GCSEBITESIZE Examinations

General Certificate of Secondary Education

Specimen Paper

MATHEMATICS
INTERMEDIATE TIER

Paper 1 Non - Calculator

Time allowed: 2 hours

You must not use a calculator.

The maximum mark for this paper is 100.

Mark allocations are shown in brackets.

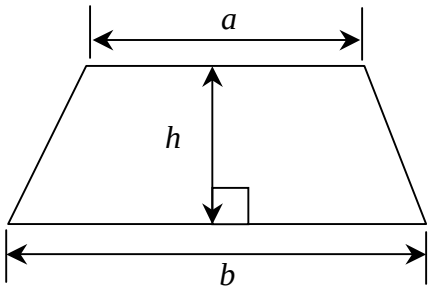
Show clearly how you work out your answer.

In addition to this paper you will require:
- mathematical instruments

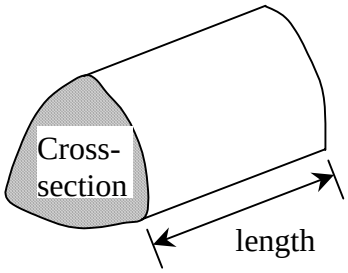
Formulae Sheet: Intermediate Tier

You may use the following formulae:

Area of trapezium = $\frac{1}{2}(a+b)h$



Volume of prism = area of cross-section × height



Answer **all** questions in the spaces provided.

1. (a) Estimate the value of $\frac{3.9 \times 7.1}{1.97}$

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……
……

Answer: …….. (2 marks)

(b) Estimate the value of

(i) 2.1^3

Answer:…….. (1 mark)

(i) $\sqrt{47}$

Answer:…….. (1 mark)

2. (a) Simplify $4a + 7b + 6a – 3b – 2a$

……
……
……

Answer: …….. (1 mark)

(b) Simplify $3(x + 2) + 5x$

……
……
……

Answer: …….. (1 mark)

(c) Solve $x + 5 = 12$

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……
……

Answer: …….. (1 mark)

(d) Solve: $5x – 2 = 13$

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……

Answer: …….. (1 mark)

(e) Solve: $7x – 14 = 4x + 7$

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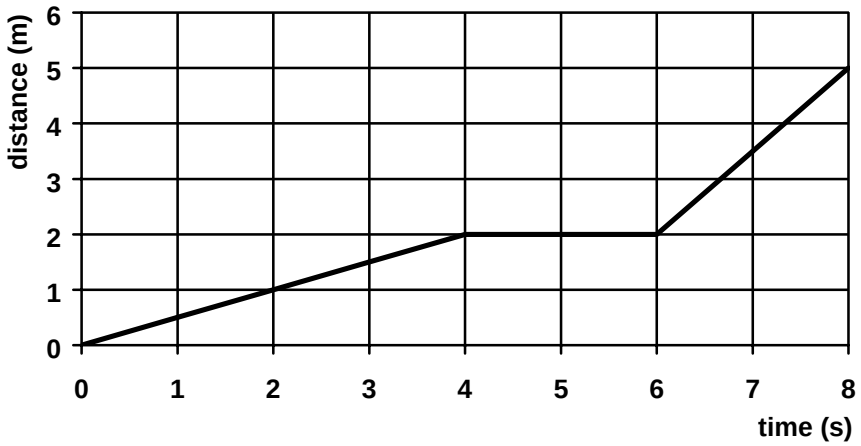
Answer: …….. (2 marks)

3. The graph shows the motion of a high-speed model car.



(a) How far away from its starting point was the car after 7 seconds?

Answer: …….. (1 mark)

(b) How far did the car travel in the first 4 seconds?

Answer: …….. (1 mark)

(c) How fast did the car go in the first 4 seconds?
……...
……...
……
Answer: …….. (2 marks)

(d) Between what times was the car travelling fastest?

Answer: …….. (1 mark)

(e) Describe what is happening between 4 and 6 seconds.
……...
……...
……...

Answer: …….. (1 mark)

4. Rakesh and Tina share out £40 in the ratio 5:3 in that order. How much do they each get?
……...
……...
……...
……...
Answer: Rakesh…….. Tina …….. (3 marks)

5. (a) A new breakfast cereal is sold in boxes as shown. What is the volume of the box?

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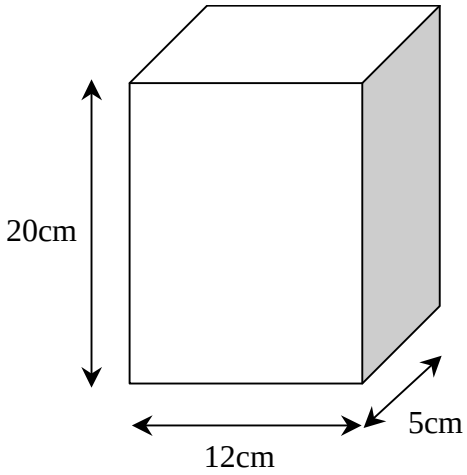
……
……

Answer …… (2 marks)



(b) In a promotion the company is offering "20% extra free". What is the new volume?

