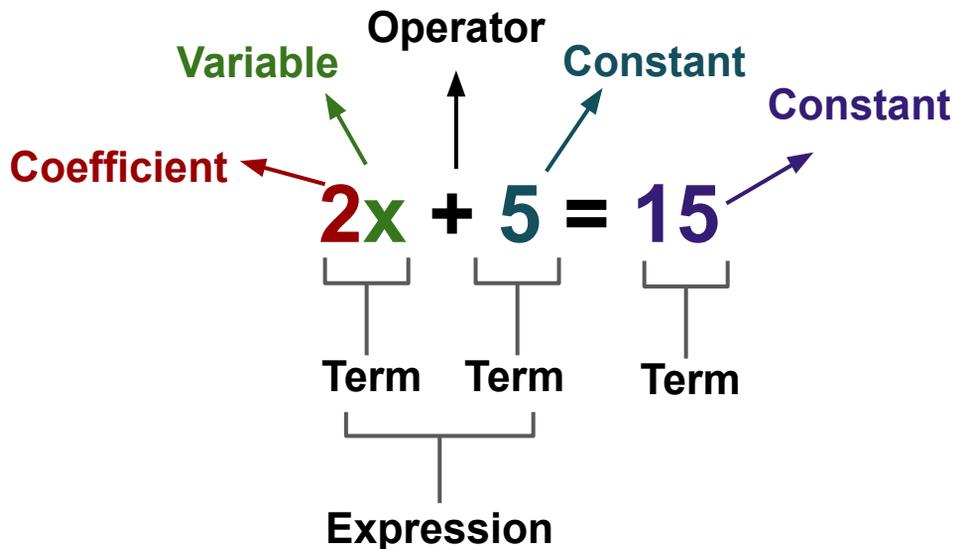


## EQUATIONS

STATEMENT	EQUATION OR EXPRESSION
$2x + 5 = 15$	Equation
$y + x + 7$	Expression
$7 + 2 = 10 - 1$	Equation

An equation without variables ( $2 + 3 = 5$ ) is called an arithmetic equation, while an equation with variables are called algebraic equation.

### PARTS OF AN EQUATION



**Left hand side (LHS) = Right hand side (RHS)**

It is mandatory for all equations to have an equal sign. This means that values of both sides, left-hand side, and right-hand side, should be equal to one another.



# EQUATIONS

## TYPES OF EQUATIONS

### ★ Linear Equations

- These are algebraic equations wherein each term has an exponent of 1, and forms a straight line when graphed.
- There are linear equations with one and two variables.
- The standard form for a single variable is:  $Ax + B = 0$
- The standard form for two variables is:  $Ax + By + C = 0$
- A and B are real numbers, and C is constant
- Examples:  $3x - 2 = 4$ ;  $6x + 2y + 9 = 0$

## HOW TO SOLVE LINEAR EQUATIONS?

Because the equations have equal sides, when you perform an operation on one side, you also have to perform it on the other side. This way, the equations will remain equal.



Here are the steps on how to solve linear equations (with one variable):

### STEP 1:

Perform the necessary operations on the equations to bring all variables on one side and the constants on the other side.

*Example:*

$$(2x + 5 = 15) - 5 \rightarrow \text{Multiply } -5 \text{ on both sides}$$
$$2x + (5 - 5) = 15 - 5 \rightarrow \text{New equation will look like this}$$



## EQUATIONS

### STEP 2:



Combine all like terms by adding or subtracting them. These are the terms with the same variable and exponents.

*Example:*

$$2x + (5 - 5) = 15 - 5 \rightarrow \text{Perform Step 2 from here}$$
$$2x = 10 \rightarrow \text{New equation will look like this}$$

### STEP 3:

Final step is to simplify the equation.

*Example:*

$$2x = 10 \rightarrow \text{Perform Step 3 from here}$$
$$2x / 2 = 10 / 2 \rightarrow \text{Divide by 2 to reduce LHS to } x$$
$$x = 5 \rightarrow \text{Final answer}$$



.....

Here are the steps on how to solve linear equation (with two variables) using the **elimination method**:

### STEP 1:

The equations must be arranged in the standard form. Check if the equations would result to cancellation when added or subtracted. If not, multiply the coefficient of the variable to one or both of the equations, such that it will result to cancellation.

