

Y9 Maths

Unit 6 Test

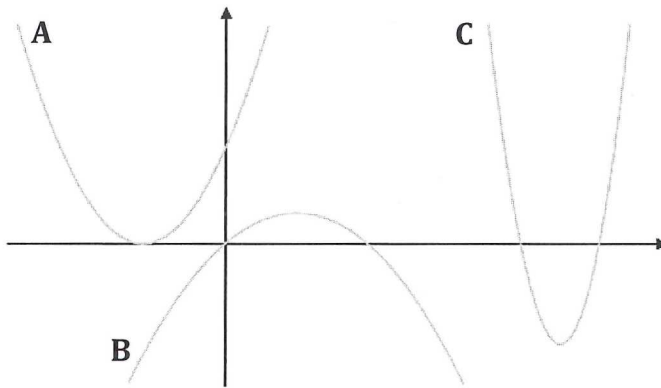
Non-linear Graphs

Name: _____

CALCULATOR ALLOWED

markscheme

1 Look at these graphs and then complete the sentences below.



a These graphs of quadratic functions are also called ...*parabolas*...

(B1)

b Each curve has *1* line of *symmetry*...

(B1) for both

c The turning points of graphs **A** and **C** are called *minimum* points.

(B1)

d The turning point of graph **B** is called a *maximum* point.

(B1)

(4 marks)

MARKS

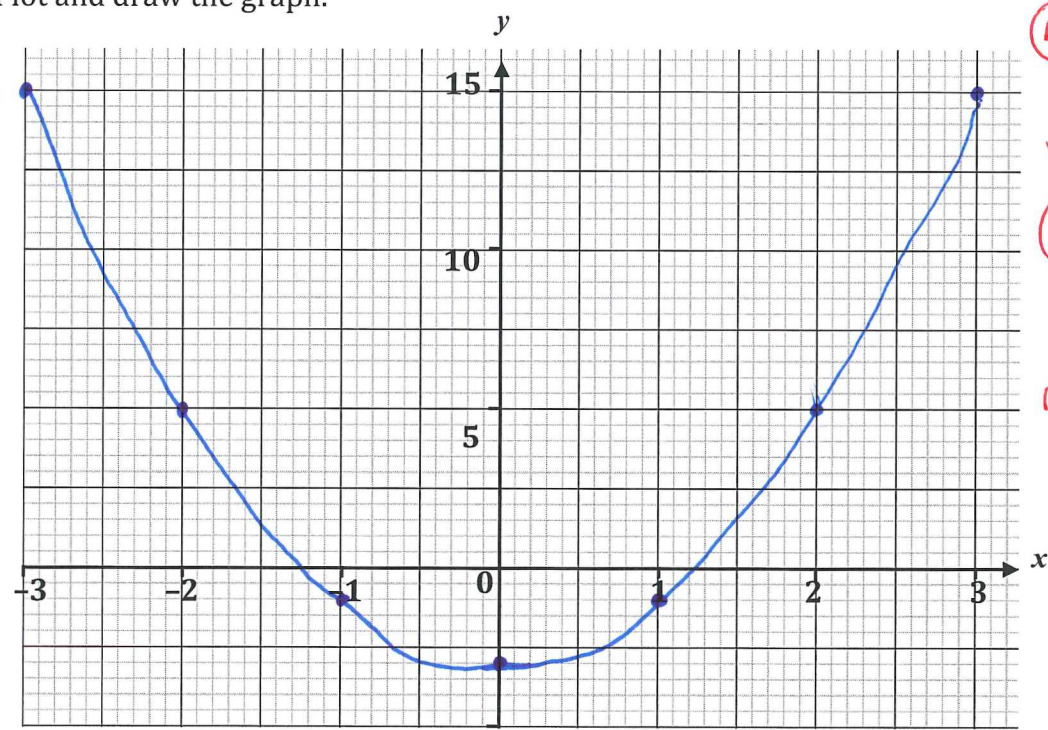
2 a Complete this table of values for the graph $y = 2x^2 - 3$

2

x	-3	-2	-1	0	1	2	3
y	15	5	-1	-3	-1	5	15

(B2) for all correct
(-1 ee)

2 b Plot and draw the graph.



