JUNIOR LYCEUM ANNUAL EXAMINATIONS – 2003
Educational Assessment Unit – Education Division.

FORM 5	MATHEMATICS (Non Calculator Paper)	TIME: 20 min.

Name _____   Class _____

Mark

ANSWER ALL QUESTIONS. THERE ARE 20 QUESTIONS TO ANSWER.

EACH QUESTION CARRIES 1 MARK.

CALCULATORS, RULERS, PROTRACTORS AND OTHER MATHEMATICAL INSTRUMENTS ARE NOT ALLOWED.

ON YOUR DESK YOU SHOULD HAVE NOTHING EXCEPT FOR PEN, PENCIL AND EXAMINATION PAPER.

TO ANSWER QUESTIONS INVOLVING NUMERICAL CALCULATIONS YOU ARE ADVISED TO CHOOSE AND USE THE MORE EFFICIENT TECHNIQUES (MENTAL OR PENCIL-AND-PAPER).

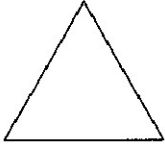**YOU ARE NOT REQUIRED TO SHOW YOUR WORKING. HOWEVER SPACE FOR WORKING IS PROVIDED IF YOU NEED IT.**
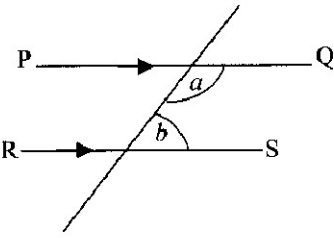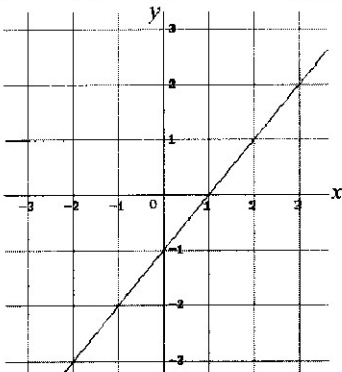

DO NOT

WRITE

IN

THIS

SPACE

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
1.	**43 × 87** gives the same result as: A) 43 × 8 + 43 × 7 B) 43 × 70 + 43 × 8 C) 43 × 80 + 43 × 7 D) 4 × 8 + 3 × 7. Ans:_____	
2.	1 Euro is approximately 40 cents. During a holiday in Italy, a Maltese tourist was charged 50 Euros for a traffic offence. What is its equivalence in Malta Lira? Ans:_____	
3.	Paul is facing South. He turns 90° clockwise. He will then face: A) North B) South C) East D) West. Ans:_____	.
4.	p^3 means the same as: (A) $3 + p$ (B) $p \times p \times p$ (C) $p + p + p$ (D) $3 \times p$. Ans:_____	
5.	The **perimeter** of an equilateral triangle is 40·5 cm. What is the length of **one** of its sides? Ans: _____	
6.	Simplify $3 - 1\frac{3}{8}$. Ans: _____	
7.	A tangent and a radius of a circle meet at an angle of: A) 30° B) 60° C) 90° D) 180°. Ans: _____	
8.	The capacity of a cylindrical beaker is 2 litres. How many **millilitres** of water does it hold when it is 75% full? Ans: _____	

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
9.	Denise uses the following LOGO commands. **PD REPEAT 360 [FD 1 RT 1]** Make a sketch of what the turtle will draw. Ans: _____	
10.	The **area** of a square is 38 cm^2. Give an **estimate** for the length of one edge of the square, giving the answer correct to the nearest whole number. Ans: _____	
11.	During a race in France, Jalabert cycled 1·9 kilometres in 3 minutes. Express this as an average **speed** in **km/h.** Ans: _____	
12.	$3 + \dfrac{1}{8}$ is equivalent to: A) $\dfrac{31}{8}$ B) $\dfrac{1}{38}$ C) $\dfrac{4}{8}$ D) $3\dfrac{1}{8}$. Ans: _____	
13.	**One** CD player and a set of **five** CDs cost Lm 40. The **same** CD player and **four** similar CDs cost Lm35·50. What is the cost of **one** CD? Ans: _____	
14.	$\left(\dfrac{2}{3}\right)^{-1}$ simplifies to: A) 3^2 B) $\dfrac{2}{3}$ C) 3^{-2} D) $\dfrac{3}{2}$ Ans: _____	

