# Quadratic Graphs

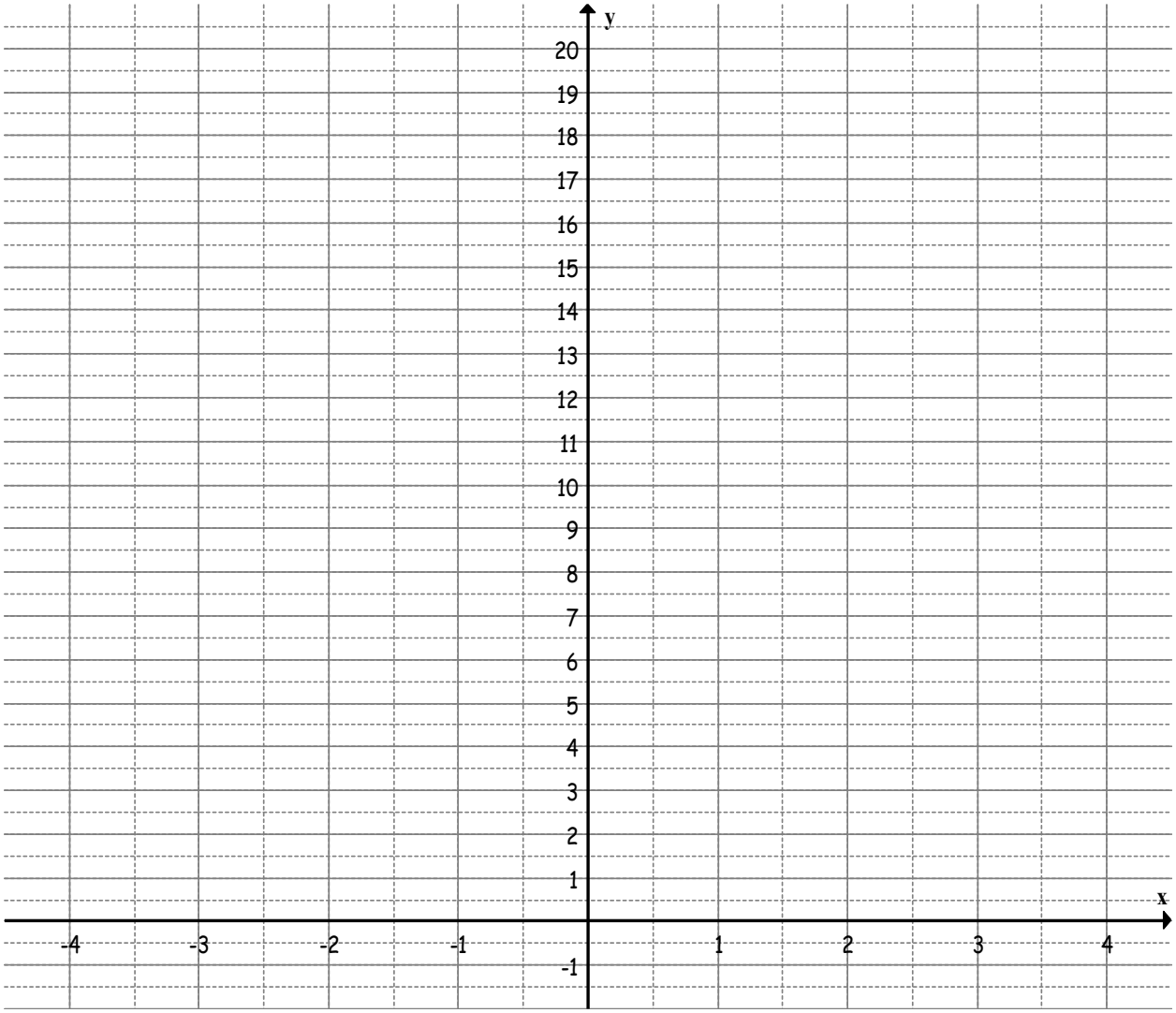
Name: _____ Date: _____

a) Fill in the table and then draw the graph of $y = x^2$ for values of x between -4 and 4.

| X | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| $x^2$ | | | | | | | | | |

b) Is the graph symmetrical?
If so what is the line of symmetry?

c) What are the coordinates of the point where the graph crosses the y axis?



# Quadratic Graphs

Name: _____ Date: _____

a) Fill in the table and then draw the graph of $y = x^2 + 2$ for values of x between -4 and 4.

| X | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | |
|---|---|---|---|---|---|---|---|---|---|
| $x^2$ | | | | | | | | | |
| +2 | | | | | | | | | |
| y | | | | | | | | | |

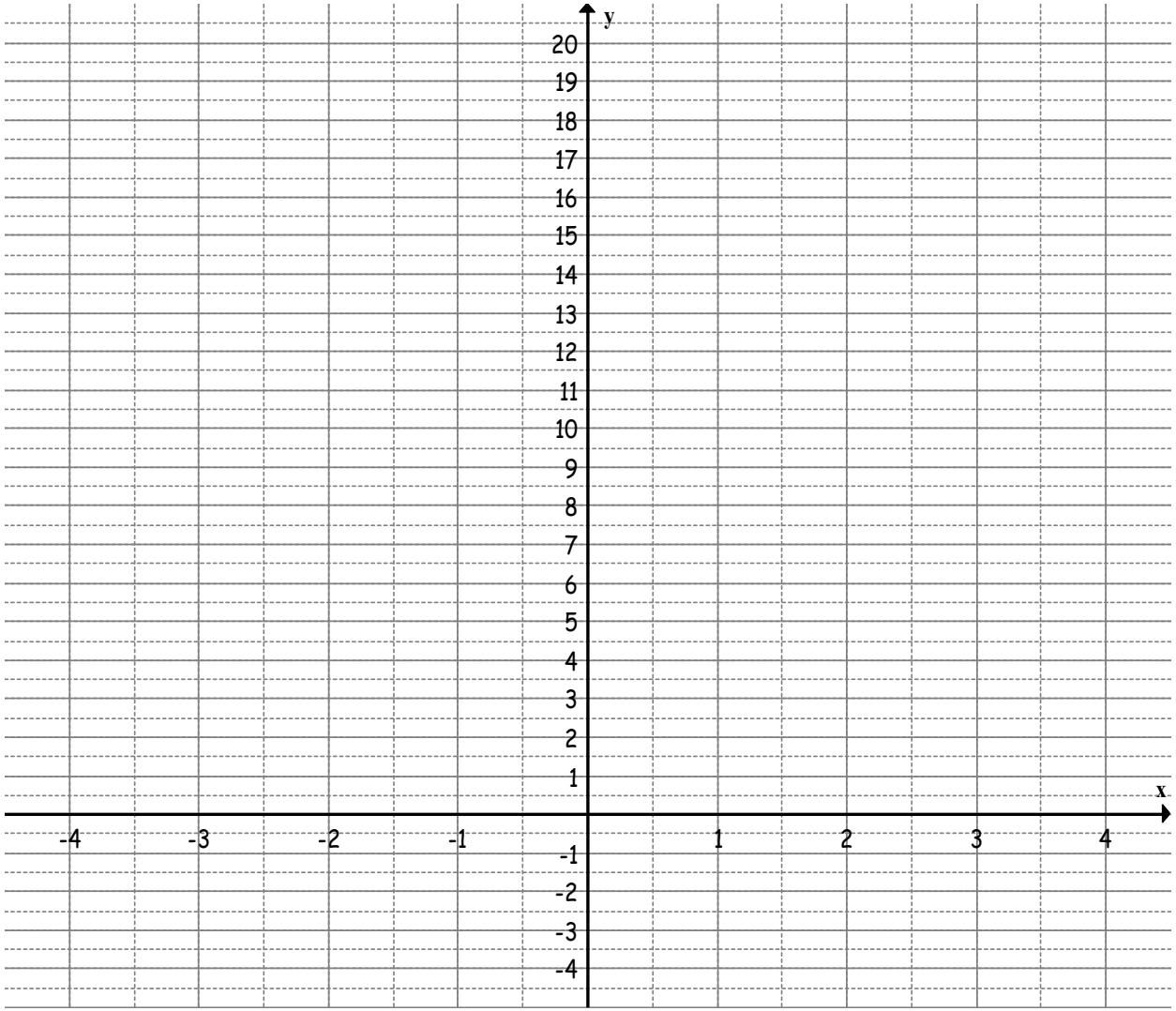
b) Is the graph symmetrical?
If so what is the line of symmetry?

c) What are the coordinates of the point where the graph crosses the y axis?

d) Fill in the table and draw the graph of $y = x^2 - 2$

| X | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | |
|---|---|---|---|---|---|---|---|---|---|
| $x^2$ | | | | | | | | | |
| -2 | | | | | | | | | |
| y | | | | | | | | | |

e) What are the coordinates of the point where the graph crosses the y axis?




f) What is the relationship between the function of the graph and intercept on the y axis?

# Quadratic Graphs

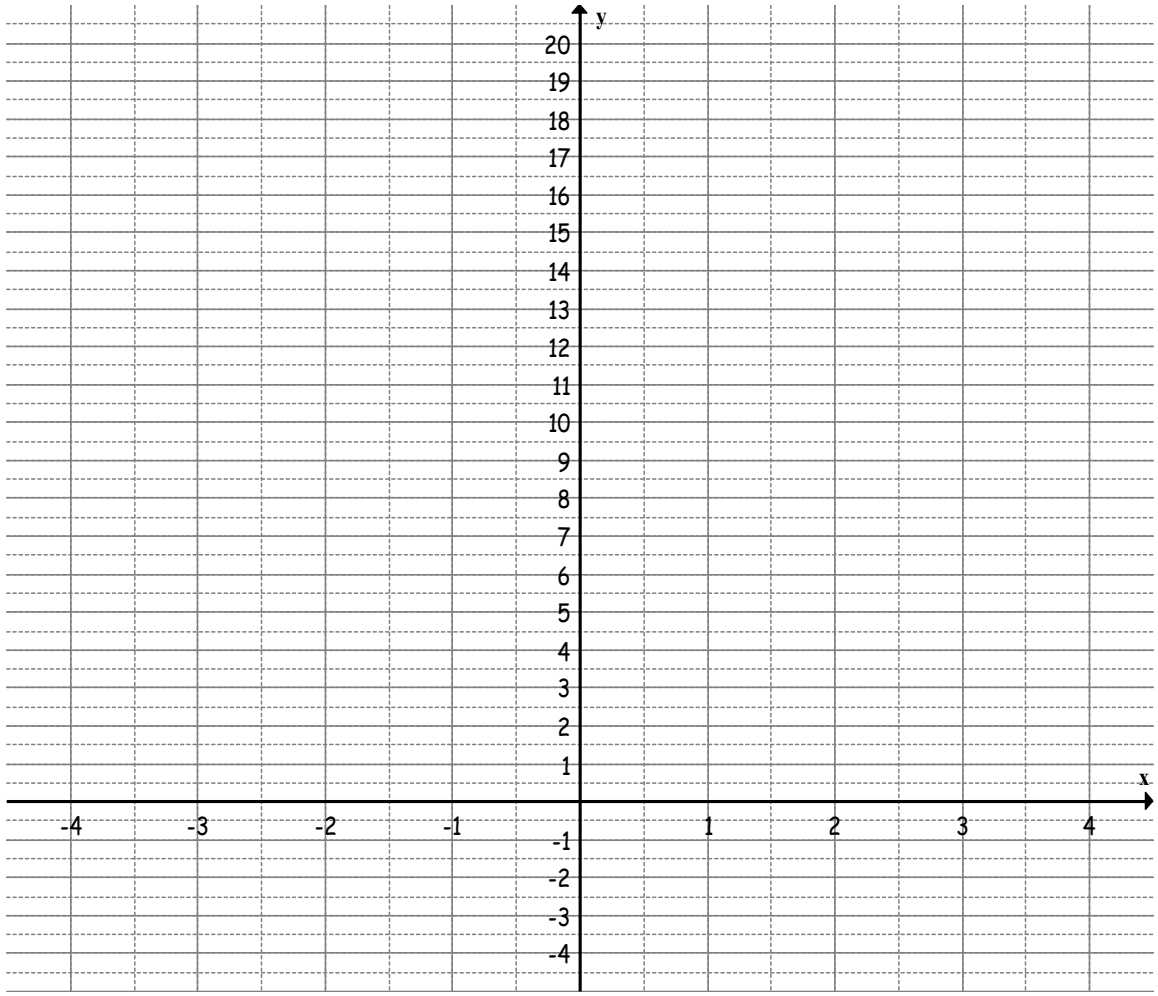
Name: _____ Date: _____

Complete the table of values for $y = x^2 + 3$.

| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| $x^2$ | 16 | | 4 | | | | | 9 | |
| +3 | +3 | | +3 | | | | | +3 | |
| y | 19 | | 7 | | | | | 12 | |

Draw the graph on the grid opposite.

