

MATHEMATICS GRADE 8



DATE:
TOPIC: GRAPHS

CONCEPTS & SKILLS TO BE ACHIEVED:


By the end of the lesson learners should know and be able to:

Interpreting graphs

- Analyse and interpret global graphs of problem situations, with a special focus on the following trends and features:
 - Increase and decrease
 - maximum or minimum
 - linear/non-linear
 - discrete or continuous

Drawing graphs

- Draw global graphs from given descriptions of a problem situation, identifying features listed above
- Use tables or ordered pairs to plot points and draw graphs on the Cartesian plane

RESOURCES:	DBE Workbook, Sasol-Inzalo book, Textbooks,
ONLINE RESOURCES	Refer to pages where you see this icon: 

DAY 1

LESSON DEVELOPMENT



A graph is just a mathematical picture of the relationship between two quantities, such as distance and time or temperature and time, etc.

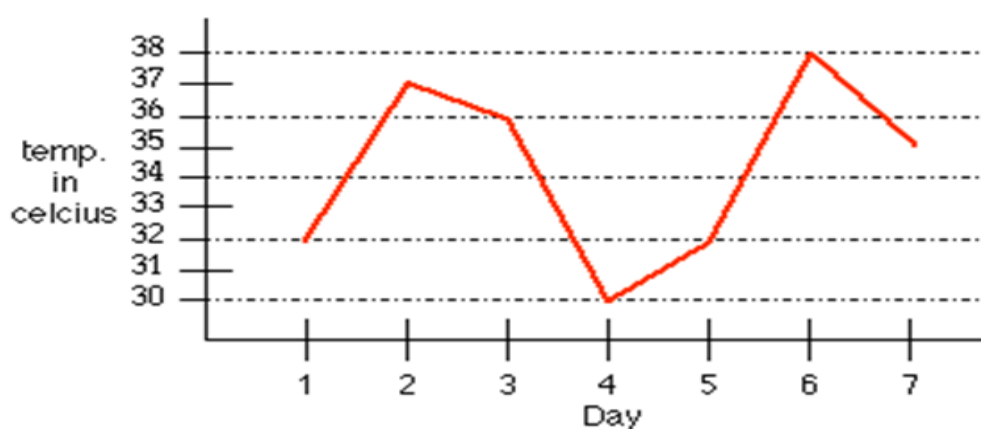
The advantage of a graph is that you can see and understand the whole picture at a glance.



Let's consider the following scenario:

Mathematicians sometimes use graphs to show the results for their experiments or if they explain their findings.

The graph below is the example of the results from an experiment where temperature of a certain place was measured over time.



On the graph above:

- The temperature on day 1 was 32° and increased to 37° on day 2
- Then on day 3 the temperature slowly decreased to 36°
- Day 4 the temperature decreased fast to 30° and slowly increased to 32° on day 5.
- In day 6 the temperature increased to 38° and decreased to 35° on day 7.

Note:

The graph has a maximum value at 38° because it changes from increasing to decreasing.

The graph has a minimum value at 30° because it changes from decreasing to increasing.

What we can tell with graphs

In the case of an increase, the graph slopes like this:

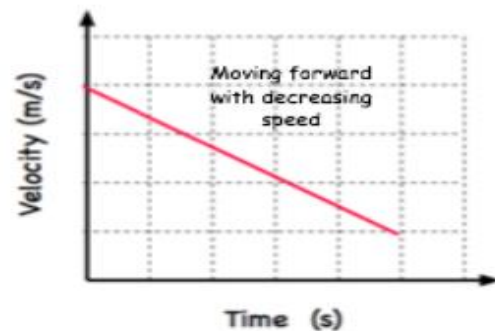
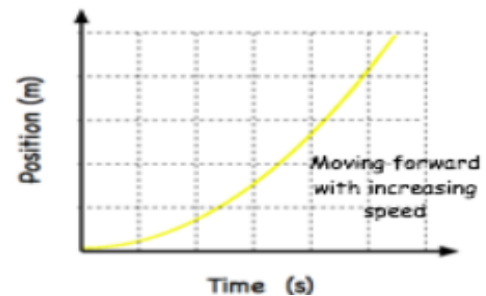
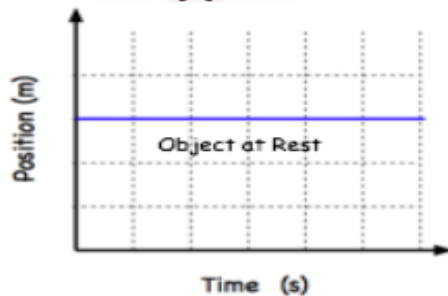


In the case of a decrease, the graph slopes like this:



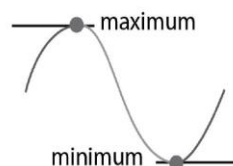
- When the **increase or decrease is constant**, the graph is a straight line and it is called a **linear graph**
- If the **increase or decrease is not constant**, the graph is **curved** and is called a **non-linear graph**.
- If there is **no change in the output variable**, the graph is a **straight horizontal line**.

Examples:



Maximum/increase: A graph has a maximum value when it changes from increasing to decreasing

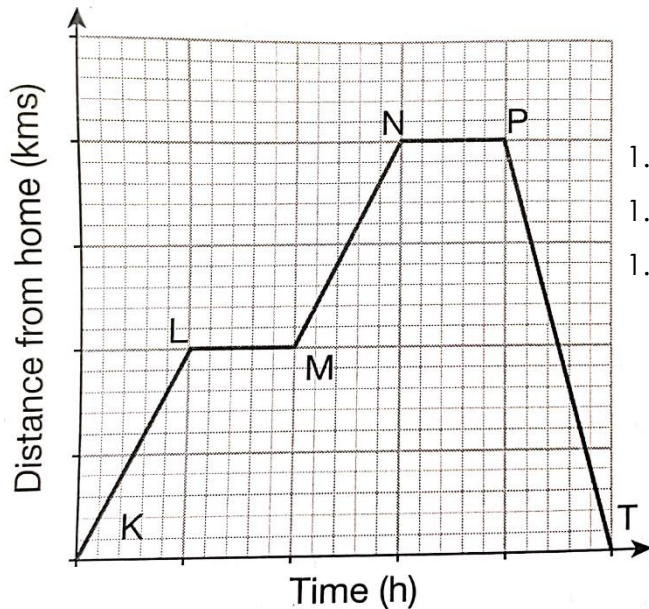
Example:



Minimum/decrease: A graph has a minimum value when it changes from decreasing to increasing

CLASSWORK:

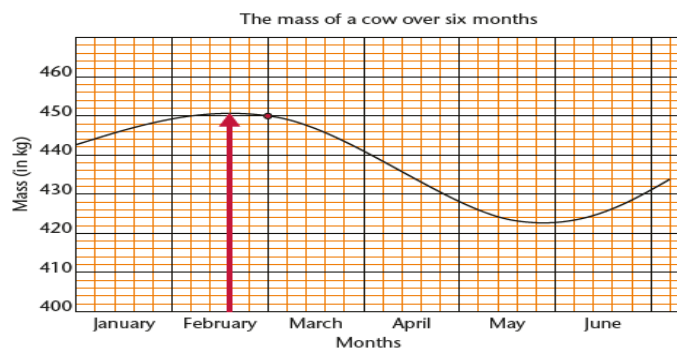
1. Study the graphs below and answer the questions that follows.



- 1.1 What is the graph telling point K and L?
- 1.2 What is happening between point N and P?
- 1.3 Describe the situation at point P and T?

2.

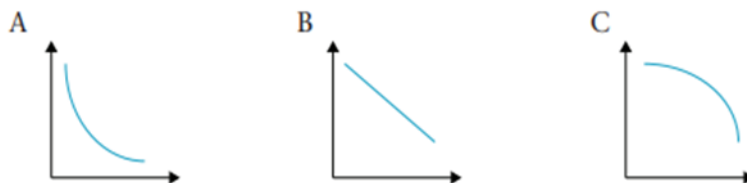
Mrs Maleka is a dairy farmer. She cares for her cows and weighs all of them daily. Here is a graph of one cow's mass in kilograms over a period of six months. At the end of February, the mass of the cow was 450 kg, as shown by the red dot.



- 2.1 The cow's mass reached a maximum a few days after the middle of February, as shown by the red arrow on the graph. When, in the period shown on the graph, did the cow's mass reach a minimum?
- 2.2 During most of February the cow weighed slightly more than 450 kg. During which month did the cow weigh less than 430 kg, for the whole month?
- 2.3 Throughout the month of June, the mass of the cow increased. During which other month did the mass of the cow also increase, right through the month?
- 2.4 During which months did the mass of the cow decrease right through the month?

HOMework:

1.



1.1 Which graph represents a quantity that decreases at a constant rate?

1.2 Which graph represents a quantity that decreases at an increasing rate?

1.3 Which graph represents a quantity that decreases at a decreasing rate?

2.