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
15.	Write 0·00058 in standard form.　　　Ans: _____	
16.	On a spreadsheet: the number in cell **A2** is 250 the number in cell **A3** is 15. In cell **A4** there is the formula =A2−A3 * 4 What value is obtained in cell **A4**?　　Ans: _____	
17.	Write down a **fraction** that lies between $\frac{1}{2}$ and $\frac{7}{8}$. 　　　　　　　　　　　　　Ans:_____	
18.	A **cylinder** has a base radius of 6 cm. Its height is 20 cm. The **curved surface area** of the cylinder is approximately: A) 360 cm^2　B) 720 cm^2　C) 2160 cm^2　D) 4320 cm^2. 　　　　　　　　　　　Ans:_____	
19.	PQ and RS are two parallel lines. What is the size of angle b, when $a = 128°$? 　　　　　　　　　　Ans:_____	
20.	This is the graph of the line $y = x - 1$ as shown on a computer screen. On the same graph, sketch the line of $y = x + 1$.	

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2003
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FORM 5   **MATHEMATICS (Main Paper)**   **TIME: 1 h 40 min**

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	Total Main	Non Calculator	**Global Mark**
Mark																

DO NOT WRITE ABOVE THIS LINE

Name _____   Class _____

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

1. Change
    a) Lm2·75 to cents   c _____

    b) 260 minutes to hours and minutes   h _____ min _____

    c) $280\,000$ cm^2 to m^2.   _____ m^2 _____

    _____(4 marks)

2. a) (i) Evaluate $3^0 + 3^2 + 3^{-1}$ (ii) Simplify $y^3 \times y^5 \div y^4$

    b) A map is drawn to a scale of 1**:**50 000. A line on the map of length 4·5 cm represents a road between two towns P and Q. What is the actual distance between these two towns? Give your answer in kilometres.

    _____(4 marks)

3. a) (i) Write the following numbers correct to **1 significant figure** to give an **estimate** for **Q.**

    $$Q = \left(\frac{28.85 + 40.92}{6.82} \right)^3$$

    (ii) Use your calculator to work out the value of **Q**. Give your answer correct to the nearest whole number.

    b) Work out $\left(3\frac{1}{2} + 1\frac{3}{8} \right) \div 6\frac{1}{2}$

    _____(4 marks)

4. One exterior angle of a regular polygon is 45º. Work out:
   a) the number of sides of the polygon
   b) the size of **one** interior angle of the polygon
   c) the **sum** of all interior angles of the polygon.

_____(4 marks)

5. A factory operator works 40 hours a week. He earns Lm2·30 per hour. The overtime rate is
   1½ times the normal rate per hour. Last week he worked a **total** of 48 hours.
   Some of this information is given in the spreadsheet shown below.

	A	B
1	Normal payment rate per hour (in Lm)	2·30
2	Normal number of hours per week	40
3	Number of overtime hours in a week	8
4	Normal pay in a week (in Lm)	
5	Overtime payment rate per hour (in Lm)	
6	Overtime pay in a week (in Lm)	
7	**Total** weekly payment including overtime (in Lm)	

List of formulae
= B4 + B6
= 1·5 * B1
= B1 * B2
= B3 * B5

a) Write down the formula you would use in cell:
   B4 _____ ; B5 _____ ; B6 _____ ; B7 _____ .

b) In a certain week the operator worked 10 hours **overtime**. How much did he earn on
   overtime during this particular week?

_____(5 marks)

6.
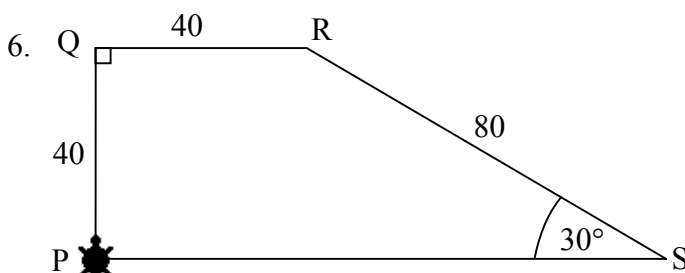
a) The trapezium PQRS is the path traced out
   by the LOGO turtle. QR is parallel to PS.
   PQ = QR = 40 turtle steps, RS = 80 turtle
   steps and $\angle$ PSR = 30°.
   Work out the length of PS in turtle steps,
   giving your answer correct to the nearest
   whole number.

