

**GCSE MATHEMATICS**Name: 

Practice Paper Higher 3

Maximum marks: 80

Calculator

Time allowed: 1 hour 30 minutes

These questions are from past papers covering topics and skills based on the advance information to help you prepare for the exams this summer.

Answer all questions in the spaces provided.

- 1 Which sequence is a geometric progression?

Circle your answer.

1 2 3 4

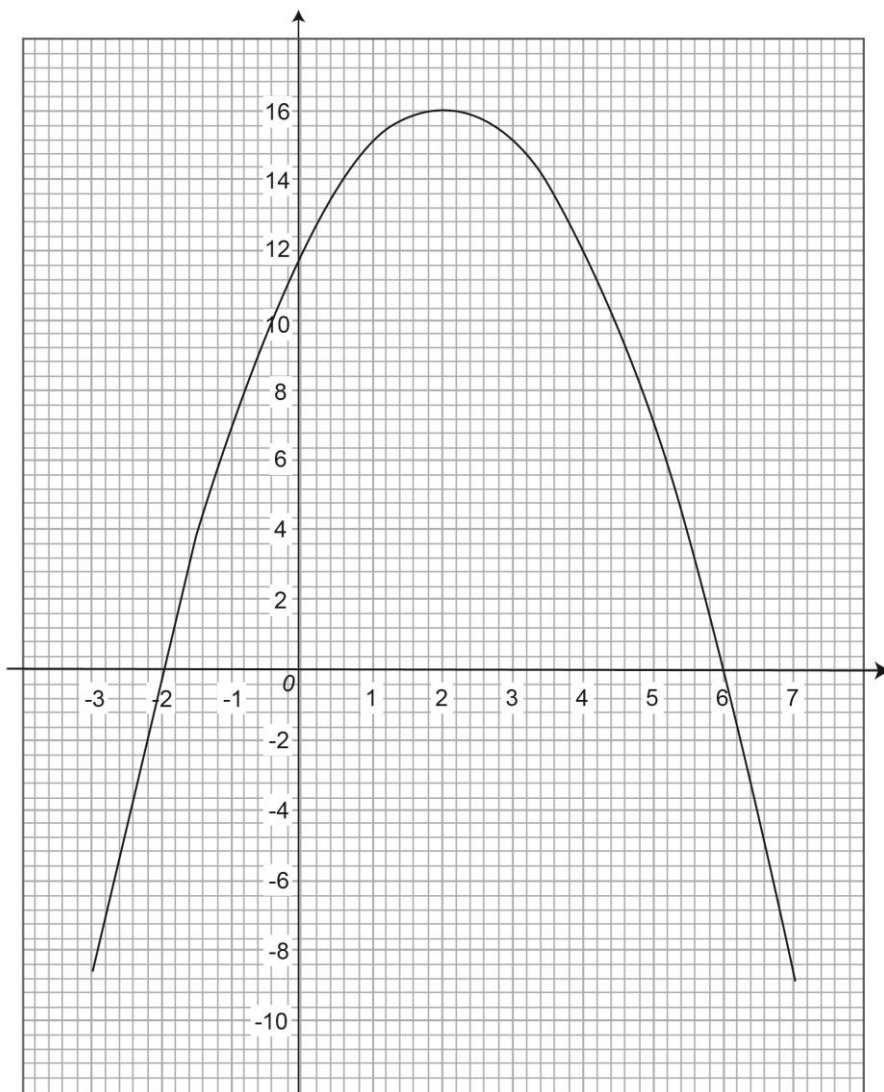
1 2 4 7

1 2 4 8

1 2 3 5

(Total 1 mark)

2 The graph  $y = a + bx - x^2$  is shown.



(a) Circle the coordinates of the turning point of the curve.

- (-2, 0)      (0, 12)      (2, 16)      (6, 0)

(1)

(b) Circle the two roots of  $a + bx - x^2 = 0$

- 2 and 6      2 and -6      2 and 6      -2 and -6

(1)

(Total 2 marks)

3 (a) A sequence starts 5 13 21 29

Circle the expression for the  $n$ th term.

$8 - 3n$        $8n + 5$        $8n - 3$        $5n + 8$

(1)

(b) The term-to-term rule for a different sequence is

Multiply the previous term by 2 then subtract 5
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The second term in this sequence is  $2x + 7$

The sum of the first three terms is 57

Work out the value of  $x$ .