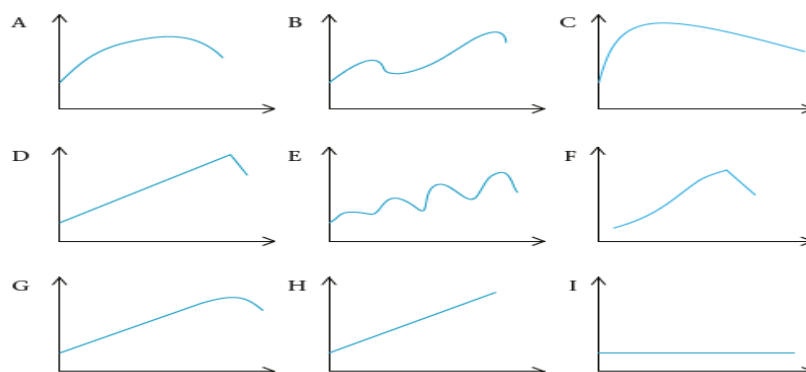
A traffic department keeps track of the traffic density on different roads.

Two traffic officers are posted somewhere along each main road and they count and record the number of cars that pass in each direction during each 15-minute interval.

They use tally marks to do this, as you can see in the example below:

	////	///	///	///	///	///
	///	///	///	///	///	///
	///	///	///	///	///	///
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	///	///	///	///	///	///
Time	06:00 to 06:15	06:15 to 06:30	06:30 to 06:45	06:45 to 07:00	07:00 to 07:15	07:15 to 07:30
Cars	14	23	37	59	71	48

2.1 Which of the graphs below do you think is the best representation of the data on traffic flow?



2.2 Which of the graphs above is the best representation of each of these traffic flow reports?

2.2.1

Time	06:00 to 06:15	06:15 to 06:30	06:30 to 06:45	06:45 to 07:00	07:00 to 07:15	07:15 to 07:30
Cars	42	53	64	75	86	75

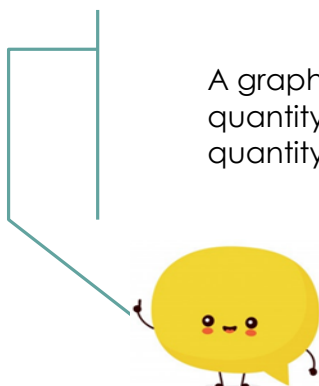
2.2.2

Time	06:00 to 06:15	06:15 to 06:30	06:30 to 06:45	06:45 to 07:00	07:00 to 07:15	07:15 to 07:30
Cars	42	123	158	147	136	124

DAY 2

LESSON DEVELOPMENT

How graphs show increases and decreases



A graph on a system of coordinates shows the way in which one quantity (called the **dependent variable**) changes when another quantity (called the **independent variable**) increases.

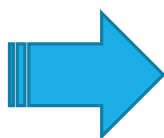
A quantity can change in the following ways:

- ✚ It can increase or decrease.
- ✚ It can increase at a constant rate, for example the total amount saved if the same amount is saved every week or month.
- ✚ It can decrease at a constant rate, for example the length of a burning candle.
- ✚ It can increase (or decrease) at a varying rate, for example the increase in the area of a square as the side length increases.

This activity is motivated by a CYBERCHASE episode.

The CyberSquad kids figure out why Sensible Flats (Town) is running out of water and fixes the problem.

After watching the video, answer the questions below:



Decreasing_Water_Le
vels_Output4x3-4x3-m



CLASSWORK:

1. At the reservoir in Sensible Flats, the CyberSquad kids get data from Cowboy Rudy about the water level in the reservoir.

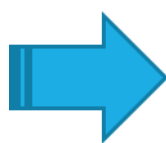
Day	Water level (ft.)
0	18
1	17
2	18
3	17
4	$17\frac{1}{2}$
5	17
6	$16\frac{1}{2}$
7	16
8	15
9	13
10	12
11	10
12	9
13	7
14	5
15	4
16	3
17	1
18	0
19	0
20	0
21	0
22	0
23	0
24	0
25	0
26	0
27	0
28	0
29	0
30	0

1.1 What is happening, over time, to the level of the water in the reservoir?

1.2 Represent the way in which the water level has changed as time passed.

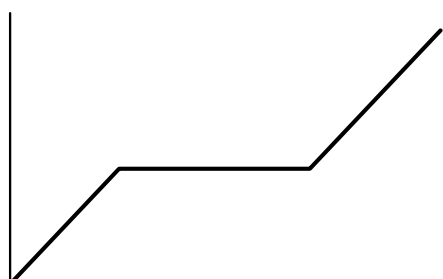
2. The CyberSquad and Digit realize that Hacker has been stealing water that comes from Lost Lake up on the mountain and they channel it back to Sensible Flats.

But now, a huge thunderstorm presents a new problem. How does a line graph help them predict how much time they have, and what to do?



A_Flooding_Threat_O
utput4x3-4x3-mp4-12

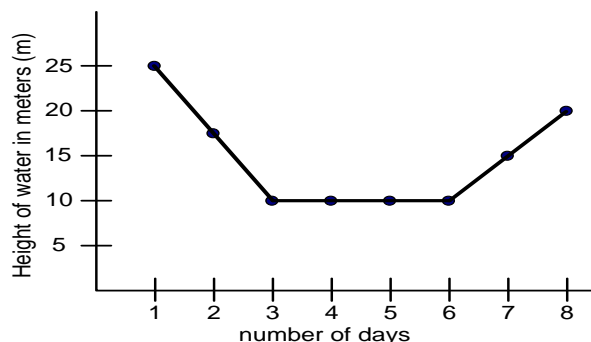
- 2.1 Tell a story using the diagram below. Base your story on water level and time.
There are no units given on the diagram below, so you can be creative about your context.



HOMEWORK:

1. The graph below shows the water level in the reservoir over several days.

Answer the questions below the graph.



1.1 How many days are recorded?

1.2 What was the highest water level?

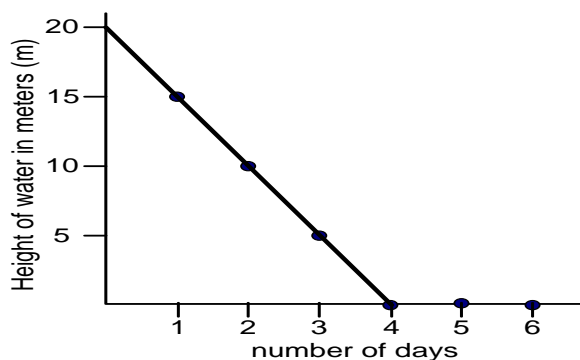
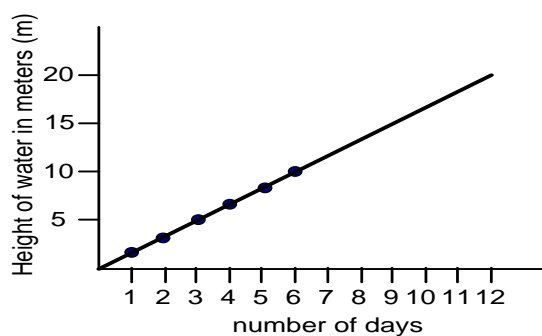
1.3 What was the lowest water level?

1.4 What happened from day 3 through day 6?

1.5 What would you predict for day 9?

2. Below are graphs of two equal-sized reservoirs. One is filling, and one is emptying.

Estimate what day it is when the two reservoirs have the same level of water.





DAY 3

LESSON DEVELOPMENT

Local Maximum and Minimum Values

Remember:

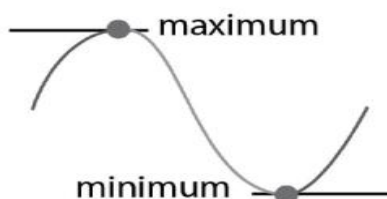
A graph has a **maximum value** when it changes from increasing to decreasing.

A graph has a **minimum value** when it changes from decreasing to increasing.

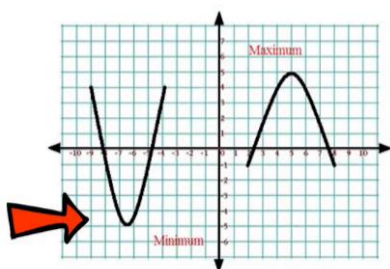
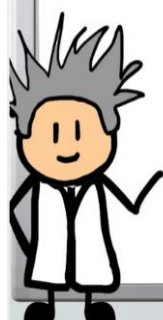
A graph can have more than one minimum or maximum value.



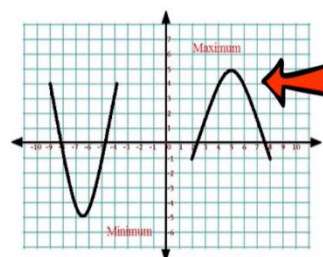
Example:



The minimum value of the function on the left is $y = -5$.



The maximum value of the function on the right is $y = 5$.

