

FORM 4

MATHEMATICS SCHEME A
Non Calculator Paper

TIME: 20 minutes

Name: _____

Class: _____

Instructions to Candidates

- **Answer all questions.**
 - **This paper carries a total of 20 marks.**
 - **Calculators and protractors are NOT ALLOWED.**
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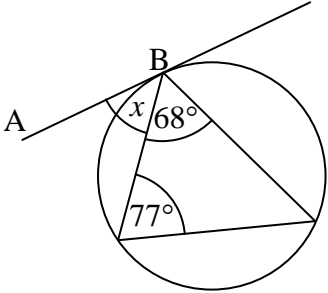
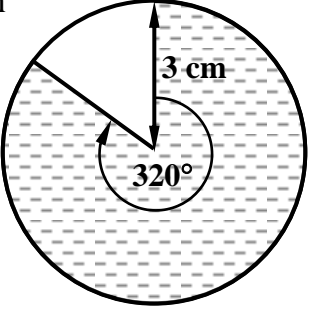
No.	Question	Space for work required
1	<p>Simplify the expression: $3a^2b \times 2ab^4$</p> <p>Ans: _____</p>	
2	<p>VAT is charged at 18%. How much VAT should be paid for an item costing €1900?</p> <p>Ans: _____</p>	
3	<p>Give the largest value of x given that $(2x + 3)(x - 1) = 0$</p> <p>Ans: $x =$ _____</p>	
4	<p>Simplify: $\sqrt{x^{-2}y^8}$</p> <p>Ans: _____</p>	
5	<p>$x^3 = \frac{8}{27}$. What is the value of x?</p> <p>Ans: $x =$ _____</p>	
6	<p>A straight line passes through the points $(-2, -5)$ and $(9, 17)$. What is the gradient of this line?</p> <p>Ans: _____</p>	
7	<p>Work out by taking out a common factor: $4.7 \times 3.2 + 9.4 \times 3.4$</p> <p>Ans: _____</p>	
8	<p>Evaluate: 0.1^{-2}</p> <p>Ans: _____</p>	

Name_____

Class_____

9	<p>Expand and simplify the expression: $3(1 + 3x) - (4x + 1)$</p> <p>Ans: _____</p>	
10	<p>A bag contains 3 red spheres and 3 black spheres. The probability tree shows all the outcomes when two spheres are picked at random. What is the probability that two red spheres are picked?</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <pre> graph LR A["3/6"] --- B["R"] A --- C["3/6"] --- D["B"] B --- E["2/5"] --- F["R"] B --- G["3/5"] --- H["B"] C --- I["3/5"] --- J["R"] C --- K["2/5"] --- L["B"] </pre> </div> <div> <p>Ans: _____</p> </div> </div>	
11	<p>The diagram shows the graph of $y = 3x - x^2$.</p> <p>The maximum value of y is: (A) 0 (B) 1.5 (C) 2.25 (D) 3</p> <p>Ans: _____</p>	

12	<p>Which of the following is false?</p> <p>(A) $c = b \sin \theta$</p> <p>(B) $a = b \cos \theta$</p> <p>(C) $a = c \tan \theta$</p> <p>(D) $c = a \tan \theta$</p> <div data-bbox="667 226 978 371"> </div> <p style="text-align: right;">Ans: _____</p>	
13	<div data-bbox="169 636 730 1055"> </div> <p>This travel graph shows a journey from P to S and back to P. Which of the following shows the highest speed?</p> <p>(A) P to Q (B) Q to R (C) R to S (D) S to P</p> <p style="text-align: right;">Ans: _____</p>	
14	<p>$A = 9.63 \times 10^2$ and $B = 8 \times 10^{-1}$</p> <p>Calculate: $A - B$. Give your answer in standard form.</p> <p style="text-align: right;">Ans: _____</p>	
15	<p>A shape T is similar but not congruent to Shape T_1. Underline the correct transformation of shape T to shape T_1.</p> <p>Translation, Rotation, Reflection, Enlargement by scale factor 2.</p>	