*Example:*

$$2x - 3y + 4 = 0$$
$$x + 7y - 1 = 0$$

*Both of these equations are already in the standard form.*



## EQUATIONS

$$2x - 2y + 4 = 0$$
$$(x + 3y - 8 = 0) - 2$$

*Multiply the equation with -2 to cancel variable x*

$$2x - 2y + 4 = 0$$
$$-2x - 8y + 16 = 0$$

*The new equation will look like this. Add these equations.*

$$-10y + 20 = 0$$

*We now have an equation with only one variable so we can proceed to solving y.*

$$-10y = 20$$
$$(-10y / 10) = (20 / -10)$$
$$y = -2$$

*This is the value of y.*

### STEP 2:

Substitute the value of the variable that you solved for to any of the equations to solve for the other variable.

*Example:*

$$x + 3(2) - 8 = 0$$

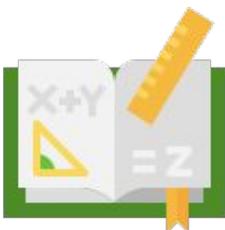
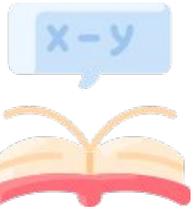
*Let's substitute that value of y to the equation that we got.*

$$x + 6 - 8 = 0$$

*This is our new equation with only one variable.*

$$(x - 2 = 0) + 2$$
$$(2x = 2) / 2$$
$$x = 2$$

*The value of x is 2 and y is -2*



# EQUATIONS

## GRAPHING LINEAR EQUATIONS

When graphing linear equations, you need to transpose it to the slope-intercept form which is  $y = mx + b$ .

### SLOPE (or Gradient) “m”

- This shows the steepness of a straight line
- $m = \text{change in } x / \text{change in } y$

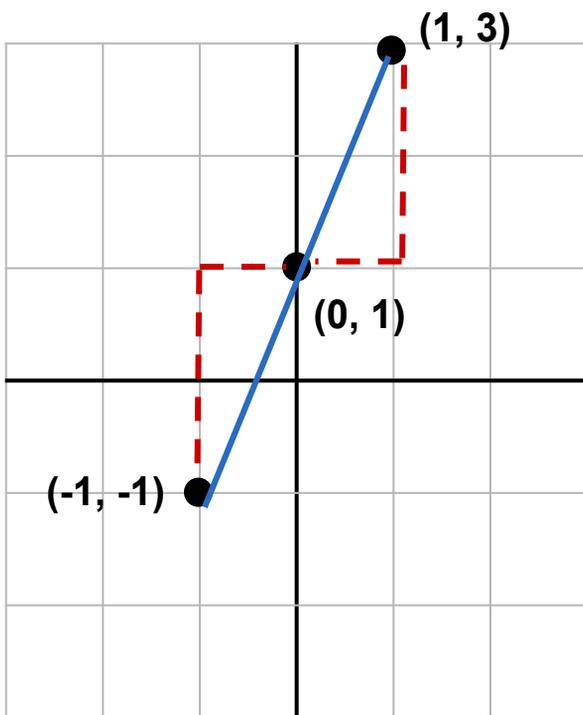


### Y INTERCEPT “b”

- This is the where the line crosses the y-axis

Provide values for x to be able to solve for y. When you plot this, the line should be forming a straight line.

Here is an example with the equation  $y = 2x + 1$ .



x	$y = 2x + 1$
-1	$y = 2(-1) + 1 = -1$ $y = -1$
0	$y = 2(0) + 1 = 1$ $y = 1$
1	$y = 2(1) + 1 = 3$ $y = 3$

*\*This is an example of a Slope-Intercept form.*

**TIP:** If a line is pointing to the right, the slope is positive. If a line is pointing to the left, the slope is negative.



# EQUATIONS

## ★ Quadratic Equations

- These are algebraic equations with single variable with the degree of 2.
- The standard form is  $ax^2 + bx + c = 0$  wherein a is not equal to 0.
- A and B are real numbers, and C is constant
- Examples:  $x^2 - 2x + 4 = 0$ ;  $2x^2 + 3x + 1 = 0$

## ★ Cubic Equations

- These are algebraic equations with 3 as the highest exponent of at least one of the terms.
- The standard form is  $ax^3 + bx^2 + cx + d = 0$  wherein a is not equal to 0.
- A and B are real numbers, and C is constant
- Examples:  $x^2 - 2x + 4 = 0$ ;  $2x^2 + 3x + 1 = 0$