(B2) all points correct and joined with a smooth curve (allow ft from (a))

B1 at least 4 points plotted correctly from (a)

1

c What is the equation of the line of symmetry?

Do not accept "y-axis"

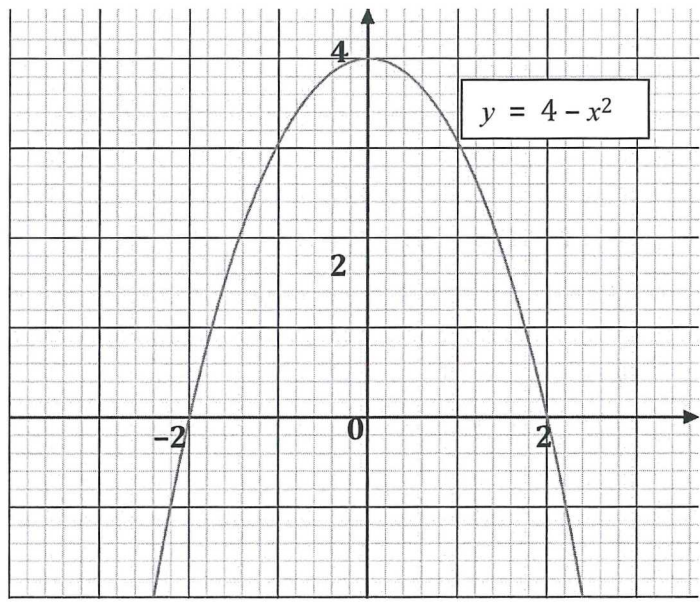
(B1)

$x = 0$

(5 marks)

MARKS

3 The graph shows the graph of $y = 4 - x^2$



Use the graph to solve these equations.

2

a $4 - x^2 = 0$

(B1) (B1)
 $x = -2, x = 2$

2

b $4 - x^2 = 3$

(B1) (B1)
 $x = -1, x = 1$

(4 marks)

Note: If students have just
written numbers $\pm 1 \pm 2$
with no " $x =$ "
then award B0 B1 B1 B1

marks

- 2 4 a Complete this table of values for the graph of $y = x^2 - x - 6$

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

(B2) for all correct
(-1 ee)

- 2 b Plot and draw the graph using the graph paper *on the next page*.

- 2 c Using the graph, write down the solutions of $x^2 - x - 6 = 0$

(B1) (B1)
 $x = -2$ $x = 3$

- 3 d Using algebra, factorise and solve the equation $x^2 - x - 6 = 0$

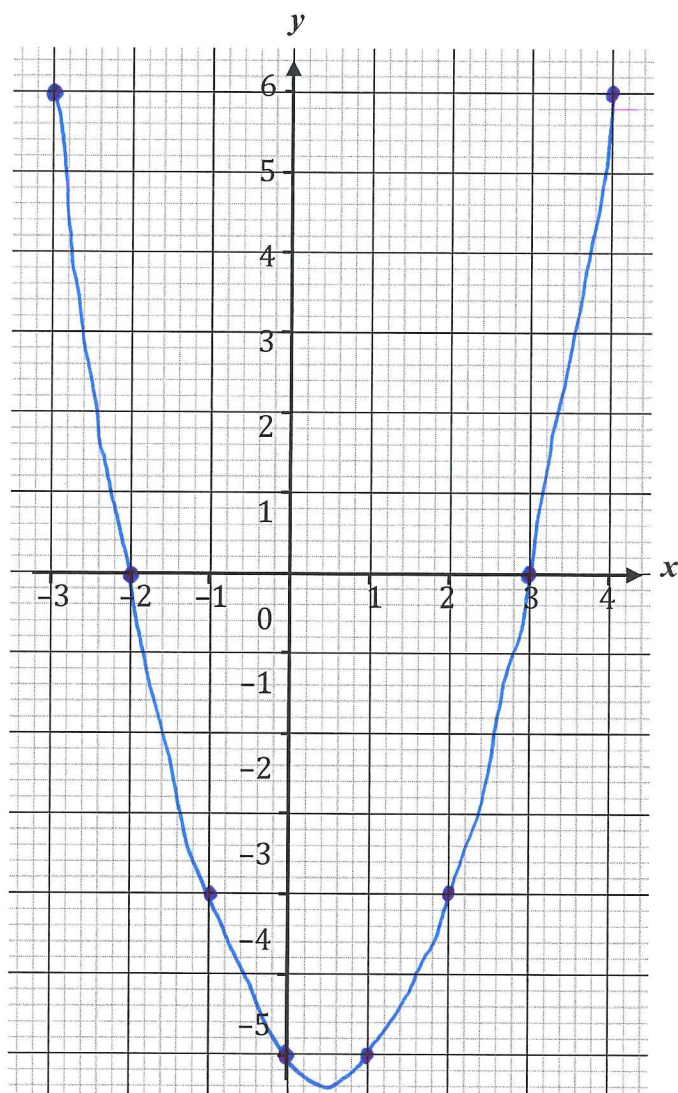
$(x - 3)(x + 2) = 0$ (B2) for both brackets correct
 $x - 3 = 0$ $x + 2 = 0$ [B1 for $(x \pm 3)(x \pm 2)$]
 $x = 3$ $x = -2$ (A1) for both