16	<p>AB is a tangent to the circle at B. Calculate the angle marked x.</p>  <p style="text-align: right;">Ans: _____</p>	
17	<p>Convert $1,200,000 \text{ cm}^3$ into m^3.</p> <p style="text-align: right;">Ans: _____</p>	
18	<p>A sycamore tree is now 30 m tall. It grows at a rate of 8% each year. Choose the correct working which shows the size of the tree in 2 years time.</p> <p>(A) $30 \times 2 \times 1.08$ (B) $30 \times 2 \times 0.92$ (C) $30 \times 0.92 \times 0.92$ (D) $30 \times 1.08 \times 1.08$</p> <p style="text-align: right;">Ans: _____</p>	
19	<p>A room is 4 m long and 2.5 m wide. It has to be covered by identical square tiles. The largest square tile that can be used is:</p> <p>(A) 20 cm long (B) 25 cm long (C) 50 cm long (D) 75 cm long</p> <p style="text-align: right;">Ans: _____</p>	
20	<p>Give the area of the shaded sector in terms of π. Simplify your answer.</p>  <p style="text-align: right;">Ans: _____</p>	

FORM 4

MATHEMATICS SCHEME A
 Main Paper

TIME: 1h 40min

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

DO NOT WRITE ABOVE THIS LINE

Name: _____

Class: _____

CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN. ANSWER ALL QUESTIONS.

Volume of sphere $= \frac{4}{3}\pi r^3$ Solutions of the equation $ax^2 + bx + c$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1. A boy has €400 in his bank account. Each week he takes out 10%.

Original amount		€400
Amount after 1 week	400×0.9	€360
Amount after 2 weeks		

Complete the above table enough to find:

- (a) The amount in the account after 3 weeks.

Ans: €_____

- (b) The number of weeks when the original amount is reduced by half.

Ans: _____

(5 marks)

2. (a) Solve the equation: $\frac{3x-2}{2} = \frac{4(1+x)}{3}$

Ans: $x =$ _____

(b) (i) Rearrange the formula $a = 2\sqrt{\frac{x}{y}}$ to make x the subject.

Ans: $x =$ _____

(ii) Find the value of x when $a = 4.5$ and $y = 16$.

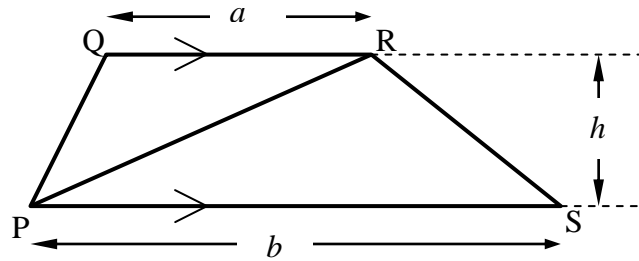
Ans: $x =$ _____

(8 marks)

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3.



(a) Write an expression for the area of triangle QRP in terms of a and h .

Ans: _____

(b) Write an expression for the area of triangle SRP in terms of b and h .

Ans: _____

(c) Use your answers in (a) and (b) to show that the area of the trapezium PQRS is $\frac{1}{2}h(a + b)$.

(4 marks)

4. Two vertical poles stand on horizontal ground and are 40 m apart. The shorter pole AB is 3 m high. The angle of elevation of the top of the longer pole CD from the top of the shorter pole AB is 8° .

(a) **Complete** the **diagram** to represent the situation.



(b) Calculate the **height of the longer pole CD**. Give your answer **in metres** correct to the **nearest 10 cm**.

Ans: _____

(5 marks)

5. A sequence of numbers starts as follows:

23 , 27 , 31 , 35 , 39 , ...

(a) Find an expression for the n th term of the sequence.

Ans: n th term = _____

(b) Show that 100 **cannot** be a term of this sequence.

(5 marks)

