



FORM 4

MATHEMATICS  
Main Paper

TIME: 1h 40 mins

Question	1	2	3	4	5	6	7	8	9	10	11	12	Main	NC	Global Mark
Mark															

**DO NOT WRITE ABOVE THIS LINE**

Name: \_\_\_\_\_

Class: \_\_\_\_\_

**INSTRUCTIONS TO CANDIDATES:**

- Answer all questions.
- This paper carries 80 marks.
- Calculators and mathematical instruments are allowed but all necessary working must be shown.

1. (a) Use your calculator to work out the value of:  $\frac{738 \times 19}{(593 + 392)}$

Give you answer correct to **3 significant figures**.

Answer: \_\_\_\_\_

(b) Use estimation to check your answer in (a). Show each step of your working.

Answer: \_\_\_\_\_

(4 marks)

2. (a) Expand and simplify:  $3(2 - x) - 2(x - 1)$

Answer: \_\_\_\_\_

(b) Factorise:  $6xy + 8xz + 4x$

Answer: \_\_\_\_\_

(c) Simplify:

(i)  $5x \times 3x^2$

(ii)  $\frac{18 + 12b}{3}$

Answer: (i) \_\_\_\_\_ Answer: (ii) \_\_\_\_\_

(7 marks)

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3. (a) Write these numbers in standard form.

(i)  $5720 =$  \_\_\_\_\_

(ii)  $0.000621 =$  \_\_\_\_\_

(b) Calculate giving your answer in **standard form**.

$$(3 \times 10^4) + (2 \times 10^5)$$

Answer: \_\_\_\_\_

(4 marks)

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4. (a) Simplify the following. Give your answers in **index form**.

(i)  $a^2 \div a^{-4} =$  \_\_\_\_\_

(ii)  $(m^4)^{-2} \times (m^3)^5 =$  \_\_\_\_\_

(iii)  $y^6 \times y^{14} \div y^5 =$  \_\_\_\_\_

(b) Fill in with the appropriate inequality sign:

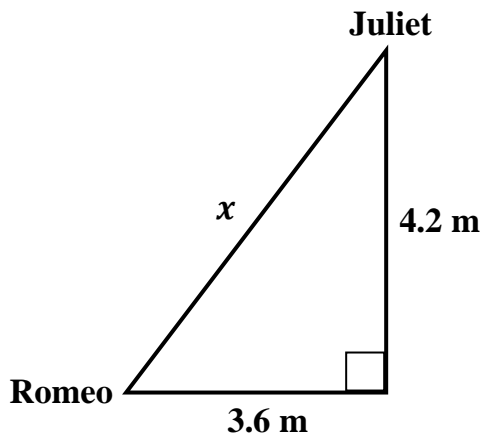
(i)  $10^2$    $2^{10}$

(ii)  $3^4$    $4^3$

(5 marks)

5. Juliet is on the balcony and Romeo is looking at her from the garden. Below is a diagram of the scene.

(a) Find **the length,  $x$  metres**, from Romeo's eyes to Juliet's eyes. Give your answer correct to **2 decimal places**.



Answer: \_\_\_\_\_ m

(b) Find the **angle of elevation** of Juliet's eyes from Romeo's eyes. Give your answer correct to the nearest degree.

Answer: \_\_\_\_\_ °

(4 marks)

6. (a) (i) Change  $4.05 \text{ m}^3$  to  $\text{cm}^3$ .

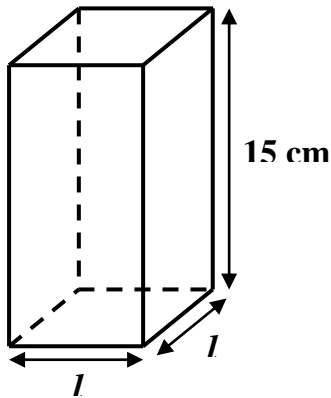
Answer: \_\_\_\_\_  $\text{cm}^3$

(ii) Now, write your answer for part (i) in standard form.

Answer: \_\_\_\_\_  $\text{cm}^3$

(b) A box has a square base. Its **height** is **15 cm** and has a **volume** of  **$1500 \text{ cm}^3$** .

Calculate the **length** of a side of the base.



Answer: \_\_\_\_\_ cm

(7 marks)

7. This is the recipe for **16 lemon muffins**.

<u>Ingredients</u>		
➤ 260 g flour	➤ 200 g sugar	➤ 1 teaspoon vanilla extract
➤ 230 g unsalted butter	➤ 4 eggs	➤ Zest and lemon juice of 1 lemon

(a) Alessia is a chef. She is doing this recipe. How much **sugar** does she need to make **30 muffins**?

