

## Quadratics And Harder Graphs

Please write clearly in block capitals

Forename:

Surname:

### Materials

For this paper you must have:

- mathematical instruments



You **can** use a calculator.

### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- You may ask for graph paper, tracing paper and more answer paper. These must be tagged securely to this answer book.

### Advice

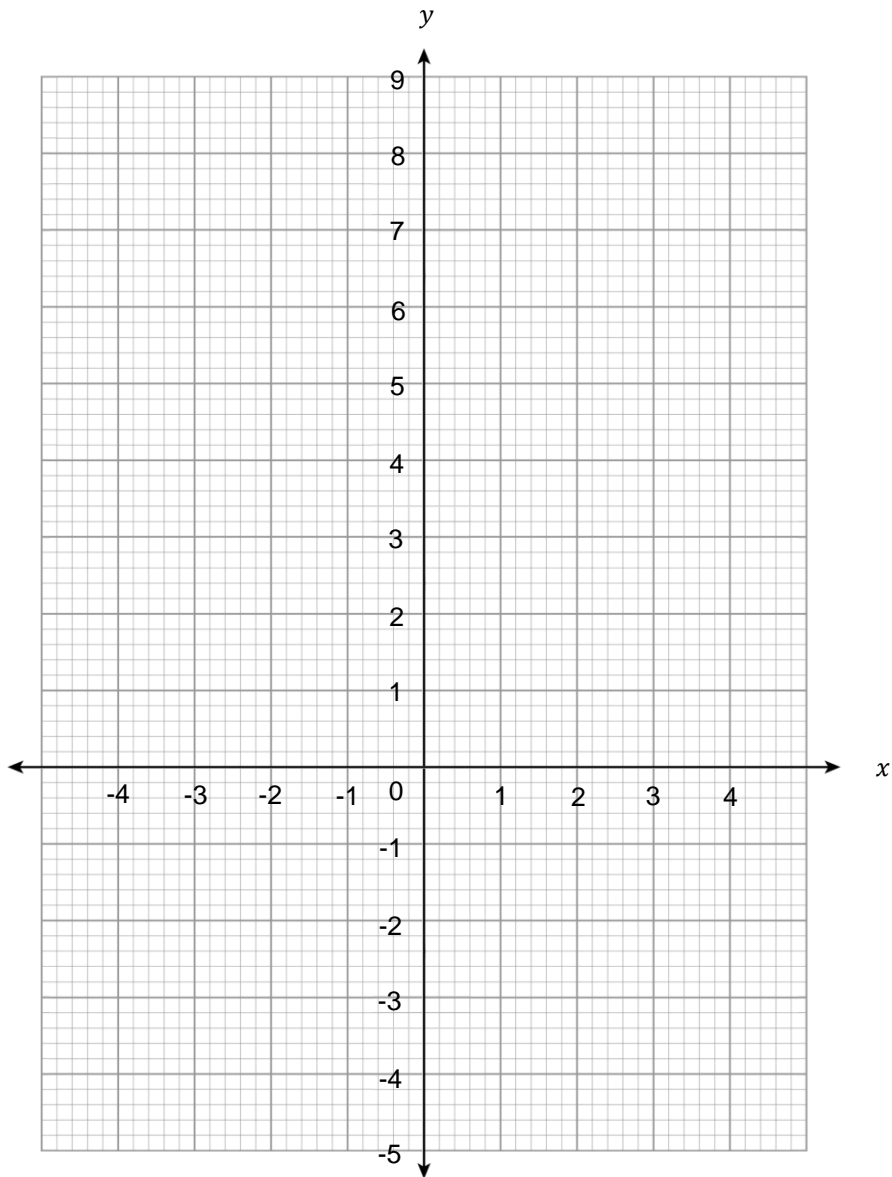
- In all calculations, show clearly how you work out your answer.