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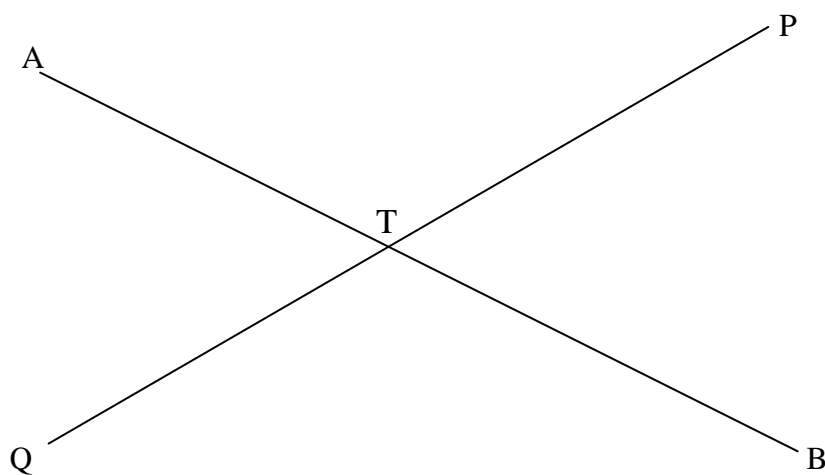
6. Lines AB and PQ intersect at T.

(a) Use ruler and compasses only to:

(i) Construct the locus of points which are equidistant from the lines AB and PQ.

(ii) Draw the locus of the points 3 cm away from T.

(b) Mark, each with an **X**, **all the points** that satisfy both the loci in (i) and (ii).



(5 marks)

7. (a) Factorise completely:

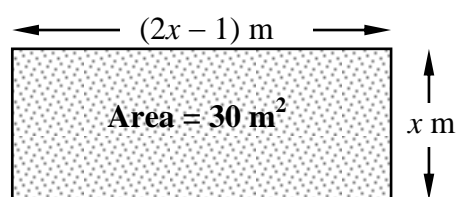
(i) $16a^2 - 4a^2x$

(ii) $9x^2 - y^2$

Ans: _____

Ans: _____

(b) (i) Show that $2x^2 - x = 30$.

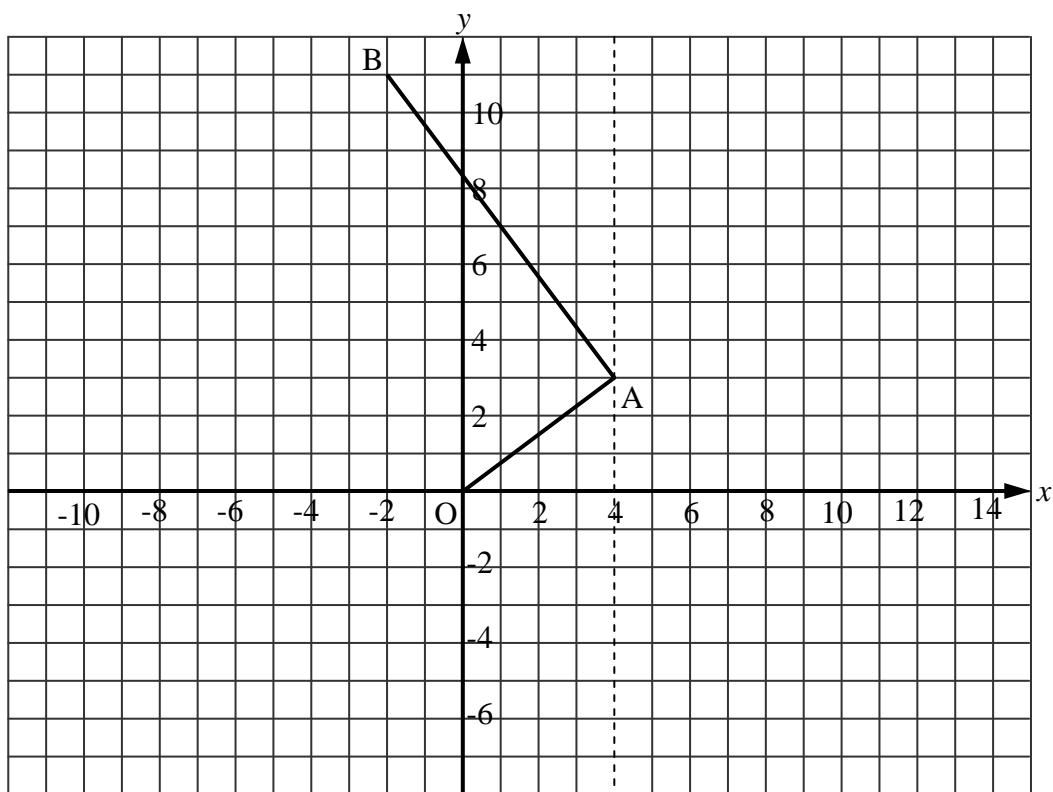


(ii) Solve the equation $2x^2 - x = 30$ to find the breadth of the rectangle, correct to 2 decimal places.