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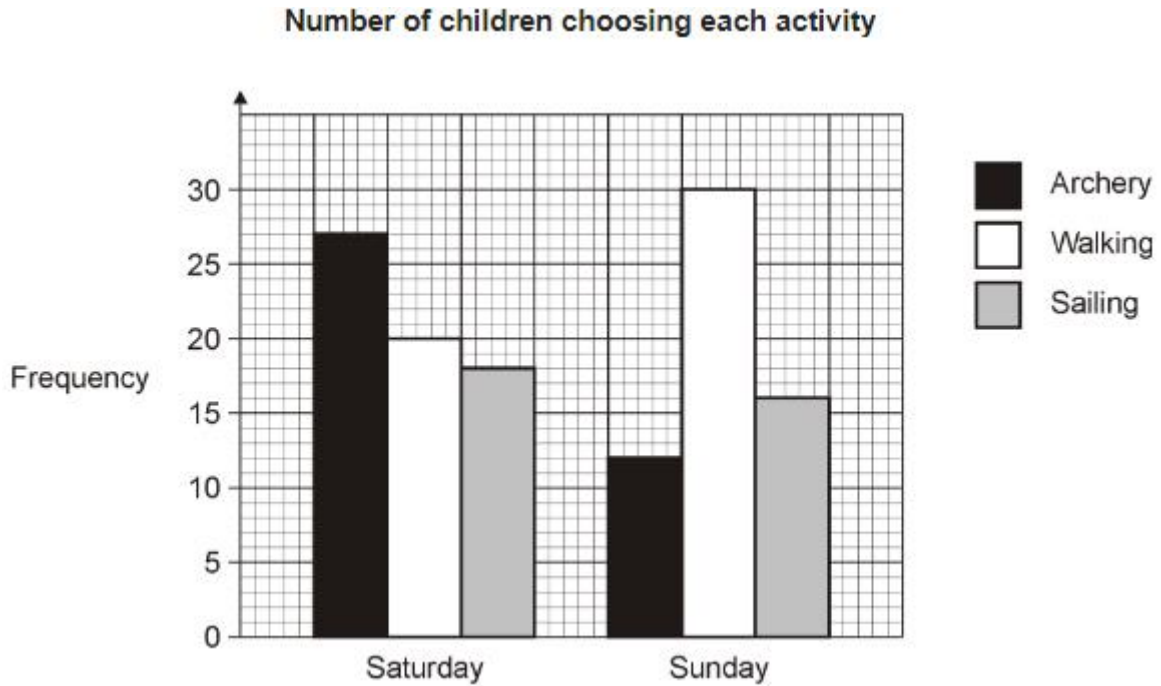
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Answer \_\_\_\_\_

(4)

(Total 5 marks)

4 An outdoor centre has activities for children.



(a) Adults help with **walking** in the ratio

$$\text{number of adults} : \text{number of children} = 1 : 5$$

3 adults can help with walking on **Saturday**.

Is this enough?

You **must** show your working.

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(2)

(b) A group of people go **sailing** in the ratio

$$\text{number of adults} : \text{number of children} = 1 : 2$$

What fraction of the group are adults?

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Answer \_\_\_\_\_

(1)

(c) On **Sunday** all the children do the activity they choose.

The ratios of adult helpers for each activity are shown in the table.

Activity	Number of adults : number of children
Archery	1 : 3
Walking	1 : 5
Sailing	1 : 2

Work out the total number of adults needed for Sunday.

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(3)

(Total 6 marks)

5 The cash price for a boiler is £2000

Customers can pay the cash price or pay monthly.

<b>Cash Price</b> £2000
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<b>Pay Monthly</b> 60 monthly payments of £40
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Work out the percentage increase from the cash price when paying monthly.

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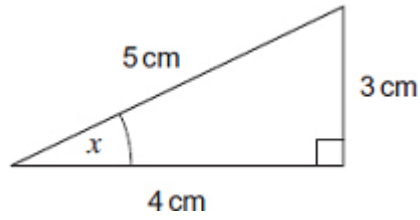
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Answer \_\_\_\_\_ %

(Total 4 marks)

- 6 (a) The diagram shows a right-angled triangle.



Not drawn accurately

Write down the value of  $\sin x$ .

Answer \_\_\_\_\_

(1)

- (b) In a different right-angled triangle,  $\tan y = 0.7$

Work out the value of  $y$ .