1 Complete the table, and plot the graph of  $y = x^2$  on the axes below.

(Level 4)

[2 marks]

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



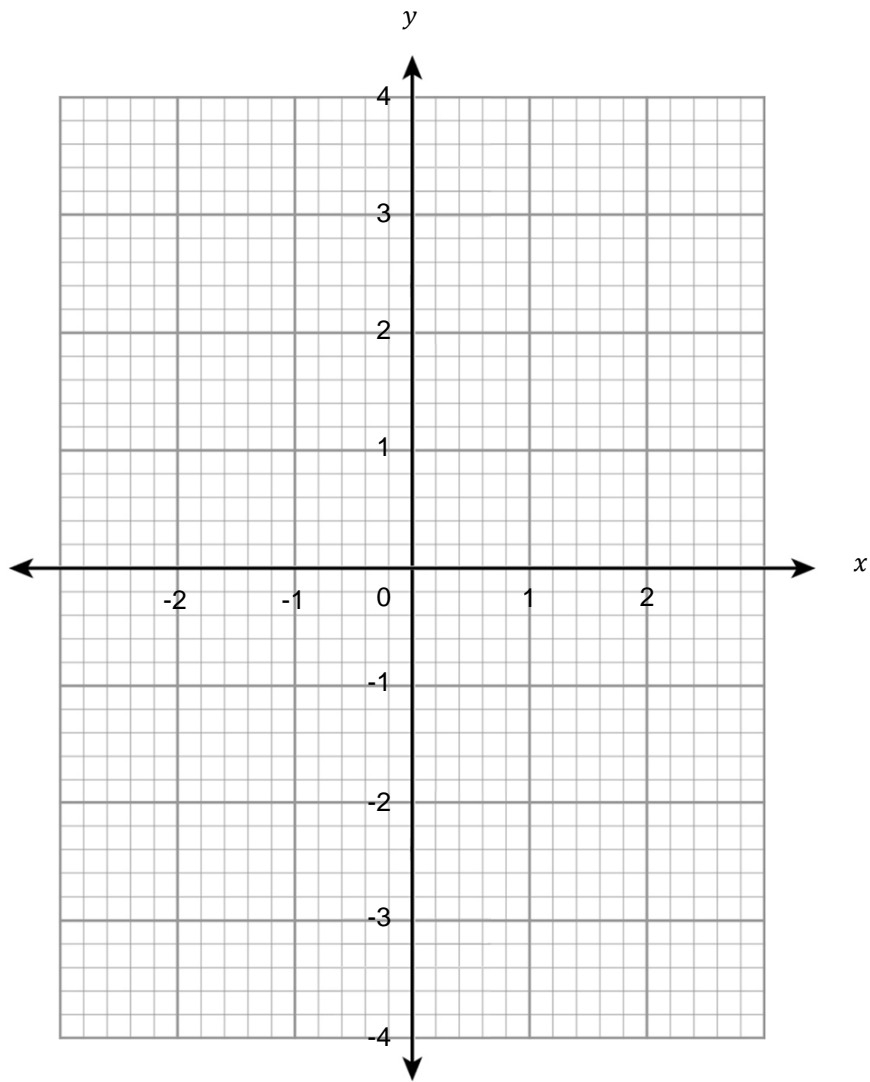
Turn over for next question

2 Plot the graph of  $y = x^3 - 2x$  for  $-2 \leq x \leq 2$  on the axes below.

(Level 5)

[3 marks]

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



Turn over for next question

3 On the axes below, plot the graphs of the quadratics for  $-2 \leq x \leq 3$

(Level 5)

