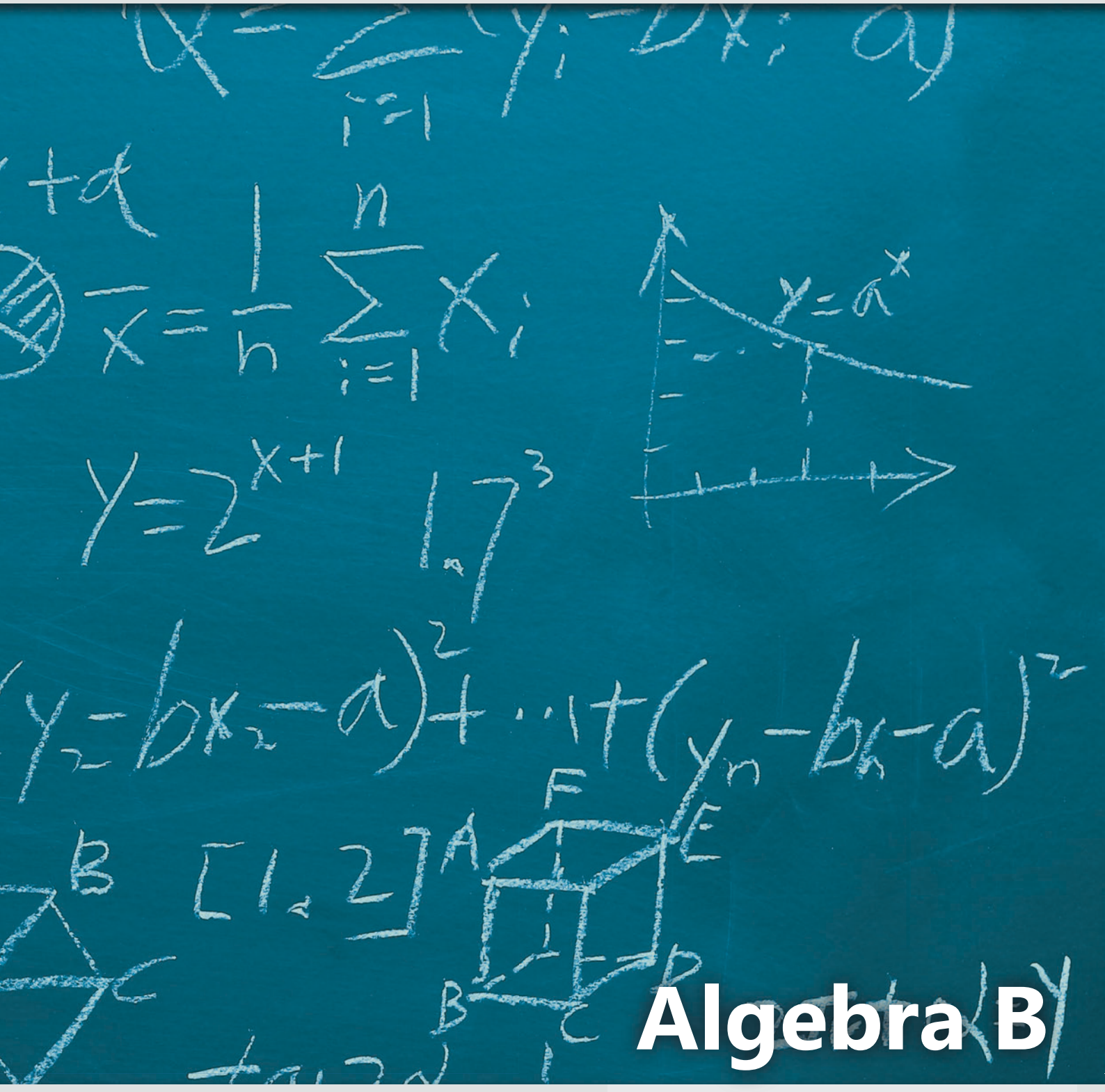

Algebra B

Name: .....

Teacher: .....

Class: .....

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Linear Graphs 1

Learning outcomes

1. Work with co-ordinates from all four quadrants

2. Find the midpoint of a line segment

3. Use ratio to find co-ordinates

4. Plot straight line graphs using a table of values

Starter activity

Find the values of y when $a = 2, b = -3$ and $c = 0.5$

1. $y = 2a + b =$

2. $y = b - 2c =$

3. $2y = a + 3b =$

4. $y - 1 = 4 - 2a =$

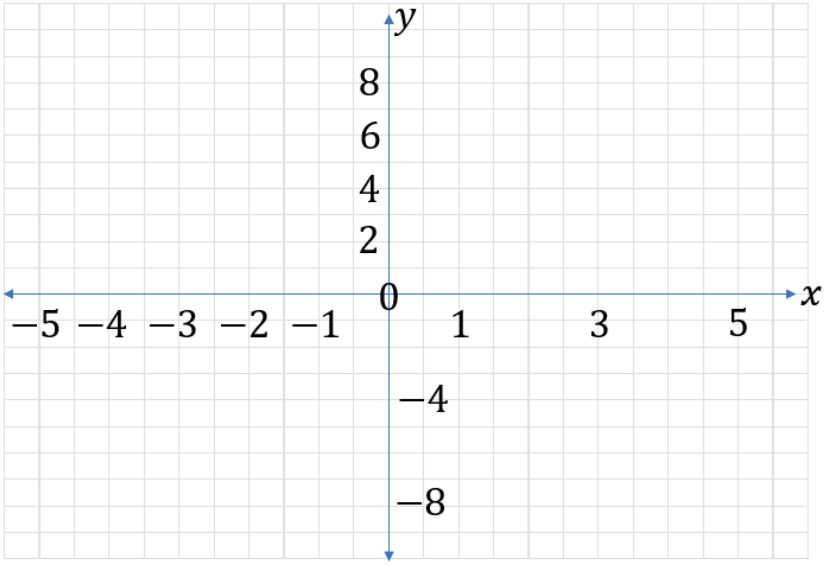
5. $\frac{y}{4} = 3b - 3 =$

6. $y^2 = 2a =$

Linear Graphs 1

Activity 1

Plot the following co-ordinates on the co-ordinate plane:

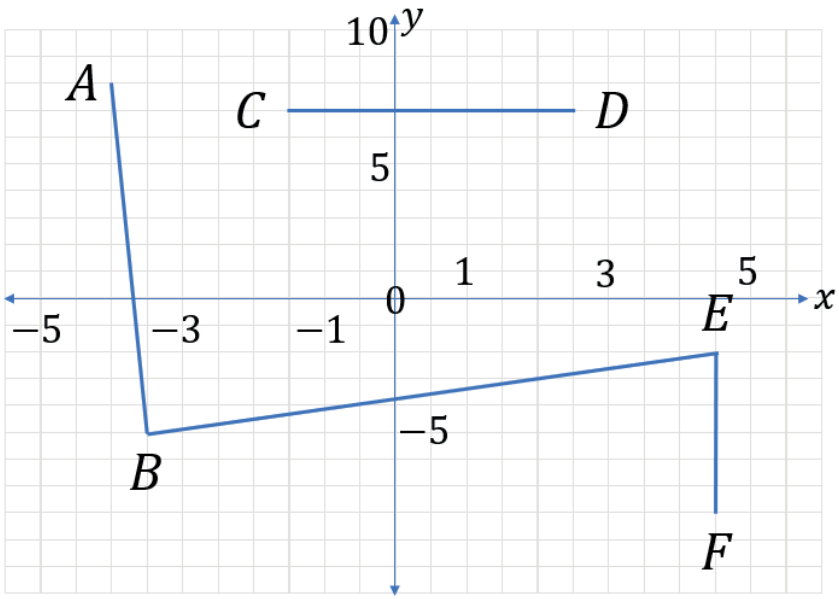


1. (5 , 6)
2. (-2, -5)
3. (0 , 3)
4. (-3, 6)
5. (4, -2)

SCORE __ / 5

Activity 2

Find the midpoints of the following lines:



1. AB
2. CD
3. EF
4. BE

SCORE __ / 8

Linear Graphs 1

Activity 3

Answer the following questions on finding coordinates using ratio:

1. A point P lies on the line segment between $\mathrm{A}(0, -4)$ and $\mathrm{B}(7,8)$, such that $\mathrm{AP}: \mathrm{PB} = 2:3$. Find the co-ordinates of P