Answer \_\_\_\_\_ degrees

(1)

(Total 2 marks)

7  $x = 2^2 \times 3 \times 5$       $y = 2 \times 3^2 \times 5^2$

- (a) Work out the Highest Common Factor (HCF) of  $x$  and  $y$

\_\_\_\_\_  
\_\_\_\_\_

Answer \_\_\_\_\_

(1)

- (b) Work out the Least Common Multiple (LCM) of  $x$  and  $y$

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Answer \_\_\_\_\_

(2)

(Total 3 marks)

8 Jon is drawing a quadrilateral.

The length of each side is 5.2 cm to 1 decimal place.

(a) Complete the error interval for the length of one side.

\_\_\_\_\_

Answer \_\_\_\_\_ cm  $\leq$  length < \_\_\_\_\_ cm

(2)

(b) Complete the error interval for the perimeter.

\_\_\_\_\_

Answer \_\_\_\_\_ cm  $\leq$  perimeter < \_\_\_\_\_ cm

(2)

(Total 4 marks)

9 Here are two column vectors.

$$\mathbf{f} = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \quad \mathbf{g} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

Work out  $3\mathbf{f} - 2\mathbf{g}$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

(Total 2 marks)

10 Put these in order starting with the smallest.

33.3     $\frac{1}{3}$     -0.3    3.03

Answer \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

(Total 2 marks)

- 11 Paul travels from Rye to Eston at an average speed of 90 km/h  
 He travels for  $T$  hours.  
 Mary makes the same journey at an average speed of 70 km/h  
 She travels for 1 hour longer than Paul.  
 Work out the value of  $T$

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Answer \_\_\_\_\_

(Total 4 marks)

- 12 Circle any fractions that are equivalent to  $0.\overset{\cdot\cdot}{3}\overset{\cdot\cdot}{6}$

$$\frac{36}{100}$$

$$\frac{36}{99}$$

$$\frac{4}{11}$$

$$\frac{9}{25}$$

(Total 1 mark)

- 13 The following data is about the same types of plants.  
 Some of the plants are treated with plant food.

	Mean height (cm)	Interquartile range (cm)
Untreated	30.2	12.3
Treated	35.1	10.7

Compare the untreated plants and treated plants.

Comparison 1 \_\_\_\_\_

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Comparison 2 \_\_\_\_\_

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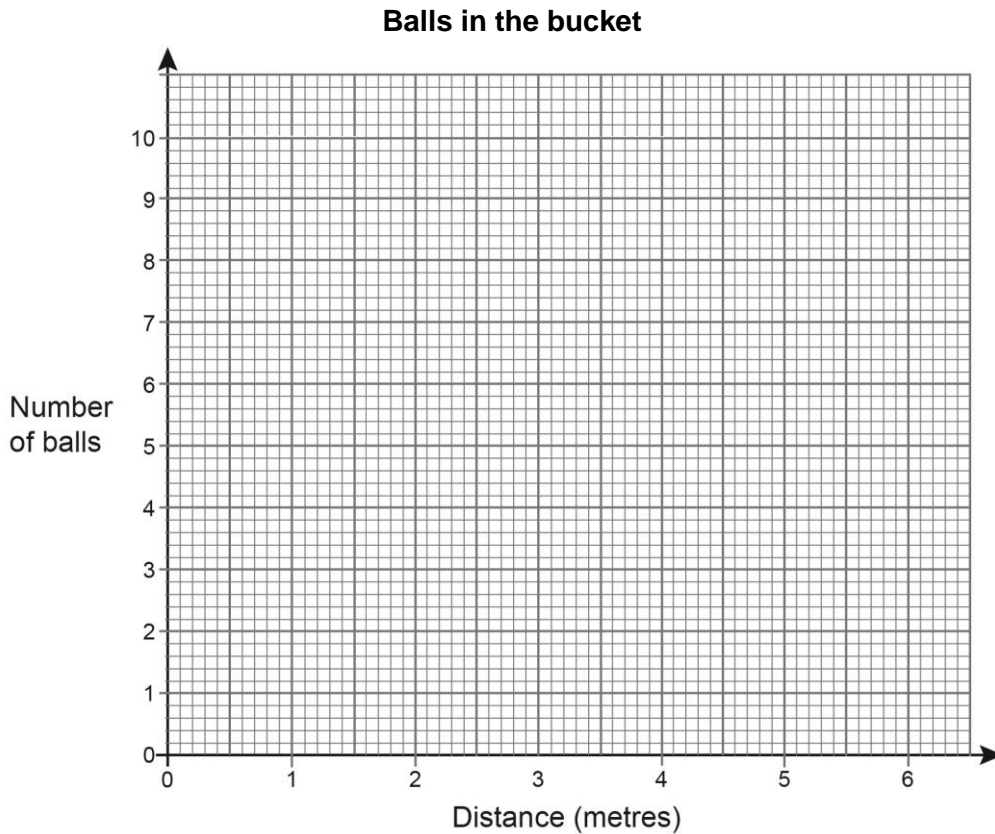
(Total 2 marks)



- 14 Matthew tried to throw balls into a bucket from different distances. He threw 10 balls from each distance. His results are shown in the table.