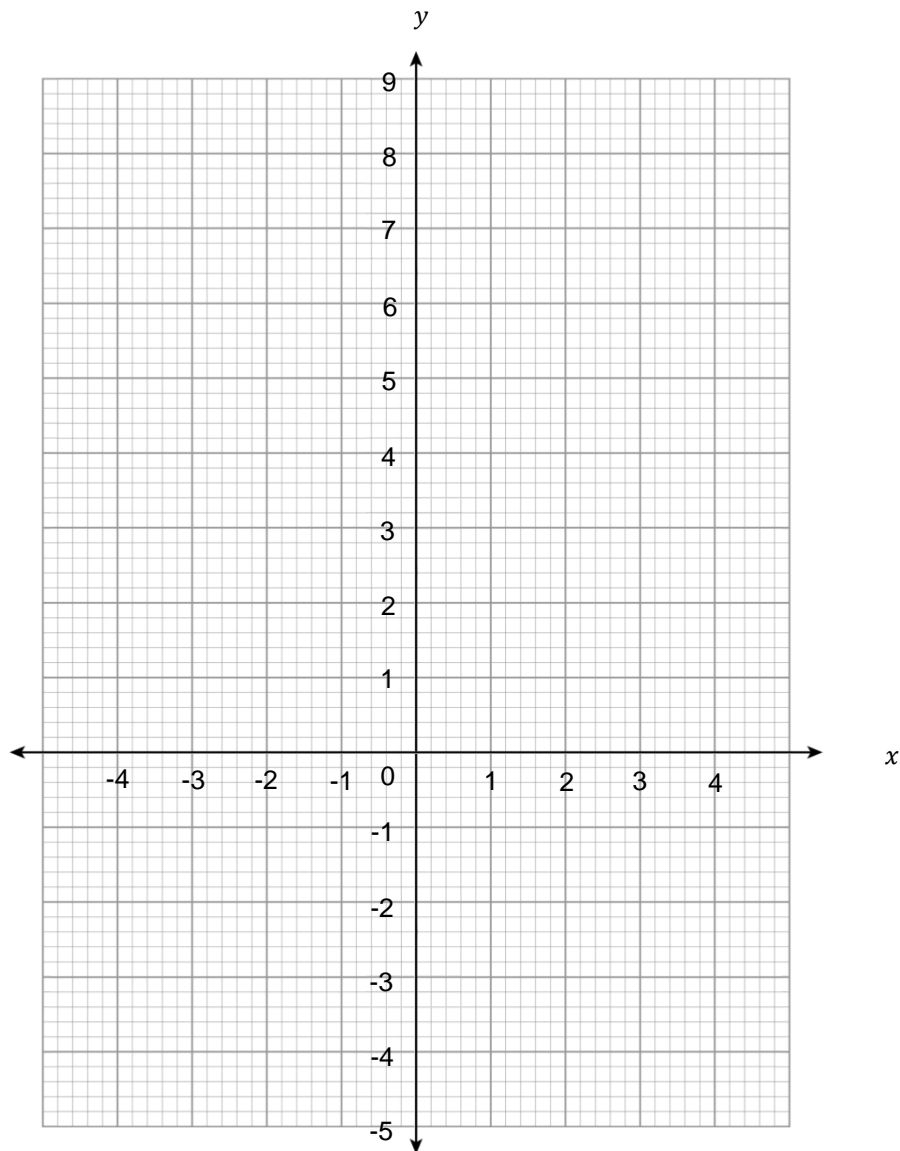
$$A: y = x^2 - 1$$

$$B: y = x^2 - x$$

[5 marks]

|          |    |    |   |   |   |   |
|----------|----|----|---|---|---|---|
| <b>x</b> | -2 | -1 | 0 | 1 | 2 | 3 |
| <b>y</b> |    |    |   |   |   |   |

|          |    |    |   |   |   |   |
|----------|----|----|---|---|---|---|
| <b>x</b> | -2 | -1 | 0 | 1 | 2 | 3 |
| <b>y</b> |    |    |   |   |   |   |



Turn over for next question

Turn over ►

4  $A$  is a cubic graph,  $B$  is a reciprocal graph, their equations are shown below.

(Level 5)

$$A: y = x^3 - 1$$

$$B: y = \frac{1}{x}$$

4(a) Complete the table below showing the values of  $A$  for  $-2 \leq x \leq 2$

[2 marks]

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

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4(b) Complete the table below showing the values of  $B$  for  $-2 \leq x \leq 2$

[2 marks]

|     |    |    |      |       |           |      |     |   |   |
|-----|----|----|------|-------|-----------|------|-----|---|---|
| $x$ | -2 | -1 | -0.5 | -0.25 | 0         | 0.25 | 0.5 | 1 | 2 |
| $y$ |    |    |      |       | Undefined |      |     |   |   |