……..
……..
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Answer: …….. (2 marks)

(c) A new designer suggests adding 20% to all 3 dimensions to make the new box. Would this work? Explain your answer.

……..
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……..
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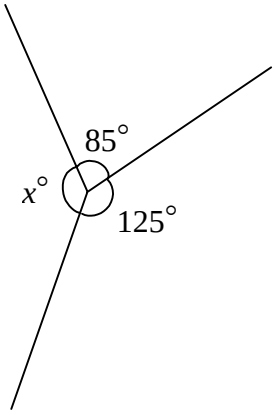
…….. (2 marks)

6. (a) Find the size of the angle marked *x*.



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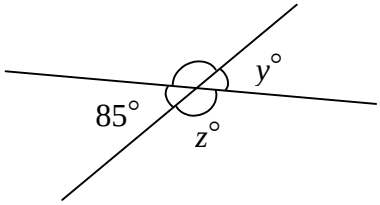
Answer: *x* = …… (1 mark)

(b) Find the size of the angles marked *y* and *z*.



……..
……..
……..

Answers: *y* = ……*z* = …… (2 marks)

(c) Fill in the table from this list of angles:
156°, 90°, 310°, 21°, 175°, 89°

Acute angle	
Obtuse Angle	
Reflex Angle	
Right angle	

(2 marks)

7. (a) Find the value of $3a + 2b$ when $a = 6$ and $b = 5$.

……..
……..

Answer: …….. (2 marks)

(b) Find the value of $2x^2$ when $x = 3$.

……..
……..

Answer: …….. (1 mark)

(c) Find the value of $5x – 3y$ when $x = {}^{-}2$ and $y = {}^{-}4$

……..
……..

Answer: …….. (2 marks)

8. The chart shows the number of winners of each prize in a local lottery one week.

(a) What is the modal prize?

Answer: …….. (1 mark)

(b) Calculate the mean prize.

……
……
……
……
……
……

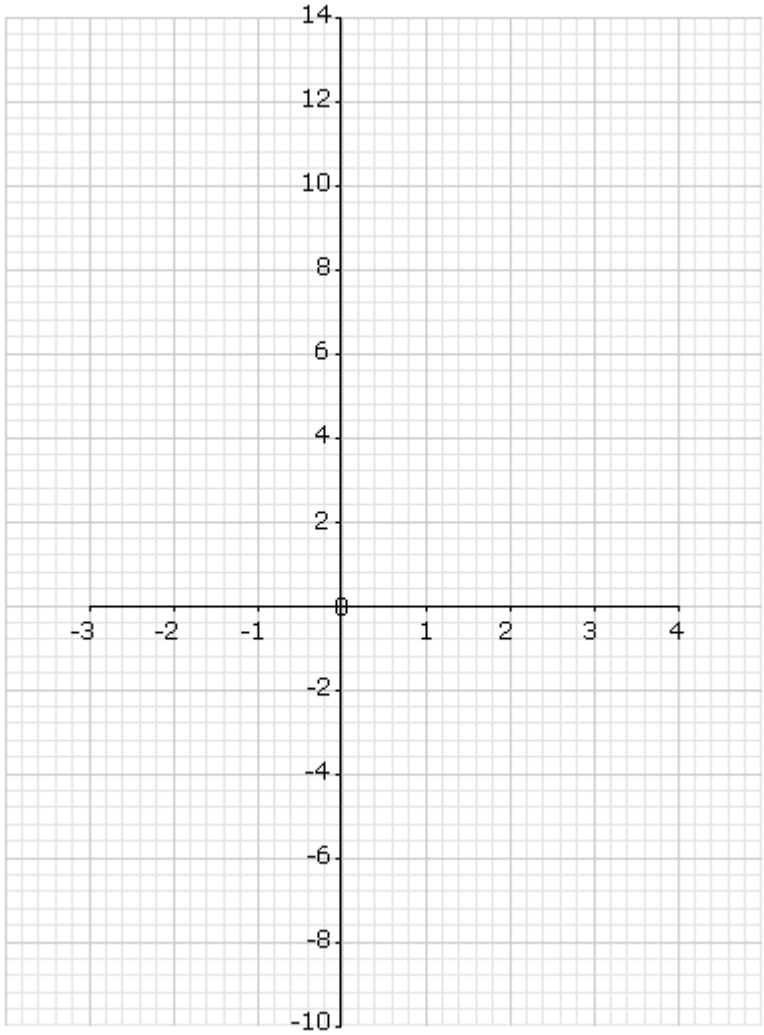
Answer: …….. (2 marks)

9. (a) Complete the table for the equation $y = 3x + 1$

x	$^{-}3$	$^{-}2$	$^{-}1$	0	1	2	3	4
y								

(3 marks)

(b) Draw the graph of $y = 3x + 1$ (2 marks)



(c) Add the line $y = 7$ to your graph. (1 mark)

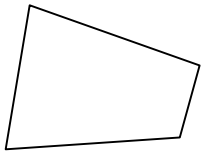
(d) Use your graph to find the solution to $3x + 1 = 7$

……..