Ans: $x =$ _____

(11 marks)

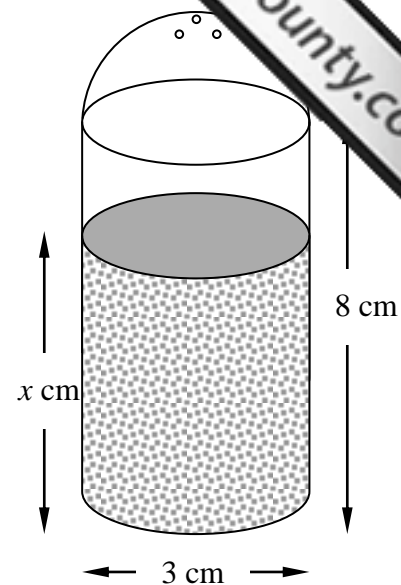
8. (a) Mark a point C to complete the rectangle OABC. **Draw** the rectangle OABC.
- (b) **Draw and label** the reflection of OABC in the line $x = 4$, to form rectangle $OA_1B_1C_1$.
- (c) Rotate rectangle OABC 90° anticlockwise about the origin to form $OA_2B_2C_2$. **Draw and label** rectangle $OA_2B_2C_2$.



(6 marks)

9. The diagram shows a pepper pot. It consists of a cylinder and a hemisphere. The cylinder and hemisphere are of diameter 3 cm. The cylinder is 8 cm high.

- (a) Calculate the volume of the pepper pot correct to 3 significant figures.



Ans: _____ cm^3

- (b) The pepper takes up $\frac{2}{3}$ of the volume of the pepper pot.

Calculate the **depth** of the pepper marked x , correct to the nearest cm.

Ans: $x =$ _____

(8 marks)

10. ABCD is a quadrilateral. E is a point inside the quadrilateral such that $AE = DE$.

(a) Calculate:

(i) angle BCE

Ans: $\angle BCE =$ _____

(ii) angle DEC

Ans: $\angle DEC =$ _____

(iii) angle EDC

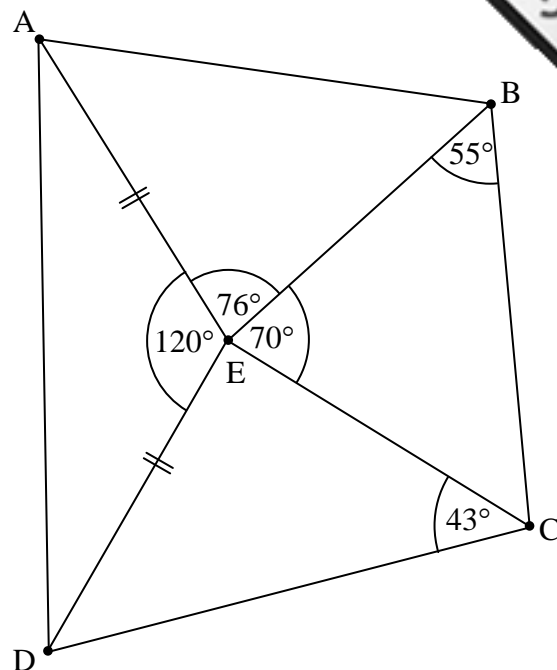
Ans: $\angle EDC =$ _____

(iv) angle EAD

Ans: $\angle EAD =$ _____

(v) angle EAB

Ans: $\angle EAB =$ _____



(b) Explain why the quadrilateral ABCD must be cyclic.