b) Complete this set of LOGO commands given to the turtle to draw the trapezium PQRS.
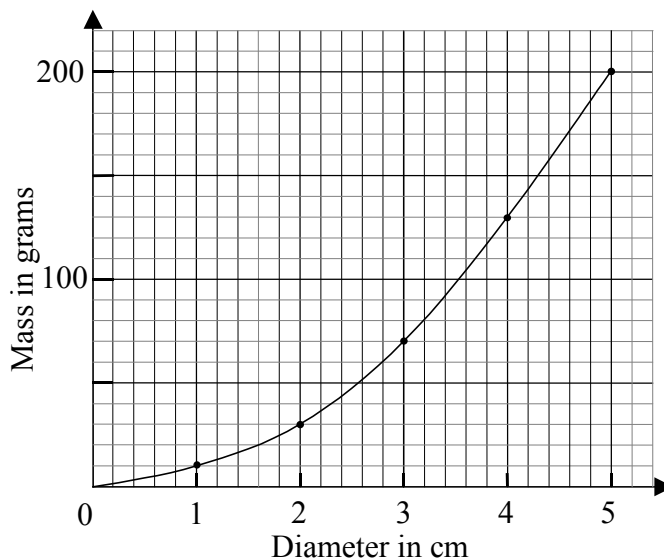   (The turtle started at point P as shown).

PD FD 40 RT 90 FD 40 RT _____ FD 80 HOME

_____(4 marks)

7. a) Angela measured the diameter and the mass of 5 circular discs made of the same material and of equal thickness. These are given in the table on the right.

d cm	1	2	3	4	5
m grams	8	32	72	128	200

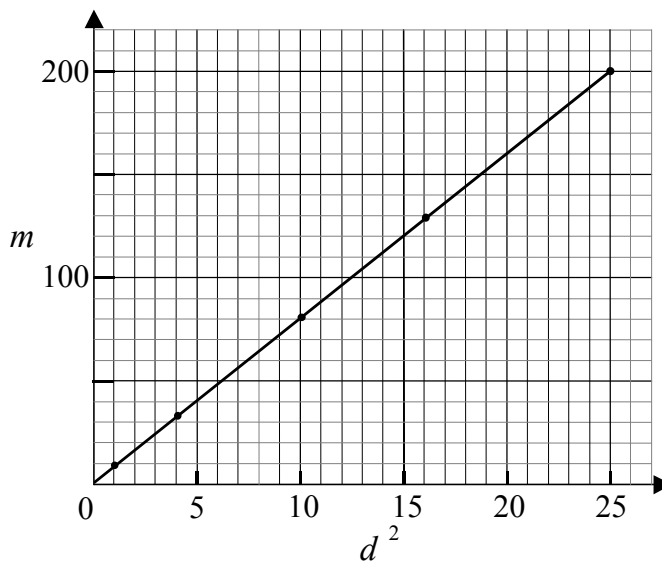Angela also drew the graph of mass (m) against diameter (d), shown on the right.

Does m vary **directly** as d? Give a reason for your answer.

b) Another girl, Brenda, drew up the table on the right by **squaring** each diameter.

d^2	1	4	9	16	25
m	8	32	72	128	200

She also drew the graph of m against d^2, shown on the right.

i) Does m vary **directly** as d^2? Give a reason for your answer.

ii) Using the table of values for d^2 and m, or otherwise, work out the **constant of variation**, k.

iii) Use this value of k to write down a formula connecting m and d^2.

iv) Use your formula to work out the value of m when d is 9 cm.