### PRACTICE TIME!

Find x in this equation.

$$2x + 8 = 14$$



# TABLE OF ACTIVITIES

<b>Ages 10-12</b> (Basic)		<u>G6-G7</u>
1	Balancing Cat	
2	Bring Back Christmas	
3	Apples Up on Top	
4	Saving Whoville	
5	Oh The Places You'll Go	
<b>Ages 11-13</b> (Advanced)		<u>G7-G8</u>
6	The Yink and Zeds	
7	Once-ler and the Thneeds	
8	Why Does He Hate Christmas?	
9	Green Eggs and Ham	
10	500 Hats of Bartholomew Cubbins	



# BALANCING CAT

G6-G7  
Basic

The Cat in the Hat is being mischievous inside the house. He has been balancing different objects at the same time to entertain the children. After recording the number of objects that he can balance ( $x$ ) and the number of seconds that he can pull off the trick ( $y$ ), an equation below was derived.

Let  $x$  = the number items that the cat will balance

$y$  = the time, in seconds, needed to finish the trick

Equation:  $y = 2x + 1$



Questions:

1. How many seconds are needed to balance a book, a bottle, and a cup?
2. How long will it take to successfully do the trick of balancing six items?
3. How many items were balanced by Cat in the Hat if it took him 21 seconds to successfully balanced it?
4. Is it possible for Cat in the Hat to balance four items within six seconds? Why or why not?



# BRING BACK CHRISTMAS

G6-G7  
Basic

The Grinch is starting to take away Christmas. He is slowly removing all items involving this Holiday. Based on his plan, we were able to identify the number of days left before Christmas and the number of things that he needs to do. Try answering the questions below using the given formula.

Let  $x$  be the number of days  
Let  $y$  be the number of things he needs to do

1. The Grinch has 10 tasks left to do to ruin Christmas. How many days can he do this all?

Use the equation:  $y = 4x - 2$

\_\_\_\_\_

2. He has 6 days left before Christmas. How many tasks can he do before the Holidays?

Use the equation:  $y = 2x + 3$

\_\_\_\_\_

3. How many days left for The Grinch if he needs to remove 10 Christmas lights and take away 10 Christmas gifts?

Use the equation:  $y = 4x + 4$

\_\_\_\_\_

4. There are 10 days left before Christmas. How many activities can he do before Christmas?

Use the equation:  $y = 3x - 2$

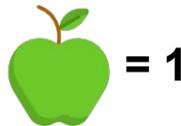
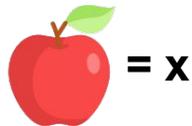
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# APPLES UP ON TOP

G6-G7  
Basic

The Lion, Tiger, and Dog are balancing apples on top of their heads while doing different activities. If these equations will determine the number of apples that they will put on their heads, find the value of  $x$ .

