

# JUNIOR LYCEUMS ANNUAL EXAMINATIONS - 2000

Educational Assessment Unit - Education Division

FORM 4

MATHEMATICS (MENTAL)

TIME: 15 minutes

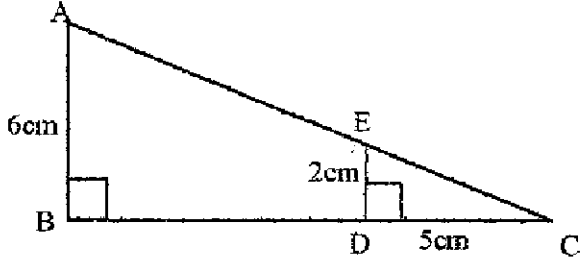
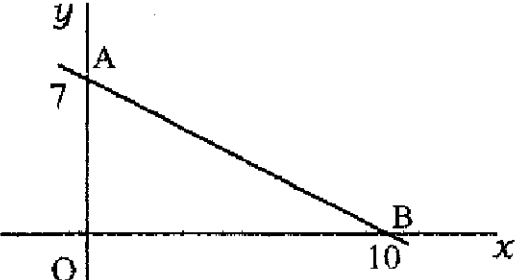
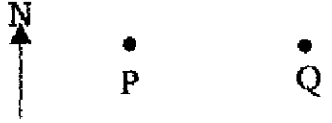
Name \_\_\_\_\_

Class \_\_\_\_\_

Mark

- ANSWER ALL QUESTIONS.
- EACH QUESTION CARRIES 1 MARK.
- CALCULATORS, RULERS, PROTRACTORS AND OTHER MATHEMATICAL INSTRUMENTS ARE NOT ALLOWED.
- WRITE DOWN YOUR ANSWER ONLY IN THE SPACE PROVIDED.

**DO NOT  
WRITE  
IN  
THIS  
SPACE**

QUESTION	ANSWER
1. Find the <b>mode</b> of the following numbers: 2, 3, 6, 2.4, 3.5, 6, 2.5, 6	
2. John and Mary share 30 sweets in the ratio of 1 : 2. How many sweets does John take?	
3. Lm1 is equivalent to 4550 Italian Lire. The value in Maltese Liri of a motorbike that costs 9 Million Italian Lire is about  (a)Lm9000 (b) Lm4000 (c) Lm2000 (d) Lm9	
4. Simplify: $\frac{x^2 - 2x}{x}$	
5. In a school there are 200 boys and 300 girls. One student is chosen at random. What is the probability that the student chosen is a girl?	
6.  <p>In the figure,            AB = 6cm,            ED = 2cm and            CD = 5cm.</p> <p>Find BC.</p>	
7. Estimate : $\frac{21.36 \times 0.49}{1.89}$	
8.  <p>What is the gradient of the line AB ?</p>	
9.  <p>The bearing of Q from P is <math>090^\circ</math>. What is the bearing of P from Q?</p>	
10. The vectors $\mathbf{a} = \begin{pmatrix} 2x \\ 3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 12 \\ 3 \end{pmatrix}$ are equal. Find x.	

# JUNIOR LYCEUM ANNUAL EXAMINATIONS 2000

Educational Assessment Unit - Education Division

FORM 4

MATHEMATICS (Main Paper)

TIME: 1 h 45 min

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Main	Mental	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. (a) Work out:  $2\frac{3}{4} - 1\frac{1}{2} \div 2$

(b) Work out:  $3^2 \times (27)^{-\frac{2}{3}}$

(4 marks)

2. John has an annual income of Lm 6500. Tax is charged at the following rates:

<u>INCOME</u>	<u>TAX RATE</u>
First Lm 3000	Tax-free
Next Lm 2000	15%
Next Lm 1500	20%

How much tax does John pay on his income?

(4 marks)

3. The sum of  $\frac{3}{11-x}$  and  $\frac{2}{x-9}$  is zero. Find  $x$ .

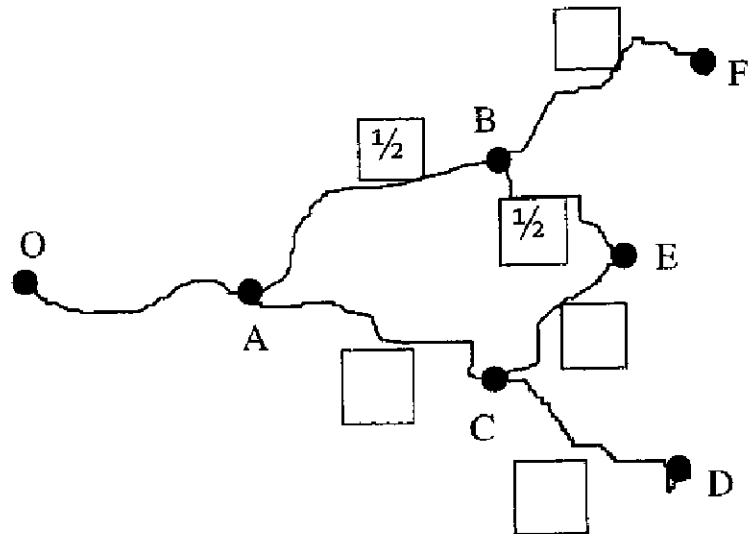
(4 marks)

4. Mary buys a flat for Lm12000. It appreciates at 10% each year.  
 (a) What will be its value after 2 years?

- (b) What shall be her profit if she sells it at the new price?