<b>Distance (metres)</b>	2.0	2.5	3.2	4.1	4.5	5.3	6.0
<b>Number of balls in the bucket</b>	9	7	8	6	2	4	1

- (a) Plot these results as a scatter graph.



- (b) Draw a line of best fit on your scatter graph. (2)
- (c) What type of correlation is shown? (1)

Answer \_\_\_\_\_ (1)

- (d) Matthew is organising a game at the school fayre. Each player will be given 10 attempts to throw a ball into a bucket. He wants the average number in the bucket to be 5. Use your line of best fit to decide how far the bucket should be from each player.

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_ metres (2)

(Total 6 marks)

15  $P$  is the principal amount.

$r$  is the interest rate over a given period.

$n$  is the number of times that the interest is compounded.

Circle the expression for the total amount accrued using compound interest.

$$P \left( 1 + \frac{r}{100} \right)^n$$

$$P + \left( \frac{r}{100} \right)^n$$

$$P \left( 1 + \frac{n}{100} \right)^r$$

$$P \left( 1 + \frac{r^n}{100} \right)$$

(Total 1 mark)

16 Expand and simplify  $(t + 4)^3$

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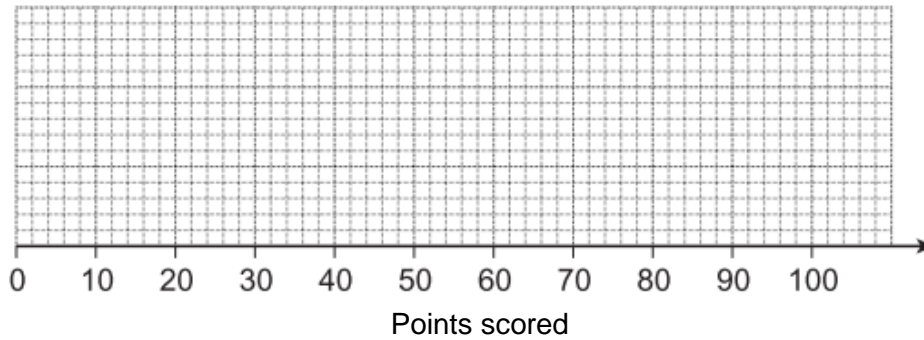
Answer \_\_\_\_\_

(Total 3 marks)

17 (a) Here is some information about the points scored in a quiz.

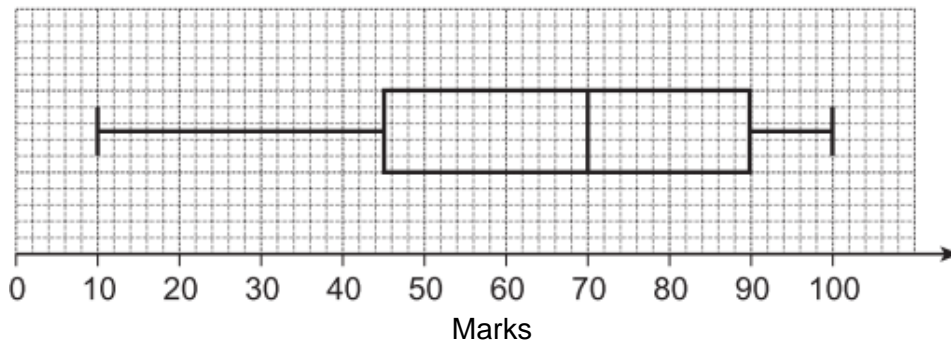
Minimum	Lower quartile	Median	Upper quartile	Maximum
15	20	50	80	90

Show this information on a box plot.



(2)

(b) This box plot represents the marks gained by students in an exam.



Nobody gained exactly 45, 70 or 90 marks.

120 students gained **less than** 90 marks.

How many students gained **more than** 70 marks?