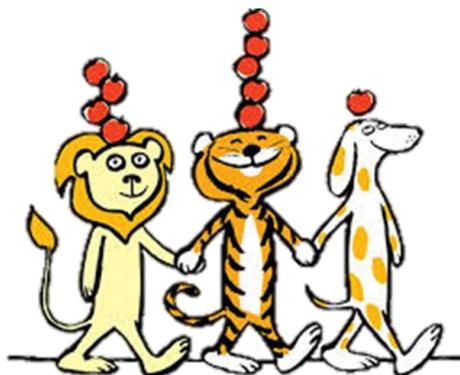


1.)  $x = \underline{\hspace{2cm}}$

2.)  $x = \underline{\hspace{2cm}}$

3.)  $x = \underline{\hspace{2cm}}$

4.)  $x = \underline{\hspace{2cm}}$



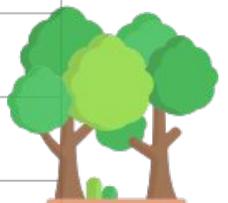
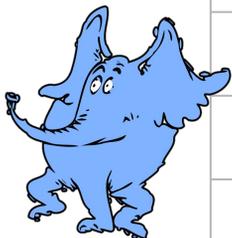
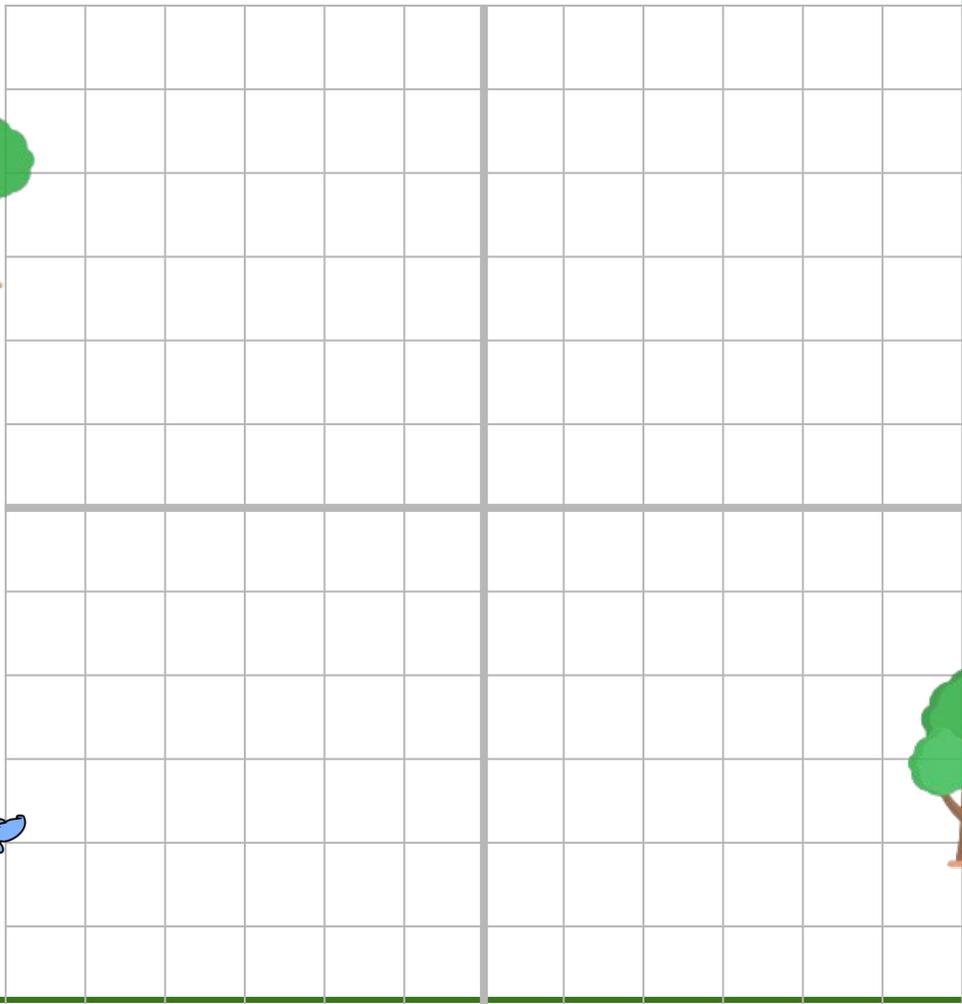
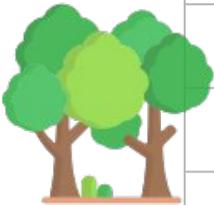
# SAVE WHOVILLE

G6-G7  
Basic

Horton is trying to save Whoville by bringing it up to Mt. Nool, which is the safest place in the forest. He has now made 10 steps, and every minute, he makes additional 5 steps. Let  $x$  be the number of minutes he has walked and  $y$  be the number of steps he has made. Plot the points in the graph below.