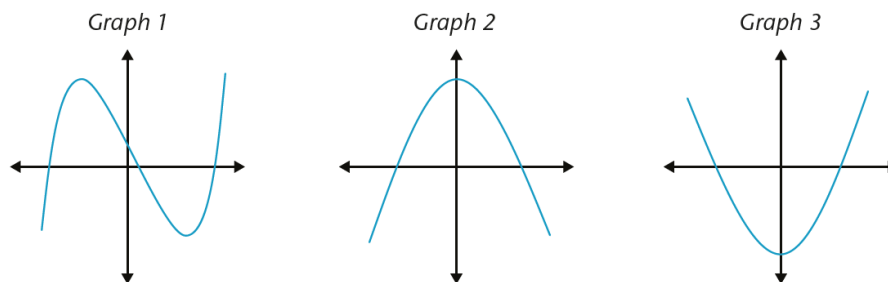




CLASSWORK:

Consider the graphs below. Describe how the dependent variable behaves in each case by indicating which graph corresponds to which description.

- (a) The variable has a maximum value because it changes from increasing to decreasing.
- (b) The variable has a minimum value because it changes from decreasing to increasing.
- (c) The variable has a maximum value as well as a minimum value because it changes from increasing to decreasing and then from decreasing to increasing.



HOMEWORK:

Draw graphs that match the following descriptions:

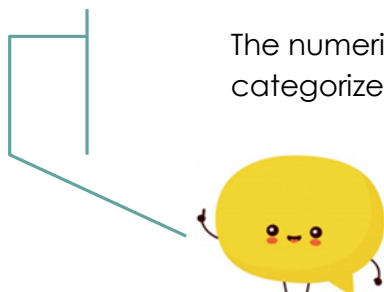
- (a) A quantity changes in a non-linear fashion, at one stage switching from decreasing to increasing and then to decreasing again.
- (b) A quantity changes from increasing at a constant rate to decreasing at a constant rate and then becomes constant.



DAY 4

LESSON DEVELOPMENT

Discrete or "Continuous"



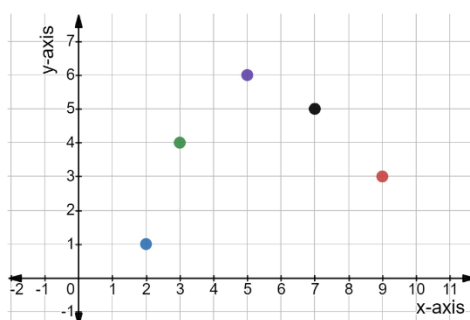
The numerical information we represent on a graph can be categorized as either **Discrete** or **Continuous data**:

Discrete → Quantities that can be counted.

Example: The mark you achieve for a math test or the number of people

Discrete graphs don't have continuous lines. Instead, discrete graphs look like **plotted points**.

Example:

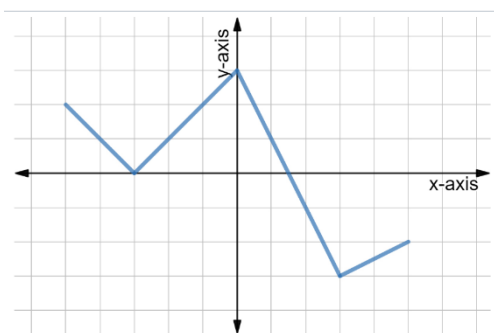


Continuous → Quantities that can be measured.

Example: The height or the weight of learners in grade 8B.

Continuous graphs have **continuous lines**. This makes them different from discrete graphs, which only include unconnected points.

Example:



CLASSWORK:

1. Use the ✓ to indicate which of the items in the list are discrete and which are continuous. Consult and use the definitions given.

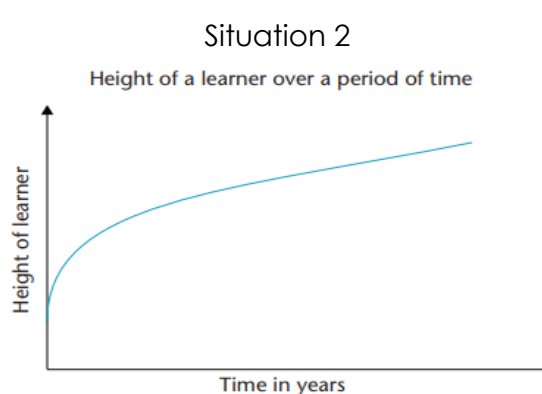
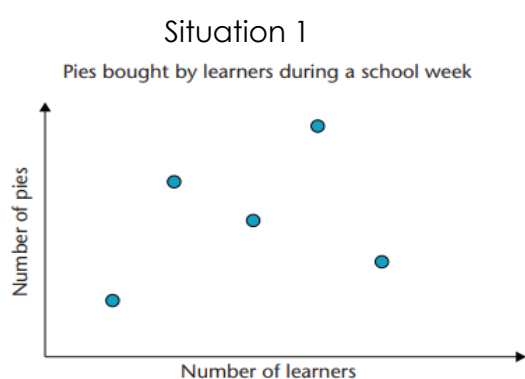
List	Discrete	Continuous
Number of cement bags		
Heights of learners in Grade 8		
Times taken for athletes to complete a 400 m hurdles race during the Olympic Games		
The number of sweets in various 500 g bags		
Temperature taken from the grade 8 learners		
The cost of an exercise book in Rands and cents		

2. Say if the following make sense or not. Explain.

- (a) 501,3 learners attended a rugby match played by the senior team.
 (b) The distance from school to the nearest shopping mall is 10,75 km.
 (c) 2 004,75 cans of cola were sold during a fundraising event.

HOMEWORK:

1. Consider the two situations below:



- (a) What type of data is graphed in situation 1?
 (b) What type of data is graphed in situation 2?
 (c) Why do you think the graph in situation 2 is a solid line?
 (d) Why are the points in situation 1 not joined?

DAY 5 REVISION

What we can tell with graphs:

The media often uses graphs to communicate information.

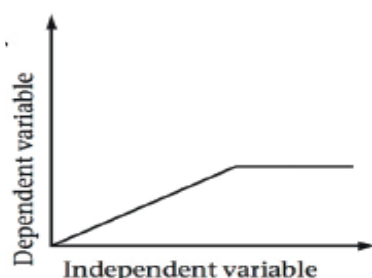
What is of **interest is the general trend** a graph shows, any **high and low points**, as well as any **increases and/or decreases**.

We must describe the general trend and answer the specific questions correctly, you are on your way to understanding how to interpret a graph.

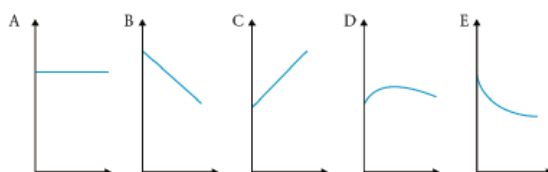


Remember:

- If there is a relationship between the variables, the **independent variable** is always shown on the **horizontal axis** and the **dependent variable** on the **vertical axis**.



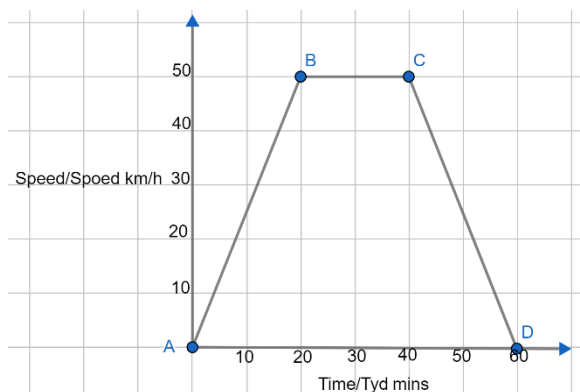
- If time is part of the relationship, it is usually the independent variable and is shown on the horizontal axis.
- If the dependent value becomes smaller as the independent value becomes bigger, the graph will be decreasing.
- If the dependent value becomes bigger as the independent value becomes bigger, the graph will be increasing.
- The graphs illustrate the following:
 - a linear graph with a constant rate of change
 - a curved graph with a rate of change that is not constant
 - a constant graph that shows no change





CLASSWORK:

1.



1.1 Which variable is the dependent variable?

1.2 Is the graph discrete or continuous?

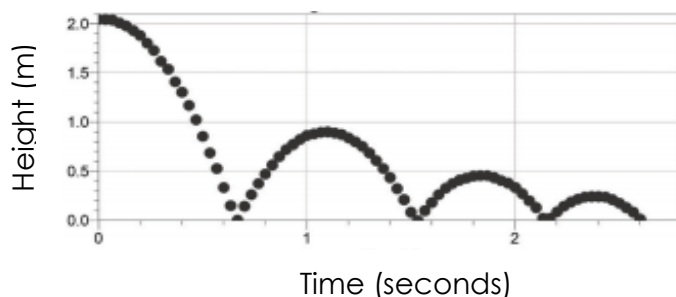
1.3 What is the maximum speed?

1.4 Label AB, BC and CD using constant, decreasing or increasing.

1.5 After how many minutes was the maximum speed reached?

2.1 Tell the story that is shown by the graph below of a bouncing ball.

Height vs Time



3. Draw a rough graph for each of the following situations:

(a) The height of a young tree and its age

(b) The level of water in a dam, over a period without any rain

(c) The temperature under a tree over a period of 24 hours

DAY 6

LESSON DEVELOPMENT

Graphs of Ordered Pairs



Input and output values can be written as a pair.

The first number in a pair represents the input number and the second number represents the output number.

We therefore say that the pair of numbers is **ordered**.