2. A point P lies on the line segment between $\mathrm{C}(-2, -2)$ and $\mathrm{D}(-3,10)$, such that $\mathrm{CP}:\mathrm{PD} = 1:4$. Find the co- ordinates of P

3. A point P lies on the line segment between $\mathrm{E}(5,6)$ and $\mathrm{F}(9,-1)$, such that $\mathrm{EP}:\mathrm{PF} = 3.5$. Find the co-ordinates of P

SCORE __ / 9

Activity 4

Fill in the gaps and plot the following straight line graphs on one coordinate plane:

1. $y = 2x$

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

2. $y = x - 4$

x	-2	-1	0	1	2	3
y	-6		-4	-3		-1

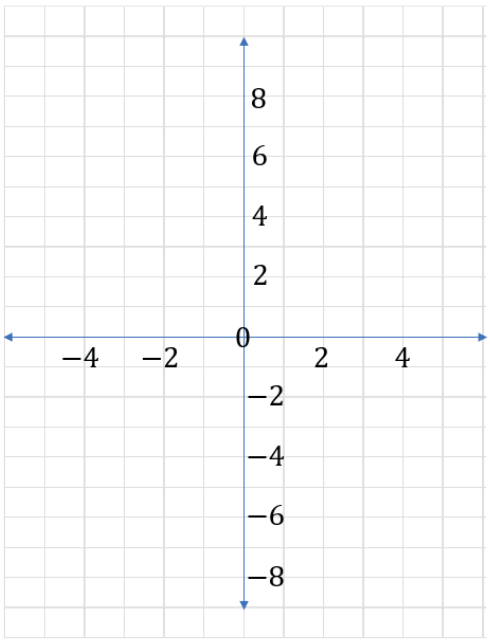
3. $y = \frac{1}{2}x$

x	-5	0	5
y		0	2.5

(This activity continues on the next page)

Linear Graphs 1

Activity 4



1. $y = 2x$

2. $y = x - 4$

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

SCORE __ / 10

Plenary - What have I learnt today?

Linear Graphs 2

Learning outcomes

1. Find the gradient of a straight line

2. Draw a line with a given gradient

3. Work out the equation of a straight line graph

4. Find the equation of a line through one point with a given gradient, or through two given points

Starter activity

Find the value of c in each of the equations, when given the values of a and b

1. $c=3a+b$

a) $a=2$ and $b=4$

b) $a=-2$ and $b=5$

2. $a=4b-c$

a) $a=8$ and $b=2$

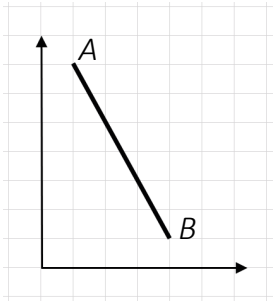
b) $a=-5$ and $b=-2$

Linear Graphs 2

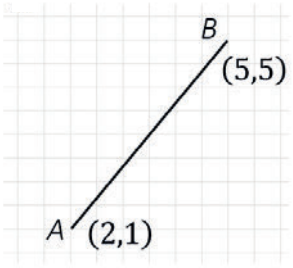
Activity 1

Calculate the gradients of the line segments AB

1.



2.

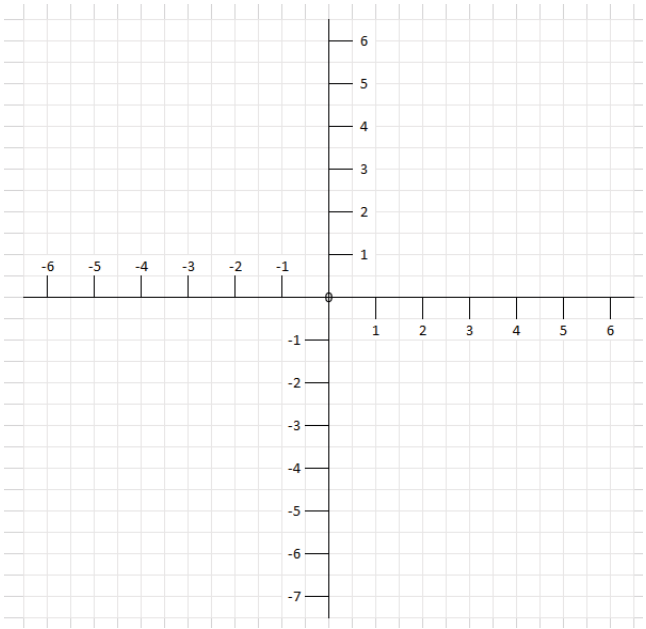


3. A line segment AB which passes through $(0,3)$ and $(6,1)$

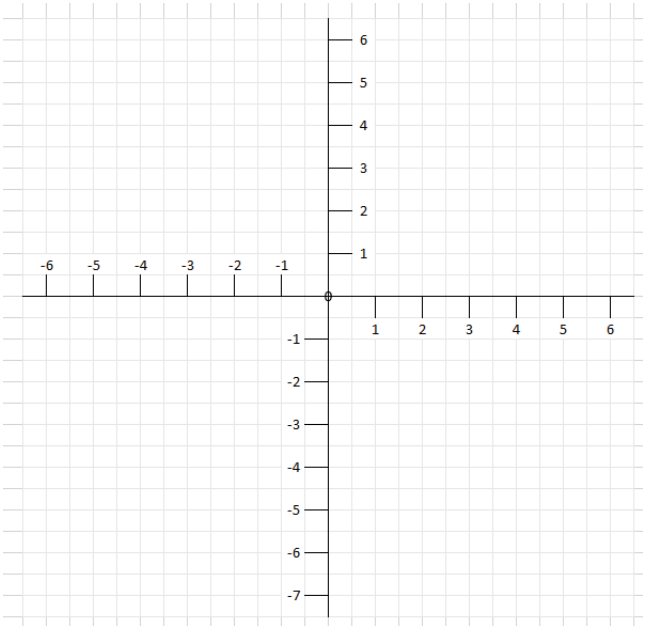
SCORE __ / 6

Activity 2

1. On the grid plot 2 different lines with a gradient of -3



2. On the grid plot 2 different lines with a gradient of $\frac{1}{2}$



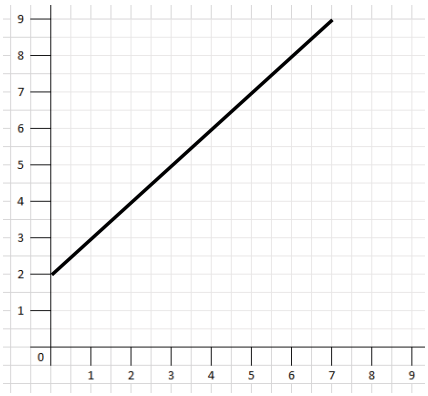
SCORE __ / 4

Linear Graphs 2

Activity 3

Find the equations of the straight lines

1.



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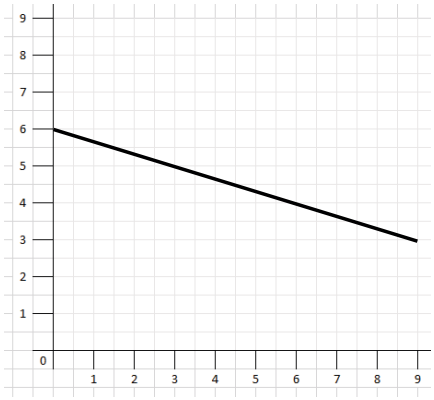

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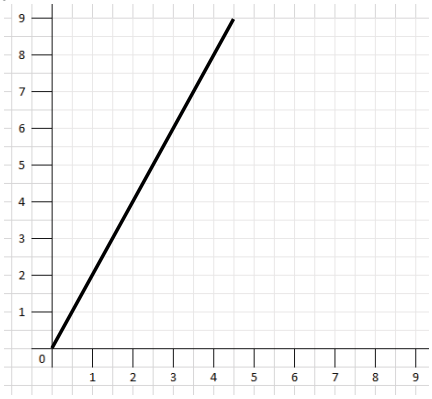


SCORE __ / 6

Activity 4

1. Find the equations of the lines using the information given

a) Gradient = 8, passes through $(0,3)$

b) Gradient = 5, passes through $(-3,-7)$

c) Gradient = -4, passes through $(-3, 3)$

(This activity continues on the next page)

Linear Graphs 2

Activity 4

2. Find the equations of the lines passing through the points

a) $(1,4)$ and $(3,14)$

b) $(4,1)$ and $(-3,-6)$

c) $(-1, 10)$ and $(-3, 4)$

SCORE __ / 12

Plenary - What have I learnt today?