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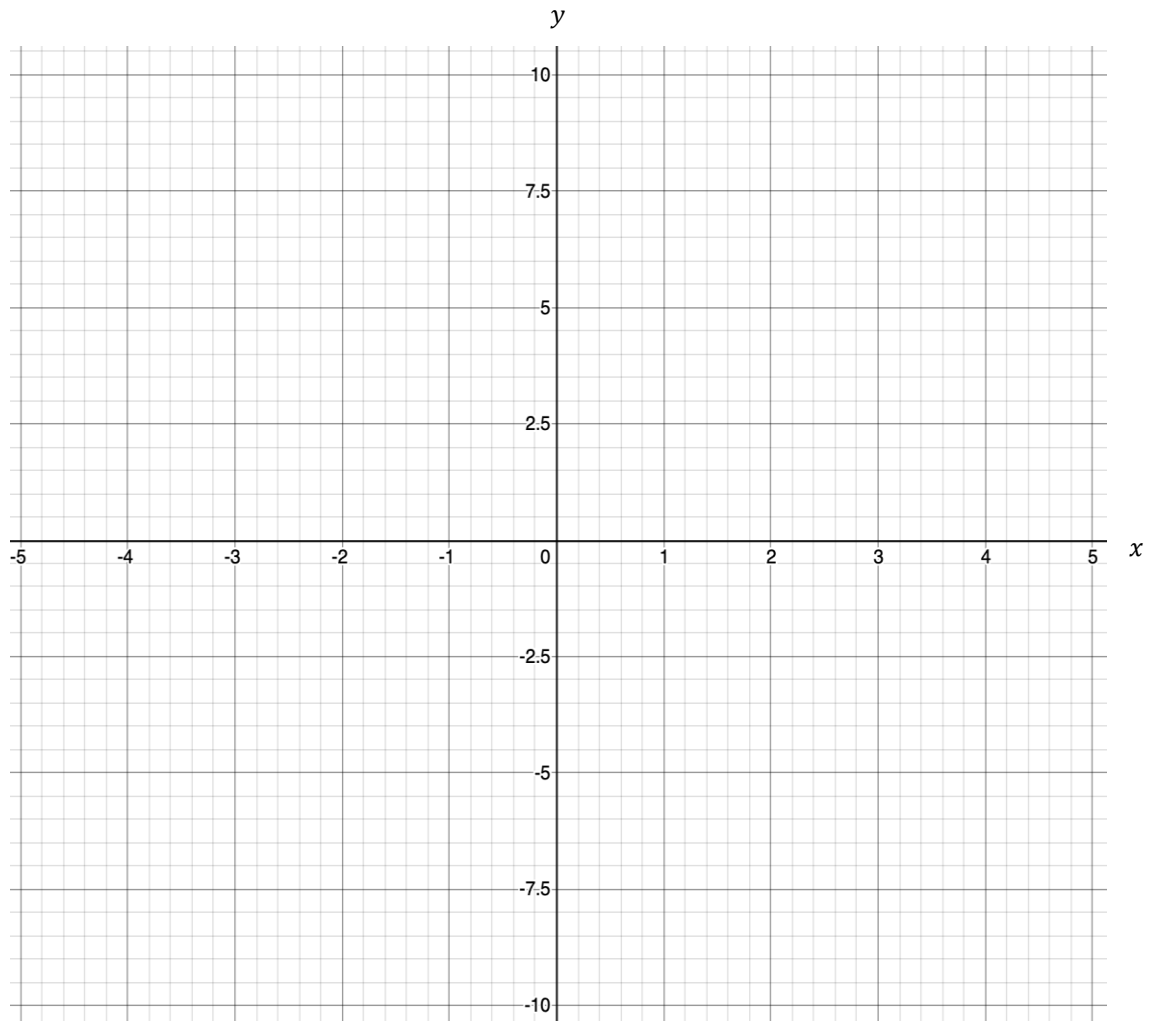


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Question continues on next page.

- 4(c)** On the axes below, plot graph *A* and graph *B*.  
Label your graphs.

[3 marks]



- 4(d)** What are the approximate points of intersection of the two graphs?