Making a graph of **ordered pairs** is another way to show how the input and output values are related.



When drawing a graph of ordered pairs, work as follows:

- First identify the input values (x) and output values (y). In most cases the input values will be given and the output values are calculated using the formula given.

Example:



Input (x)	1	2	3	4	5	6
Output (y)	15	10	5	0	-5	-10

(*input value ; output value*) \rightarrow (x - *coordinate* ; y - *coordinate*) \rightarrow (3; 5).

- The output values are written on the y -axis (the vertical axis) and the input values are written on the x -axis (the horizontal axis).
- Plot the ordered pair.

The ordered pair is (3; 5).

- To plot this pair, put your finger on the number 3 on the x -axis and another finger on the number 5 on the y -axis.
- Move your finger on the number 3 in a line straight up and move your finger on the number 5 straight across.
- Where your two fingers meet, make a point. You can describe this point with the ordered pair (3; 5).



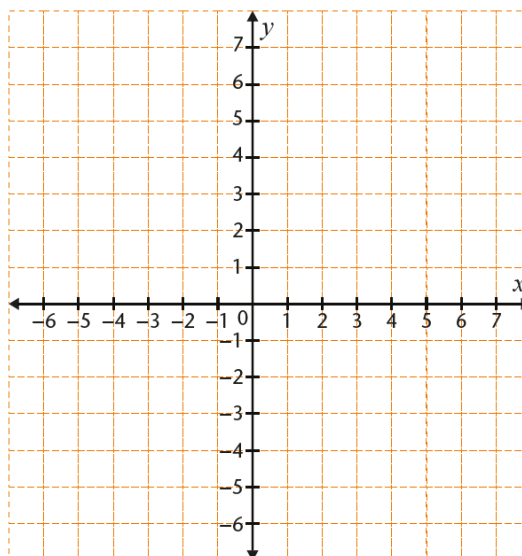
<https://tinyurl.com/mecxvxl>

(When accessed the website, click the step by step button)

CLASSWORK:

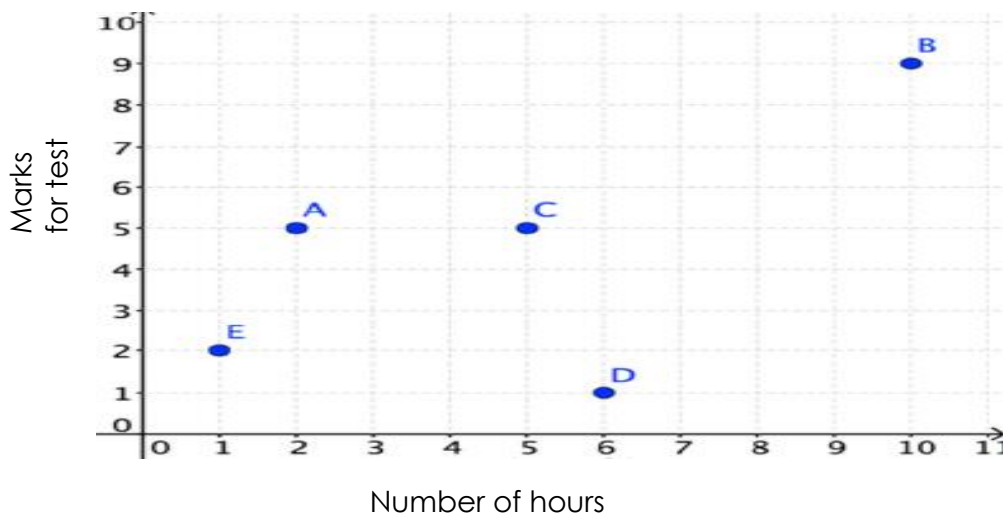
1. On graph paper plot the ordered pairs given below:

- (a) $A(0; 3)$
- (b) $B(3; 0)$
- (c) $C(-2; 1)$
- (d) $D(4; -4)$
- (e) $E(-3; -2)$



HOMEWORK:

A teacher records the number of hours that 5 learners (**A**нна, **B**об, **C**ам, **D**инео, **E**брахим) study for a test and then records the mark they get for the test (out of 10). She plots the results:



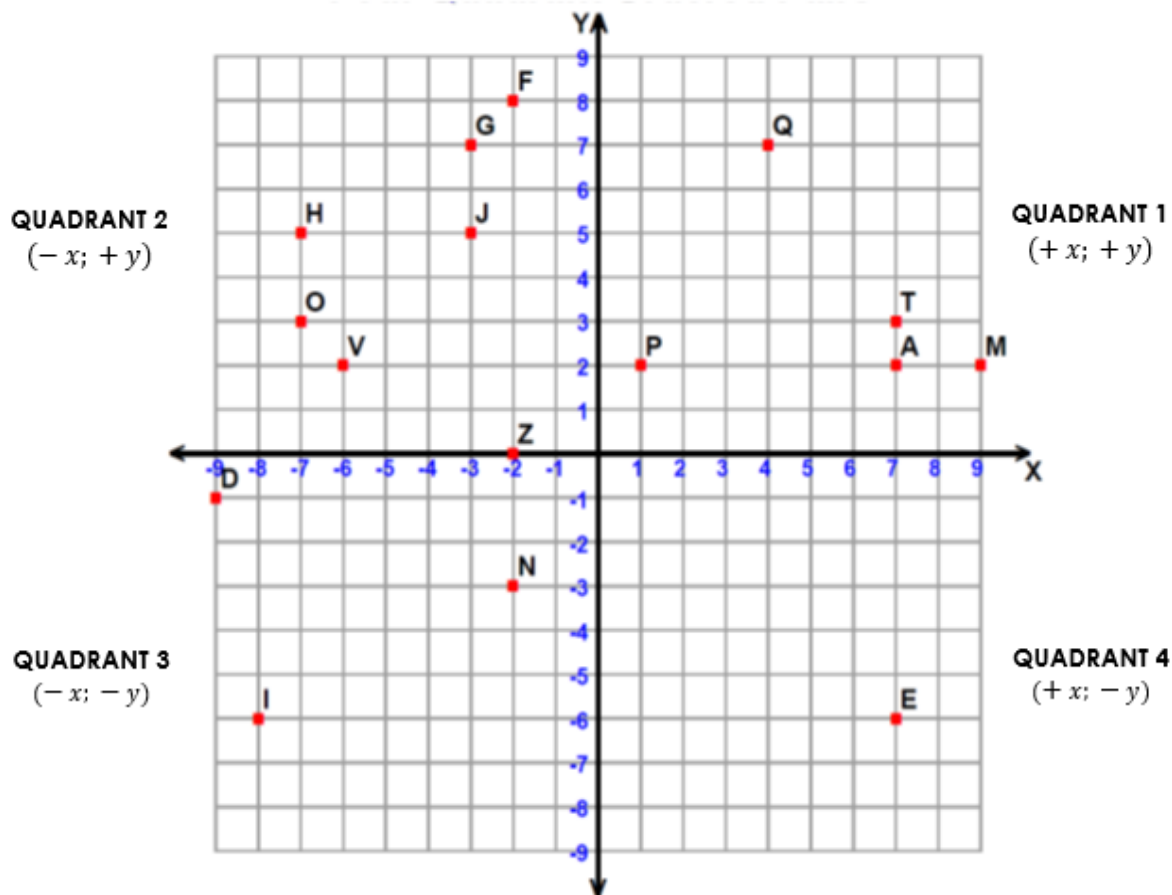
- a) Which learner got the highest mark for the test?
- b) Which learner got the lowest mark for the test?
- c) How many hours did Anna study for, and what mark did she get?
- d) Which learners studied for more hours than Cam?
- e) Which learners got more marks than Ebrahim?

DAY 7

CONSOLIDATION EXERCISE



Study the diagram and complete the worksheet below.



Tell what point is located at each ordered pair.

- | | | | |
|---------------------|---------------------|---------------------|---------------------|
| 1) $(-9, -1)$ _____ | 3) $(-3, +5)$ _____ | 5) $(-6, +2)$ _____ | 7) $(+7, -6)$ _____ |
| 2) $(+4, +7)$ _____ | 4) $(+7, +3)$ _____ | 6) $(-2, +8)$ _____ | 8) $(-2, -3)$ _____ |

Write the ordered pair for each given point.

- | | | | |
|-------------|-------------|-------------|-------------|
| 9) M _____ | 11) H _____ | 13) Z _____ | 15) P _____ |
| 10) G _____ | 12) O _____ | 14) I _____ | 16) A _____ |

Plot the following points on the coordinate grid.

- | | | | |
|------------------|------------------|------------------|------------------|
| 17) S $(-3, -1)$ | 19) U $(-4, +7)$ | 21) X $(-7, -1)$ | 23) Y $(+7, -7)$ |
| 18) L $(-4, -6)$ | 20) B $(+2, +5)$ | 22) K $(+3, -9)$ | 24) C $(-5, -4)$ |

DAY 8

LESSON DEVELOPMENT

Draw graphs from tables of ordered pairs

Example:

Copy and complete the table below for $y = x + 3$:

x	y	(x, y)
-4		
-3		

Formula: $y = x + 3$

Shows the relationship between the input (x) and the output(y).