Linear Graphs 3

Learning outcomes

1. Draw straight line graphs using the gradient - intercept method and the cover up method

2. Use $y = mx + c$ to identify parallel lines and perpendicular lines

3. Find equations of parallel lines and perpendicular lines

Starter activity

Make y the subject of the formulae

a) $x = y + 2$

b) $x = y - 5$

c) $x = 4y$

d) $x = 2y + 1$

e) $4x - 2y = 8$

f) $3x = 8 - 2y$

Linear Graphs 3

Activity 1

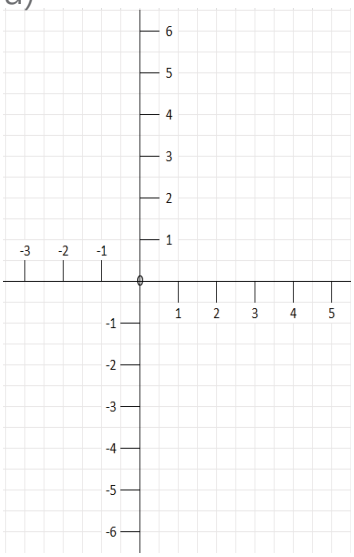
1. Using the gradient - intercept method plot the following graphs:

a) $y = 2x - 5$

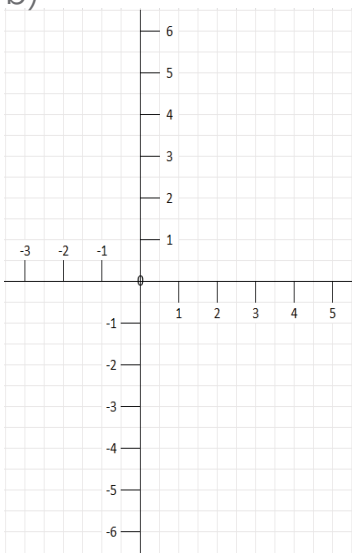
b) $y = x + 3$

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

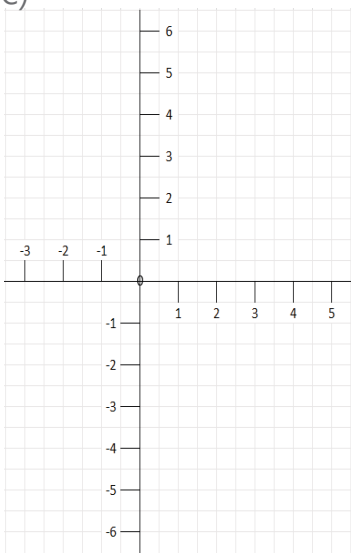
a)



b)



c)

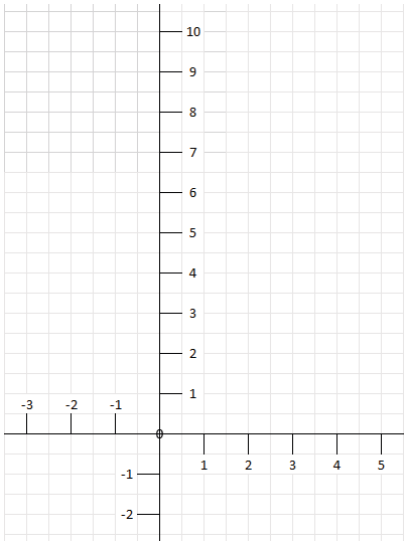


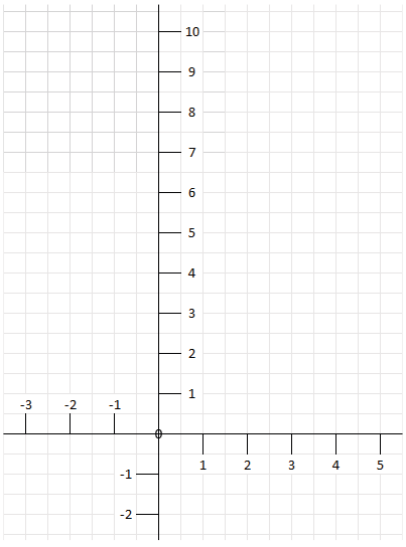
2. Using the cover up method plot the following graphs:

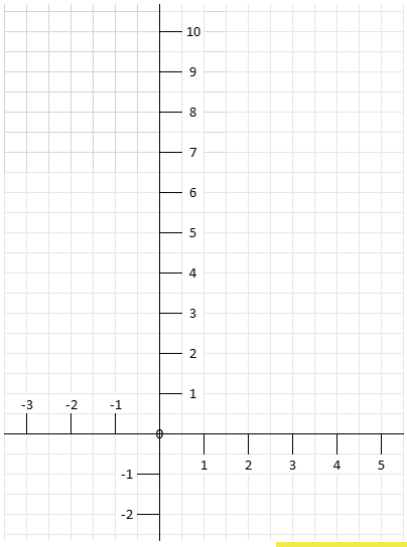
a) $2x + y = 8$

b) $4x + 2y = 4$

c) $2x + 4y = 6$







SCORE __ / 12

Linear Graphs 3

Activity 2

1. Which of the lines is parallel to the line $y = 2x - 1$

a) $y - 2x = 4$ b) $2y = 2x + 5$ c) $2x + y + 7 = 0$

2. Which of the lines is perpendicular to the line $4y + 8x = 6$

a) $x + 2y = 8$ b) $y = 2x - 3$ c) $8y - 4x = 3$

SCORE __ / 6

Activity 3

1. Find the equation of the line which is parallel to the given line and passes through the given point

a) $y = 5x - 7 \ \ (1,8)$ b) $y = 7 - 9x \quad (1, -11)$

(This activity continues on the next page)

Linear Graphs 3

Activity 3

2. Find the equation of the line which is perpendicular to the given line and passes through the given point

a) $y = -3x + 1 \quad (9,8)$

b) $2y = 6x - 1 \quad (-6,1)$

SCORE __ / 6

Plenary - What have I learnt today?

Quadratic Graphs

Learning outcomes

1. Recognise graphs of quadratic functions

2. Use a table of values to plot quadratic graphs

3. Sketch and interpret graphs of quadratic equations

Starter activity

Solve the equations for $a = 4, b = -2, c = 1.5$

1. $x = \frac{ab + c}{2} =$

2. $x = c^2 =$

3. $x = \frac{b}{2} + 4 =$

4. $x = b^2 - ac =$

5. $x = 4c - 3b =$

6. $x = 5a - b^2 =$

Solve the equations by factorising:

1. $0 = x^2 - 6x + 8 =$

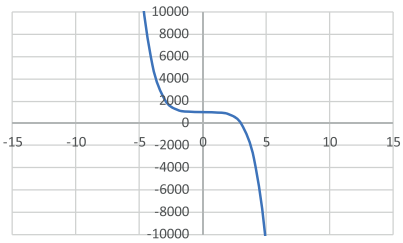
2. $2x^2 - 7x + 6 = 0 =$

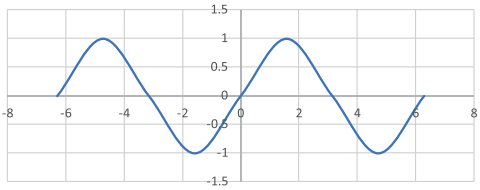
3. $x^2 - 4x = 0 =$

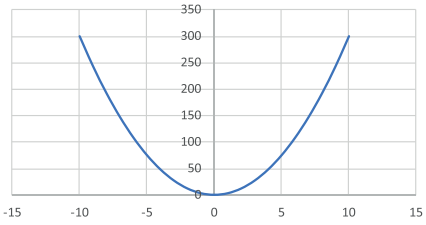
Quadratic Graphs

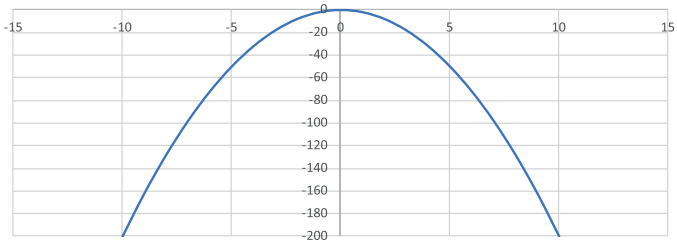
Activity 1

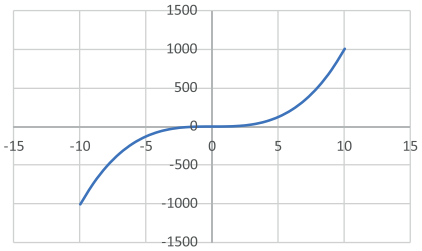
Circle the quadratic graphs and explain whether the co-efficient of x^2 is positive or negative.