Equation:  
 $y = 5x + 10$

x	1	2	3	4
y				



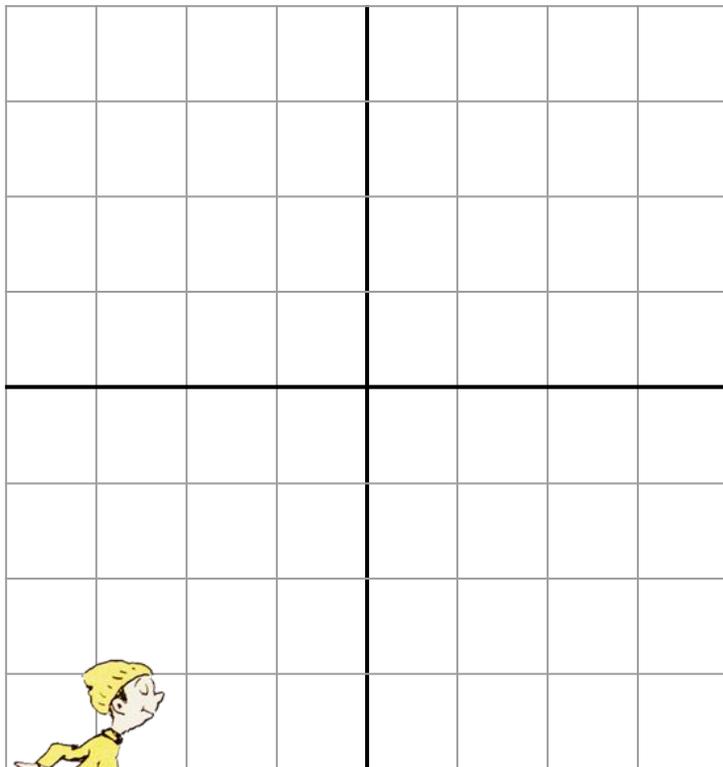
# OH THE PLACES YOU'LL GO

G6-G7  
Basic

**Oh, The Places You'll Go is an inspirational book that talks about your journey in life. Identify the equation that will lead you to the top based on the data given below. Plot the given points on the graph.**

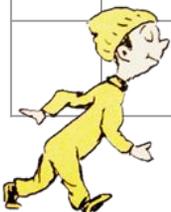
At your current age, you already have made 2 good deeds to other people. For every good deed, you always receive a 'Thank you!'. For every word of gratitude that you receive, you earn 3 steps that will lead to the top, which means that you have already earned 6 steps.

Let  $x$  be the number of words of gratitude received and  $y$  be the number of current steps you have earned.



Equation:

$x$	$y$
2	
	18



# THE YINK AND ZEDS

G7-G8  
Advanced

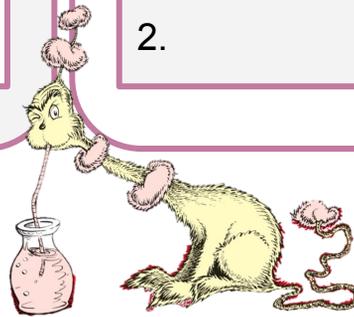
The Yink and Zeds are featured in the book *One Fish Two Fish Red Fish Blue Fish*. The Yink loves pink ink, while the Zeds are many and grow their hair fast. Read the statements below and transform them into equations.

Yink drank 6 inks more than twice a number which has sum of 26 inks.

1.

Yink bought a number of inks less than 5 inks he spilled. He now has 30 inks left.

2.



The Zeds' hair is 5 times longer than they were before. It is now 20 inches long.

3.

The Zeds are as thrice as many as they were before. There are now 90 Zeds in total.

4.



# ONCE-LER AND THE THNEED

G7-G8  
Advanced

The Lorax has been trying to save the Truffula Forest from Once-ler ever since he came. Based on the story narrated by Once-ler, show the appropriate equations of the word problems below, and solve for the missing variables.

In The Lorax, Once-ler charges \$0.15 to answer questions, plus a nail and the shell of a great great great grandfather snail. If he now charges \$2 and the equivalent of a nail is \$1, what is the price of a great great great grandfather snail when he earned a total of \$50 from 10 customers?



Once-ler started to knit Thneed which he sold at \$3.98. If he decides to have a small and a large size as a set, what could be the prices when the large size was priced as twice as much as a small size? He was able to earn a total of \$270 from 30 customers.



# WHY DOES HE HATE CHRISTMAS?

G7-G8  
Advanced

The Grinch hates Christmas, but thanks to Cindy Lou Who, everything has changed about The Grinch. Read the problem below and solve for the missing variable.

The Grinch hates Christmas. It was not explained much in the book as the reason why he hates it, but it was theorized that it was because his heart was twice as small as the normal heart.

The Grinch has been doing everything to stop Christmas from being celebrated until he met Cindy Lou Who who made his heart twice as big as before.

If the measurement of his old and new hearts has a total of 60 L/min, what is the measurement of his new heart if his old heart measures 4 L/min.



**Solution:**

**Answer:**



# GREEN EGGS AND HAM

G7-G8  
Advanced

**Guy-Am-I now likes green eggs and ham and can't get enough of it. Solve the problem below to help Guy-Am-I identify the prices of the green eggs and ham.**

Sam-I-Am has been offering green eggs and ham to Guy-Am-I, which he refused many times. When he gave himself the chance to taste it, he liked it so much.