Solution:

x	y	(x, y)
-4	-1	(-4,1)
-3	0	(-3,0)

Ordered pairs



Replace x with the given x value to find the corresponding y value.

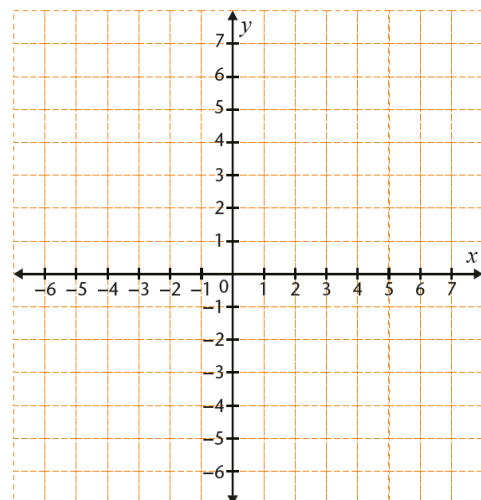


$$\begin{aligned} y &= x + 3 \\ y &= (-4) + 3 \\ y &= -1 \end{aligned}$$

$$\begin{aligned} y &= x + 3 \\ y &= (-3) + 3 \\ y &= 0 \end{aligned}$$

Now complete the rest of the table and plot the ordered pairs on the graph paper below. Join the points to form a graph.

-2	1	(-2; 1)
-1		
0		
1	4	(1; 4)
2		
3		
4		



Solution:

-2	1	$(-2; 1)$
-1	2	$(-1; 2)$
0	3	$(0; 3)$
1	4	$(1; 4)$
2	5	$(2; 5)$
3	6	$(3; 6)$
4	7	$(4; 7)$

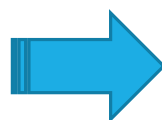
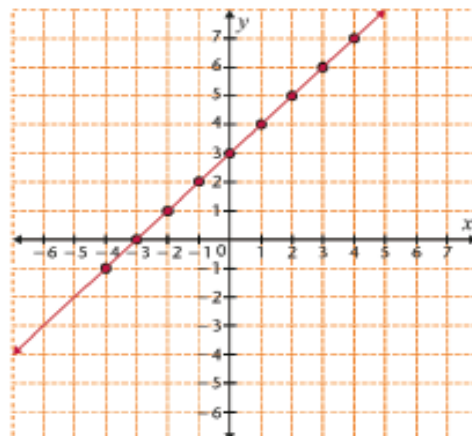
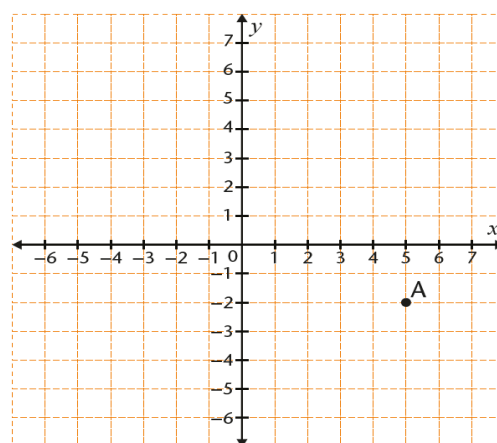


Table Of Ordered
Pairs_Substitution _A

CLASSWORK:

1.1 Copy and complete the table below for the formula $y = -x + 3$:

x	y	$(x; y)$
-4		
-3		
-2	5	$(-2; 5)$
-1		
0		
1	2	$(1; 2)$
2		
3		
4		



1.2 On the graph paper plot the ordered pair on the axis system.

1.3 Join the points to form a graph.

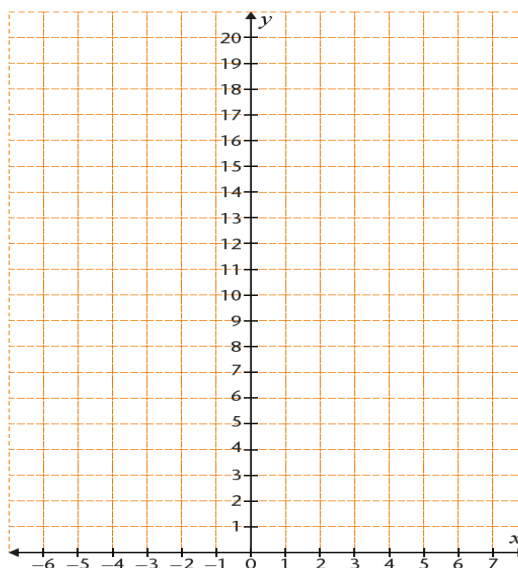
1.4 What are the values of the ordered pair A on the graph?



HOMEWORK:

a) Copy and complete the table below for the formula $y = x^2 + 3$:

x	y	$(x; y)$
-4		
-3		
-2	7	$(-2; 7)$
-1		
0		
1	4	$(1; 4)$
2		
3		
4		



b) On the graph paper plot the ordered pairs on the axis system. Join the points to form a graph.

c) Is the point $(10; 103)$ on the graph? Explain

d) Is the graph linear or non-linear?

e) Does the graph have a minimum or maximum value? What is this value?

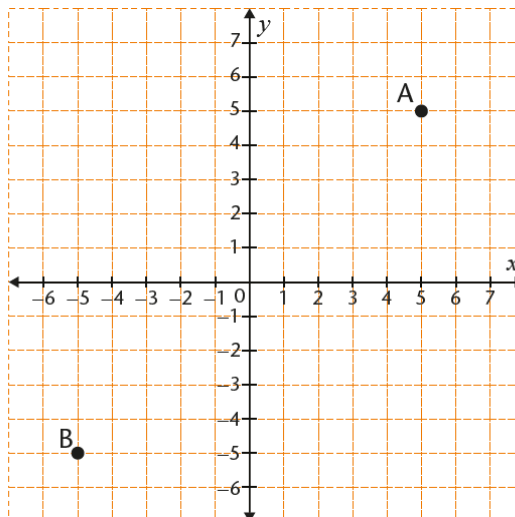
DAY 9

CONSOLIDATION EXERCISES

1.

a) Copy and complete the table below for the formula $y = x$:

x	y	$(x; y)$
-4		
-3		
-2	-2	$(-2; -2)$
-1		
0		
1	1	$(1; 1)$
2		
3		
4		



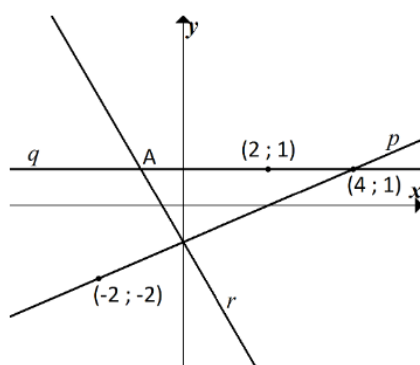
(b) On graph paper, copy the axis system. Then plot the ordered pairs on the axis system.

(c) Join the points to form a graph.

(d) Write down the values of the ordered pairs A and B on the graph.

2.

The figure below shows sketch graph of the straight lines p, q and r



a) Which graph is increasing?

b) Which graph shows no change in the output values?

c) Which graphs in decreasing?



3.

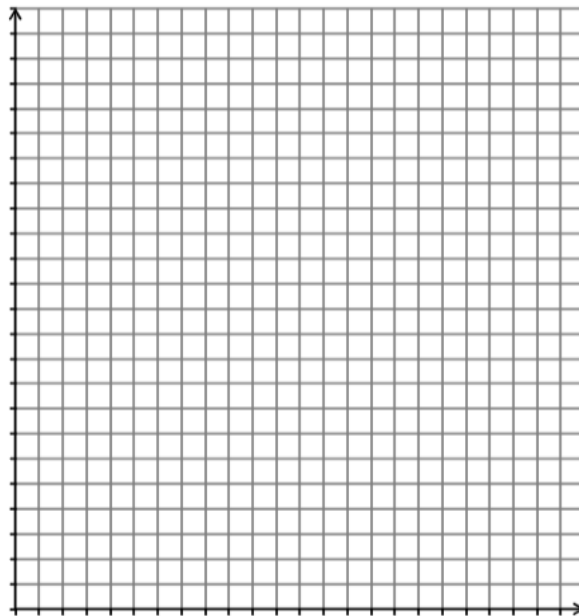
The bag of sweets has 24 sweets in it. The sweets are shared equally.

The table shows the number of sweets that each person will get depending on the number of people sharing.

(a) Complete the table below to show all possibilities if the sweets are not broken.

Number of people sharing	1	2	3	4	6	8	12	24
Number of sweets each person gets				6	4			1

(b) Draw the graph of the values in the table



c) Is the graph linear or no-linear, increasing or decreasing?



DAY 10

CONSOLIDATION EXERCISES

1.

When astronauts go on space walks, 1 kilogram of gas lasts them 2 hours. They must have 1 hours' worth of gas left in their tank when they return to the spacecraft. The table below shows the number of hours an astronaut can go on a spacewalk depending on the amount of gas in their tank.