SCORE __ / 4

Activity 2

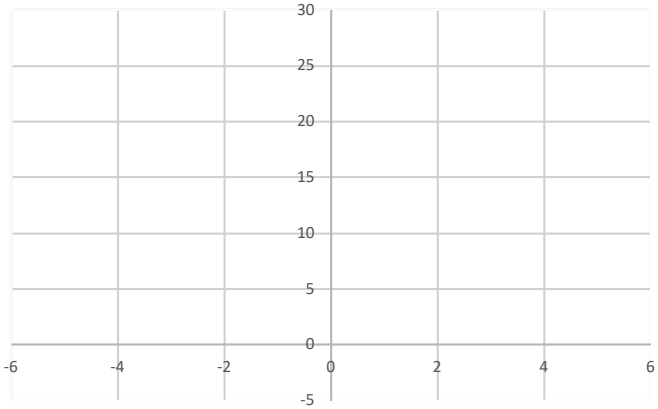
Plot the following quadratic graphs from the table of values below:

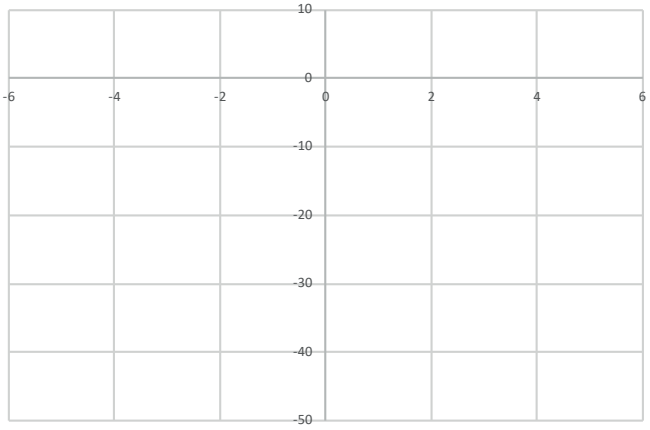
1.

x	−5	−3	−2	−1	0	1	2	3	5
y	28	10	4	0	−2	−2	0	4	18

2.

x	−5	−3	−2	−1	0	1	2	3	5
y	−46	−14	−4	2	4	2	−4	−14	−46





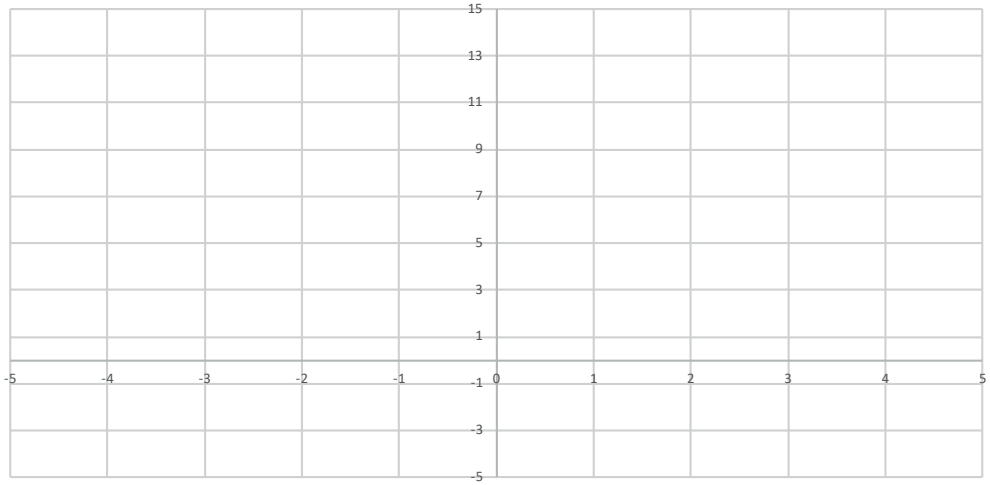
SCORE __ / 8

Quadratic Graphs

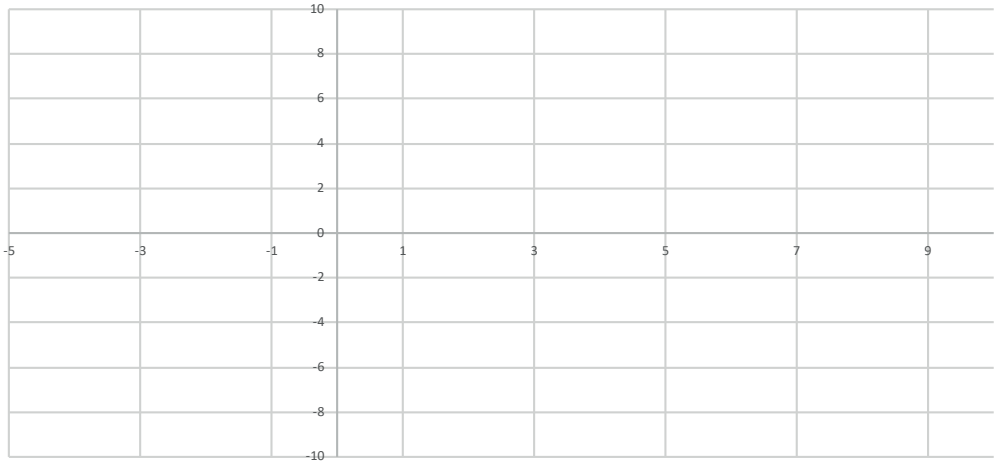
Activity 3

Sketch the following graphs labelling the turning points and the x–intercepts:

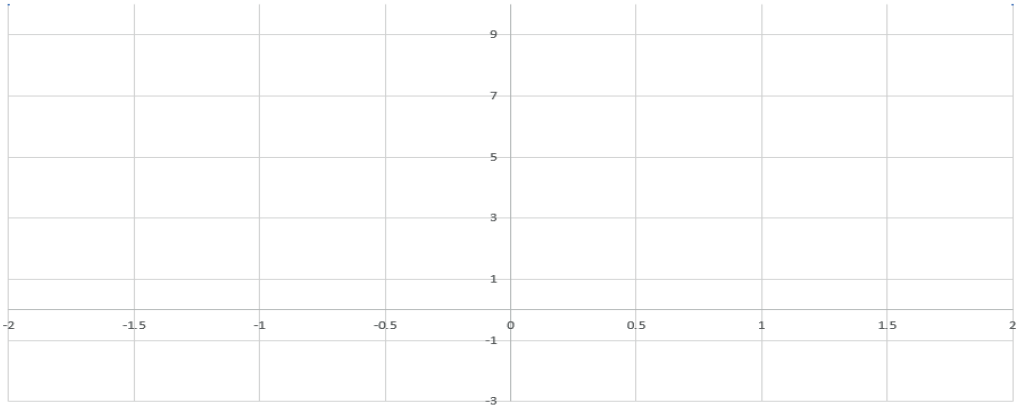
1. $y = x^2 - 5$



2. $y = 6x - x^2$



3. $3y = 9x^2 - 6$



SCORE __ / 12

Quadratic Graphs

Plenary - What have I learnt today?