……..

Answer: ……..…… (2 marks)

10. (a) Rotate the shape through 90° anti-clockwise, using the centre marked as a cross.



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(2 marks)

(b) Draw an enlargement scale factor 2 using the centre marked.

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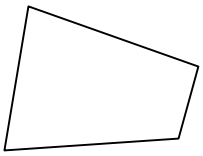

(2 marks)

(c) Circle the transformations under which the image would be congruent to the object.

Translation Rotation Enlargement Reflection

(1 mark)

11. A furniture company makes tables and chairs. Tables are sold for £120 and chairs are sold for £45.

(a) An order comes in for 9 tables and 17 chairs. What is the total bill?

……..……...
……..……...
……..……...
……..……...
Answer: …….. (2 marks)

(b) If the cost of manufacture is £70 for tables and £22 for chairs, what will the profit be on this order?

……...
……...
……...
……...
Answer: …….. (2 marks)

(c) Write down an expression for the profit to be made on an order for *t* tables and *c* chairs.

……..……...
……..……...
Answer: …….. (2 marks)

12. (a) Give prime factorisations of 432 and 522.

……..……..……...
……..……..……...
……...
……...
……...

432 = ……
522 = …… (1 mark)

(b) Hence or otherwise find the highest common factor and least common multiple of 432 and 522.

……...
……...
……...
……...

HCF = ……
LCM = …… (2 marks)

13. The diameter AB of the circle is 10cm. The length of BC is 6cm. Calculate the length of AC.

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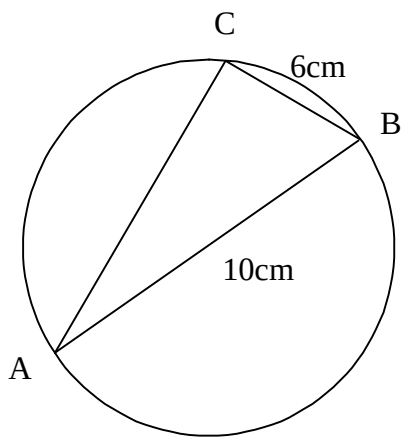
……
……
……
……
……

AC = ……
(2 marks)



14. A computer games retailer sells packs of games made up from mid-price and full-price titles.

Pack A contains 3 mid-price and 2 full-price titles and sells for £93.45
Pack B contains 5 mid-price and 3 full-price titles and sells for £146.42
If *m* is the cost of one mid-price title and *f* is the cost of one full-price title:

(a) (i) Write down an equation for the cost of Pack A

Answer:……

(ii) Write down an equation for the cost of Pack B

Answer:……
(1 mark)

(b) Use these equations to find the cost of:
(i) the mid-price title
(ii) the full-price title
……
……
……
……
……
……
…… (3 marks)

15. (a) State the *n*th term of each of the following sequences:

(i) 3, 7, 11, 15, 19, ….
……
……
……
Answer: …….. (1 mark)

(ii) $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25}, ...$
……
……
……
……
Answer: …….. (1 mark)

(iii) 4, 7, 12, 19, 28,…..
……
……
……
……
Answer: …….. (1 mark)

(b) Given that $u_n = 5u_{n-1} + 1$ and that $u_1 = 3$ find the value of u_4.
……
……
…… (2 marks)

16. A cuboid has sides such that the longest side is two units more than the shortest side and the middle length side is one unit longer than the shortest side.

(a) Write down an expression for the total surface area.

……..
……..
……..
……..
……..
……..
……. (3 marks)

(b) Given that the area of the smallest face is 6 square units, calculate:

(i) The value of x

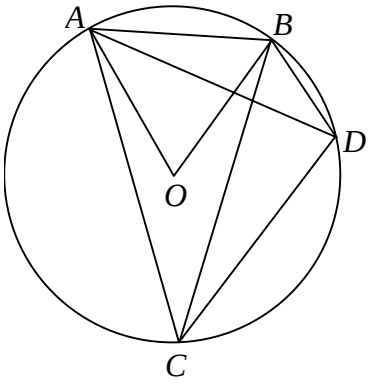
……..
……
……
……
……. (1 mark)

(ii) The total surface area of the cuboid.