_____ (6 marks)

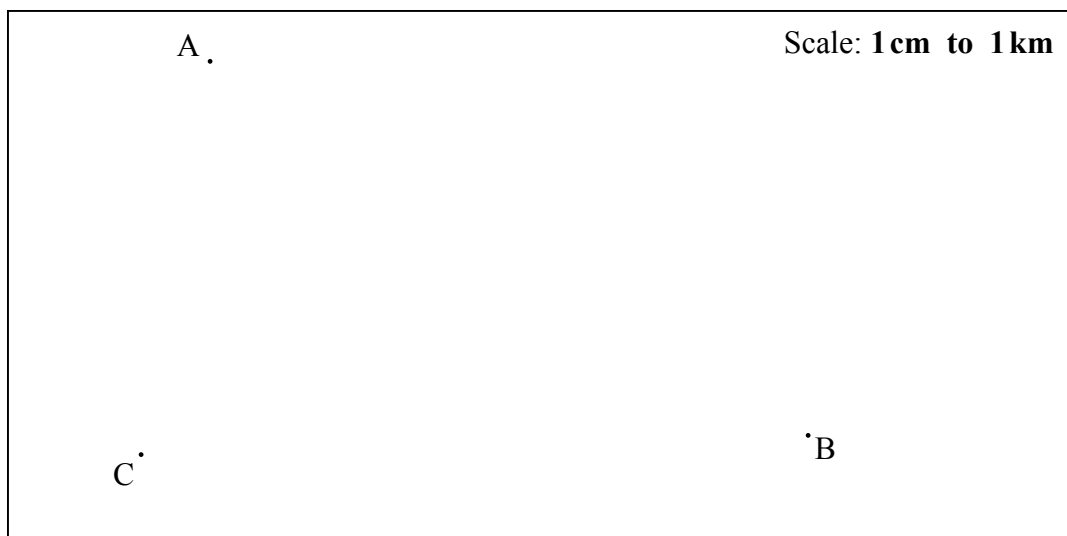8. $f(x) = 3x + 2$ and $g(x) = \dfrac{x}{2} + 7$.

a) Work out f(−3).	b) Solve $f(x) = g(x)$.	c) Find $f^{-1}(x)$.

_____(6 marks)

9. A telephone company wants to set up a new radio telephone transmission mast to provide
   services to three towns A, B and C.   The diagram below shows the position of the three towns.
   The diagram is drawn to a scale of **1 cm to 1 km**.

A.   Scale: **1 cm to 1 km**

                                                          ·B
     ·
   C

   The mast has to be located **within** the triangular area enclosed by the towns A, B and C so that it
   is **equidistant from towns A and B** and   **4 km from town C**.

a) Using the same scale as in the diagram, construct accurately the position of the mast on the
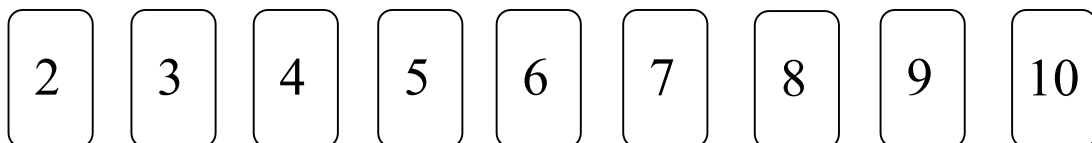   diagram. Mark the position of the mast with an M.
    (*All construction lines and arcs must be shown*).

b) From your drawing measure and write down the distance of BM, giving your answer in km
    correct to 1 decimal place.

_____(5 marks)

10. This question refers to a pack of nine cards, numbered as shown below.

| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

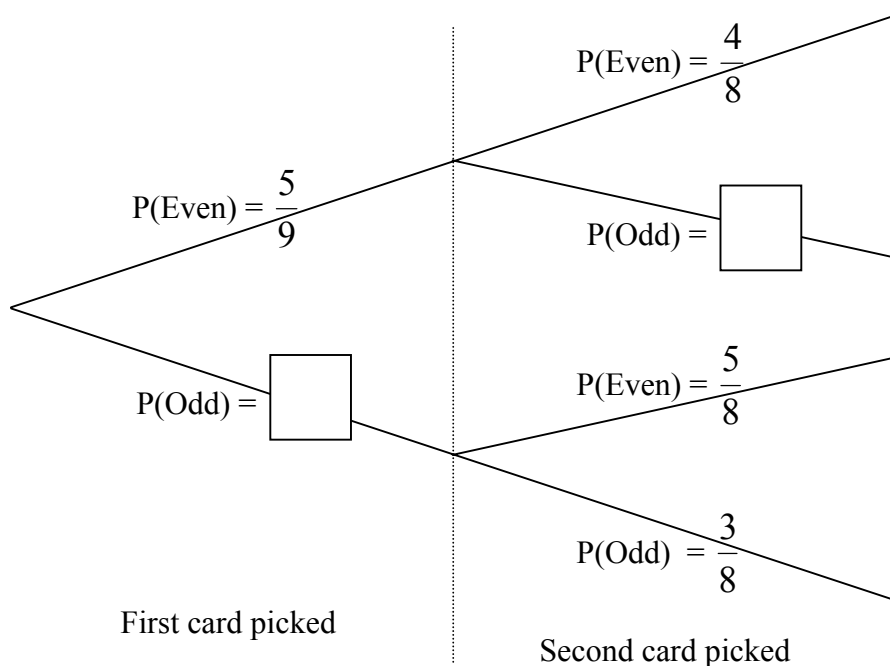The cards were placed face down on a table in a random order.