Other Graphs 1

Learning outcomes

1. Recognise graphs of cubic, reciprocal and exponential functions

2. Plot and interpret cubic and reciprocal graphs

3. Sketch and interpret exponential functions

Starter activity

Find the value of the following expressions, where: $x = 3, f = -2, z = 0.5$

1. $fx =$

2. $2z =$

3. $fx^2 =$

4. $(fx)^2 =$

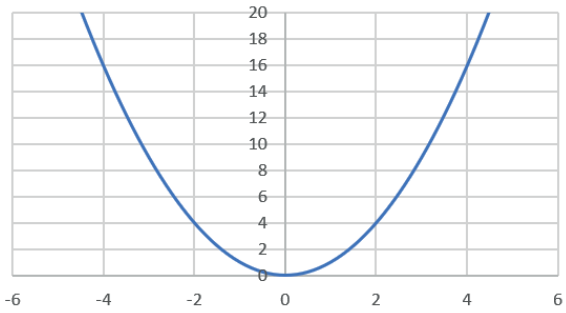
5. $-4xz =$

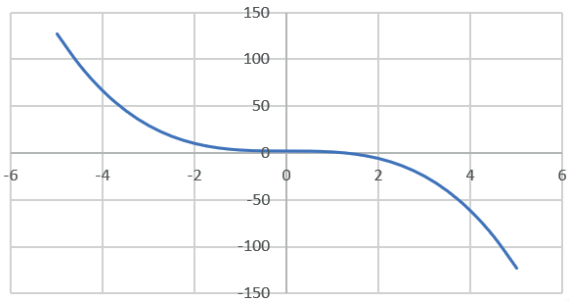
6. $z^2 + f^3 =$

Other Graphs 1

Activity 1

Label the graphs below as Quadratic, Exponential, Cubic or Reciprocal functions:





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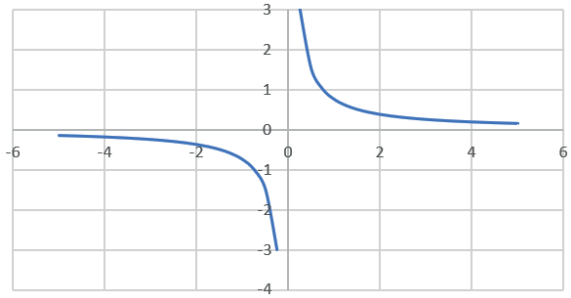

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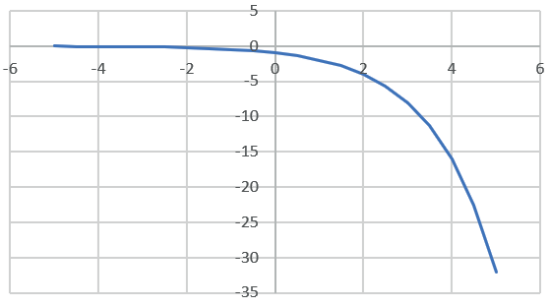

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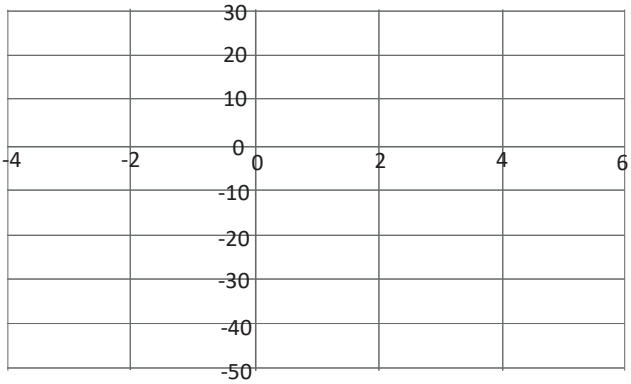
SCORE __ / 4

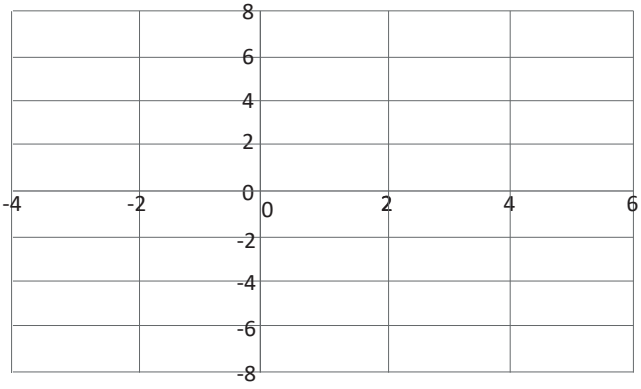
Activity 2

Plot the following reciprocal and exponential graphs labelling the x and y Intercepts and the asymptotes, where appropriate:

1. $y = x^3 - 4x^2$

2. $y = \frac{7}{2x}$





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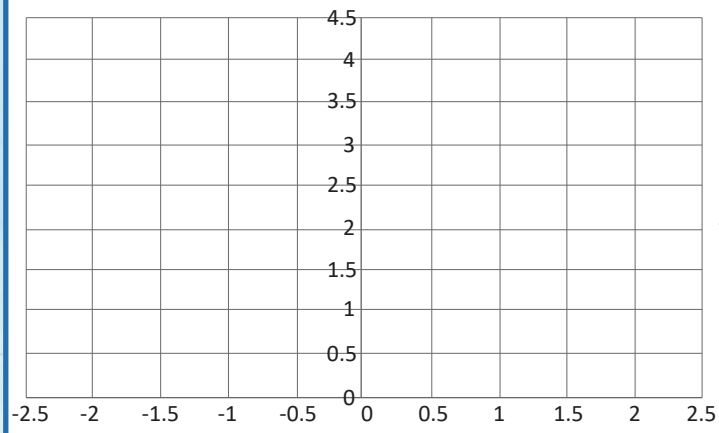
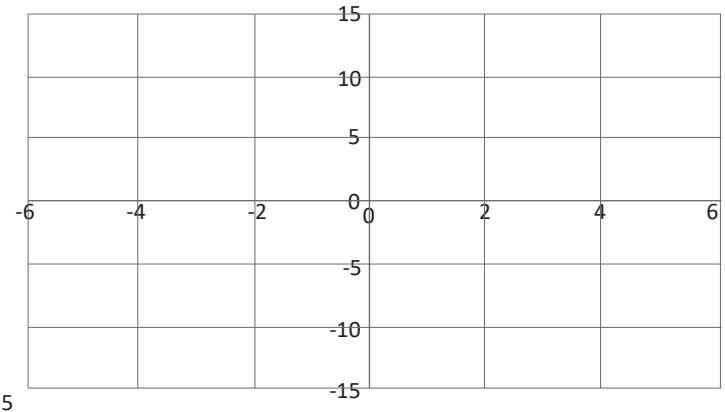
Other Graphs 1

Activity 2

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



4. $3xy = -4$

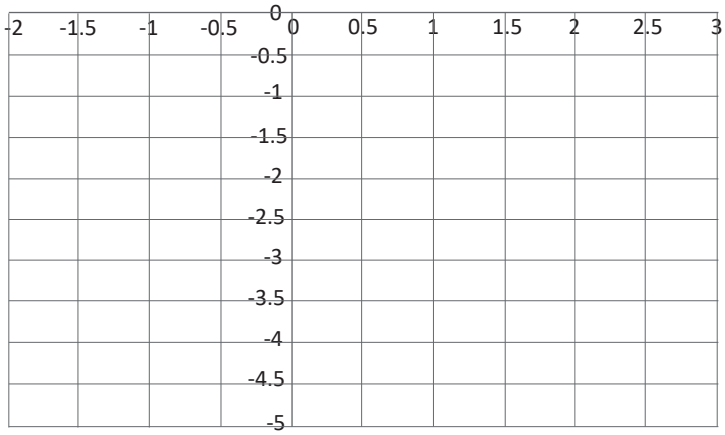


SCORE __ / 16

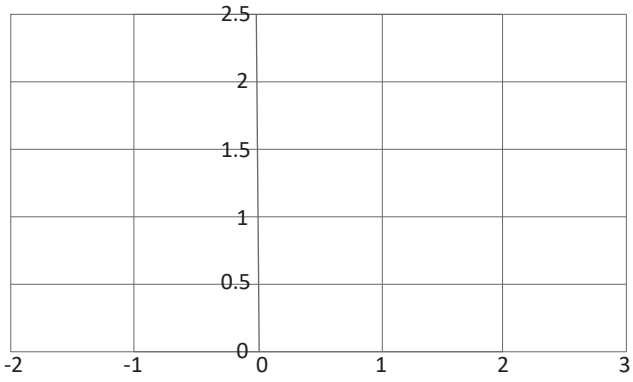
Activity 3

Sketch the following exponential graphs and label the y-intercept and the asymptote:

1. $y = -2^x$



2. $y = 3^{-x}$



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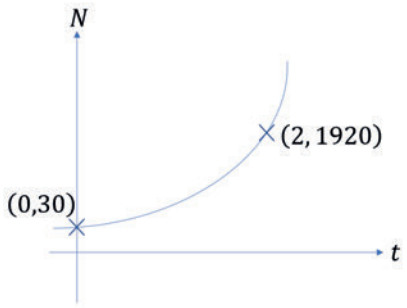
Other Graphs 1

Activity 3

3. The graph shows how the population of rabbits increases over time.
The equation of the curve is $N = ab^t$ where:
t = time N = number of rabbits and a and b are positive constants.
Find the values of a and b



SCORE __ / 10

Plenary - What have I learnt today?