Construct your own table of values for $y = x^2 - 3$



# Quadratic Graphs

Name: _____ Date:_____

Sketch the graphs of the following functions.
On each sketch write the value of y where the curve crosses the y axis.

1. $y = x^2 - 1$

2. $y = x^2 - 5$

3. $y = x^2 + 1$

4. $y = x^2 + 5$

5. $y = x^2 + 2$

6. $y = x^2 - 2$

# Quadratic Graphs

Name: _____ Date:_____

Sketch the graphs of the following functions.
On each sketch write the value of y where the curve crosses the y axis.

1. $y = x^2 - 10$

2. $y = x^2 + 8$

3. $y = x^2 - 8$

4. $y = x^2 + 7$

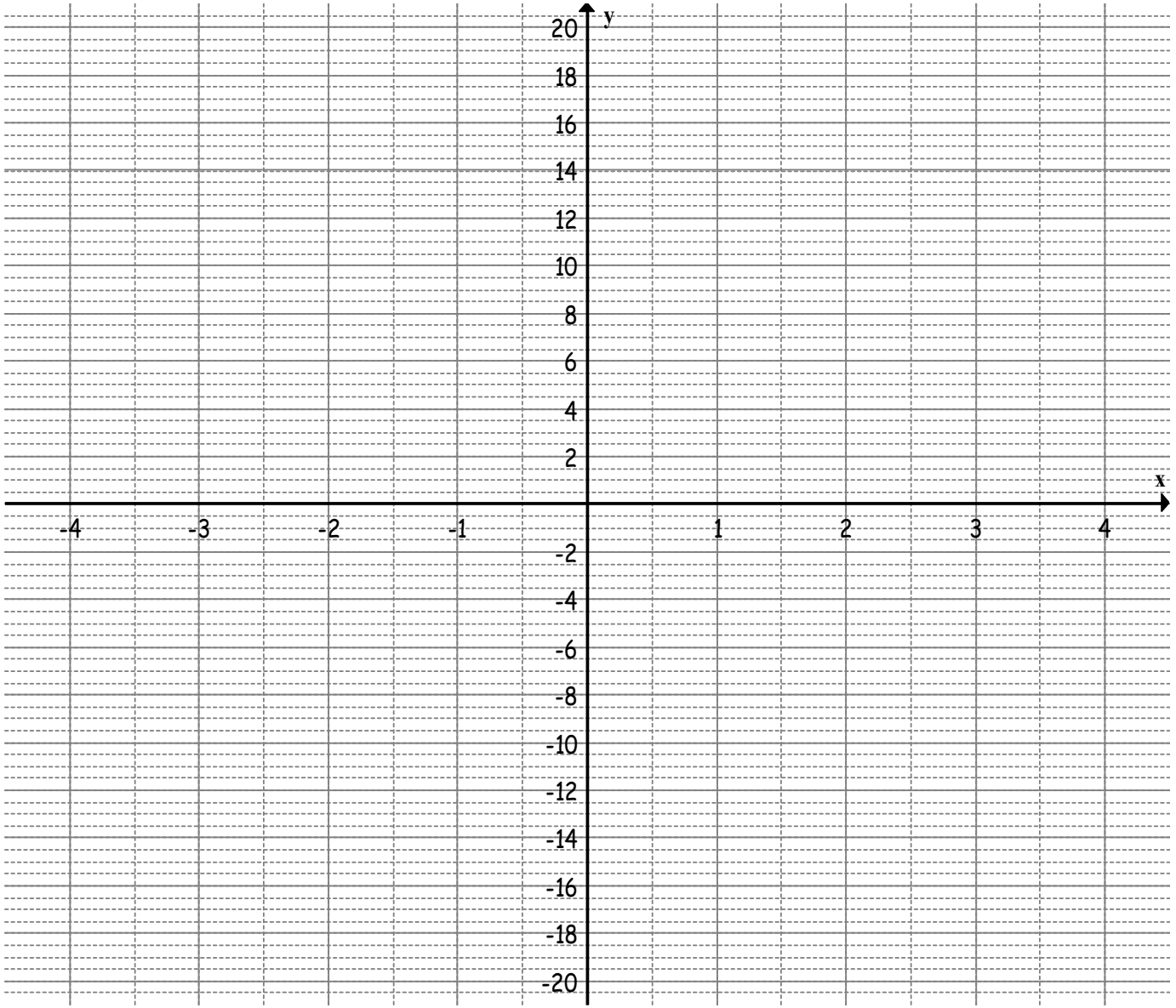
5. $y = x^2 + 6$

6. $y = x^2 - 9$

# Quadratic Graphs

Name: _____ Date:_____

By drawing graphs confirm that the graph of $y = -x^2$ is a reflection of the graph $y = x^2$ in the x axis.



# Quadratic Graphs

Name: _____ Date: _____

Complete the table of values for $y = 1 - x^2$ .

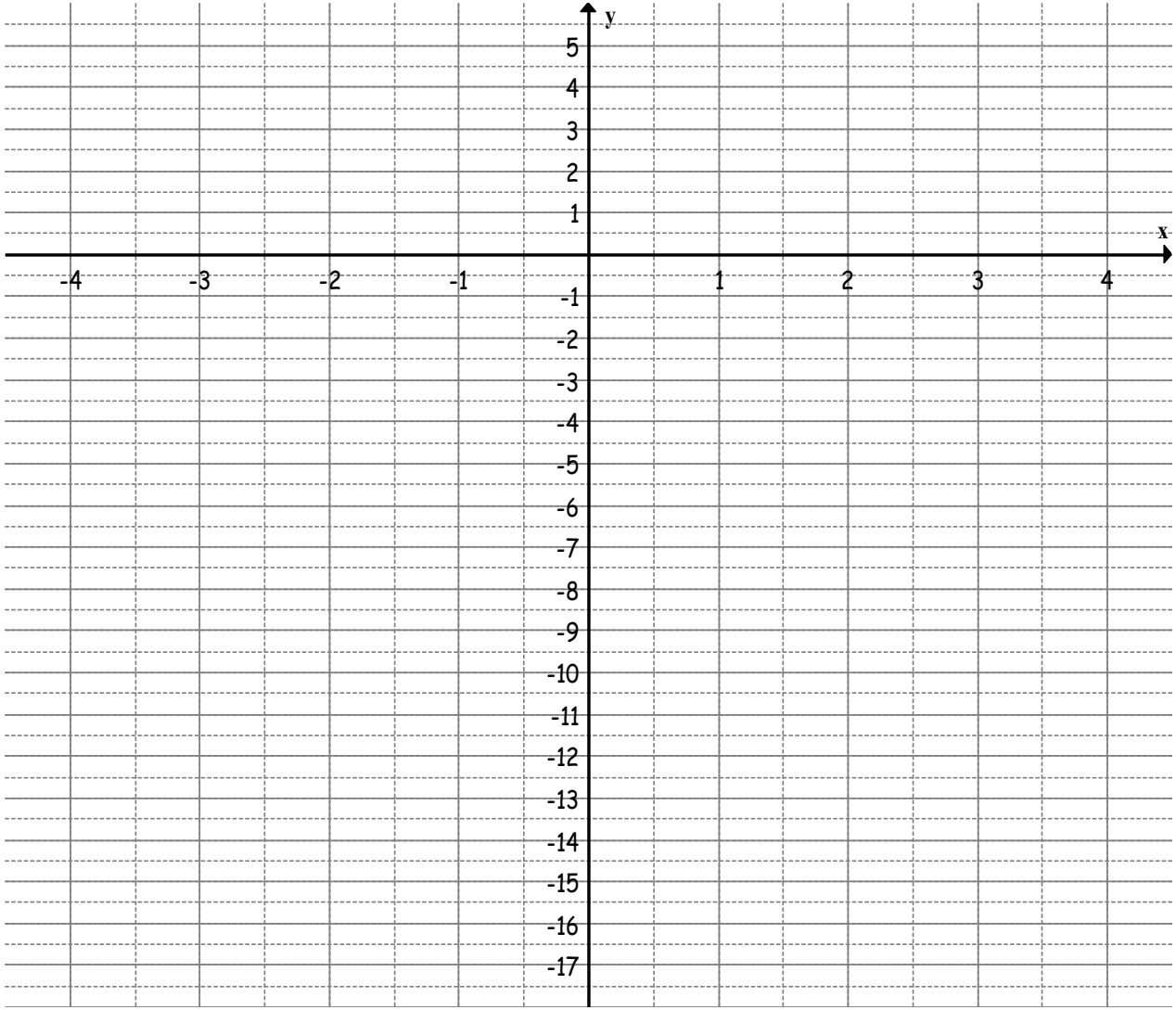
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | | | | 1 | | | | |
| $-x^2$ | -16 | | | | 0 | | | | |
| y | -15 | | | | 1 | | | | |

Draw the graph on the grid opposite.

Complete the table of values for $y = 4 - x^2$ .

| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| 4 | 4 | | | | 4 | | | | |
| $-x^2$ | -16 | | | | 0 | | | | |
| y | -12 | | | | 4 | | | | |

Draw the graph on the grid opposite.