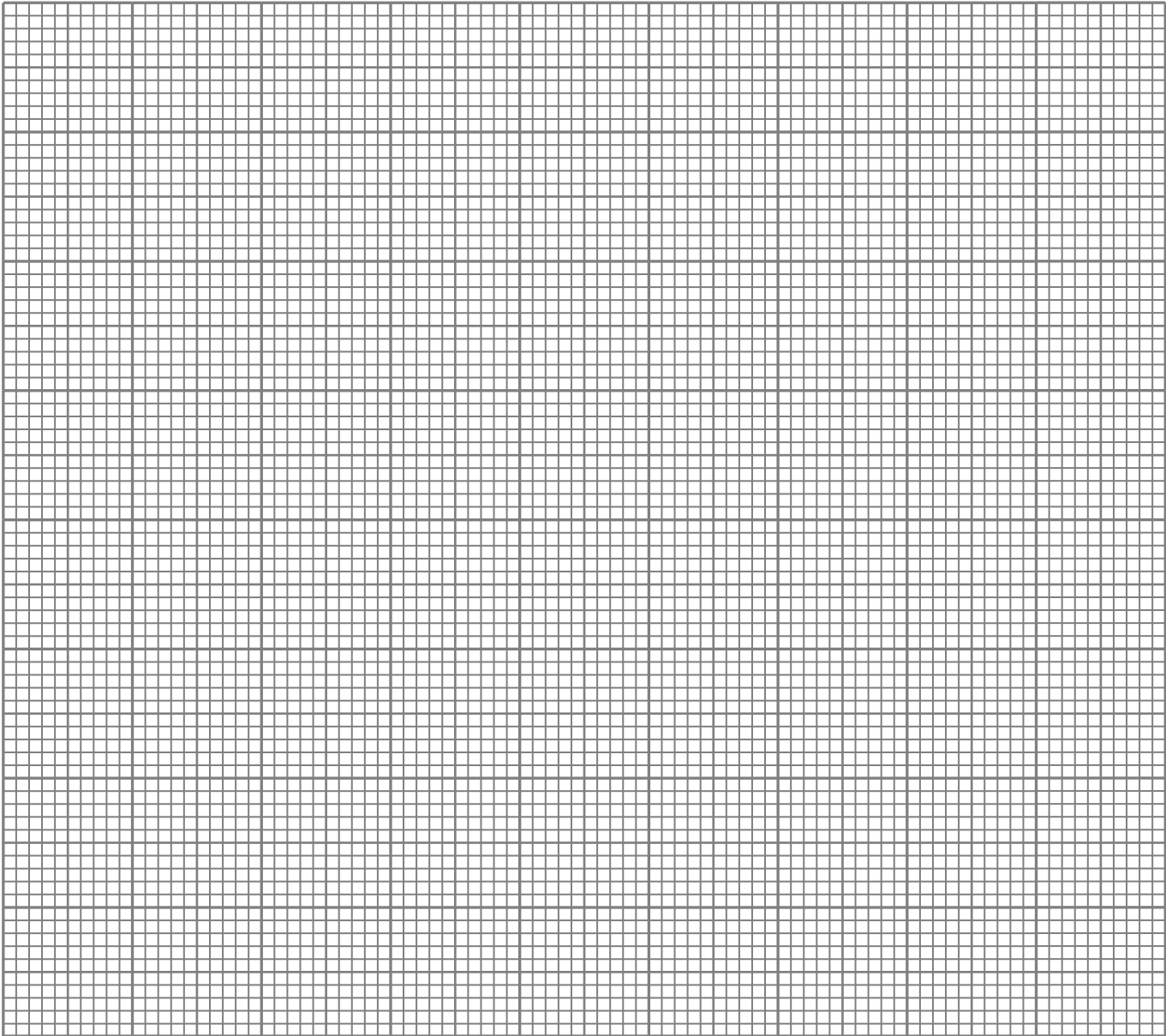
(7 marks)

11.(a) Complete the table for $y = \frac{x^2}{2}$.

x	-4	-3	-2	-1	0	1	2	3	4
$y = \frac{x^2}{2}$	8			0.5				4.5	

(b) **Draw and label** a pair of axes with $-4 \leq x \leq 4$ and $0 \leq y \leq 8$.