[2 marks]

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Answer \_\_\_\_\_

**Turn over for next question**

5 The graph below shows the graph of,

(Level 6)

$$y = 5^x$$

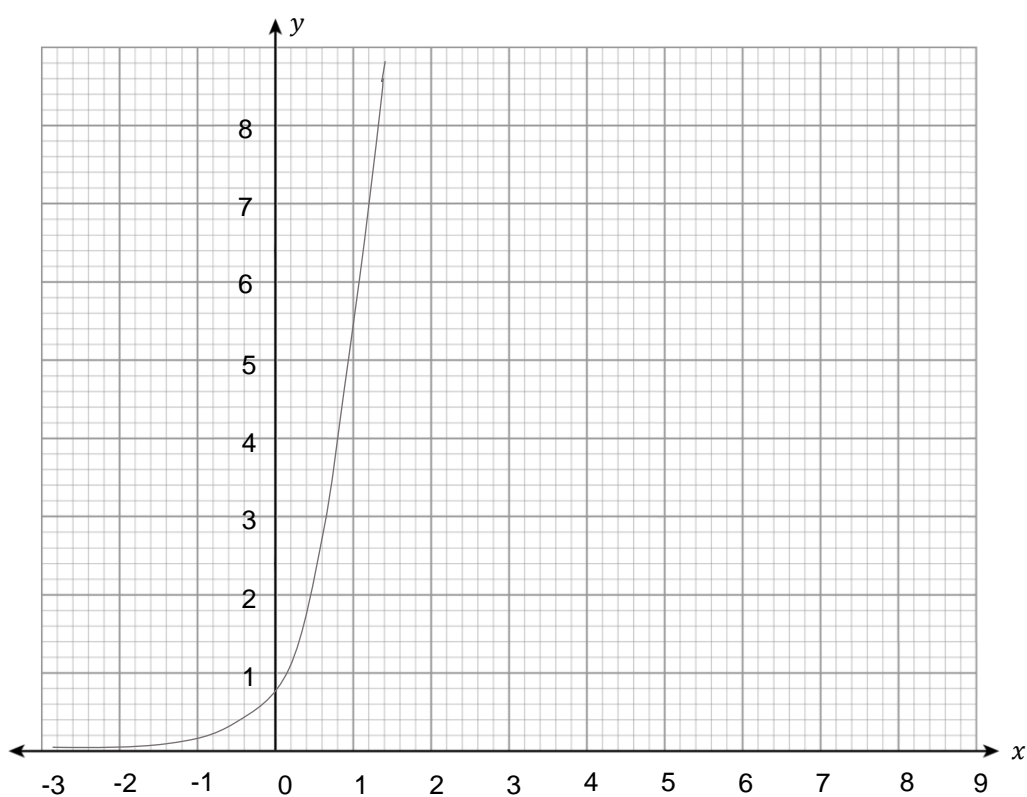
5(a) Complete the table below showing the values of  $y = 2^x$  for  $-2 \leq x \leq 3$

[2 marks]

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

5(b) Plot  $y = 2^x$  on the axes below for the values of  $-2 \leq x \leq 3$

[2 marks]



5(c) Describe the differences between the two graphs, making sure to include reference to the shape of each curve and any points of intersection.

[3 marks]

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Answer \_\_\_\_\_

Turn over for next question

**6(a)** What is the difference between a sketch and a plot of a graph?

(Level 6)

[1 mark]

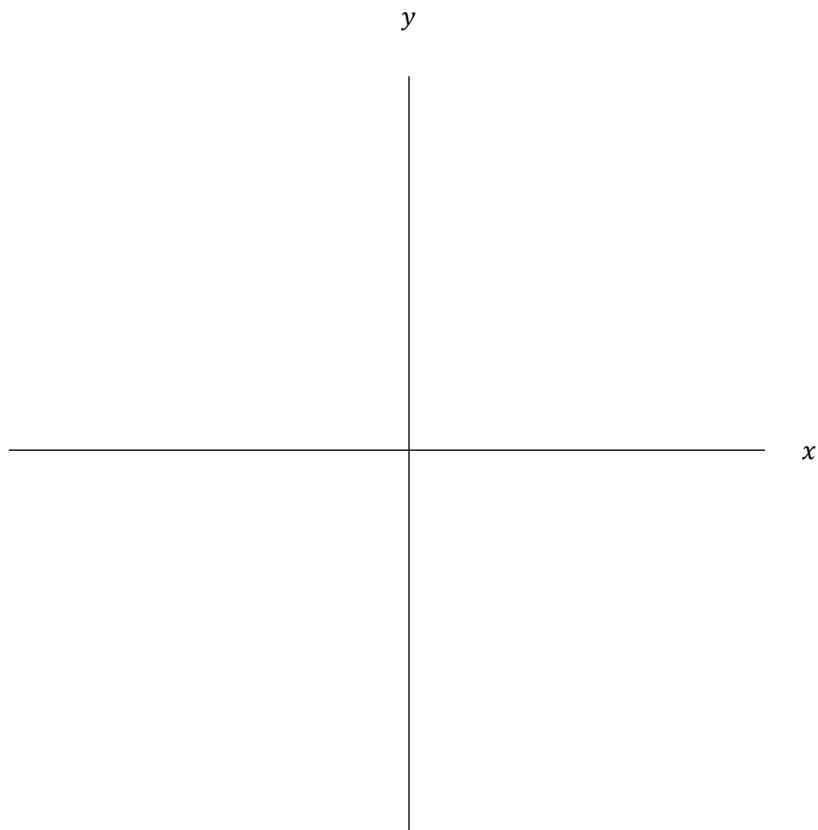
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Answer \_\_\_\_\_