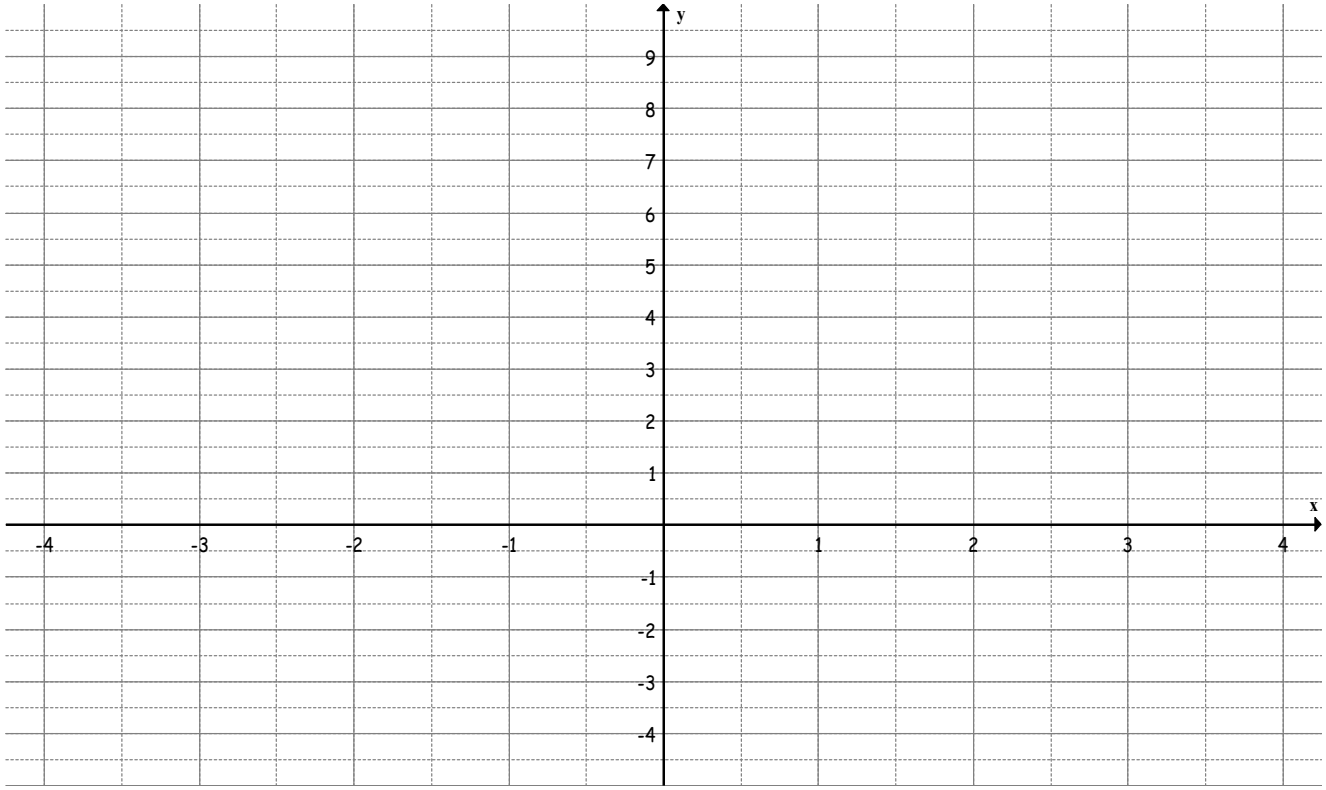
# Quadratic Graphs

Name: _____ Date:_____

Construct your own table of values for $y = x^2 - 3$

Complete the table of values for $y = x^2 + 3$.

| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| $x^2$ | 16 | | 4 | | | | | 9 | |
| +3 | +3 | | +3 | | | | | +3 | |
| y | 19 | | 7 | | | | | 12 | |




Draw the graphs on the grid opposite.

# Quadratic Graphs

Name: _____ Date: _____

Complete the table for the function $y = x^2 - 5$, plot the co-ordinates and draw a smooth curve through the points.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $x^2$ | | | | | | | |
| -5 | | | | | | | |
| y | | | | | | | |

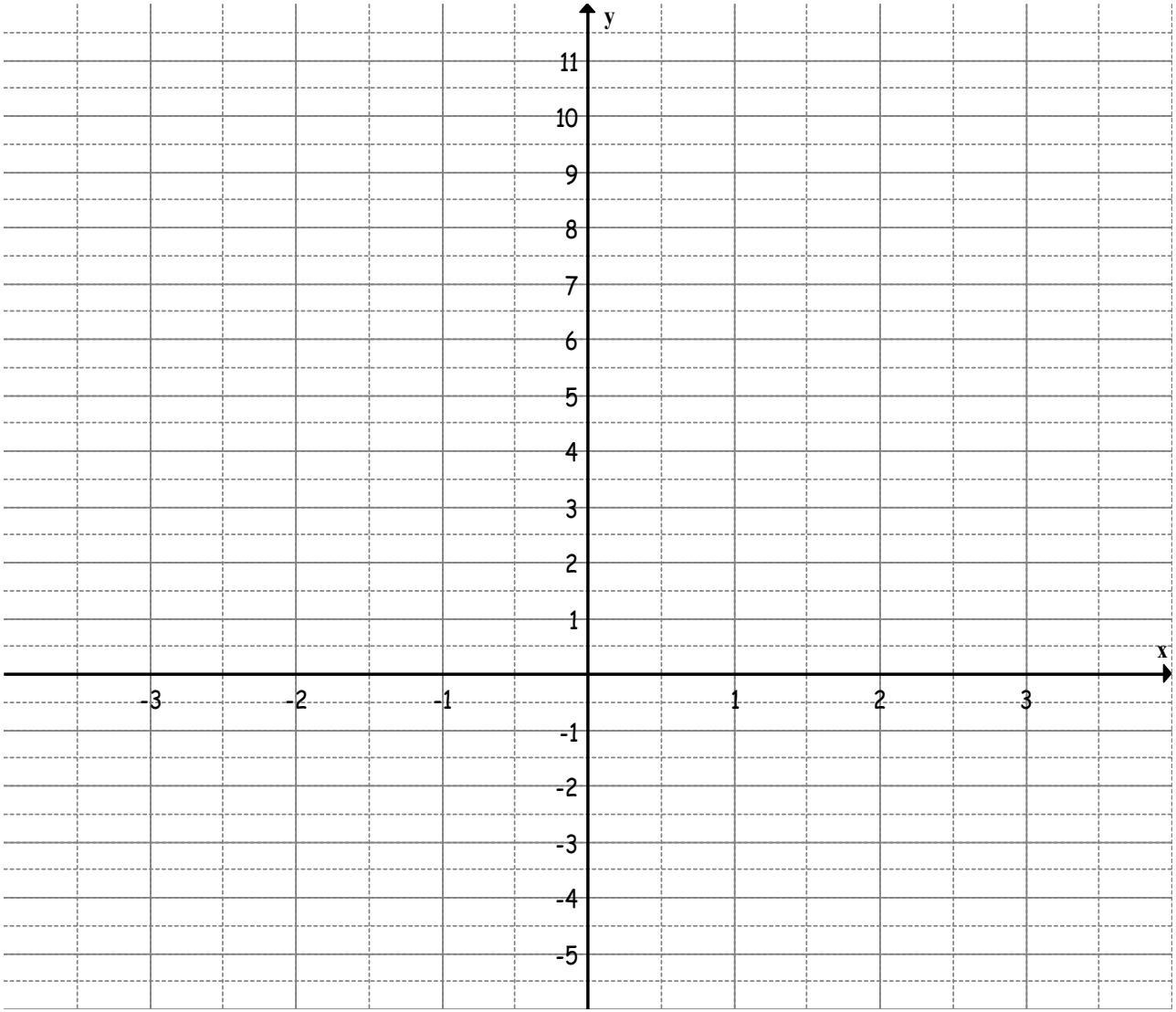
Use you graph to solve the equation $x^2 - 5 = 0$

Complete the table for the function $y = x^2 - 2$, plot the co-ordinates and draw a smooth curve through the points.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $x^2$ | | | | | | | |
| -2 | | | | | | | |
| y | | | | | | | |

Use you graph to solve the equation $x^2 - 2 = 0$

What do you notice about the two curves?



# Quadratic Graphs

Name: _____ Date: _____

Complete the table for the function $y = 5 - x^2$, plot the co-ordinates and draw a smooth curve through the points.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| 5 | | | | | | | |
| $-x^2$ | | | | | | | |
| y | | | | | | | |

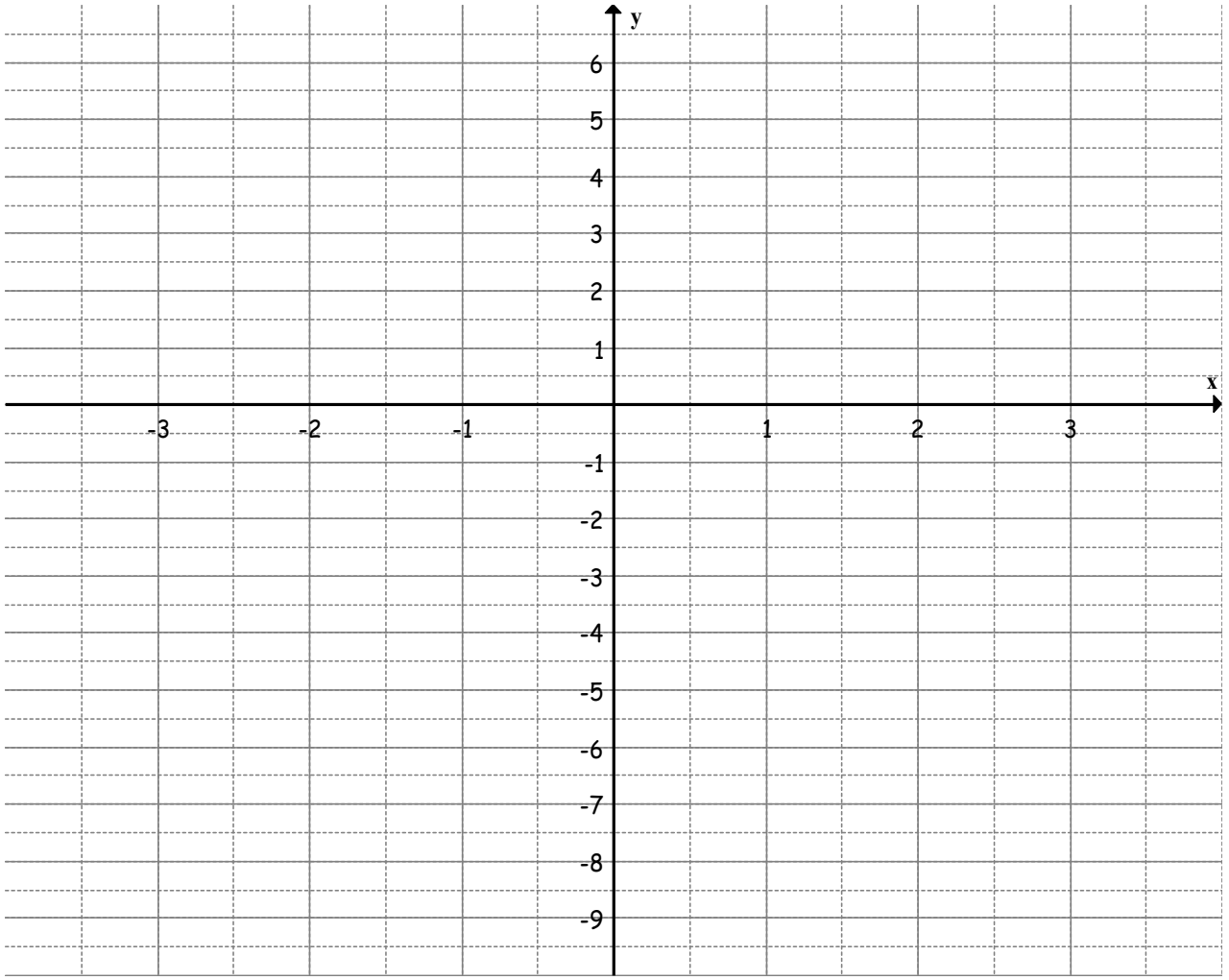
Use you graph to solve the equation $5 - x^2 = 0$

Complete the table for the function $y = 2 - x^2$, plot the co-ordinates and draw a smooth curve through the points.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| 2 | | | | | | | |
| $- x^2$ | | | | | | | |
| y | | | | | | | |

Use you graph to solve the equation $2 - x^2 = 0$

What do you notice about the two curves?