Answer: \_\_\_\_\_ g

(b) Alessia used **1170 g** of **flour**. How many muffins did she make?

Answer: \_\_\_\_\_ muffins

(4 marks)

8. Consider the formula  $k = 4m + 5n$

(a) Find  $k$  when  $m = 3$  and  $n = -2$ .

Answer: \_\_\_\_\_

(b) **Rearrange** the formula to make  $n$  the subject of the formula.

Answer: \_\_\_\_\_

(c) John is working out the following. He wants to substitute  $k = 11$  and  $n = -5$

in the following equation:

$$\frac{k - 5n}{4} = m$$

The following is his working. Can you find his mistake?

**Work out the correct answer.**

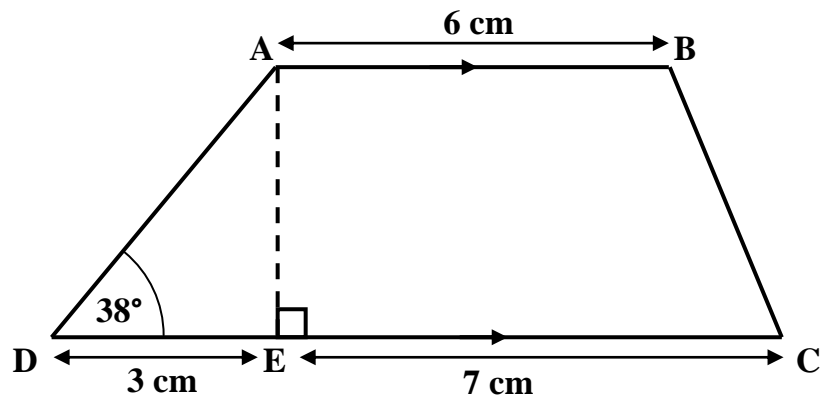
<u>John's Working</u>	
	$\frac{k-5n}{4} = m$
<b>Step 1:</b>	$\frac{11-5(-5)}{4} = m$
<b>Step 2:</b>	$\frac{11-25}{4} = m$
<b>Step 3:</b>	$-\frac{14}{4} = m$
<b>Step 4:</b>	$-3.5 = m$

<u>Correct Working</u>
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Incorrect Step: \_\_\_\_\_, Correct Answer: \_\_\_\_\_

(7 marks)

9. In the figure below, AB is parallel to DC, angle ADC =  $38^\circ$ , angle AEC =  $90^\circ$ , AB = 6 cm, DE = 3 cm and EC = 7 cm.



Calculate correct to **2 decimal places**,

- (a) the length of AE and AD.

Answers: AE: \_\_\_\_\_ cm

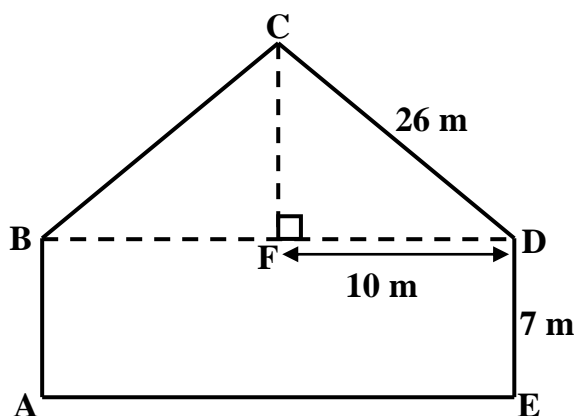
AD: \_\_\_\_\_ cm

- (b) the area of the trapezium ABCD.

Answer: \_\_\_\_\_  $\text{cm}^2$

(10 marks)

10. The diagram below shows a cross-section of a greenhouse made up of an isosceles triangle BCD and a rectangle ABDE.



- (a) Work out **CF**.

Answer: \_\_\_\_\_ m

- (b) Work out **angle BCD**, correct to the **nearest degree**.

Answer: \_\_\_\_\_ °

- (c) Work out the **area of the cross-section ABCDE**.

Answer: \_\_\_\_\_ m<sup>2</sup>

(8 marks)

11. A solid metal cylinder has a **diameter** of **10 cm** and a **height** of **20 cm**.

(a) Work out the **curved surface area** of the cylinder.

Give your answer correct to **3 significant figures**.

Answer: \_\_\_\_\_  $\text{cm}^2$

(b) Calculate the **volume** of the cylinder.

Give your answer correct to **3 significant figures**.

Answer: \_\_\_\_\_  $\text{cm}^3$

The cylinder is melted down and the resulting metal is all used to make a cube.

(c) Find the **length** of one edge of the cube.

Give your answer correct to **1 decimal place**.