**6(b)** Sketch the curves  $y = \frac{1}{x}$  and  $y = 2x + 1$  on the same axes.

[2 marks]



Turn over for next question



8

Match the sketches of the six graphs below to the equations given.

(Level 6)

One has been done for you.

A:  $y = x^3 + 2x^2$

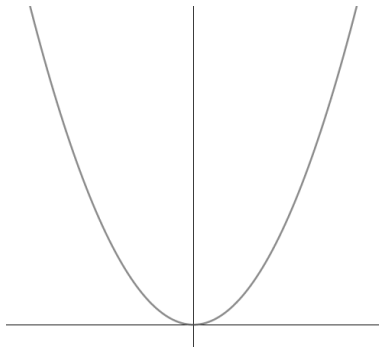
B:  $y = x^3$

C:  $y = -x^3$

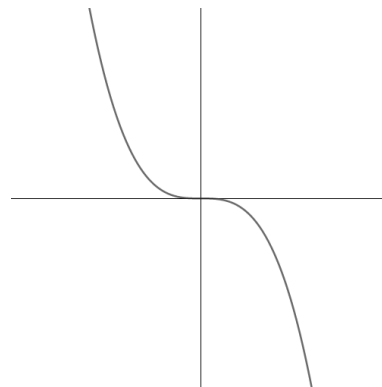
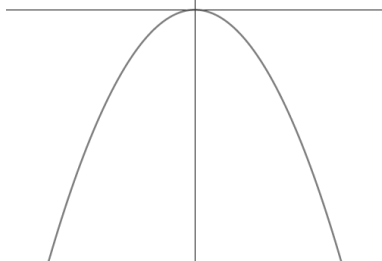
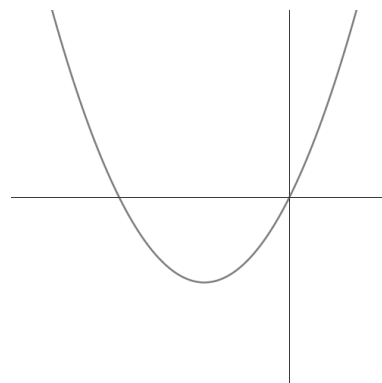
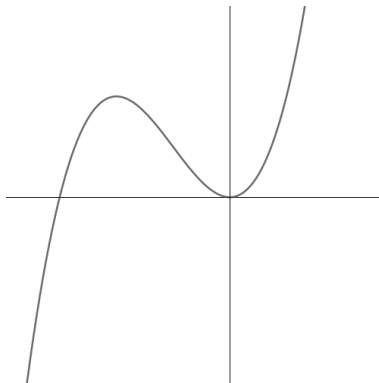
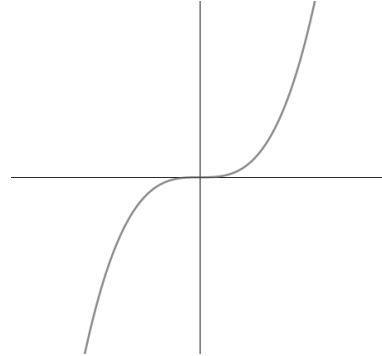
D:  $y = x^2$