(-1 mark if "x =" is omitted from c or d)

- 1 e Explain the connection between your answers to parts c and d, giving a reason.

The answers are the same since solving $x^2 - x - 6 = 0$ is the same as finding the intersection points of $y = x^2 - x - 6$ and $y = 0$
(B1)

(for question 4b)



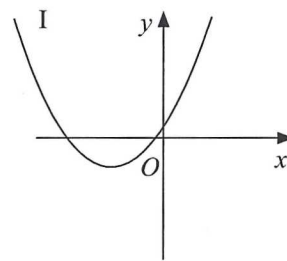
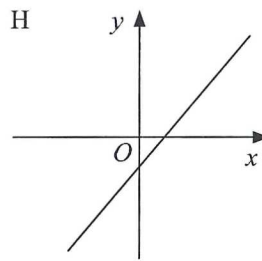
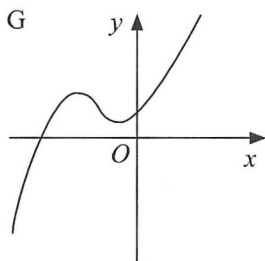
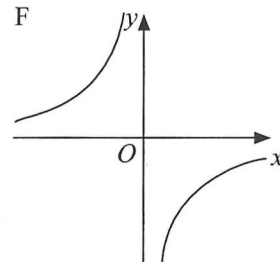
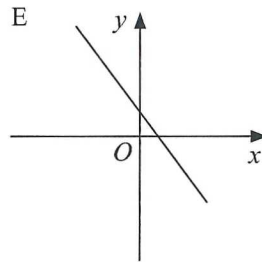
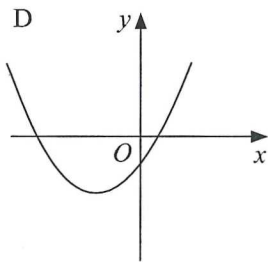
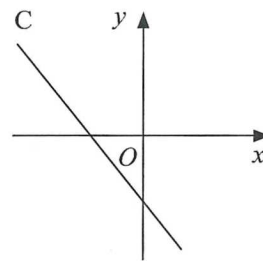
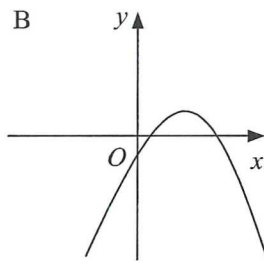
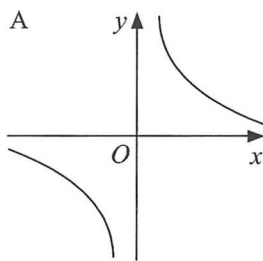
(B2) all points correct
and joined with a
smooth curve
(allow ft from (a))

B1 at least 4 points
plotted correctly
from (a)

↗
-ve y-axis scale a bit dodgy!

MARKS

5 a Look at the graphs below.