Other Graphs 2

Learning outcomes

1. Identify and sketch translations of a given graph

2. Identify and sketch reflections of a given graph

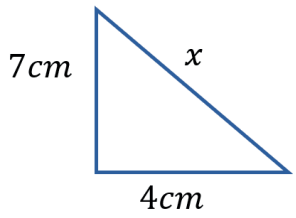
3. Recognise and use the equation of a circle with centre at the origin

4. Find the equation of a tangent to a circle at a given point

Starter activity

Use Pythagoras' Theorem to calculate the length of side $\boldsymbol{x}$ .Give your answer to 1dp.

1.



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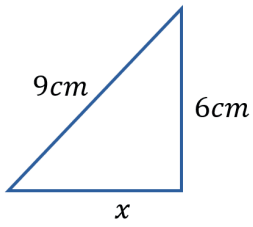
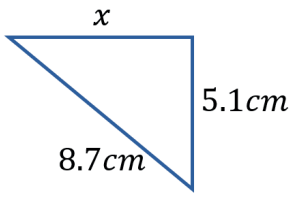


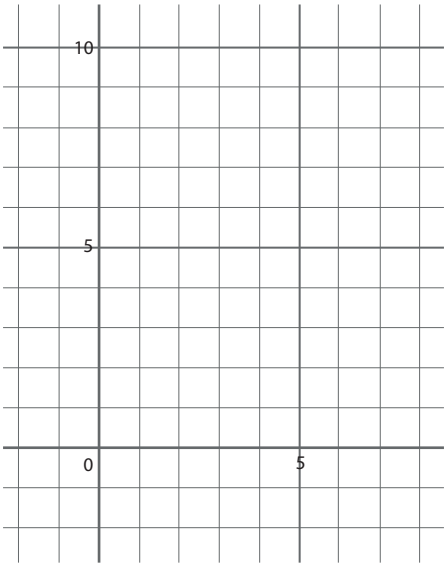
3.



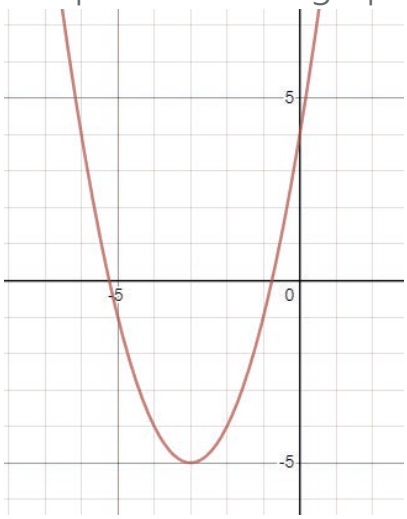
Other Graphs 2

Activity 1

1. The function $y = (x-4)^2 + 2$ is a translation of $y = x^2$.
   a) Describe the translation
   b) Sketch the graph of the translated function



2. The graph of $y = x^2$ has been translated. Find the equation of the graph



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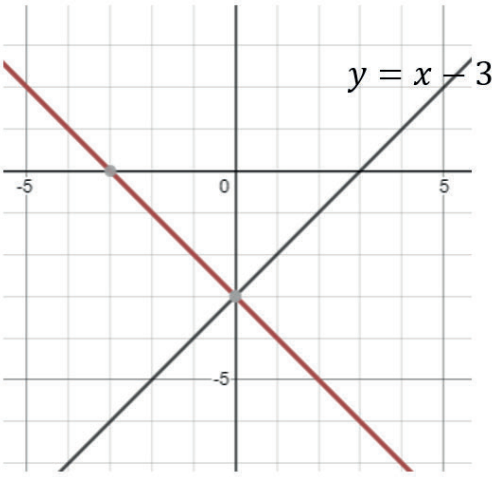
Activity 2

1. The graph of $y = x - 3$ has been transformed
   a) Identify the transformation
   b) Give the equation of the transformed graph



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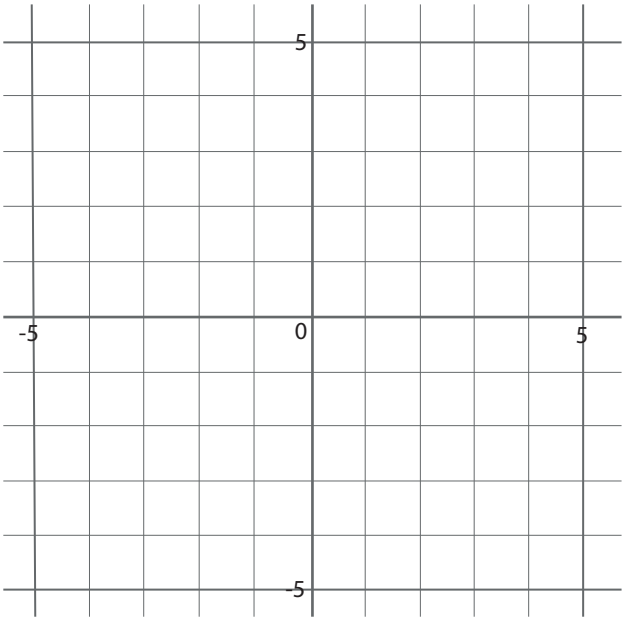
Other Graphs 2

Activity 2

2. Sketch the pair of functions:

$y = 2x + 1$

$y = -2x - 1$



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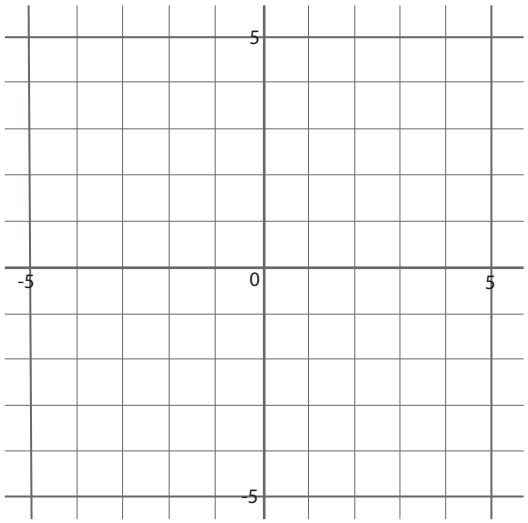
Activity 3

1. Sketch the graph of $x^2 + y^2 = 9$



2. Write the equation of a circle with centre at the origin and radius 11

3. The point $(4,4)$ lies on a circle with centre $(0,0)$. What is the equation of the circle?

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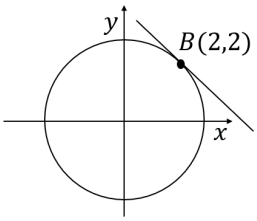
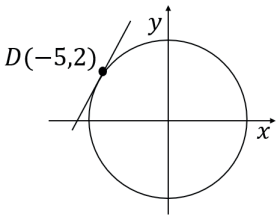
Other Graphs 2

Activity 4

1. Point B lies on the tangent to the circle $x^2 + y^2 = 8$.Find the equation of the tangent



2. Point D lies on the tangent to the circle $x^2 + y^2 = 29$.Find the equation of the tangent



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Plenary - What have I learnt today?

Real Life Graphs 1

Learning outcomes

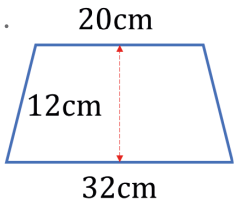
1. Plot and interpret graphs in real contexts

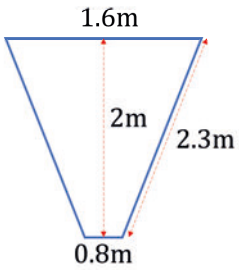
2. Interpret distance-time graphs

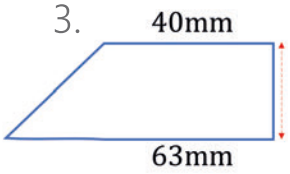
3. Interpret velocity-time graphs and estimate the distance travelled

Starter activity

Find the area of the following shapes (leave your answer to 1dp)

1. 