# Quadratic Graphs

Name: _____ Date: _____

Complete the table for the function $y = 2x^2$, plot the co-ordinates and draw a smooth curve through the points.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| y | | | | | | | |

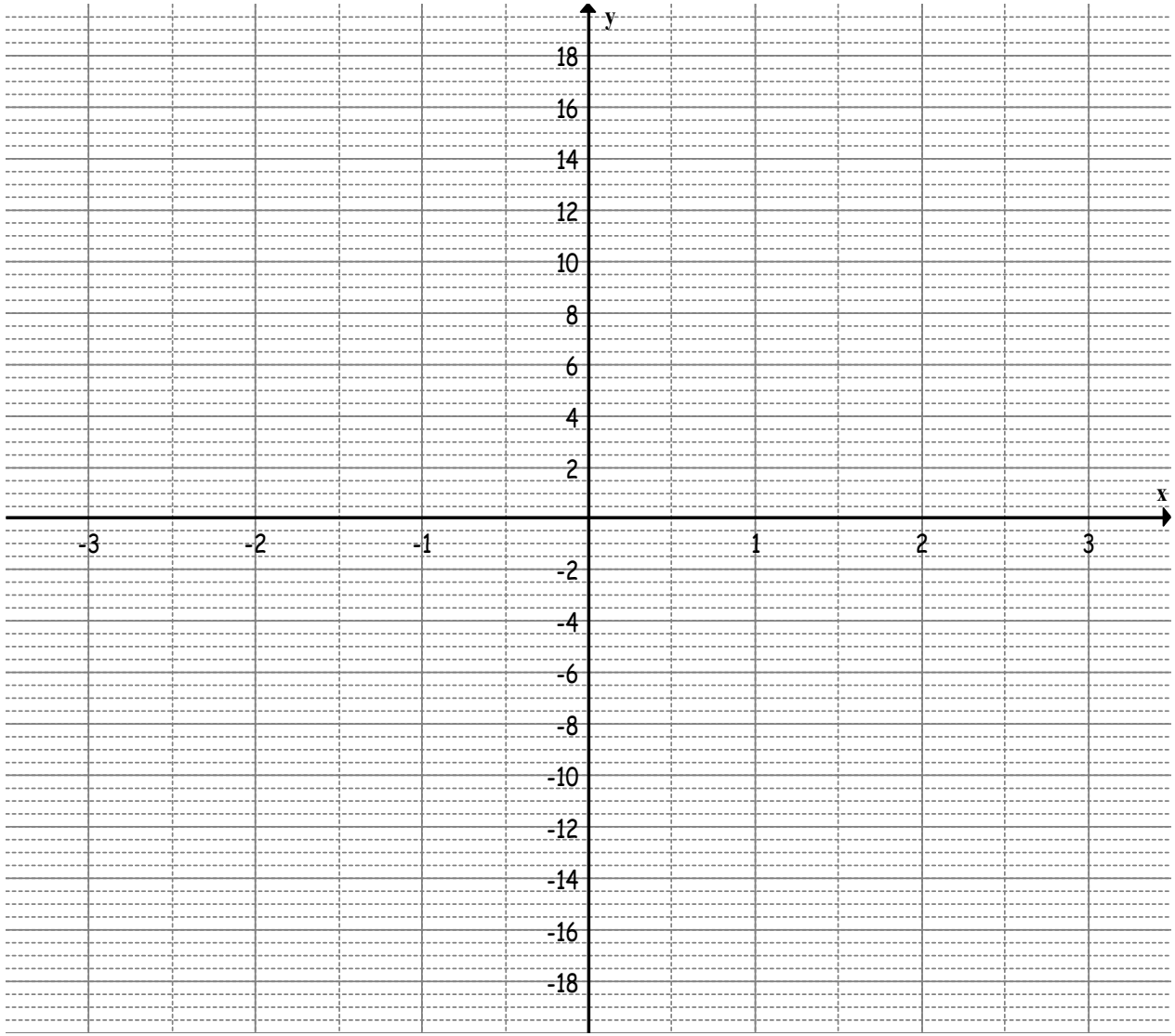
Use you graph to solve the equation $2x^2 = 5$

Complete the table for the function $y = -2x^2$, plot the co-ordinates and draw a smooth curve through the points.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| y | | | | | | | |

Use you graph to solve the equation $-2x^2 = -5$

What do you notice about the two curves?



# Quadratic Graphs

Name: _____ Date: _____

Complete the following table of values for the graph of:

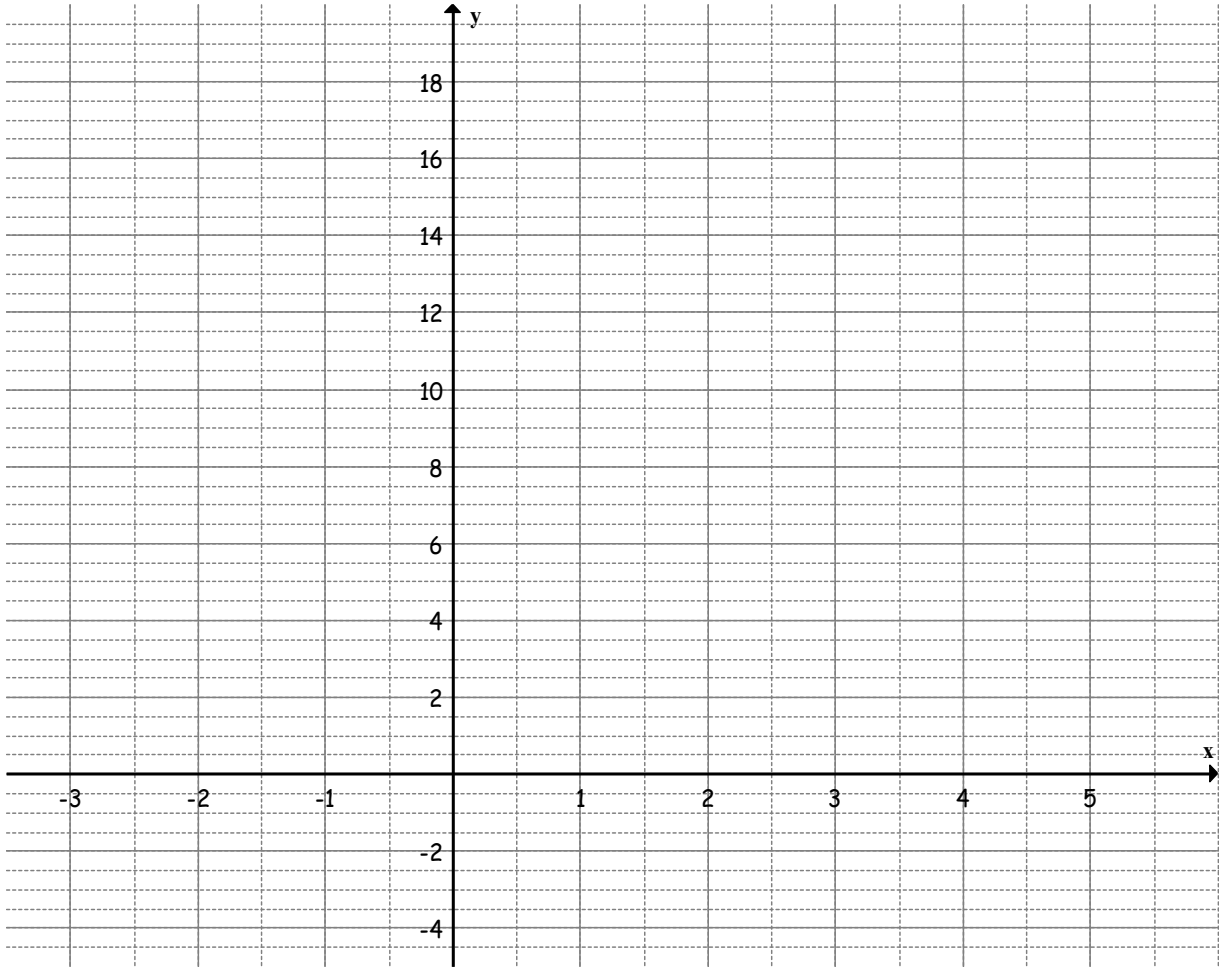
$y = x^2 - 3x$.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|
| $x^2$ | | | | | | | | | |
| -3x | | | | | | | | | |
| y | | | | | | | | | |

a) Plot the graph of $y = x^2 - 3x$ and use it to solve the equation $x^2 - 3x = 0$

b) On the same axes, plot the graph of the straight line $x + y = 4$.

c) Write down the ***x*-coordinates** of the points where your 2 graphs meet.



# Quadratic Graphs

Name: _____ Date: _____

Complete the following table of values for the graph of:

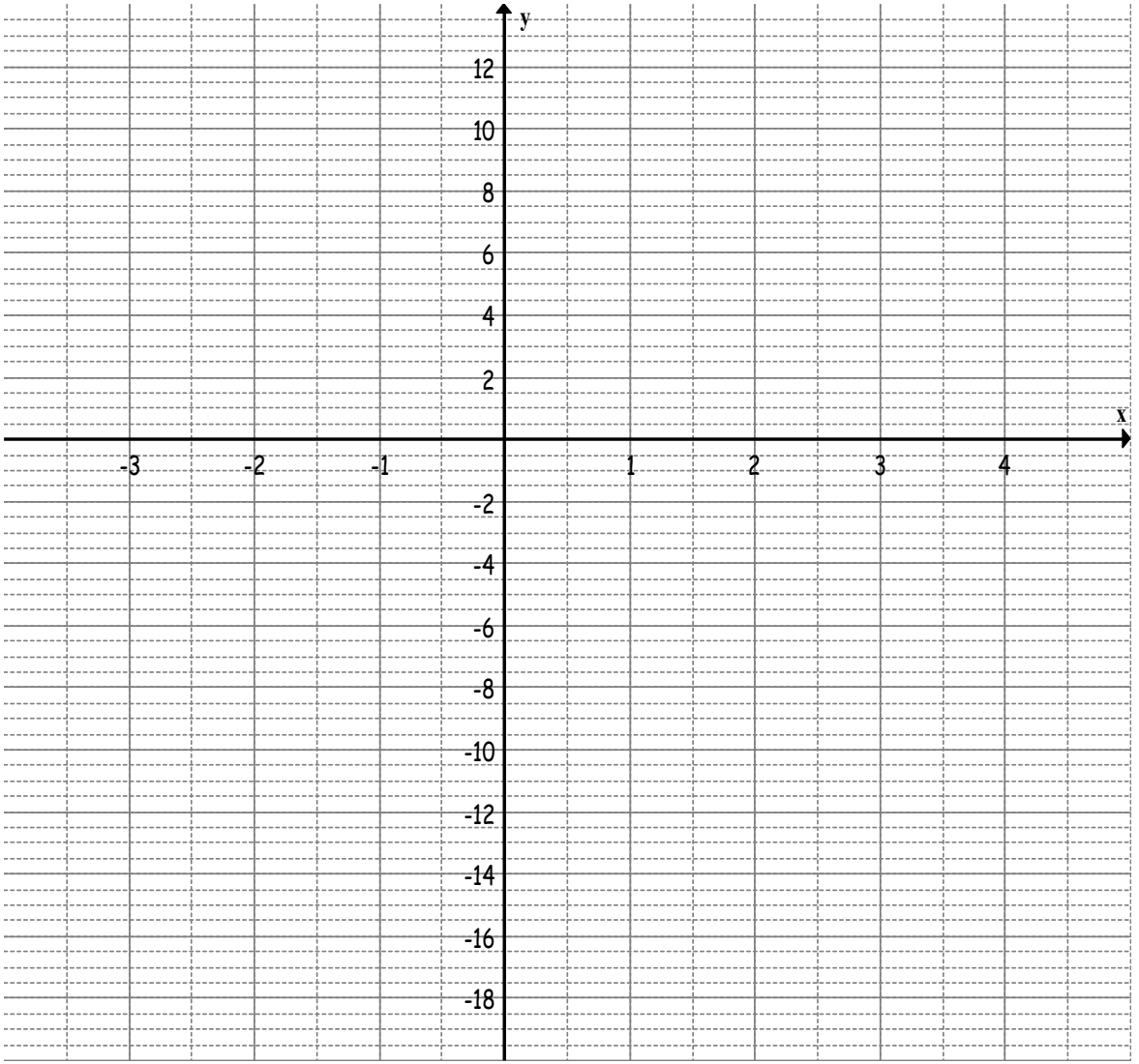
$y = 10 + x - 2x^2$.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| *10* | 10 | | | | | | | |
| +x | -3 | | | | | | | |
| $-2x^2$ | -18 | | | | | | | |
| y | -11 | | | | | | | |

a) Plot the graph of $y = 10 + x - 2x^2$ and use it to solve the equation $10 + x - 2x^2 = 0$

b) On the same axes, plot the graph of the straight line $y = 2x + 1$.

c) Write down the $x$-coordinates of the points where your 2 graphs meet.