a) Kevin picked a card at random from the pack. He then replaced the card face down. Write down the probability that the card picked showed:
   (i) a **prime** number.   (ii) an **even** number.

 b) The cards were again placed face down on a table in a random order.
    Another boy, Simon, then picked a card at random from the pack and did **not** replace it. He then picked a second card. Complete the following tree diagram.

$P(Even) = \dfrac{5}{9}$

$P(Even) = \dfrac{4}{8}$

$P(Odd) =$ [ ]

$P(Odd) =$ [ ]

$P(Even) = \dfrac{5}{8}$

$P(Odd) = \dfrac{3}{8}$

First card picked

Second card picked

Use the tree diagram to work out the probability that, for the cards picked by Simon:
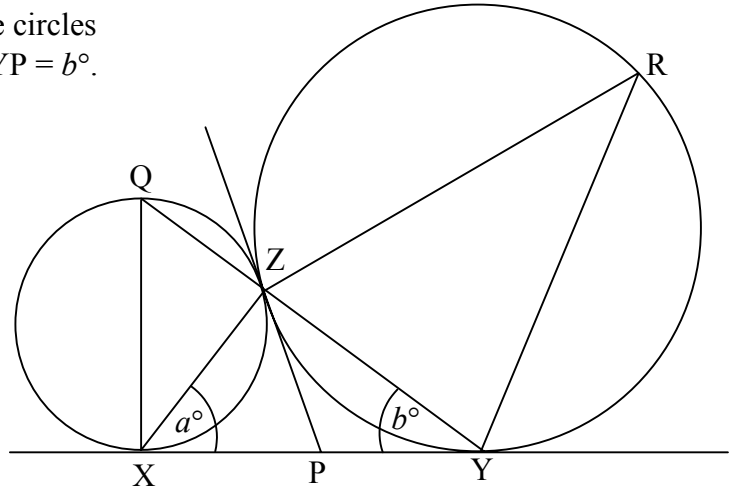   (i)   **both** cards showed **even** numbers
   (ii) only **one** card showed an **even** number
   (iii) the **product** of the two numbers shown was **even**.

(9 marks)

11. XPY and PZ are two common tangents to the circles shown in the diagram. $\angle ZXP = a°$ and $\angle ZYP = b°$.
**Explain why, giving reasons**:

i) XP = PY   ii) $\angle XZY = 90°$

iii) $\angle ZRY = b°$.

_____(8 marks)

12. The following table gives the prices of 200 houses which are offered for sale in a monthly property magazine for town A. **The prices shown are in Lm 1000's**.
(Ex. $20 \leq p < 30$ means houses priced at Lm 20 000 or more but less than Lm 30 000).
A histogram illustrating the given information is also shown.

| Price(p) in Lm 1000's	Number of houses f	Halfway value of p x	fx	Cumulative frequency
$0 \leq p < 10$	3	5	15	3
$10 \leq p < 20$	7	15	105	10
$20 \leq p < 30$	27	25	675	37
$30 \leq p < 40$	52	35	1820	89
$40 \leq p < 50$	67	45	3015	156
$50 \leq p < 60$	26	55	1430	182
$60 \leq p < 70$	18	65	1170	200
Total			8230	
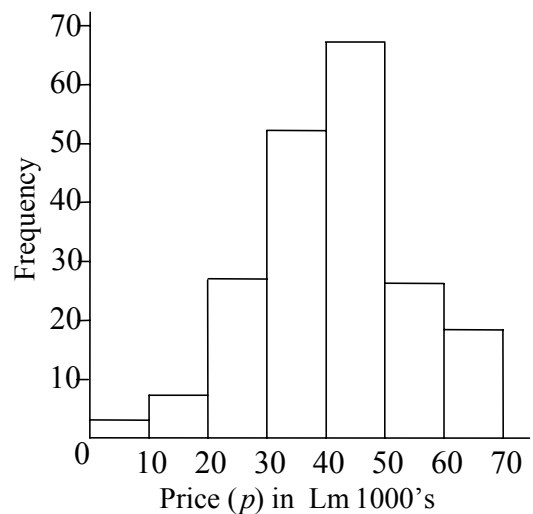
a) (i) Work out an estimate for the **mean** price.