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Answer \_\_\_\_\_

(3)

(Total 5 marks)

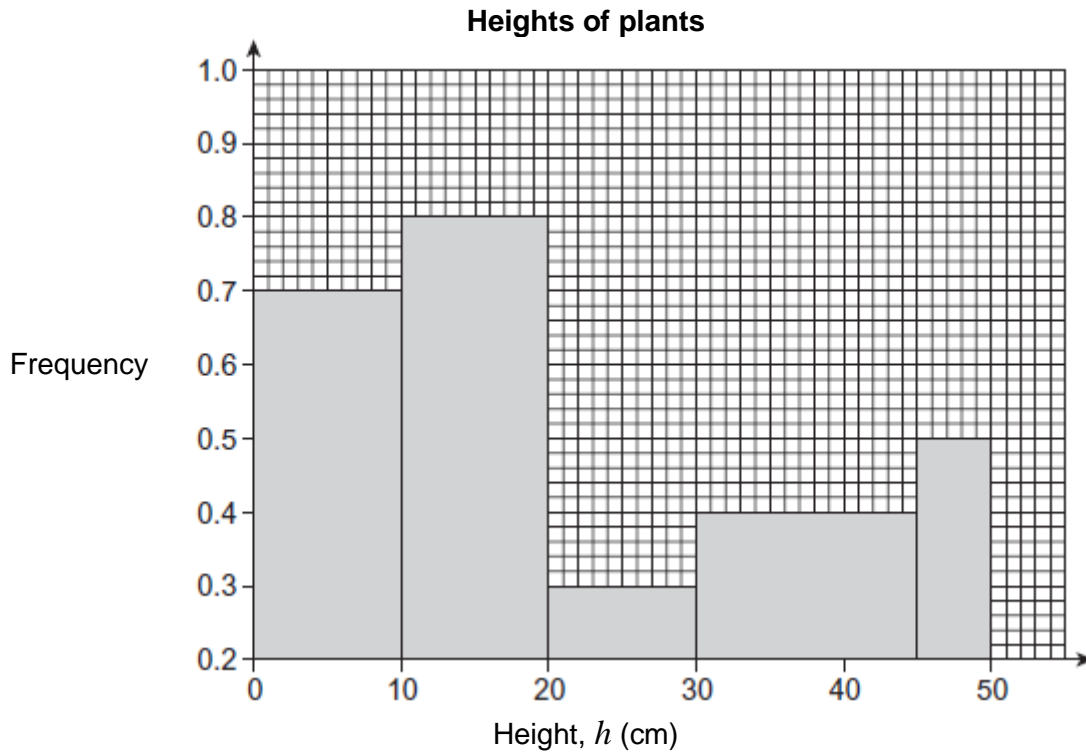
- 18** Two ordinary fair dice are thrown.  
One dice shows a number greater than 3.  
The other dice shows a number less than 3.  
Put these statements in order, starting with the least likely.
- A** Both dice show an even number.
  - B** Both dice show an odd number.
  - C** One dice shows an odd number and one dice shows an even number.
- You **must** show your working.

Answer \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**(Total 3 marks)**

19 Jon uses this data about the heights of plants ( $h$ ) to draw the histogram below.

Height, $h$ (cm)	$0 < h \leq 10$	$10 < h \leq 20$	$20 < h \leq 30$	$30 < h \leq 45$	$45 < h \leq 50$
Frequency	7	8	3	6	5



Write down **three different** mistakes that he has made.

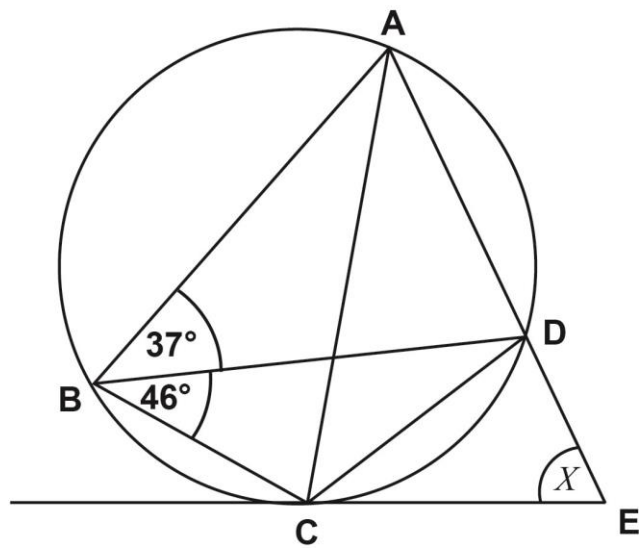
Mistake 1 \_\_\_\_\_

Mistake 2 \_\_\_\_\_

Mistake 3 \_\_\_\_\_

**(Total 3 marks)**

- 20 The diagram shows a cyclic quadrilateral  $ABCD$ .  
 $ADE$  is a straight line.  
 $CE$  is a tangent to the circle.