(4 marks)

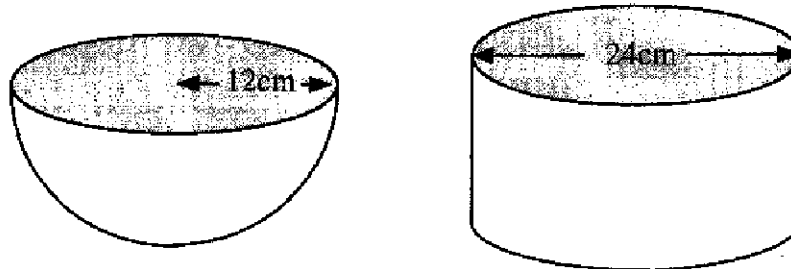
5. A driver is at O and is travelling in the direction of A. A, B, C, D, and E are towns on her map. When she reaches each of the junctions at A, B, or C, she is equally likely to go right or left.



- (i) Complete the tree diagram.  
 (ii) What is the probability that she goes to E?

(4 marks)

6. A mixing bowl has the shape of a hemisphere of radius 12cm.



(a) What is the volume, to 3 s.f., of liquid it can hold if it is full to the brim ?

The bowl is emptied into a cylindrical cake-tin of diameter 24cm.

(b) Find, to the nearest cm, the depth of liquid in the cake-tin.

$$\left( \text{Volume of sphere} = \frac{4}{3} \pi r^3 \right)$$

(6 marks)

---

7. (a) What must be added to  $(x^2 - 6x)$  to make it a perfect square? Answer: \_\_\_\_\_

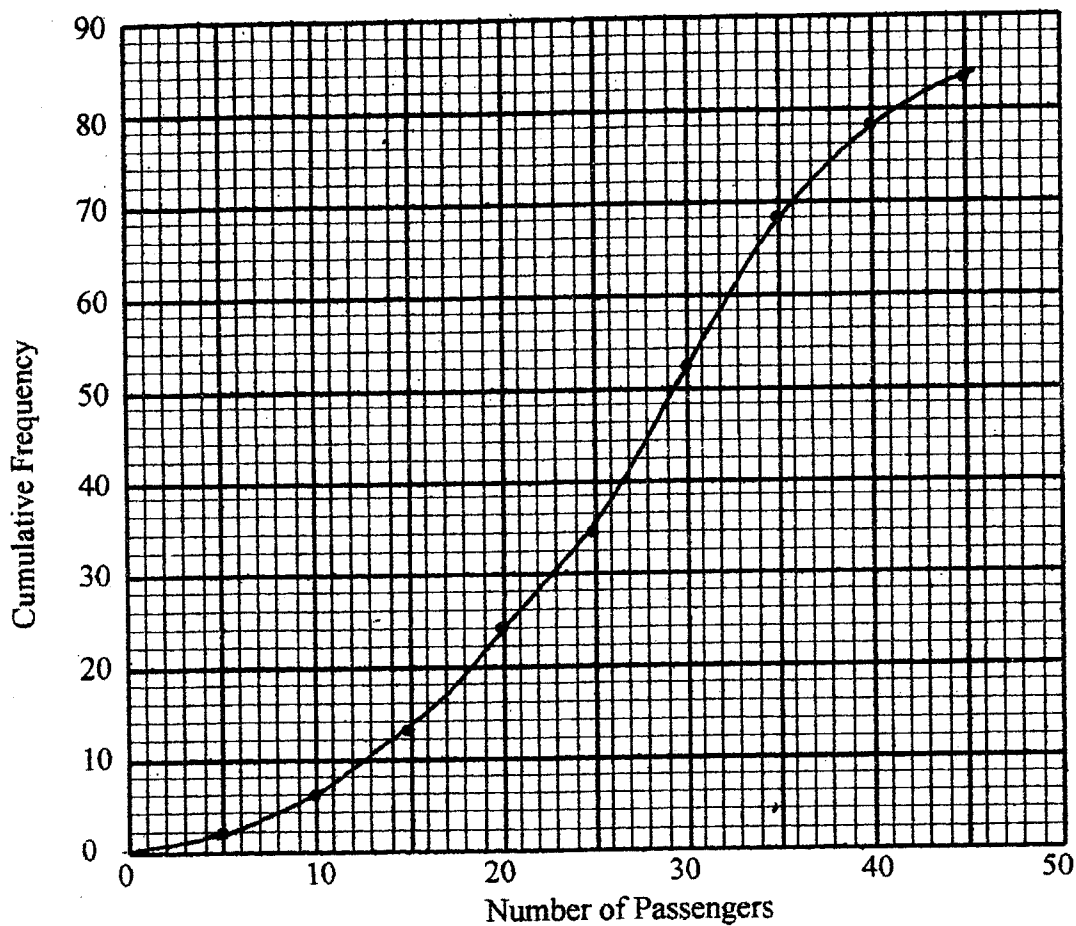
Hence solve the equation  $x^2 - 6x + 7 = 0$ , giving your answers to 2 d.p.