Write down the letter of the graph which could have the equation

(i) $y = \frac{2}{x}$

A

(B1)

(ii) $y = 2x^2 + 7x + 3$

I

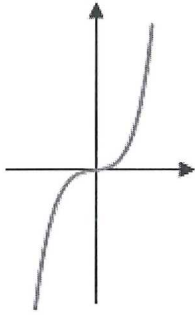
(B1)

b For graph A above, explain why does it not cross the y-axis?

(B1) for either "because it's an asymptote" or
 "you cannot divide by zero (when $x=0$)"
 or another sensible statement

MARKS

c For the graph below:



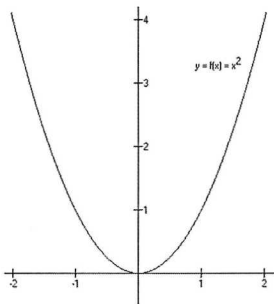
(i) what is the special name given to the point on the graph where it twists and turns (at the origin)?

point of inflection (B1)

(ii) suggest a possible equation for the graph

$y = x^3$ $y = kx^3$ where $k > 0$ (B1)

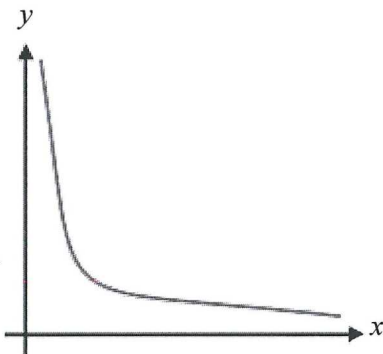
d The graph below is $y = x^2$. Describe what the graph of $y = 3x^2$ would look like in comparison.



It would be very similar shape
but narrower/skinnier !!

(B1)

e Describe a real-life situation which could be represented by this graph.



Price of a car falling as time (x axis) goes by

(B1) for any sensible suggestion

(7 marks)

MARKS

2

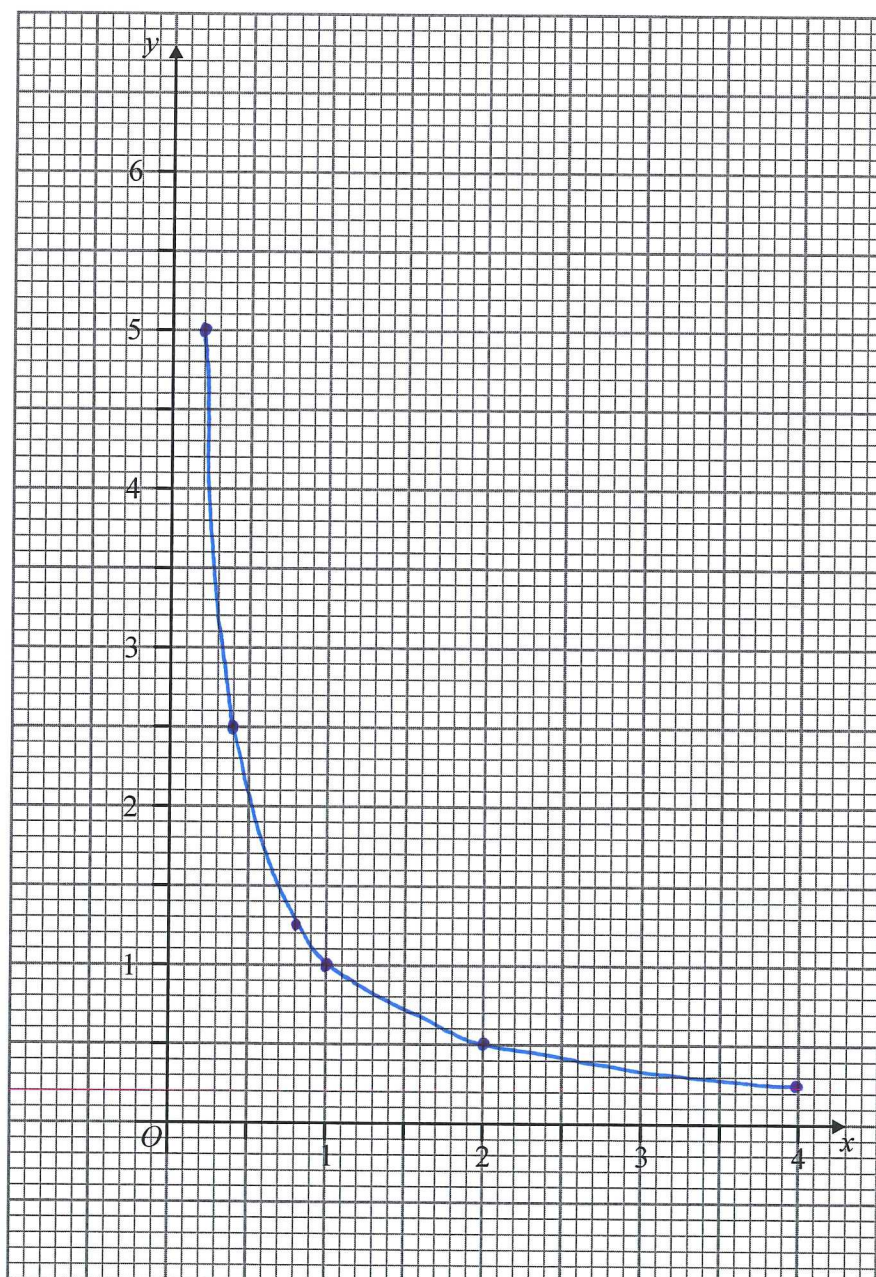
6. a Complete the table of values for $y = \frac{1}{x}$