Not drawn accurately

Work out the size of angle  $x$

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$x =$  \_\_\_\_\_ degrees

(Total 3 marks)

**21**  $f(x) = 3^{2x}$  and  $g(x) = x^3$  for all values of  $x$ .

(a) Work out the value of  $f(1) + g(4)$

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Answer \_\_\_\_\_

(2)

(b) Work out the value of  $g^{-1}(-27)$

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Answer \_\_\_\_\_

(2)

(c) Work out an expression for  $gf(x)$

Give your answer as a power of 3 in its simplest form.

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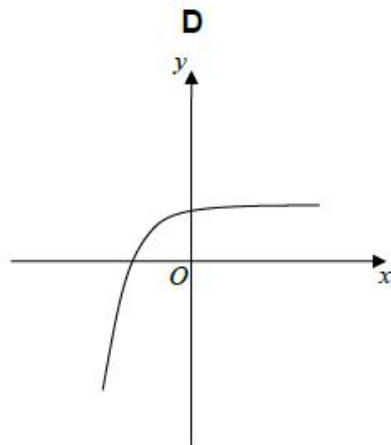
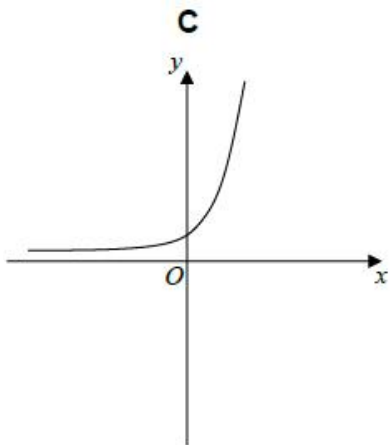
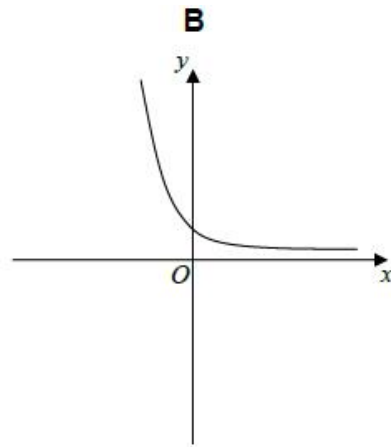
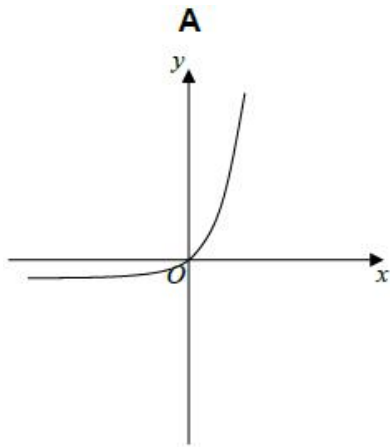
Answer \_\_\_\_\_

(2)

(d) One of these graphs is a sketch of  $y = 3^{2x}$

Which one?

Circle the correct letter.



(1)

(Total 7 marks)



22 (a) Show clearly that  $(3x + 1)^2 \equiv 9x^2 + 6x + 1$

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(1)

(b) Solve the simultaneous equations  $y = 3x + 1$   
 $y^2 = 4x^2 - x + 7$

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Answer \_\_\_\_\_

(5)

(Total 6 marks)

23 You are given that 1 knot = 1 nautical mile per hour.

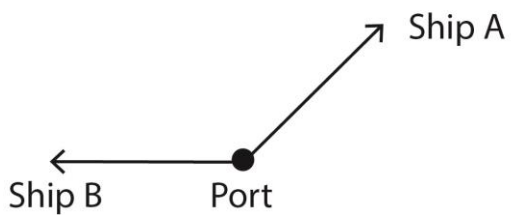
Two ships leave a port at the same time.

Ship **A** sails at 10 knots on a bearing of  $035^\circ$

Ship **B** sails at 15 knots on a bearing of  $270^\circ$

Calculate the distance between the ships after **2 hours**.

Do **not** use a scale drawing.



Not drawn accurately



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Answer \_\_\_\_\_ nautical miles

(Total 5 marks)