(c) Draw the graphs of $y = \frac{x^2}{2}$ and $y = 5.8$

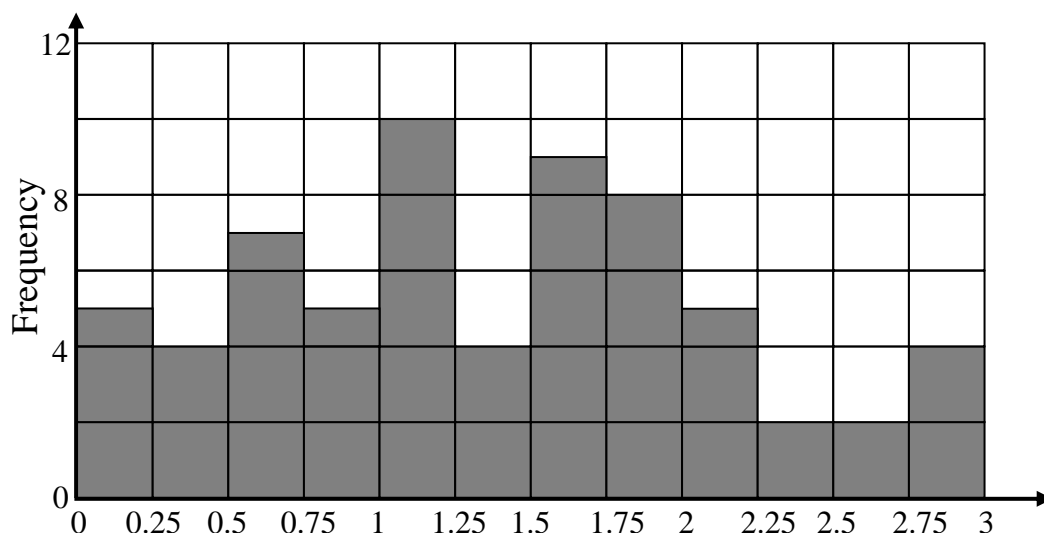


(d) Use your graphs to **solve the equation** $\frac{x^2}{2} = 5.8$ correct to 1 decimal place.

Ans: $x = \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$

(8 marks)

12. The frequency chart shows raw data that has been grouped.

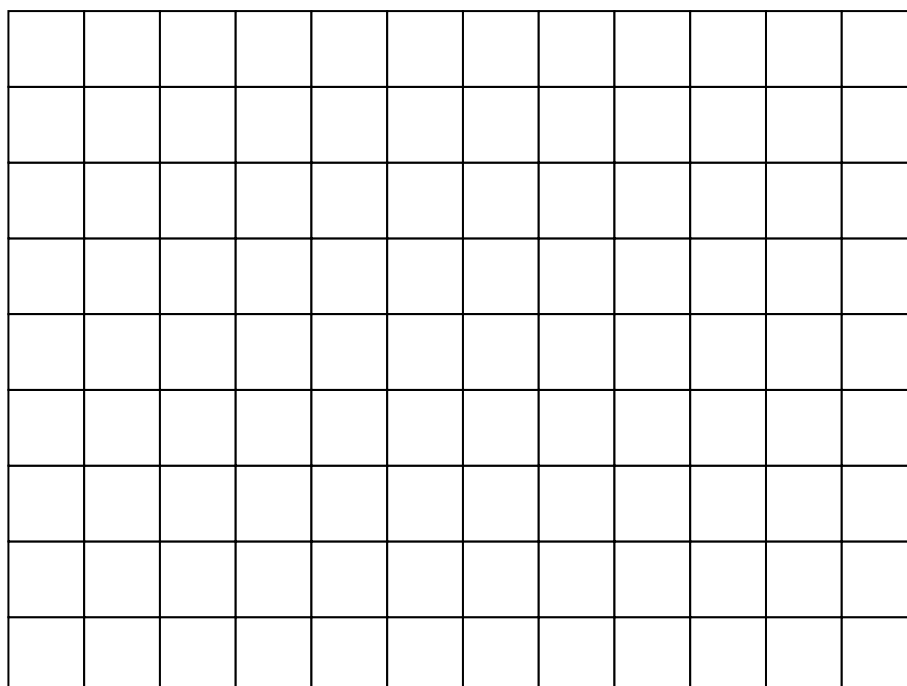


(a) Which is the **class interval** in which the **median** lies?

Ans: _____

(b) (i) Draw another frequency chart for **the same raw data** using the following class intervals:

0 – 0.5 , 0.5 – 1 , 1 – 1.5 , 1.5 – 2 , 2 – 2.5 and 2.5 – 3



(ii) What is the **modal class**?

Ans: _____

(8 marks)

End of Paper