(ii) On the histogram shade the bar representing the **modal group**.

b) The following cumulative frequency curve was drawn using the data given in the table.
   Use the cumulative frequency curve to estimate:
   (i) the **median price**   (ii) the **interquartile range**

c) A married couple cannot afford to spend more than Lm 45 000 to buy a house. Estimate the
   percentage of the 200 houses that are within their price range.



Price(*p*) in Lm 1000's
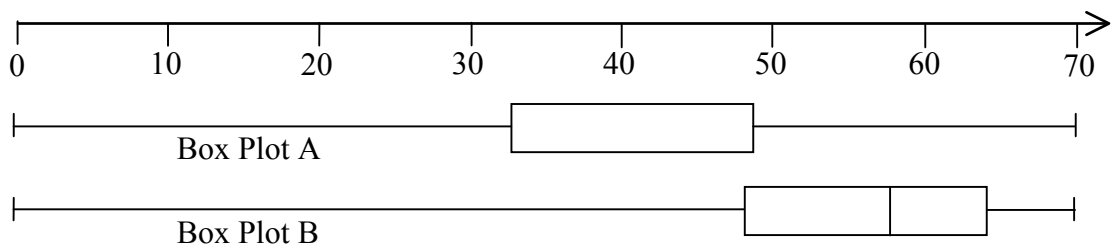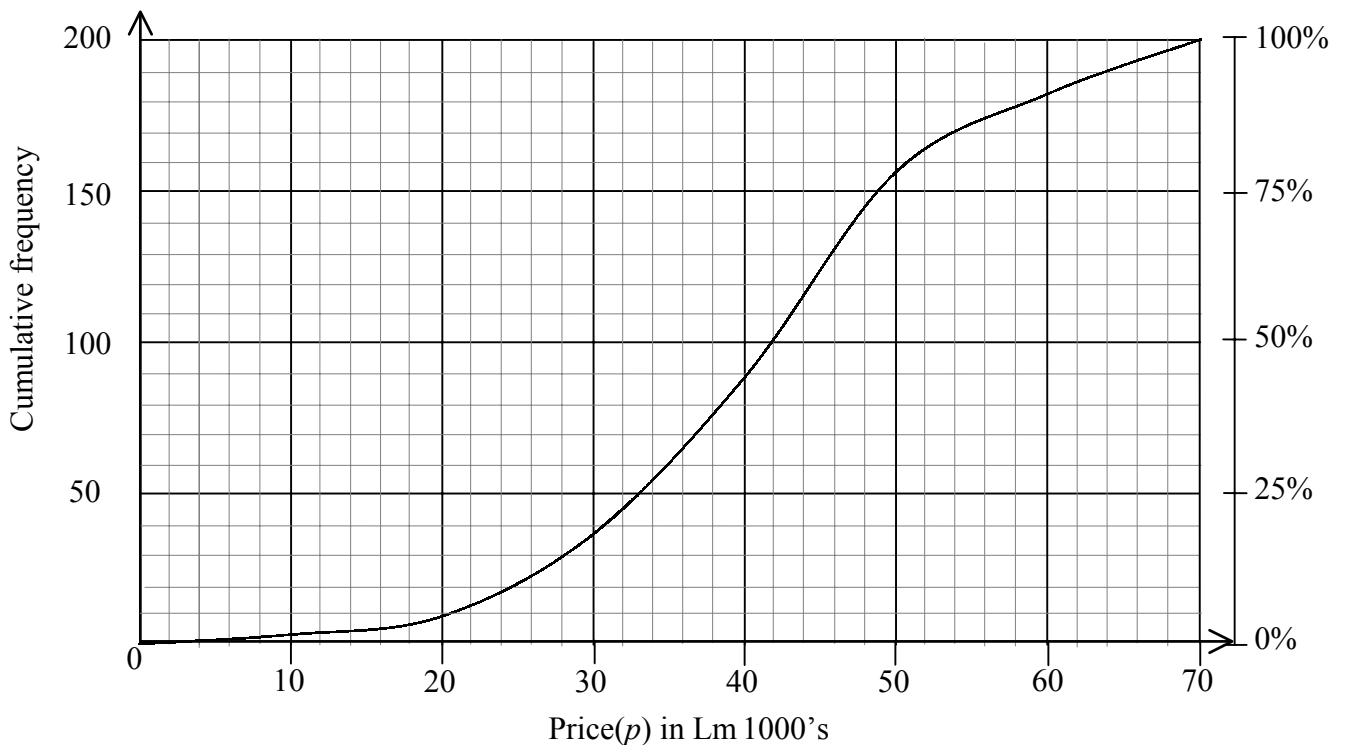
d) Box plot A illustrates the distribution of prices for town A. Draw a line on box plot A to
   mark the location of the **median**.