# Quadratic Graphs

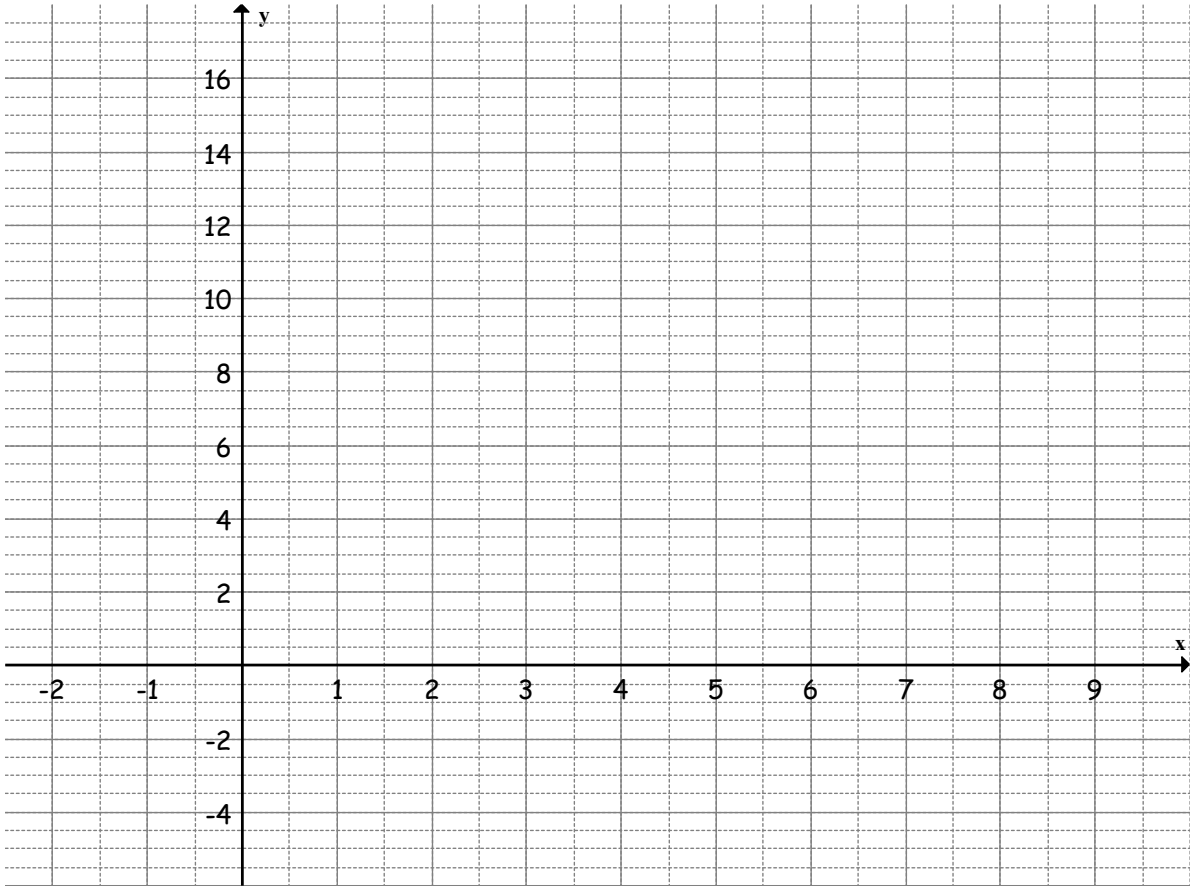
Name: _____ Date: _____

Complete the table of values for the function:

$y = x^2 - 5x + 2$.

| x | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $x^2$ | | | | | | |
| -5x | | | | | | |
| +2 | | | | | | |
| y | | | | | | |

| x | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|
| $x^2$ | | | | | |
| -5x | | | | | |
| +2 | | | | | |
| y | | | | | |




a) Plot the graph of $y = x^2 - 5x + 2$ for values of x between -2 and 5.

b) On the same axes, plot the graph of the straight line $y = 2x + 1$.

c) Write the coordinates of the points where the graphs cross.

c) Use your graph to find the solution to the equation $x^2 - 5x + 2 = 0$.

# Quadratic Graphs

Name: _____ Date: _____

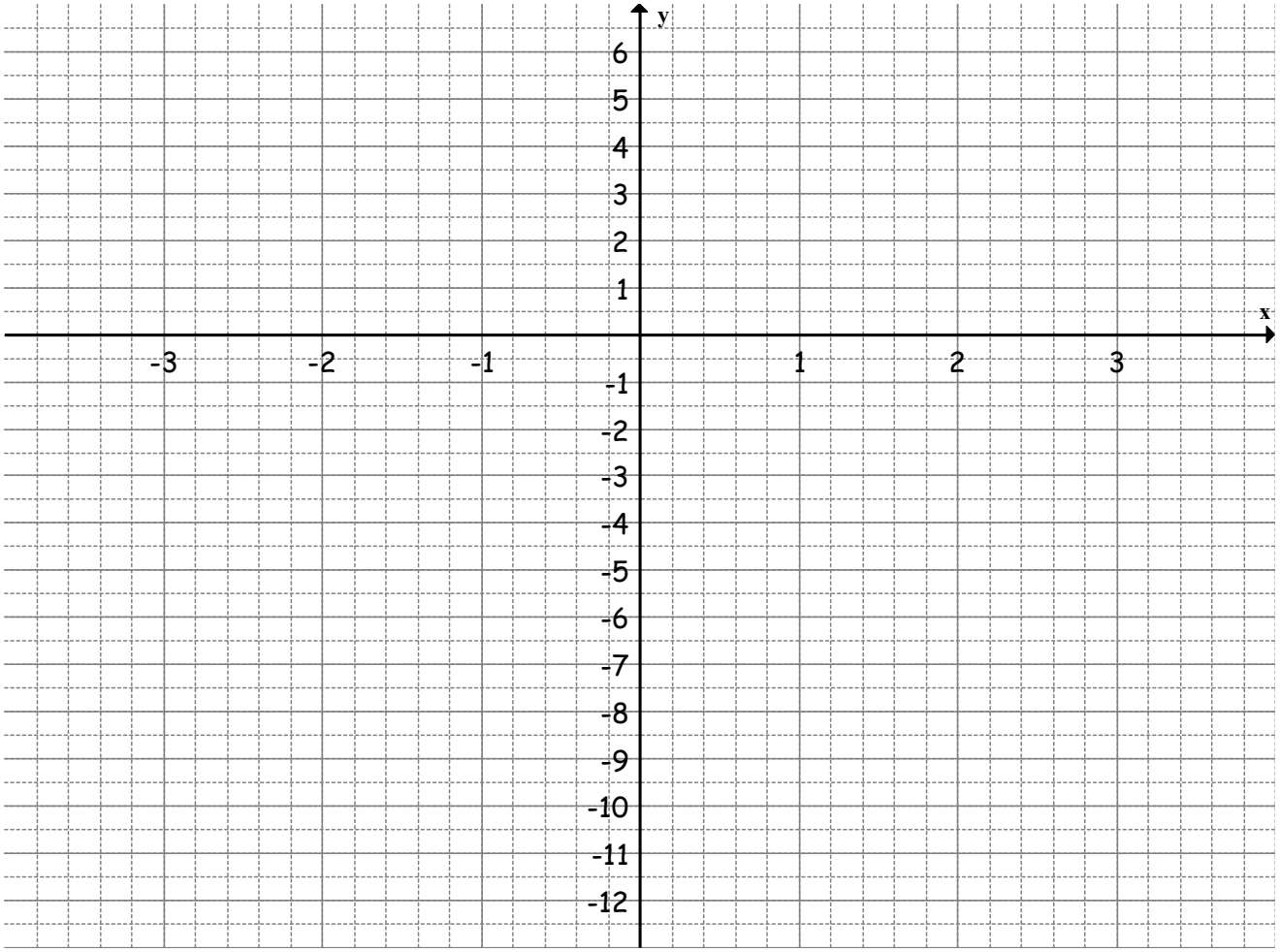
Complete the table of values for the function $y = 6 - 2x^2$.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| 6 | | | | | | | |
| $-2x^2$ | | | | | | | |
| y | | | | | | | |

a) Plot the graph of $y = 6 - 2x^2$ for values of $x$ between -3 and 3.

b) Use your graph to find approximate solutions of the equation $6 - 2x^2 = 0$.

c) Use your graph to find approximate solutions of the equation $6 - 2x^2 = -2$.



# Quadratic Graphs

Name: _____ Date: _____

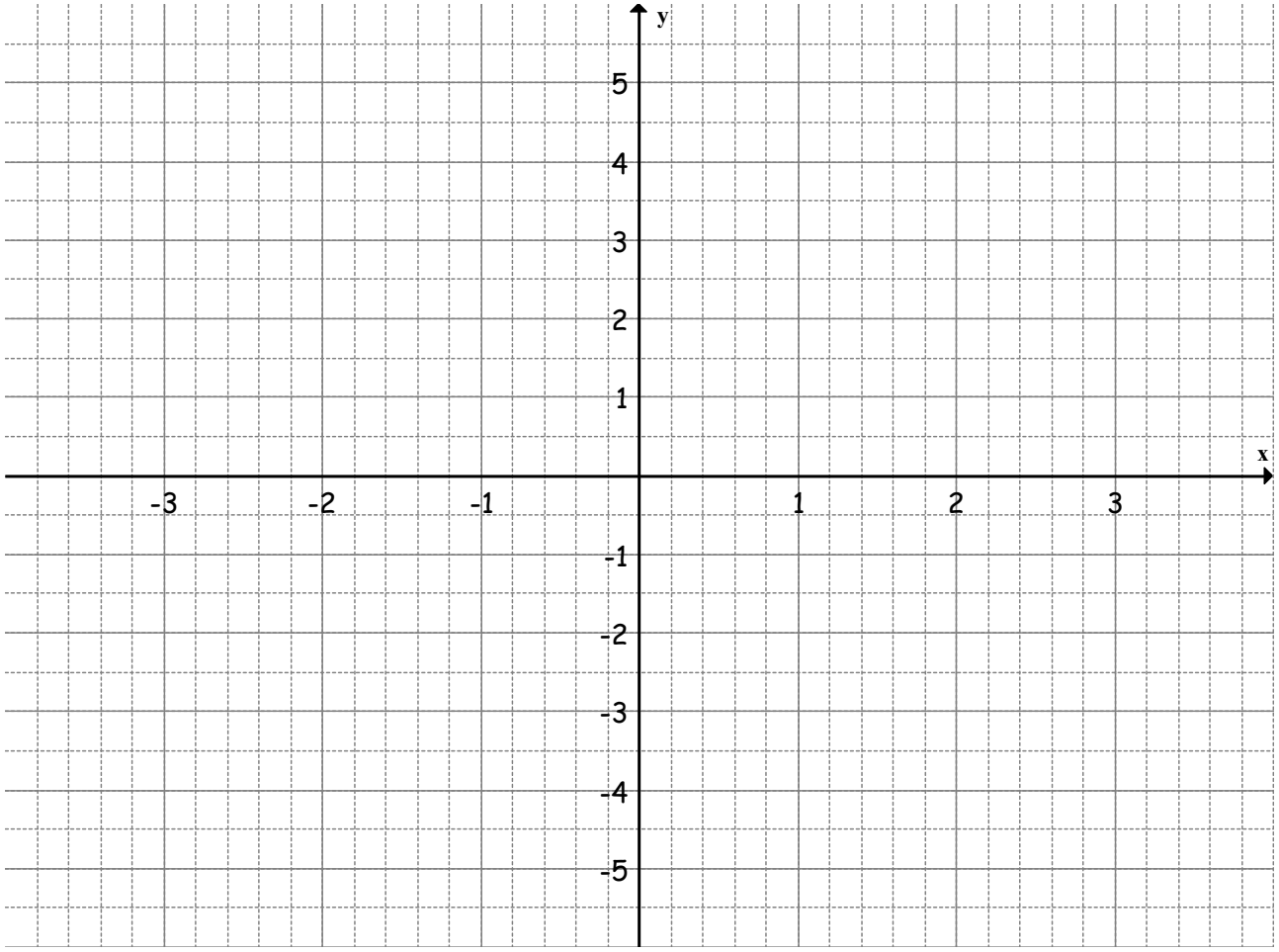
Complete the table of values for $y = 5 - x^2$.

| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| 5 | | 5 | 5 | 5 | | | 5 |
| $-x^2$ | | -4 | -1 | 0 | | | -9 |
| y | | 1 | 4 | 5 | | | -4 |

b) Plot the graph of $y = 5 - x^2$ for values of $x$ between -3 and 3.

c) Use your graph to find approximate solutions of the equation $5 - x^2 = 0$.