Answer: \_\_\_\_\_ cm

(10 marks)



12. (a) Complete the table for  $y = x^2 - 2$  for values of  $x$  from  $-3$  to  $3$ .

$x$	$-3$	$-2$	$-1$	$0$	$1$	$2$	$3$
$x^2$		$4$		$0$		$4$	$9$
$-2$	$-2$			$-2$		$-2$	$-2$
$y$			$-1$		$-1$	$2$	$7$

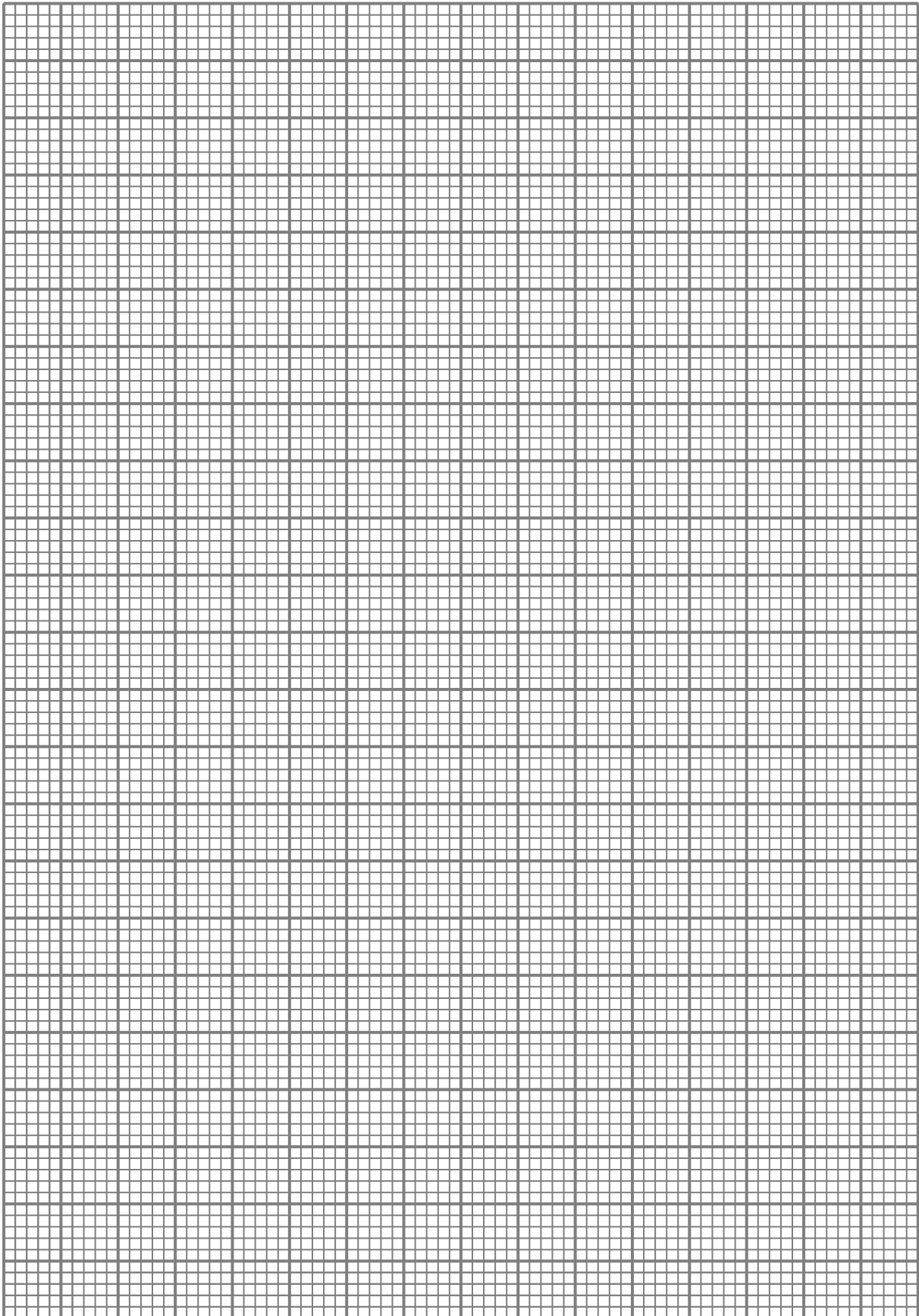
(b) Using a scale of 2 cm to represent 1 unit on the  $x$  –axis and 1 cm to represent 1 unit on the  $y$  –axis, plot the graph of  $y = x^2 - 2$ , on the graph paper.

(c) Use your graph to solve the equation  $x^2 - 2 = 4$ .

Answer:  $x =$ \_\_\_\_\_ or  $x =$ \_\_\_\_\_

(10 marks)

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**End of Paper**