e) Box plot B illustrates the distribution of prices for another town B. In which of the two towns
   has the married couple the greater number of houses to choose from? Explain your answer.

13. The following table of values of x and y was used by Mark to draw the graph of $y = \dfrac{1}{x}$, for

values of x from 0.2 to 4. (*The values of y were rounded off to 2 decimal places*).

x	0.2	0.4	0.6	0.8	1	2	3	4
y	5	2.5	1.67	1.25	1	0.5	0.33	0.25
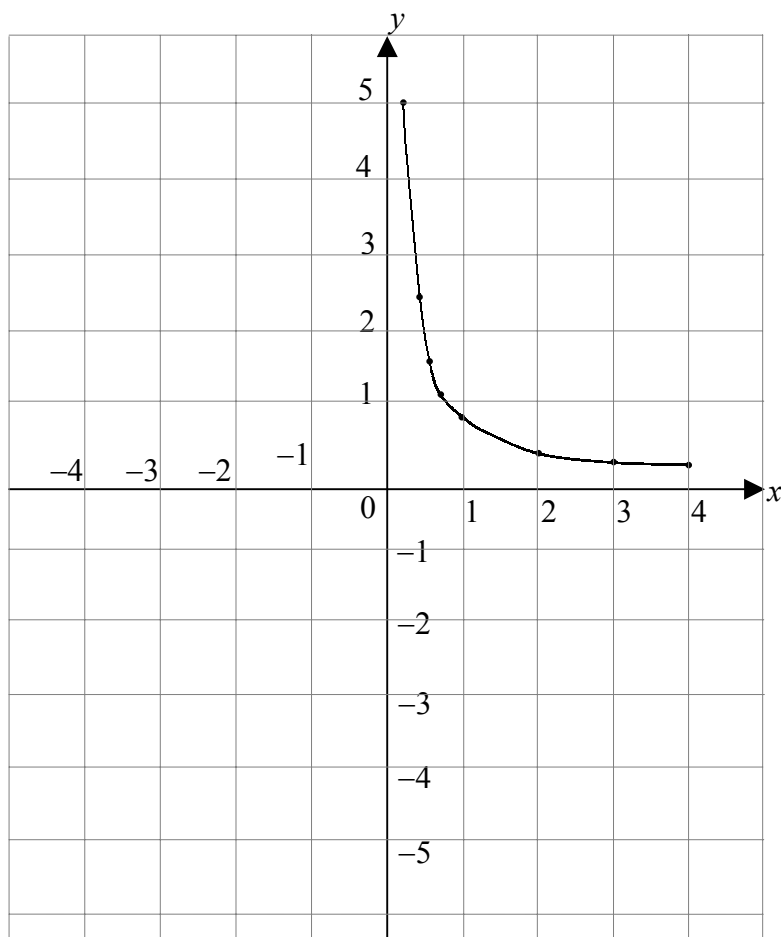
a) The graph drawn by Mark is shown on the left.
i) On the same axes **sketch** the graph if Mark had also taken values of x from -4 to -0.2.

ii) Give a reason why $x = 0$ was not included in the table of values.

iii) What happens to the value of y as x gets closer to zero for positive values of x?

b) i) On the same axes draw the graph of $y = x + 2$.
   ii) From your graphs write down an estimate **to one decimal place** for the **positive** solution of

   $\dfrac{1}{x} = x + 2.$

   iii) Use the method of **trial and improvement** to give the **positive** solution to $\dfrac{1}{x} - x = 2$,

   correct to **two decimal places**. (Show all your working).

END OF PAPER