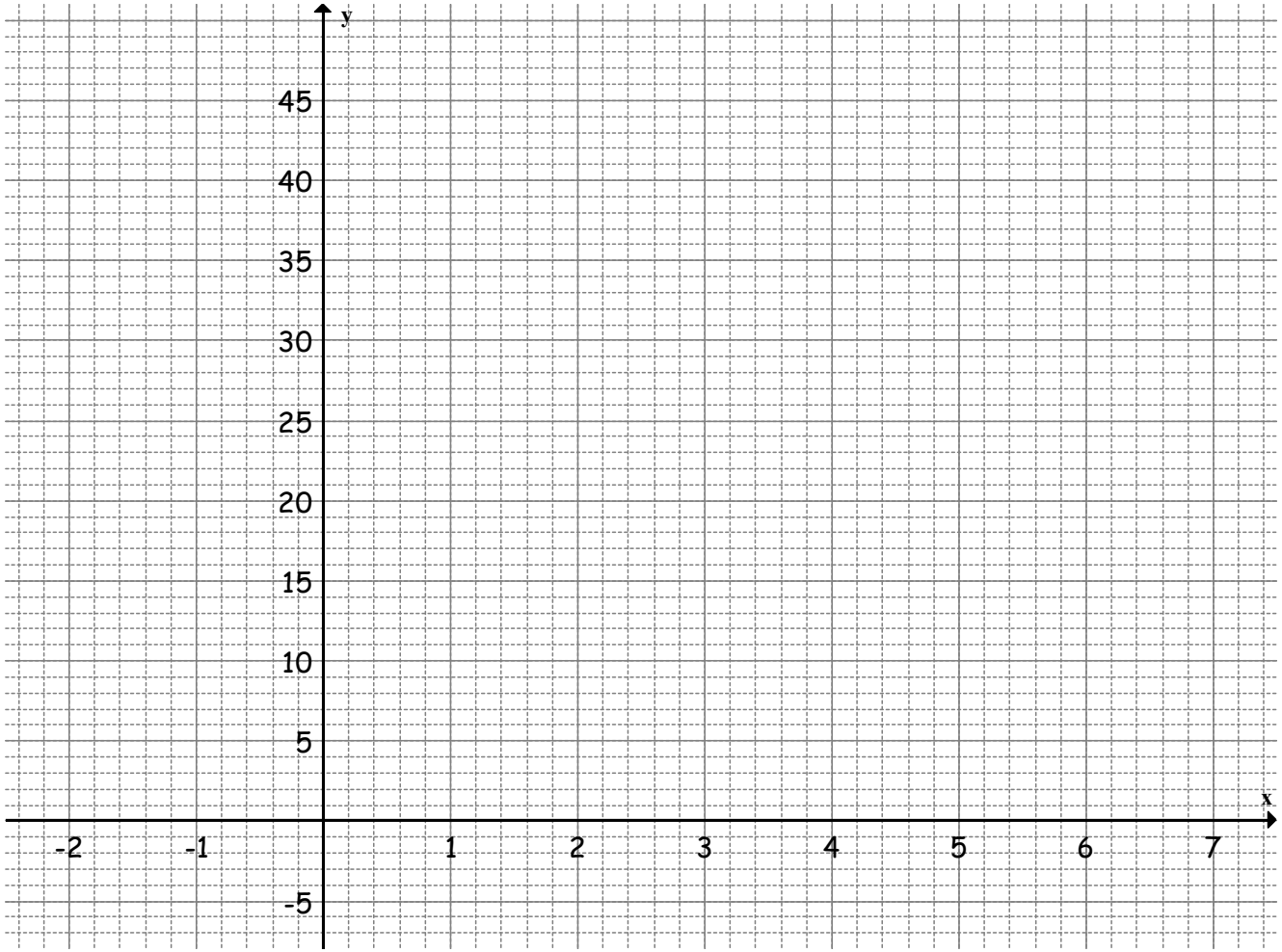
d) Use your graph to find approximate solutions of the equation $5 - x^2 = -1.25$



# Quadratic Graphs

Name: _____ Date: _____

a) Draw the graph of $y = 2x^2 - 13x + 15$ for the values of x from -2 to 7.




b) Use your graph to find solutions to the equations:

i) $2x^2 - 13x + 15 = 0$

ii) $2x^2 - 13x + 15 = 5$

# Quadratic Graphs

Name: _____ Date: _____

The graph shown has the equation:

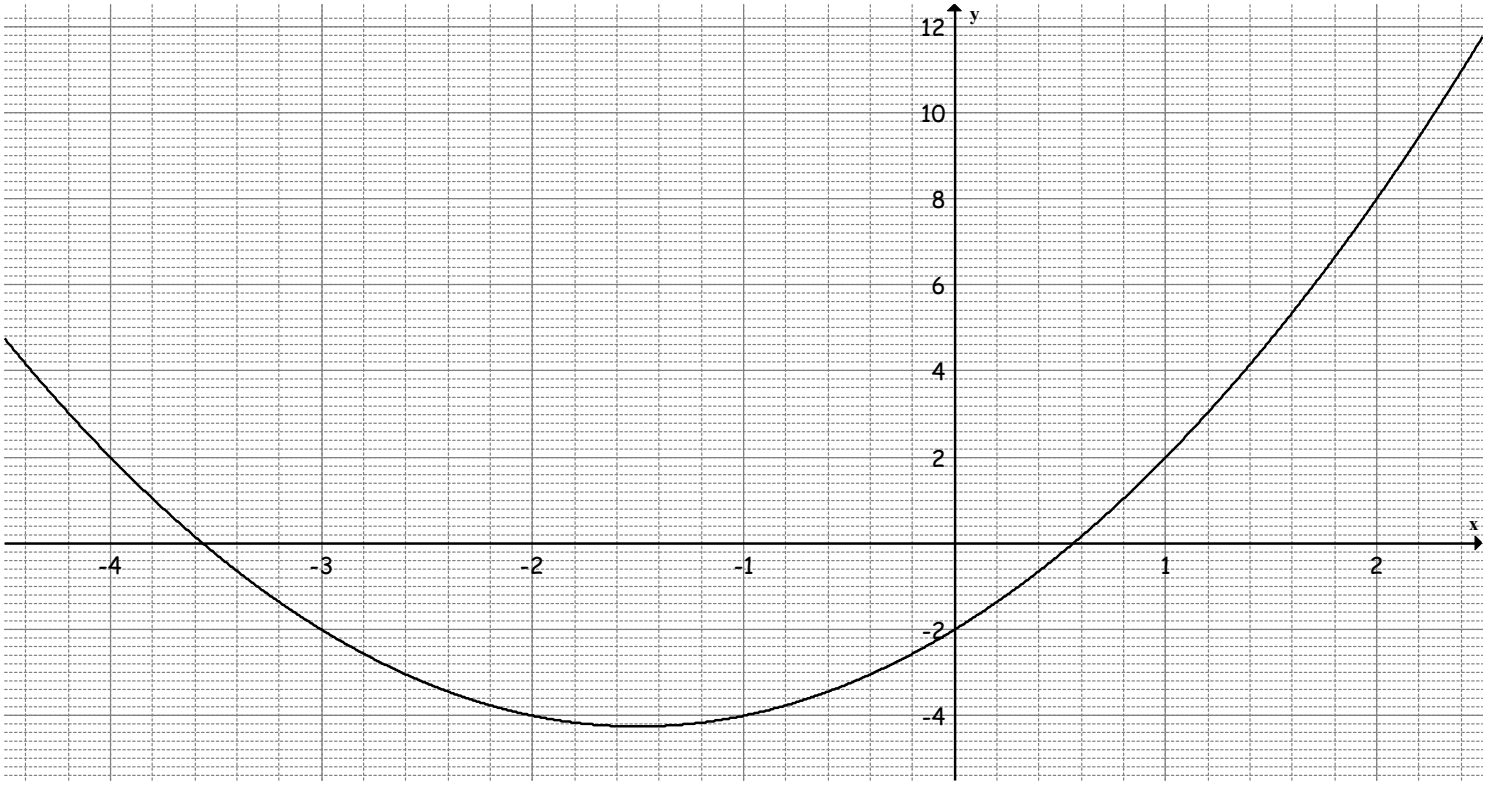
$y = x^2 + 3x - 2$

a) Use the graph to find the roots of the equation:

$x^2 + 3x - 2 = 0$

b) By drawing a suitable straight line use the graph to solve the equation:

$x^2 + 2x - 3 = 0$



# Quadratic Graphs

Name: _____ Date: _____

The graph of $y = x^2 + 2x - 3$ is shown opposite.

a) Write down the coordinates of the intercept with the y axis.

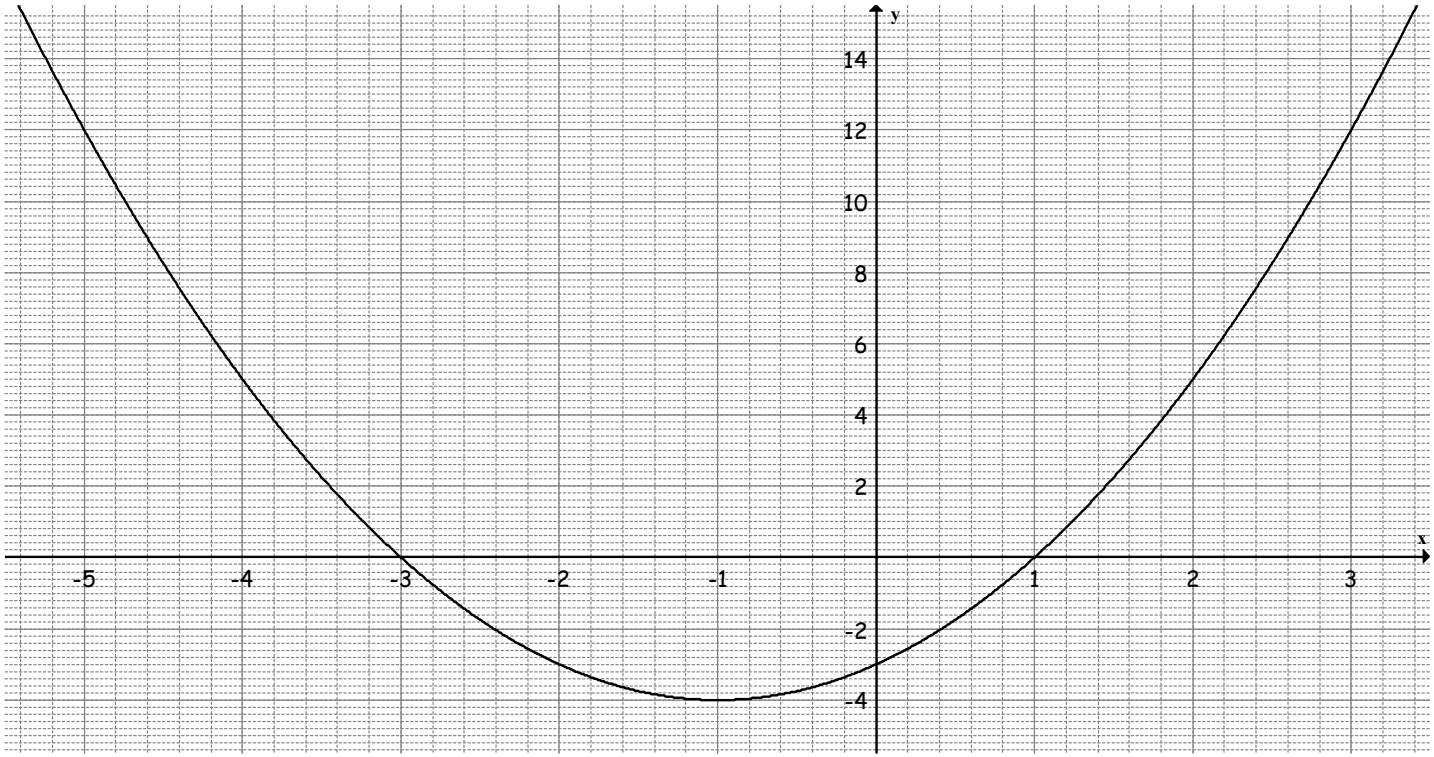
b) Write down the coordinates of the vertex.