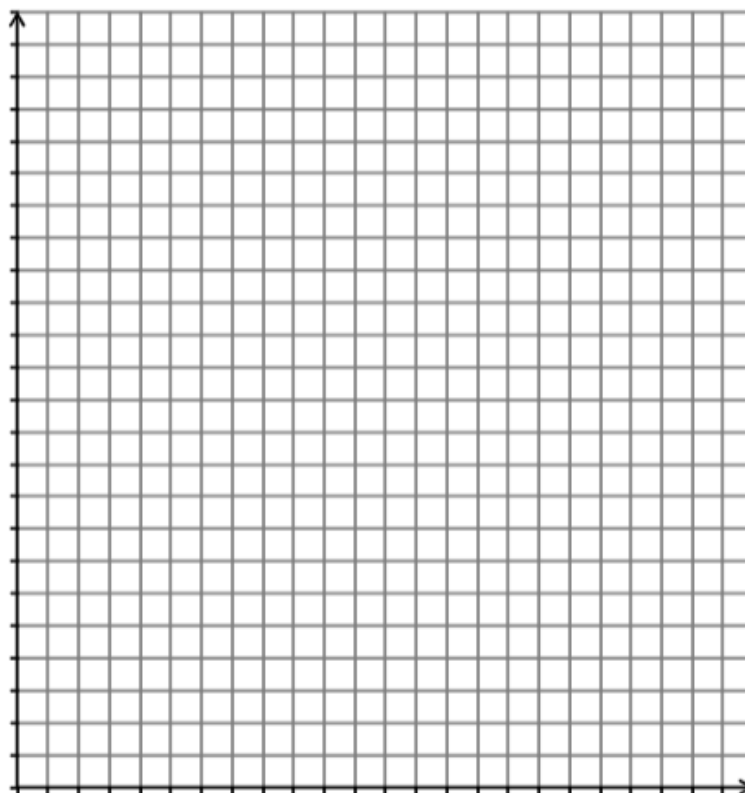
Relationship: $y = 2x - 1$

Gas in the tank (kg)	(x)	3	4	5	6		10
Hours away from the base	(y)	5	7	9		15	



1.1 Copy the table and fill in the missing numbers using the formula $y = 2x - 1$

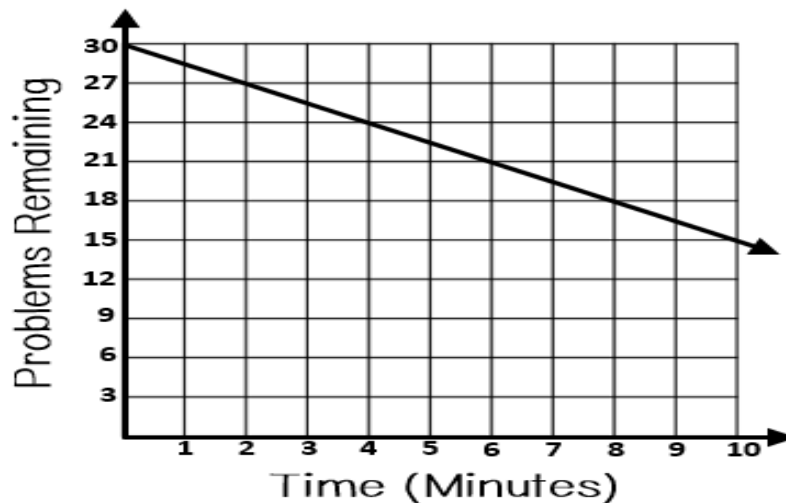
1.2 Plot the point on the table in the grid provided



1.3 Is the graph increasing or decreasing?

2.

The graph shows the number of homework problems. Amanda has remaining problems based on the number of minutes she has been working. Which of the following statements is not true?



2.1 Amanda started with 30 homework questions.

2.2 Amanda finishes 2 homework questions every 3 minutes.

2.3 Amanda finishes 3 homework questions every 2 minutes.

2.4 After 10 minutes, Amanda has finished half of her homework problems.

3.

Relationship: $y = -2x + 12$

x	-2	-1	0	1	2	3
y						

3.1 Complete the table.

3.2 Plot the ordered pairs on a Cartesian Plane and join the points.

3.3 Is this graph:

3.3.1 linear/non – linear

3.3.2 increasing/decreasing



MEMORANDUM DAY 1

CLASSWORK:

- 1
 - 1.1 The graph is increasing
 - 1.2 The graph is constant
 - 1.3 At graph decreases from point P to point T
- 2.
 - 2.1 Towards the end of May
 - 2.2 May
 - 2.3 January
 - 2.4 March and April

HOMEWORK:

- 1.
 - 1.1 B
 - 1.2 C
 - 1.3 A
- 2.
 - 2.1 Graph F
 - 2.2.1 Graph D
 - 2.2.2 Graph C

MEMORANDUM DAY 2

CLASSWORK:

- 1.1 Water level began at 18 feet depth. It was recorded for 30 days. Water level is decreasing from day 1 to day 18. After day 18, the tank is empty.
 - 1.2 Line Graph
2.
(possible story)
Someone fills glass of water halfway. Stops filling it to answer a telephone, and then returns to fill the glass the rest of the way.

HOMEWORK:

- 1.1 8 days are recorded
 - 1.2 Highest water level was 25 meters.
 - 1.3 Lowest level was 10 meters.
 - 1.4 From day 3 to 6, the water depth remained constant
 - 1.5 For day 9, predict that the water level will be 25 meters
2.
On day 3, they are both at 5 meters.

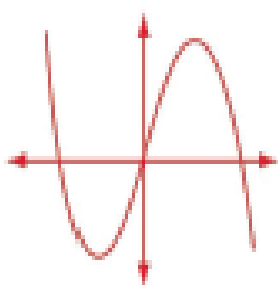
MEMORANDUM DAY 3

CLASSWORK:

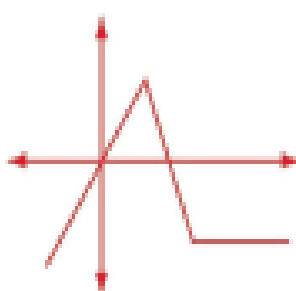
1.
 - (a) Graph 2
 - (b) Graph 3
 - (c) Graph 1

HOMEWORK:

(a)



(b)



MEMORANDUM DAY 4:

CLASSWORK:

List	Discrete	Continuous
Number of cement bags	✓	
Heights of learners in Grade 8	✓	
Times taken for athletes to complete a 400 m hurdles race during the Olympic Games		✓
The number of sweets in various 500 g bags	✓	
Temperature taken from the grade 8 learners		✓
The cost of an exercise book in rands and cents		✓

2.
 - (a) This does not make sense. The number of people is always a whole number.
 - (b) This does make sense. Distance can be expressed as a rational number.
 - (c) This does not make sense. The number of cans is always a whole number.



HOMEWORK

1.

- (a) Discrete data
- (b) Continuous data
- (c) Because it is a graph of continuous data.
- (d) Because it is a graph of discrete data.

MEMORANDUM DAY 5

CLASSWORK

1.

- 1.1 Speed
- 1.2 continuous
- 1.3 50km/h
- 1.4 AB – increasing, BC – constant, CD - decrease
- 1.5 20 minutes

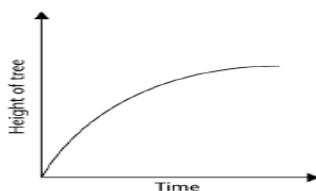
2.

There are a few minimum points in the graph and these all represent the ball hitting the ground each time that it bounces.

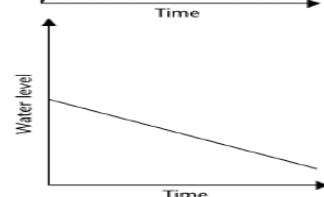
- The ground is the lowest possible point that the ball can go.
- The maximum point on the graph is at 2m – the height the ball is first dropped from.
- No matter how many times the ball bounces, it will never reach the height of 2m again.
- The height decreases less and less as the ball bounces

3.

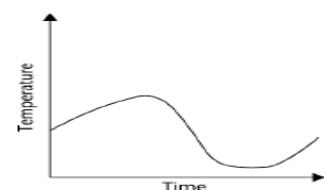
(a)



(b)



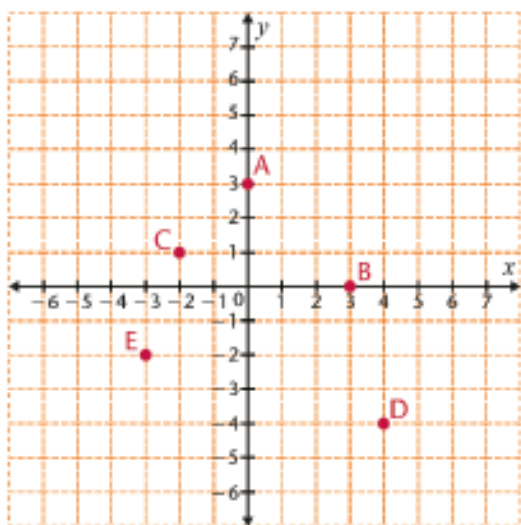
(c)



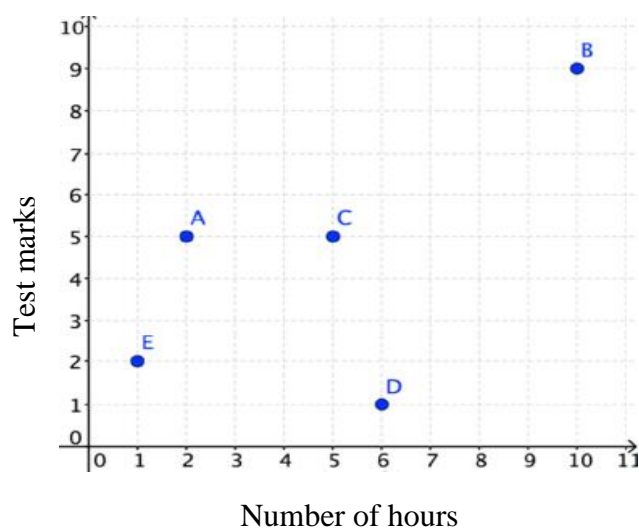
MEMORANDUM DAY 6

CLASSWORK

1.