2. 

3. 

Real Life Graphs 1

Activity 1

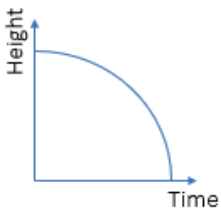
The four vases are full of water. They are being siphoned of water at a constant rate. The graphs show the water in the vases over time. Match each graph to the correct vase and explain your reasoning.

1. 

2. 

3. 

4. 



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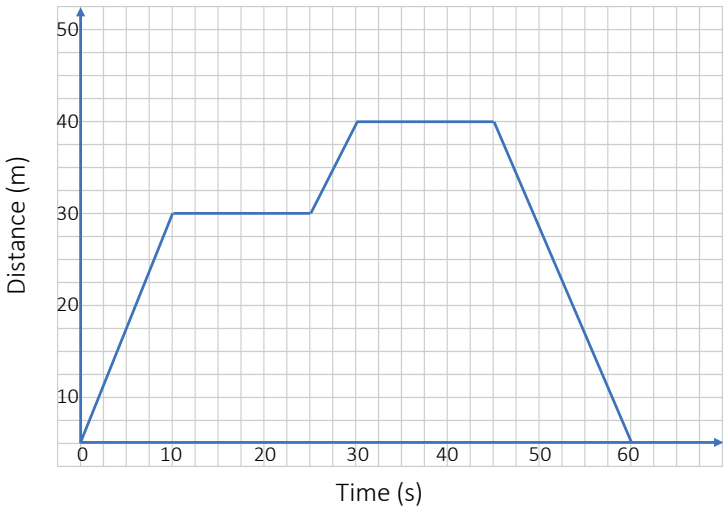
Activity 2

Answer the following questions based on distance-time graphs

1. Describe the journey of the cyclist, including the speed travelled at each stage (ms^{-1})

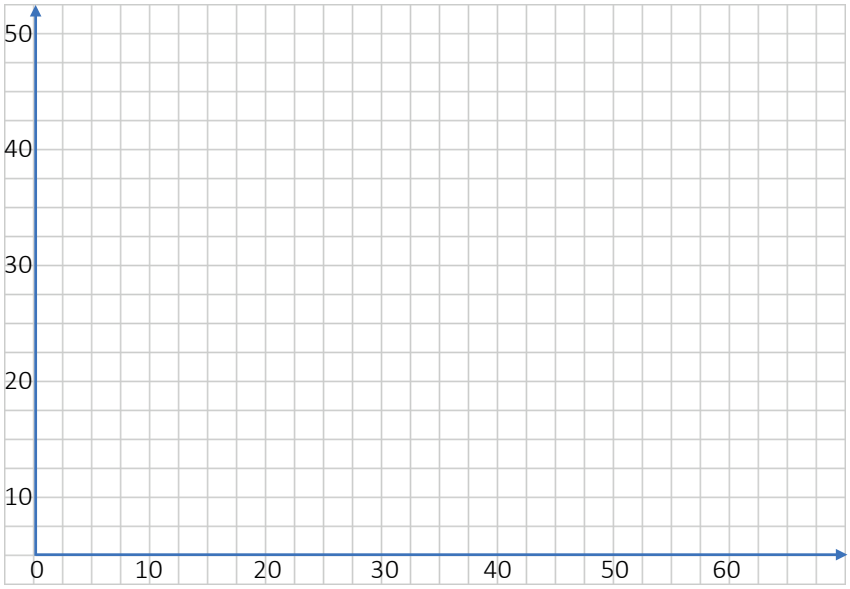


(This activity continues on the next page)

Real Life Graphs 1

Activity 2

2. Draw a distance-time graph to show the following journey
   A cyclist travels at 40mph for 30 minutes, rests for 20 minutes then returns home in 10 minutes.
   What speed was the cyclist travelling in the last 20 minutes?



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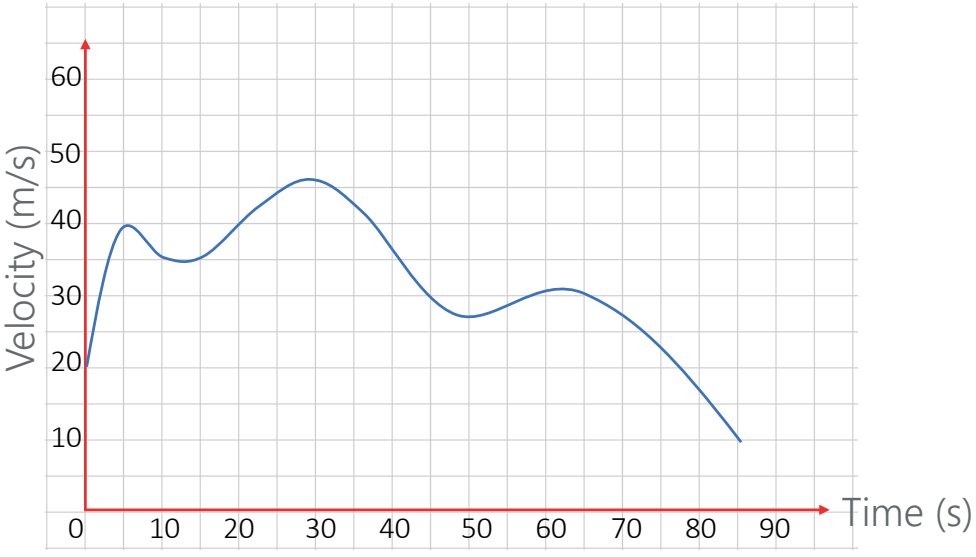
Activity 3

Find the total distance travelled from the following velocity-time graph
HINT: Use a width of 10 seconds



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Real Life Graphs 1

Plenary - What have I learnt today?

Real Life Graphs 2

Learning outcomes

1. Interpret straight line gradients as rates of change

2. Calculate and interpret the average gradient between two points on a curve

3. Calculate and interpret a gradient at a point on a curve

Starter activity

Simplify the following fractions, express your answers in their simplest form

1. $\frac{15}{35}=$

2. $\frac{22}{16}=$

3. $\frac{7}{49}=$

4. $\frac{32}{6}=$

5. $\frac{10}{50}=$

6. $\frac{30}{15}=$

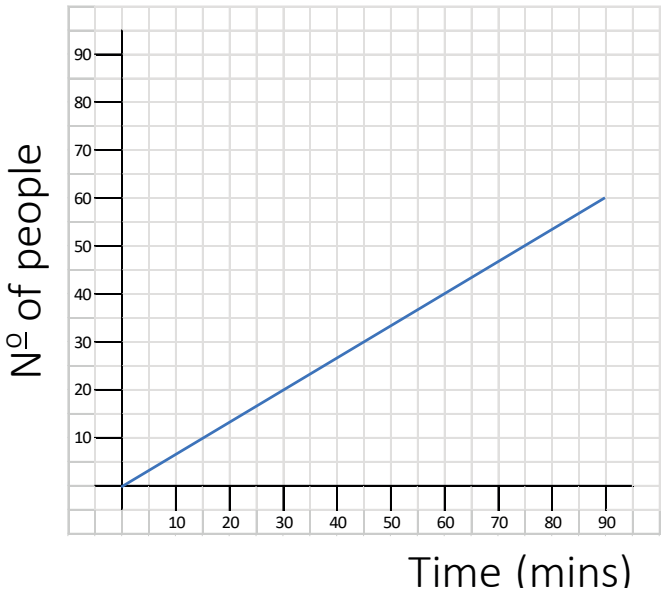
7. $\frac{1400}{70}=$

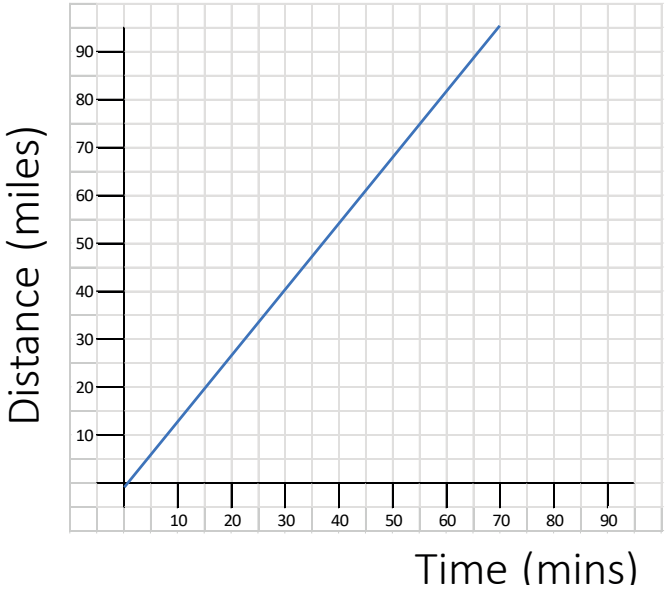
8. $\frac{95}{10}=$

Real Life Graphs 2

Activity 1

Find the gradient of the following straight line graphs making sure you carefully write the units