c) What are the roots of the equation:

$x^2 + 2x - 3 = 0$ ?

d) By drawing a suitable straight line solve the equation:

$x^2 + x - 1 = 0$ ?




e) By drawing another straight line solve the equation:

$x^2 + 3x + 1 = 0$

# Quadratic Graphs

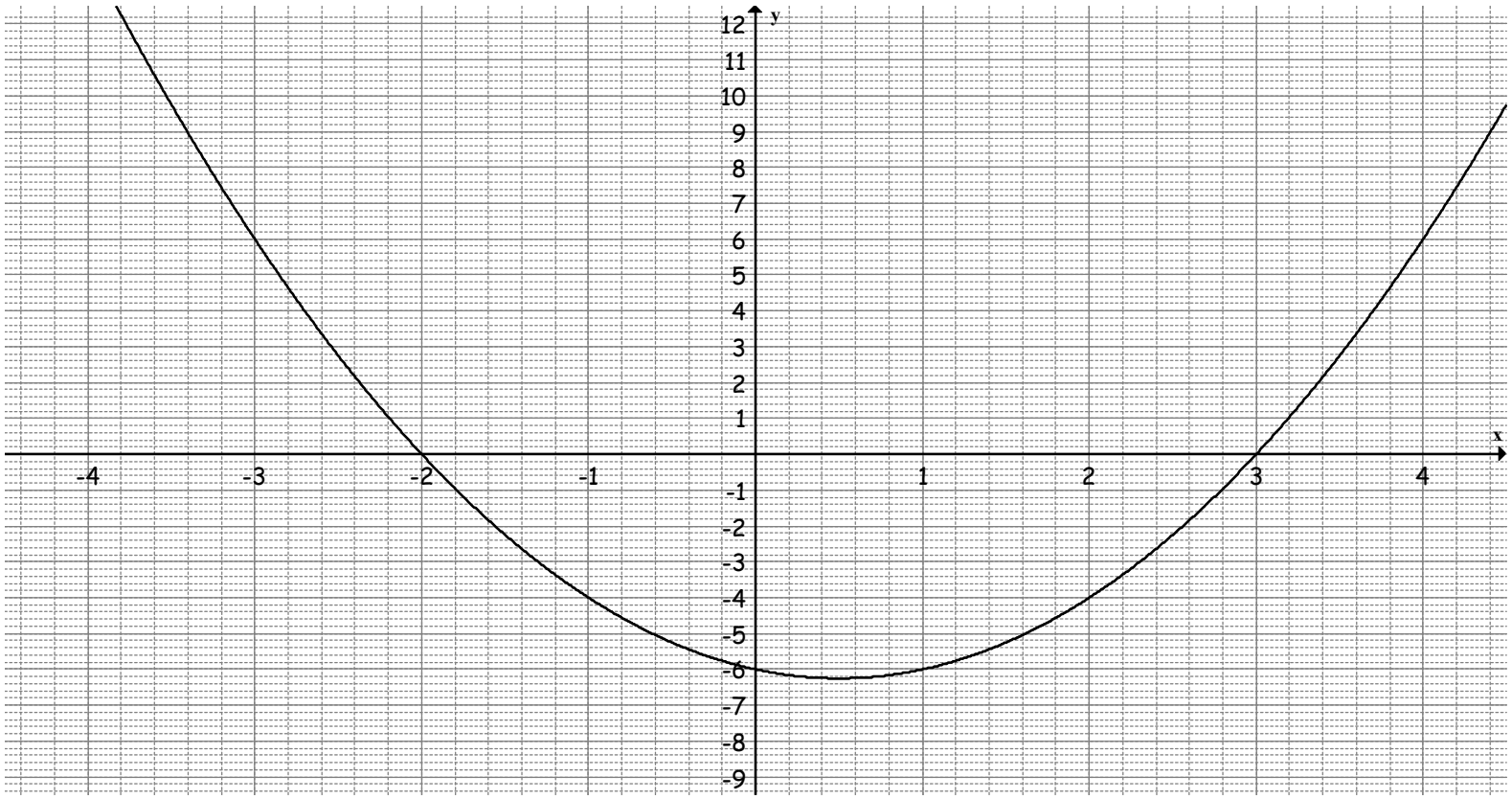
Name: _____ Date: _____

This is the graph of $y = x^2 - x - 6$

a) Use the graph to solve the equation $x^2 - x - 6 = 0$

b) Deduce the solutions to the equation $x^2 - x - 12 = 0$

c) By drawing a suitable straight line solve the equation $x^2 - 2x - 8 = 0$



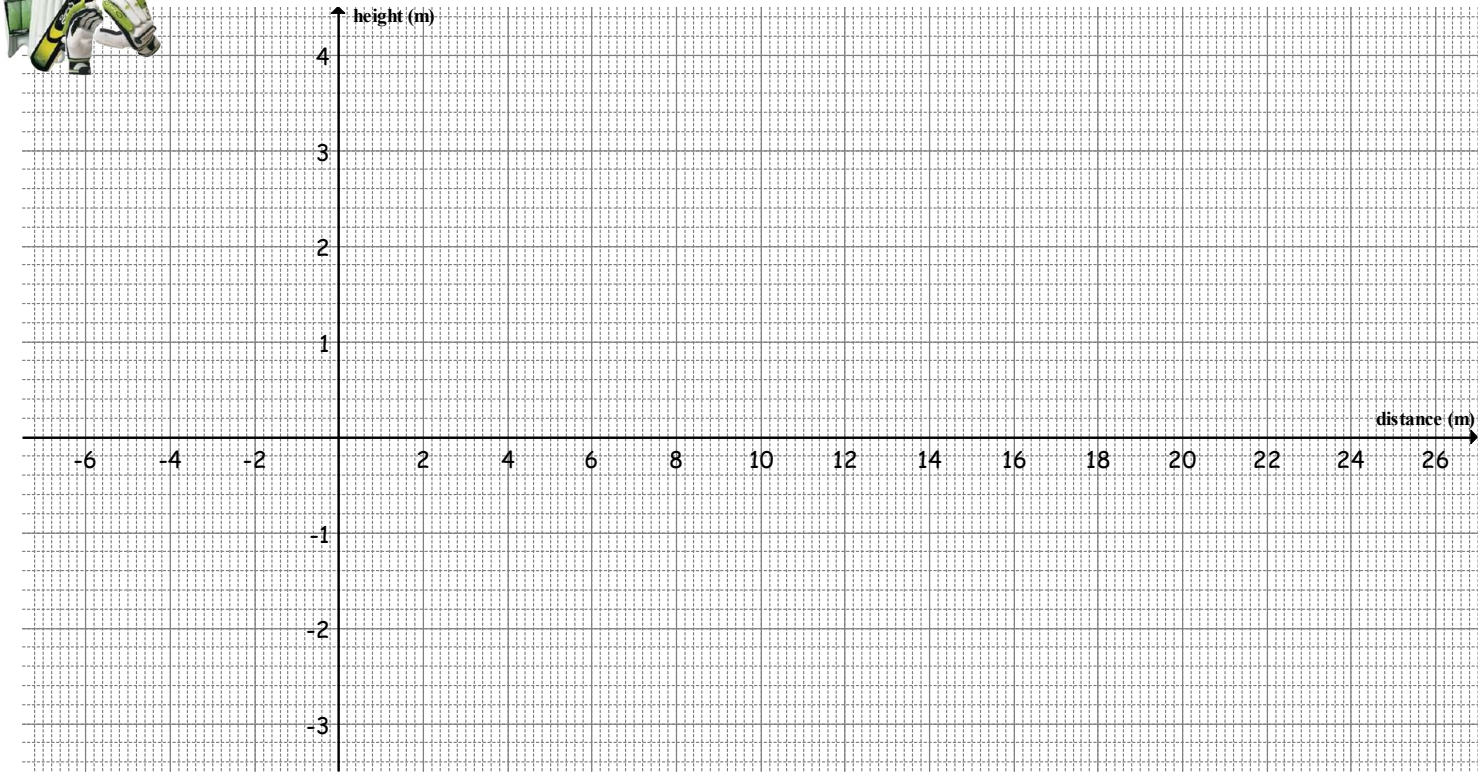
# Quadratic Graphs

Name: _____ Date: _____

In the local cricket match the bowler's delivery, which was missed by the batsman, could be described by the equation:

$y = 0.24x - 0.013x^2 + 2.$

Where y is the height of the ball and x is the distance that the ball has travelled from the bowler.




a) Draw the graph of this equation from $-7 \leq x \leq 26$.

Use your graph for the following questions:

b) Explain why the equation $0.24x - 0.013x^2 + 2 = 0$ has only one credible root.

c) Solve the equation $0.24x - 0.013x^2 + 2 = 0$ to find the one credible root.

d) What is the significance of the solution to the equation?

e) What was the maximum height that the ball reached?