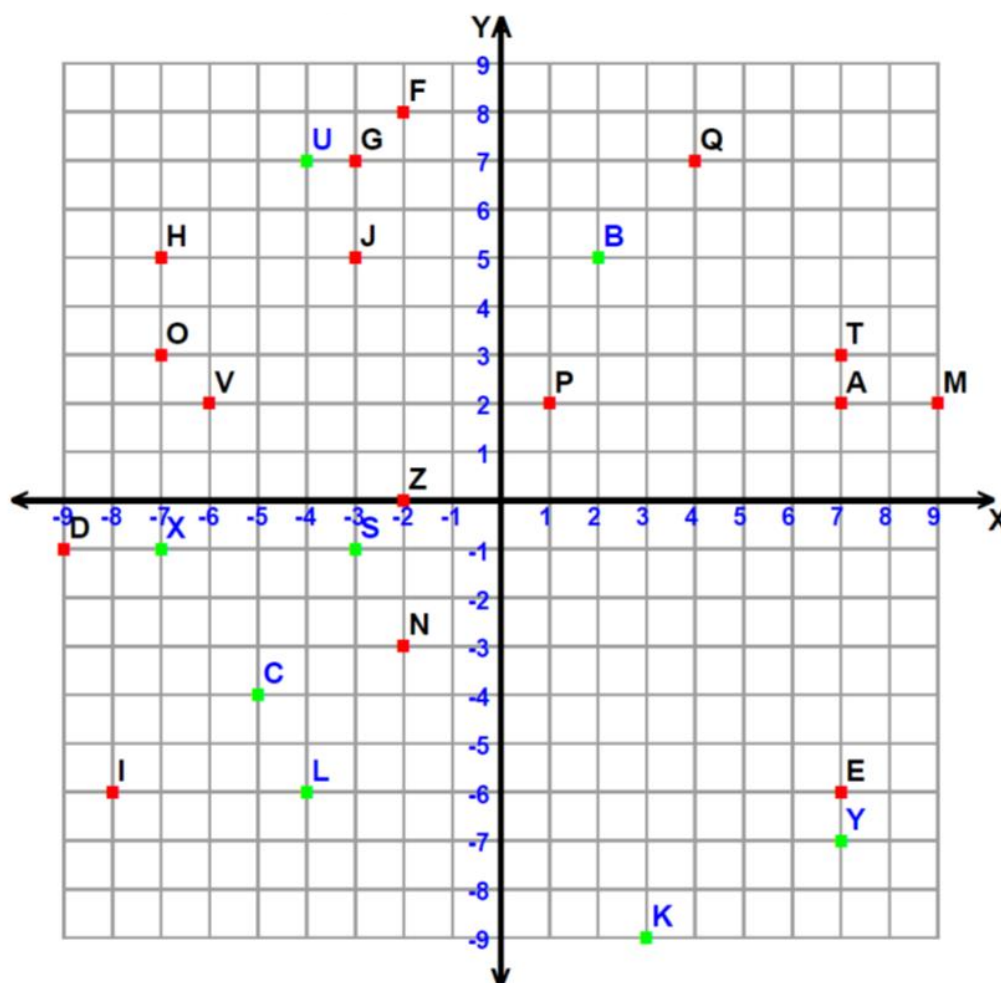
HOMEWORK



- Bob had the highest mark
- Dineo had the lowest mark
- 2 hours and she got $\frac{5}{10}$
- Deneo and Bob studied more hours than Cam
- Bob, Cam and Anna got more marks than Ebrahim

MEMORANDUM DAY 7

CLASSWORK



Tell what point is located at each ordered pair.

- | | | | |
|------------------------|------------------------|------------------------|------------------------|
| 1) $(-9, -1)$ <u>D</u> | 3) $(-3, +5)$ <u>J</u> | 5) $(-6, +2)$ <u>V</u> | 7) $(+7, -6)$ <u>E</u> |
| 2) $(+4, +7)$ <u>Q</u> | 4) $(+7, +3)$ <u>T</u> | 6) $(-2, +8)$ <u>F</u> | 8) $(-2, -3)$ <u>N</u> |

Write the ordered pair for each given point.

- | | | | |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 9) M <u>$(+9, +2)$</u> | 11) H <u>$(-7, +5)$</u> | 13) Z <u>$(-2, +0)$</u> | 15) P <u>$(+1, +2)$</u> |
| 10) G <u>$(-3, +7)$</u> | 12) O <u>$(-7, +3)$</u> | 14) I <u>$(-8, -6)$</u> | 16) A <u>$(+7, +2)$</u> |

Plot the following points on the coordinate grid.

- | | | | |
|------------------|------------------|------------------|------------------|
| 17) S $(-3, -1)$ | 19) U $(-4, +7)$ | 21) X $(-7, -1)$ | 23) Y $(+7, -7)$ |
| 18) L $(-4, -6)$ | 20) B $(+2, +5)$ | 22) K $(+3, -9)$ | 24) C $(-5, -4)$ |

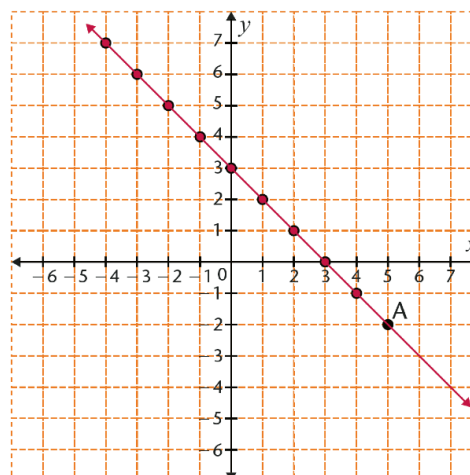
MEMORANDUM DAY 8

CLASSWORK

1.1

x	y	$(x; y)$
-4	7	$(-4; 7)$
-3	6	$(-3; 6)$
-2	5	$(-2; 5)$
-1	4	$(-1; 4)$
0	3	$(0; 3)$
1	2	$(1; 2)$
2	1	$(2; 1)$
3	0	$(3; 0)$
4	-1	$(4; -1)$

.2 & 1.3



1.

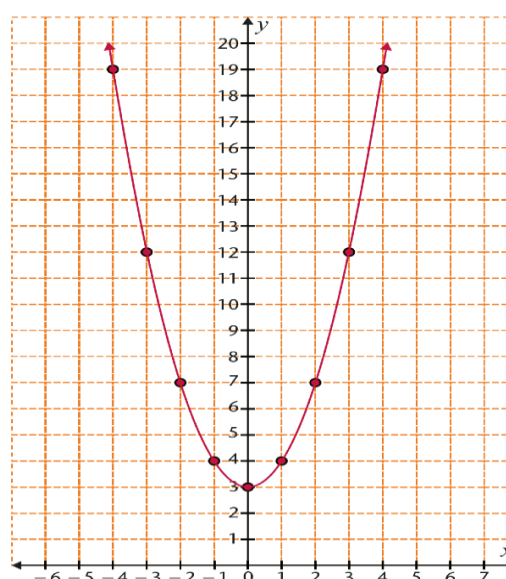
1.4 $A(5; -2)$

HOMEWORK:

a)

x	y	$(x; y)$
-4	-13	$(-4; -13)$
-3	-6	$(-3; -6)$
-2	-1	$(-2; -1)$
-1	2	$(-1; 2)$
0	3	$(0; 3)$
1	2	$(1; 2)$
2	-1	$(2; -1)$
3	-6	$(3; -6)$
4	-13	$(4; -13)$

b)



c) Yes, because $y = (10)^2 + 3 = 100 + 3 = 103$.

d) Non-linear

e) minimum value, $y = 3$

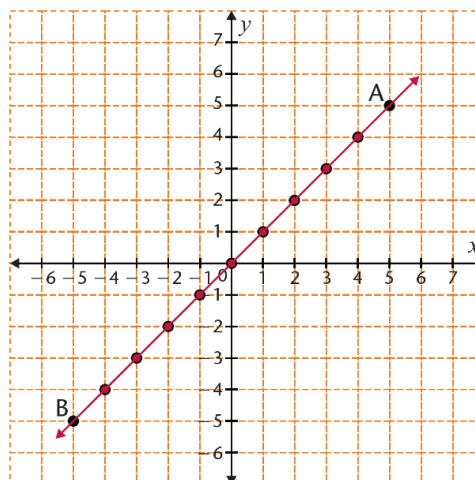
MEMORANDUM DAY 9

1.