E:  $y = x^2 + 2x$

F:  $y = -x^2$

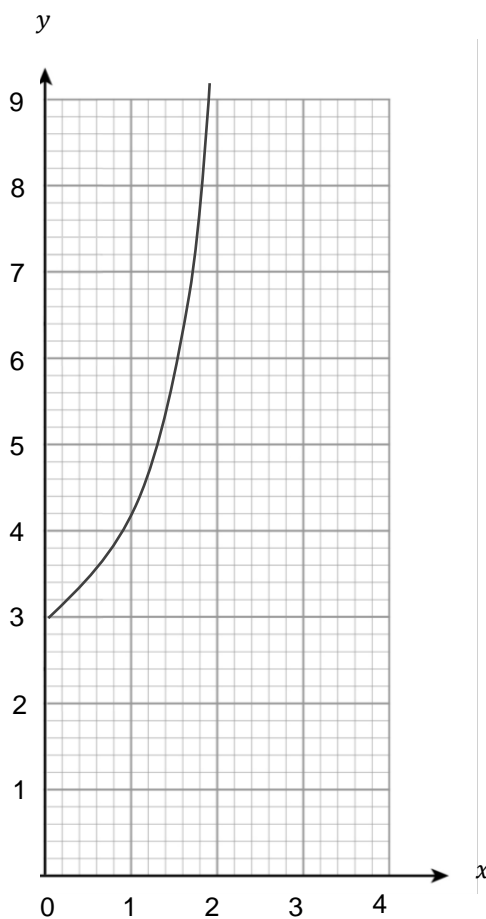
**[5 marks]**

D

 5

Turn over ►

- 9 The grid below shows the graph of  $N = Ar^t$  which represents the number of bacteria in a sample (N) over a period of time (t). A and r are constants. (Level 6)



Use the graph to find the values of the constants A and r.

[3 marks]

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Answer \_\_\_\_\_

Turn over for next question

10

Match the sketches of the six graphs below to the equations given.

(Level 6)

One has been done for you.

A:  $y = 1/x$

B:  $y = -1/x$

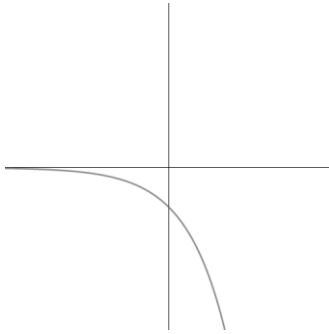
C:  $y = 1/10x$

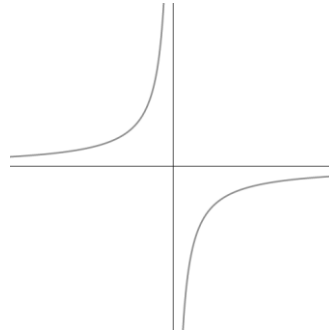
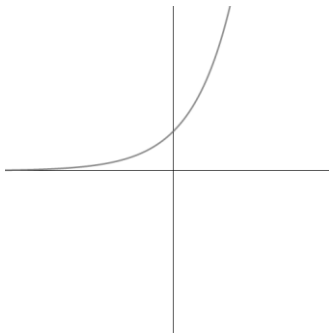
D:  $y = e^x$

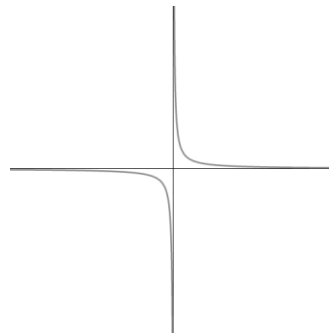
E:  $y = 0.5x$

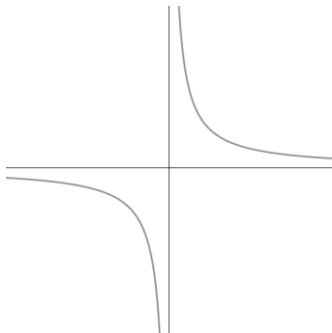
F:  $y = -e^x$

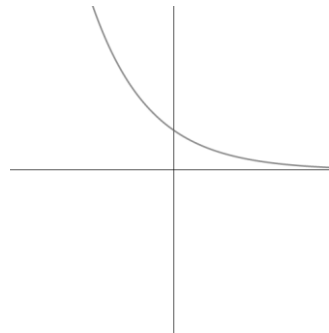
[5 marks]




 B








 5

END