……..
……
……
……. (2 marks)

17. Given that

$\angle AOB = 75^o, \angle CBD = 62^o, \angle BAD = 30^o$



Calculate:

(a) Angle ACB

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..... (1 mark)

(b) Angle BDA

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……
……
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..... (2 marks)

(c) Angle ABD

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……
……
……
..... (2 marks)

18. A game is played using one four-sided die, numbered 1 to 4, and one six-sided die, numbered 1 to 6. The aim of the game is to find 4s. The two dice are rolled together.

If either of the dice shows a 4 you get 1 point for each 4 shown.
If the total adds up to 4, you get 3 points.
If the product of the two dice is 4 you get 5 points.

(a) What is the probability that a player gets 5 points for their roll?

……
……
……
Probability = ……. (2 marks)

(b) What is the probability that a player gets 1 point for their roll?

……..
……..
……..
Probability = ……. (1 mark)

(c) What is the probability that a player gets fewer than 3 points for their roll?

……..
……..
……..
……..
Probability = ……. (2 marks)

19. (a) Find the value of 7^{-2}

……..
……..
Answer: …….. (1 mark)

(b) Simplify $(2^3)^4$

……..
……..
Answer: …….. (1 mark)

(c) Evaluate $\left(\frac{7^3 \times 7^5}{7^{10}}\right)^{-1}$

……..
……..
Answer: …….. (2 marks)

20. (a) Factorise $x^2 + 11x + 30$

……..
……..
……..

Answer: …….. (2 marks)

(b) Hence solve: $x^2 + 11x + 30 = 0$

……...
……...
……...

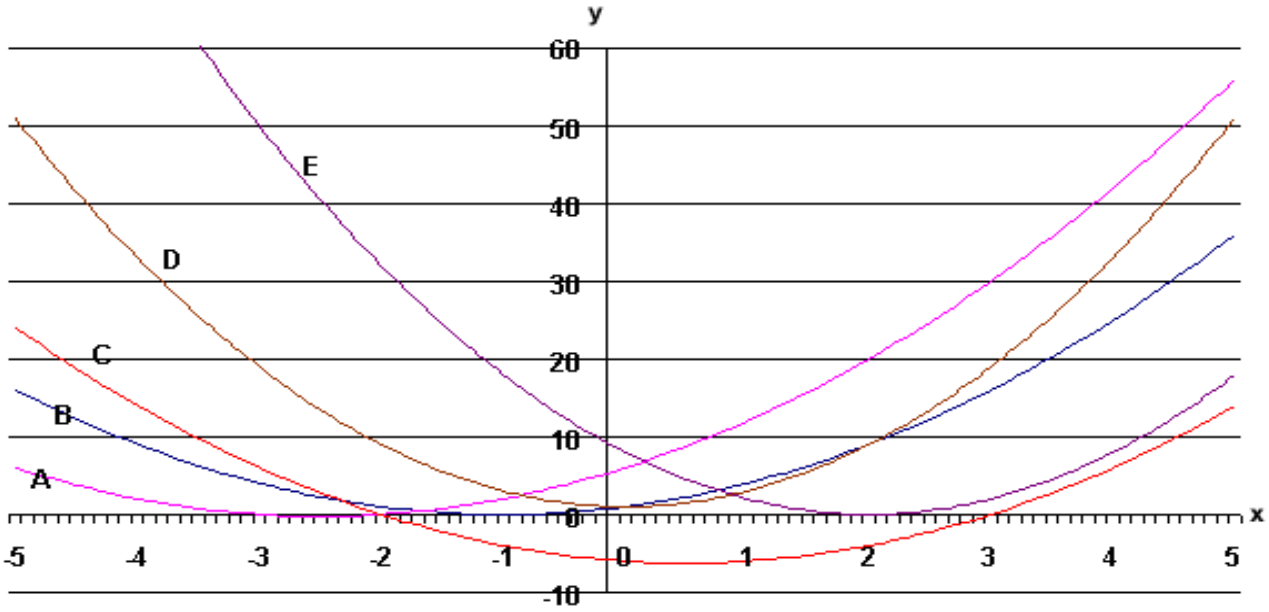
Answer: …….. (1 mark)

(c) Solve $2x^2 + x - 6 = 0$ leaving your answers as fractions where appropriate.

……...
……...
……..

Answer: …….. (2 marks)

21. Match the functions to the graphs. Fill in the table with the letter corresponding to the function in each case. (4 marks)



Function	Graph
$y = (x+1)^2$	
$y = x^2 + 5x + 6$	
$y = 2x^2 + 1$	
$y = x^2 - x - 6$	
$y = 2(x-2)^2$	