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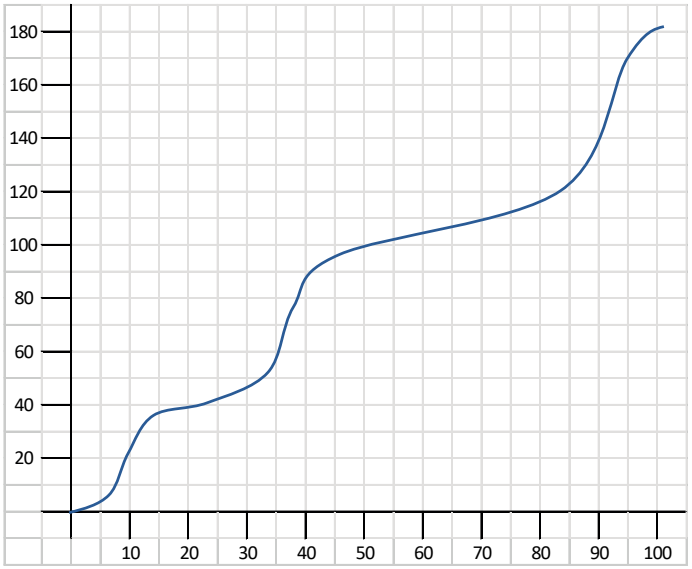
Real Life Graphs 2

Activity 2

Complete the following questions based on the average gradient between two points on a curve:



The graph shows the distance travelled by a cyclist during a race

a) Calculate the average speed travelled between 30 and 50 seconds

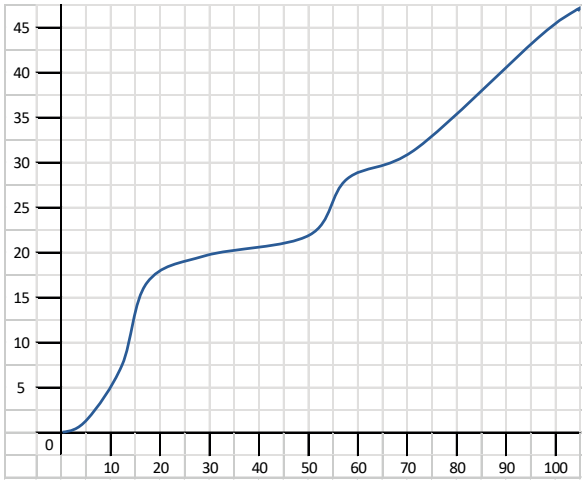
b) Calculate the average speed travelled between 60 and 70 seconds

c) Calculate the average speed for the whole journey

SCORE __ / 6

Activity 3

Answer the following questions to find the gradient at a specific point on the curve



The graph shows the distance a rabbit ran in the morning in metres

Find:

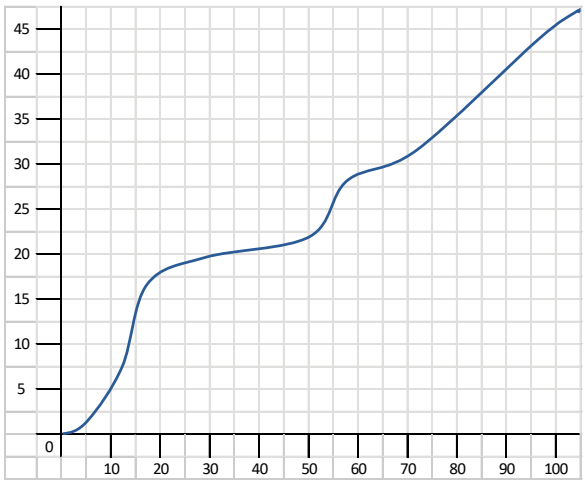
a) The average speed of the rabbit at 50 seconds

(This activity continues on the next page)

Real Life Graphs 2

Activity 3

b) The average speed of the rabbit at 90 seconds



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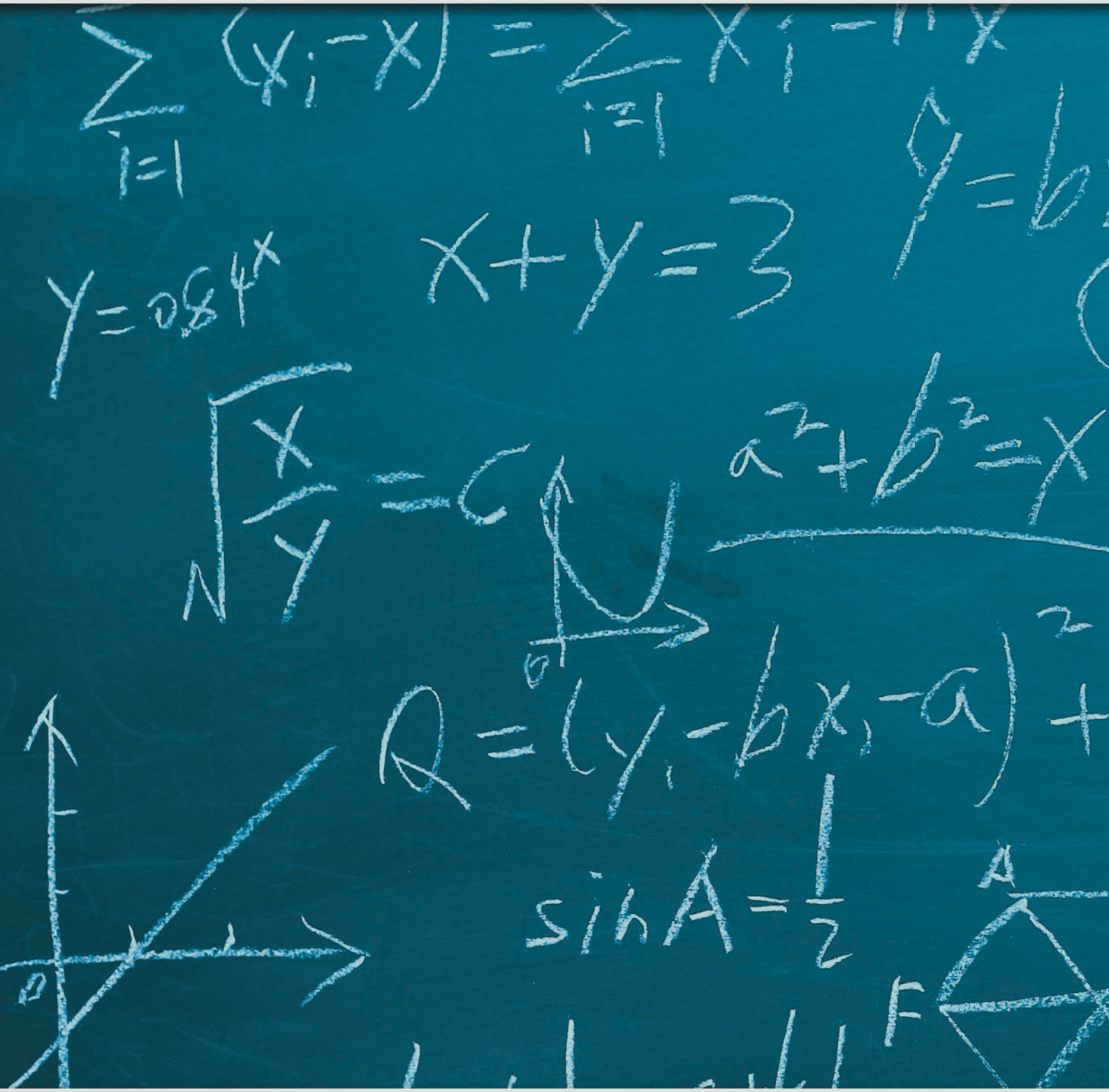
Plenary - What have I learnt today?

Notes



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