x	0.2	0.4	0.8	1.0	2.0	4.0
y	5.0	2.5	1.25	1.0	0.5	0.25

(B2) for all correct
(-1 ee)

2

- b On the grid, draw the graph of $y = \frac{1}{x}$ for $x > 0.2$



(B2) all points
correct and
joined with
a smooth
curve
(allow ft
from (a))

B1 at least
4 points plotted
correctly from
(a)

(4 marks)

MARKS

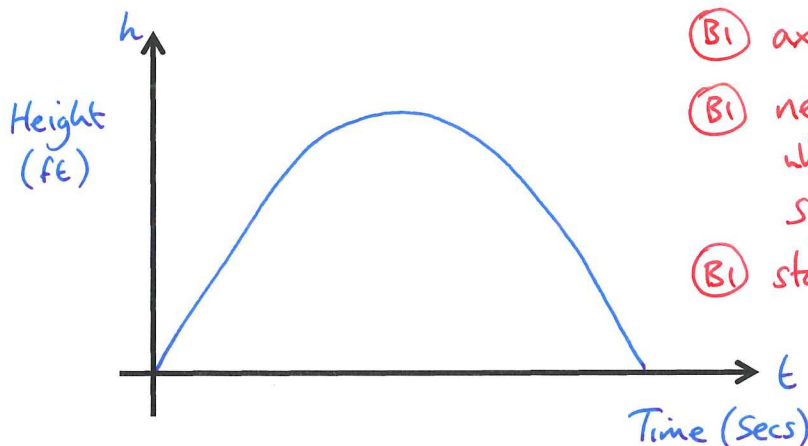
7. The trajectory of a golf ball can be modelled by the equation

$$h = 10t - t^2$$

where h is the height in feet and t is the time in seconds

3

- a Sketch what the above function would look like, ensuring you label both axes.



(B1) axes labelled

(B1) negative parabola shape which is roughly symmetrical

(B1) starts at (0,0)

3

- b Use algebra to find the time taken for the ball to reach a height of 24 feet for the first time. *

$$10t - t^2 = 24 \quad (B1)$$

$$0 = t^2 - 10t + 24$$

$$0 = (t - 6)(t - 4) \quad (M1) \text{ for } (\pm t \pm 6)(\pm t \pm 4)$$

$\swarrow$
 $t = 6$

$\swarrow$
 $t = 4$

* Do not award final A1 mark if $t = 6$ is also indicated as an answer

→ (A1) c.a.o.
4 seconds

(6 marks)

TOTAL = 40 MARKS