Considering that it was the present time. He bought 3 green eggs and 5 hams and spent \$115 in total. When he went back to the store to order again, he spent \$35 for 3 green eggs and 1 ham. How much would 2 hams cost?



Let  $x$  be the cost of eggs, and  $y$  the cost of hams.

**Solution:**

**Answer:**



# 500 HATS OF BARTHOLOMEW CUBBINS

G7-G8  
Advanced

Bartholomew Cubbins had one hat, which was old. One day, the King passed the village, and whenever he removed the hat on his head, another one would appear. This made the King mad and ordered to bring him to the castle. Read the problem below and graph the linear equation being described.

Bartholomew was brought to the castle due to the King's order. The castle is very high and has a slope of 3 and y-intercept of 5.  
Graph Bartholomew's way to the castle.



# ANSWER GUIDE

## Activity 1

1. 7 secs
2. 13 secs
3. 10 items
4. No, he needs 9 seconds to do it.

## Activity 2

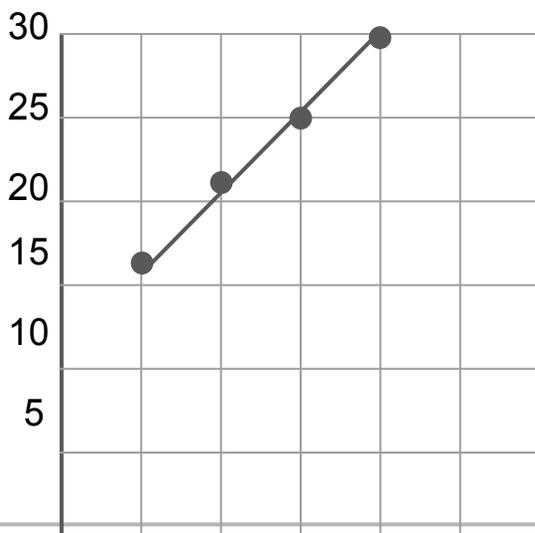
1. 3 days
2. 15 tasks
3. 4 days
4. 28 activities

## Activity 3

1. 2
2. 3
3. 2
4. 7

## Activity 4

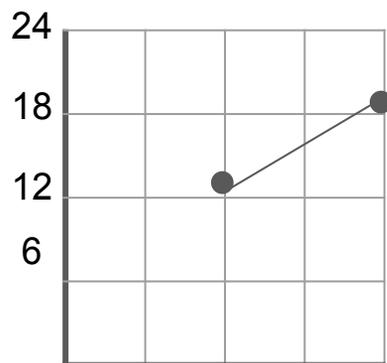
(1, 15) (2, 20) (3, 25) (4, 30)



## Activity 5

Equation:  $y = 3x + 6$

(2, 12) (4, 18)



*\*Only the 1st quadrant is shown for A4 & A5*

## Activity 6

1.  $6 + 2x = 26$
2.  $x - 5 = 30$
3.  $5x = 20$
4.  $3x = 90$



# ANSWER GUIDE

## Activity 7

$$\begin{aligned}1.) \quad & 10(2 + 1 + x) = 50 \\ & 20 + 10 + 10x = 50 \\ & 10x = 50 - 20 - 10 \\ & 10x = 50 - 30 \\ & 10x = 20 \\ & \mathbf{x = \$2}\end{aligned}$$

$$\begin{aligned}2.) \quad & 30(x + 2x) = 270 \\ & 30x + 60x = 270 \\ & 90x = 270 \\ & \mathbf{x = \$3 \text{ small}} \\ & \mathbf{2x = \$6 \text{ large}}\end{aligned}$$

## Activity 8

$$\begin{aligned}2x + 4 &= 60 \\ 2x &= 60 - 4 \\ 2x &= 56 \\ \mathbf{x} &= \mathbf{28 \text{ L/min}}\end{aligned}$$

## Activity 9

$$\begin{aligned}(3x + 5y &= 115) \\ (3x + y &= 35) - 1\end{aligned}$$

$$\begin{aligned}4y &= 80 \\ (y = 20) & \cdot 2\end{aligned}$$

$$\begin{aligned}3x + 5y &= 115 \\ -3x - y &= -35\end{aligned}$$

$$2y = 40$$

$$\begin{aligned}5y &= 115 \\ -y &= -35\end{aligned}$$

**2 hams are priced at \$40**

## Activity 10

*\*Answers may vary depending on the points.*



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