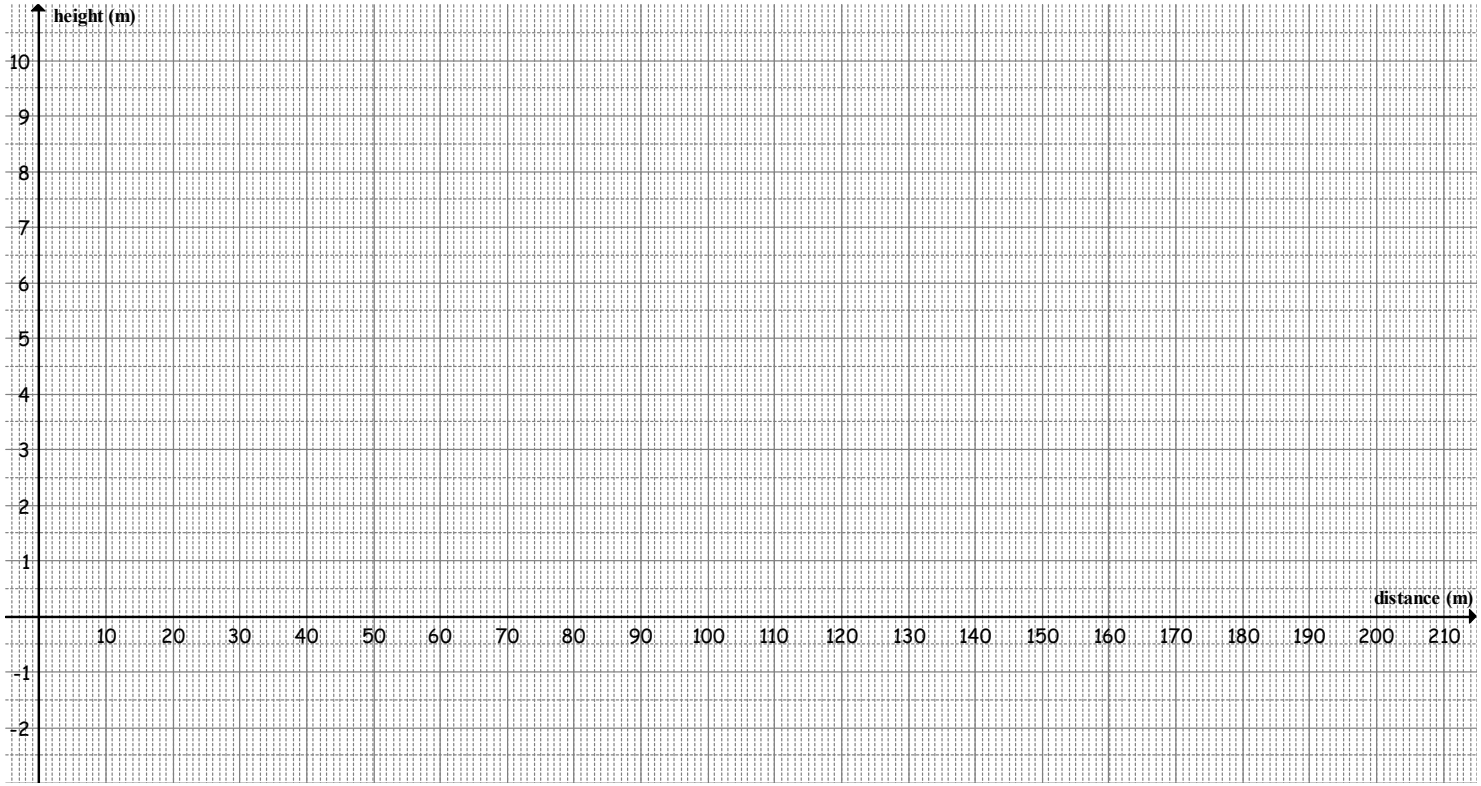
f) If the batsman tried to hit the ball when it was 1m above the ground how far away from the bowler was he?

# Quadratic Graphs

Name: _____ Date:_____

A canon ball is fired at a target.
Its path is a curve that can be modelled by the equation $h = 0.2d - 0.001d^2$.
h is the height of the canon ball and d is the horizontal distance that it has travelled.

a) Draw a graph of this equation over the range $0 \leq x \leq 210$.




Use your graph to answer the following questions:

b) What is the maximum height reached by the canon ball?

c) The canon ball hit its target.
How far away was the target?

d) If the canon ball took 0.8s to reach the target calculate:

i) its speed in metres per second.

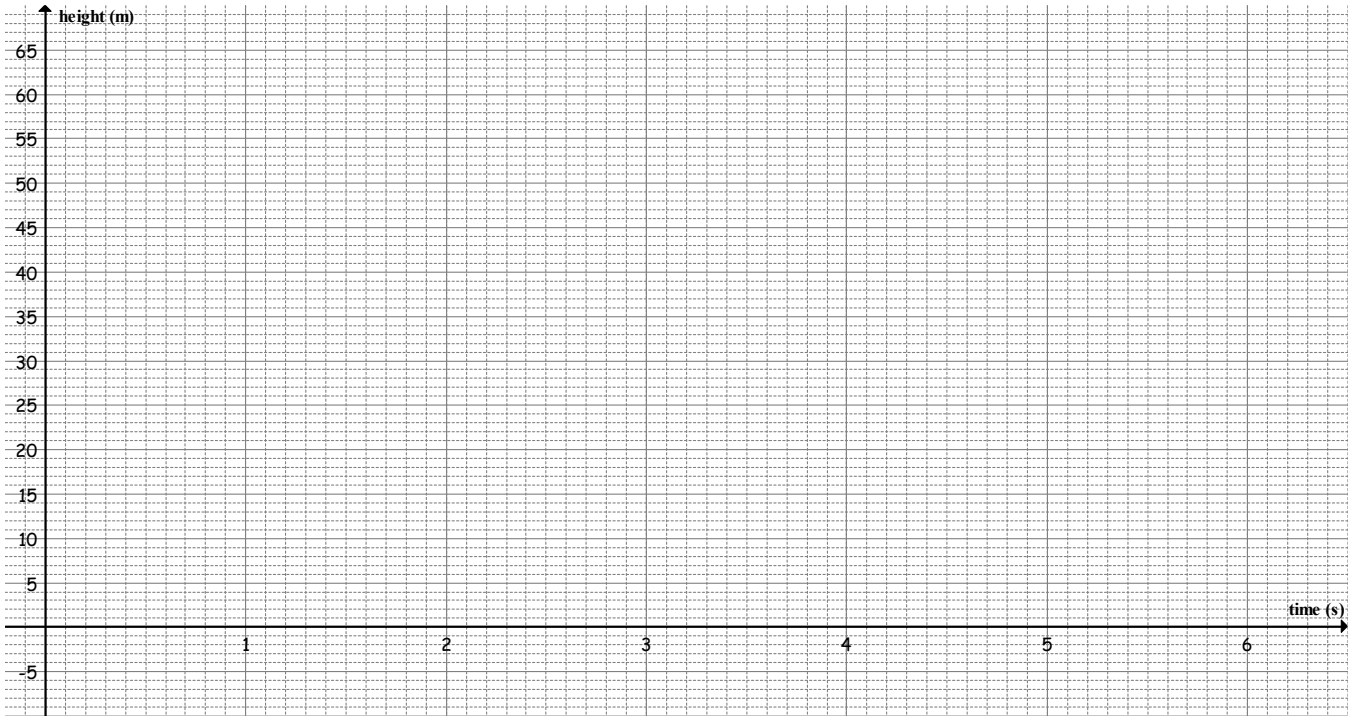
ii) its speed in miles per hour (given that 1 metre per second = 2.24 miles per hour).

# Quadratic Graphs

Name: _____ Date:_____

A man throws a ball from the top of a 50m building.
The balls height at any time can be found by the equation:

$$h = 15t - 4t^2 + 50$$




a) Illustrate the balls path by drawing a graph for $0 \leq x \leq 6$.

Use your graph to answer the following questions:

b) What was the maximum height reached by the ball?

c) How long did it take the ball to reach its maximum height?

d) How long did it take the ball to reach the ground?

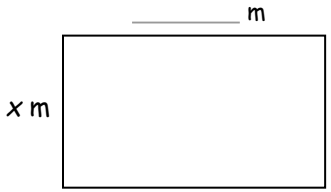
e) If the ball travelled a horizontal distance of 150m before hitting the ground what was its average speed?

# Quadratic Graphs

Name: _____ Date: _____

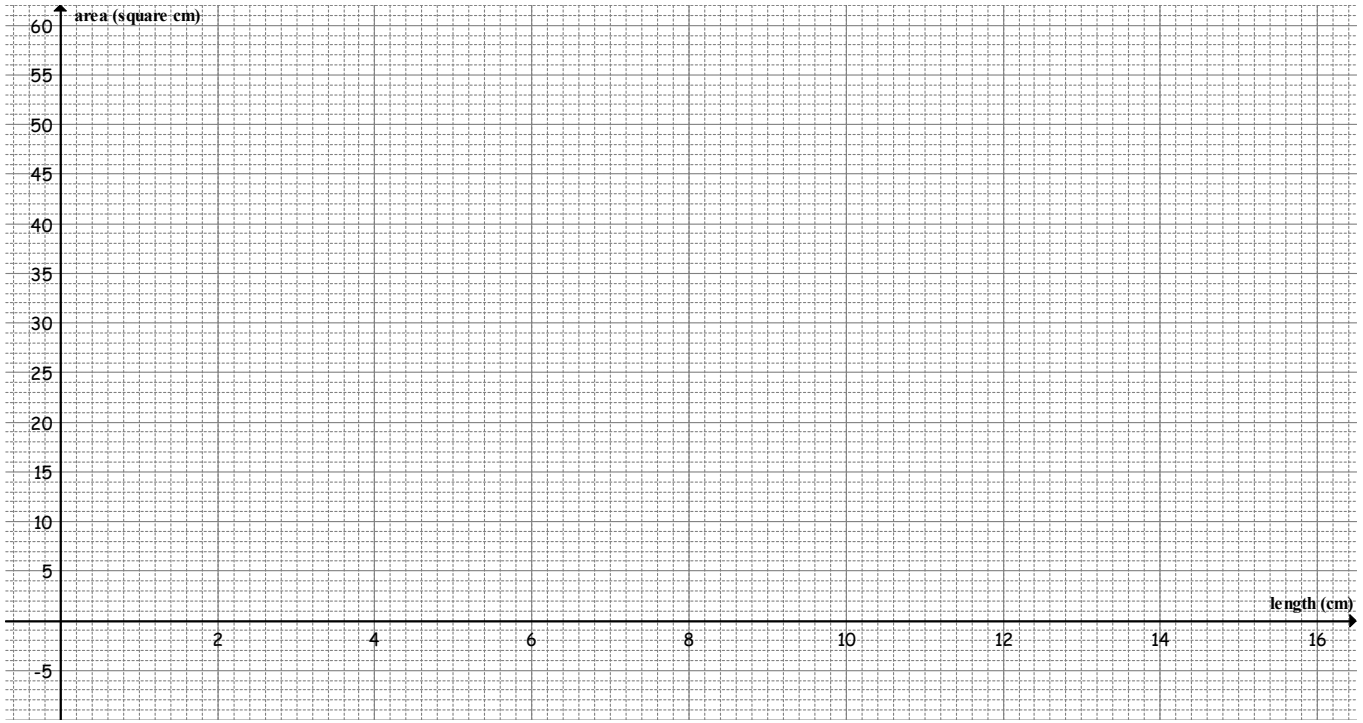
You have exactly 30m of fencing that you want to use to fence off a rectangular/square flower bed.
You want to fence off the largest area that you can.

a) If you let the length of the flower bed be $x$ metres. What is its width?




b) Write an expression in terms of x for the area of the flower bed.

c) Plot the graph of area against length on the grid provided.




Use your graph to find:

d) The maximum area of the flower bed.

e) The dimensions of the flower bed.

# Quadratic Graphs

Name: _____ Date:_____

## Accident Investigation

You have been asked to investigate whether or not the two drivers involved in a road accident were breaking the 30mph speed limit when the accident occurred.
The stopping of a car can be modelled by the equation $S = \frac{U^2}{2a}$ .
Where S is the distance the car took to stop (the length of the skid mark on the road) in metres, U is the speed of the car in metres per second ($ms^{-1}$ ) and a is the deceleration (the rate at which the car slowed down) in metres per second$^2$.

a) Rearrange the above equation into the normal quadratic format (ie $ax^2 + bx + c = 0$).

Tests on the road surface estimated that the deceleration (a) of each car was 21 metres per second$^2$.

b) Mrs Smiths car left skid marks on the road that were 20.5m long.

i) Draw the graph to illustrate this data ($0 \leq U \leq 40$) using the grid on the next worksheet.

ii) Use your graph to estimate her speed at the time of the crash.

iii) Convert her speed into mph given that $1ms^{-1} = 2.24$mph.

c) Mr Jones car left marks that were 33m long.

i) Draw the graph to illustrate this data on the same grid as the previous graph.

ii) Use your graph to estimate his speed at the time of the crash.

iii) Convert his speed into mph.

d) Were either of the drivers breaking the speed limit at the time?

# Quadratic Graphs

Name: _____ Date: _____

## Road traffic accident investigation graphs