a)

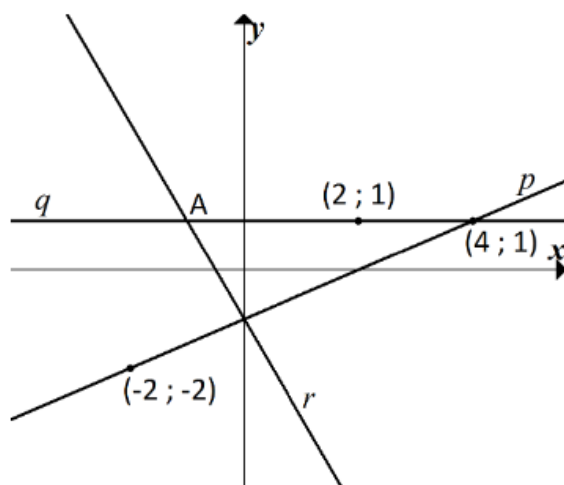
x	y	$(x; y)$
-4	-4	$(-4; -4)$
-3	-3	$(-3; -3)$
-2	-2	$(-2; -2)$
-1	-1	$(-1; -1)$
0	0	$(0; 0)$
1	1	$(1; 1)$
2	2	$(2; 2)$
3	3	$(3; 3)$
4	4	$(4; 4)$

b) & c)



d) $A(5; 5)$ and $B(-5; -5)$

2



a) The graph p is increasing

b) The graph q is constant

c) The graph r is decreasing

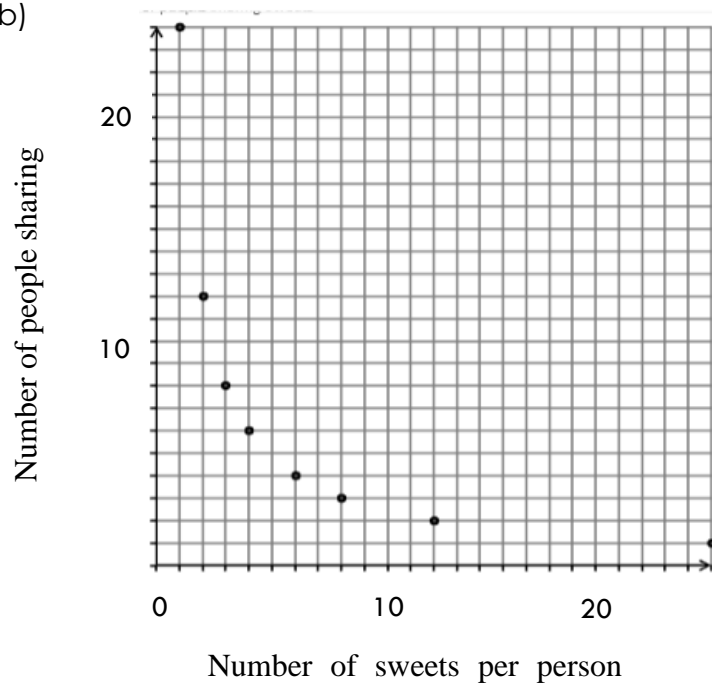


3

a)

Number of people sharing	1	2	3	4	6	8	12	21
Number of sweets each person gets	24	12	8	6	4	3	2	1

b)



c) The graph is non – linear and decreasing



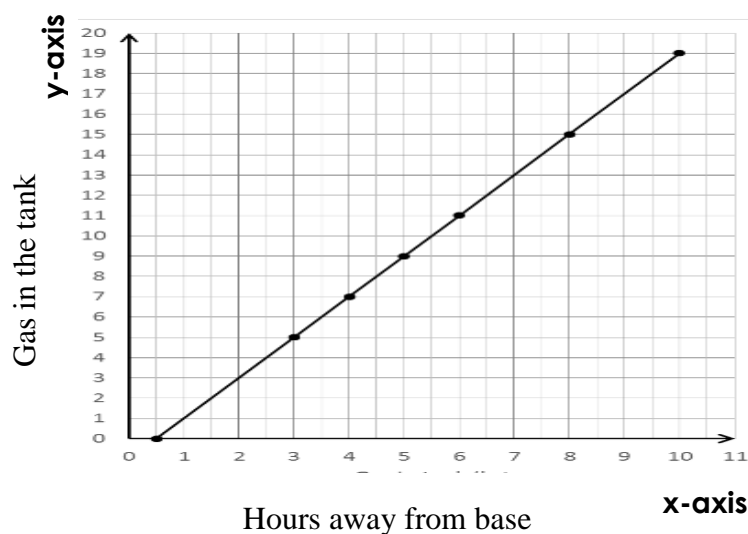
MEMORANDUM DAY 10

1.1 $y = 2x - 1$

$x = 6: y = 2(6) - 1$ $x \leftarrow \text{divide by 2} \leftarrow \text{add 1} \leftarrow 15$ $x = 10$ $y = 2(10) - 1$
 $y = 12 - 1$ $8 \leftarrow \text{divide by 2} \leftarrow \text{add 1} \leftarrow 15$ $y = 20 - 1$
 $y = 11$ $y = 19$

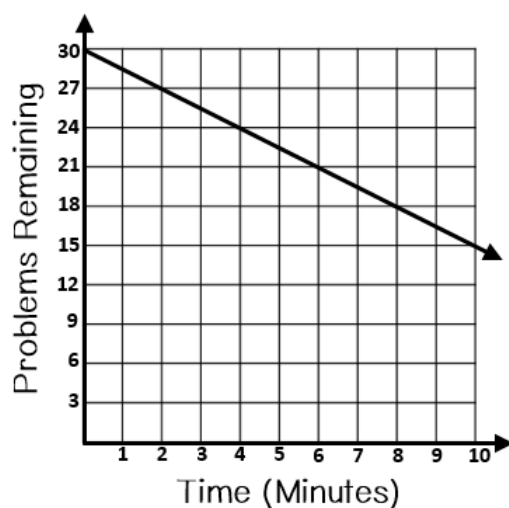
Gas in the tank (x)	3	4	5	6	8	10
Hours away from the base (y)	5	7	9	11	15	19

1.2)



1.3) Increasing

2.



- a) true
- b) false
- c) true
- d) true

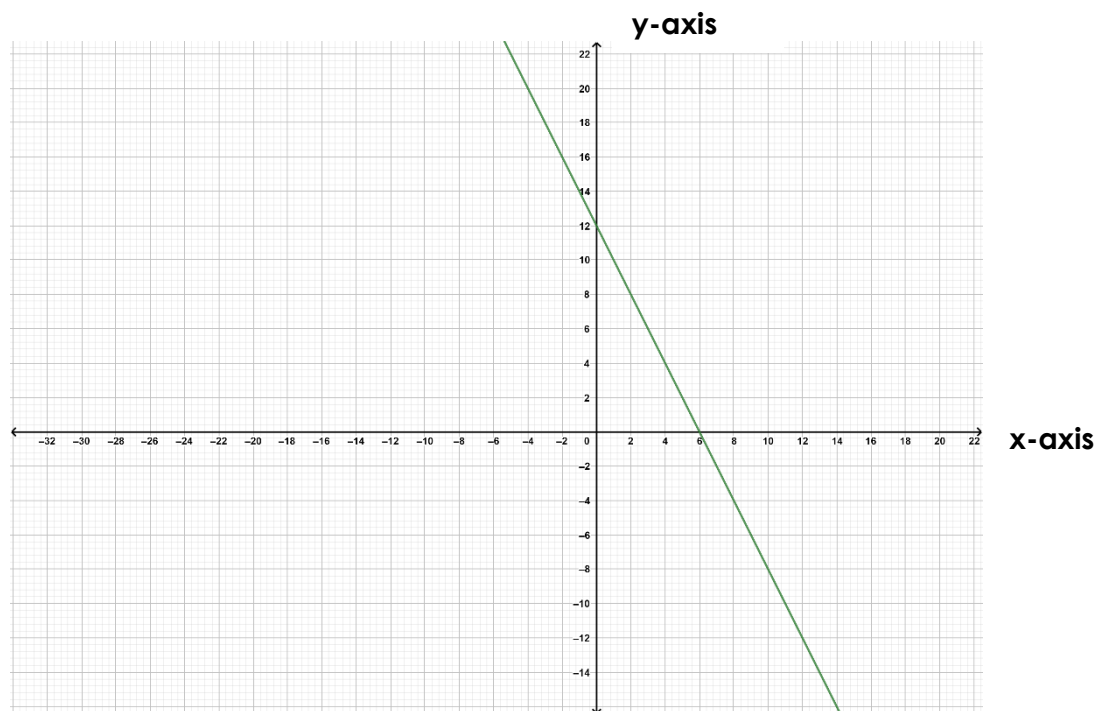


3.

3.1

x	-2	-1	0	1	2	3
y	16	14	12	10	8	6

3.2



3.3.1 linear

3.3.2 decreasing