(b) Make  $b$  the subject of the following formula :  $\frac{3}{a-b} = \frac{a}{2b}$

(6 marks)

8. A bus driver kept a record of the number of passengers per trip using his bus. Here are the data and the Cumulative frequency curve showing the results:

Number of passengers	$\leq 5$	$\leq 10$	$\leq 15$	$\leq 20$	$\leq 25$	$\leq 30$	$\leq 35$	$\leq 40$	$\leq 45$
Cumulative Frequency	2	6	13		34		68	78	



Use the graph

(a) to fill in the missing values in the table.

(b) to **estimate** :

- (i) the median number of passengers, \_\_\_\_\_
- (ii) the lower quartile, \_\_\_\_\_
- (iii) the upper quartile, \_\_\_\_\_
- (iv) the inter-quartile range, \_\_\_\_\_
- (v) the total number of trips involved. \_\_\_\_\_

(6 marks)

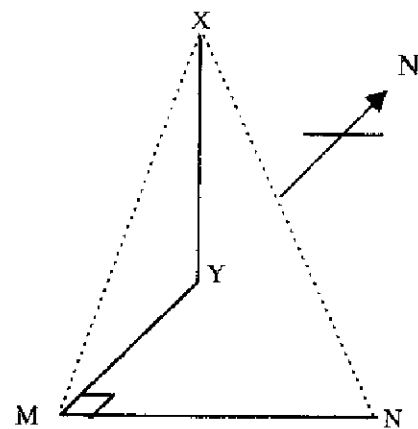
9. At a fair, 2 balloons and 3 stickers cost 17cents; 3 balloons cost 6cents more than 2 stickers.

Taking  $x$  cents to be the price of a balloon, and  $y$  cents to be the price of a sticker, form two simultaneous equations and use them to find the price of (a) 1 balloon and of (b) 1 sticker.

(6 marks)

- 
10. X is the top and Y is the foot of a vertical mast XY,  
80 metres high.  
M is a point 100m due South of Y.  
N is 120m due East of M.  
M, Y, N are on a horizontal plane.

- (i) What is the angle of elevation of X from M, to the nearest degree?

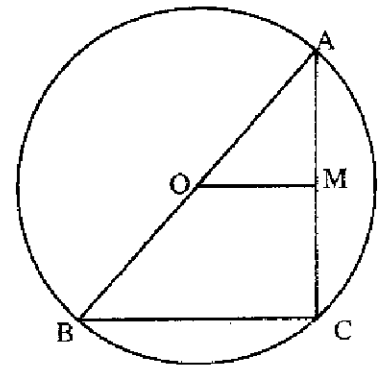


- (ii) Find the distance YN to the nearest metre.

- (iii) Find the angle of elevation of X from N to the nearest degree.

(6 marks)

11. O is the centre of the circle of which AB is a diameter.  
M is the mid-point of AC.



- i) Find the size of angle AMO and give a reason for your answer.  
Size: \_\_\_\_\_ Reason: \_\_\_\_\_

\_\_\_\_\_

- ii) Find the size of angle ACB and give a reason for your answer.  
Size: \_\_\_\_\_ Reason: \_\_\_\_\_

\_\_\_\_\_

- iii) Show that  $\Delta^s$  AOM and ABC are similar.

- iv) What is the ratio AM : AC?                      AM : AC = \_\_\_\_\_.

The area of  $\Delta$  AOM is  $5\text{cm}^2$ .

- v) Find the area of  $\Delta$  ABC.

(8 marks)

12. Complete the following table for  $y = \frac{8}{x}$ .

x	1	2	4	6	8
$y = \frac{8}{x}$			2		

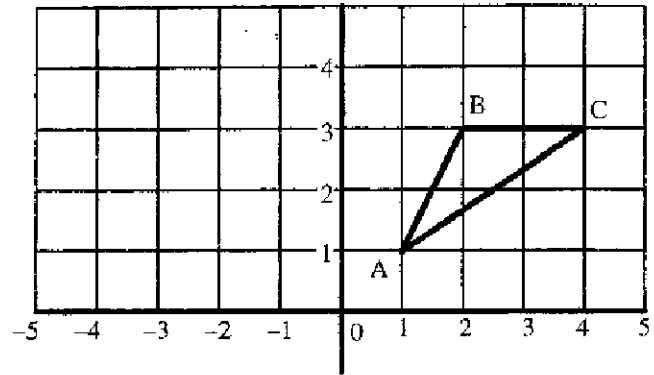
- (i) On graph paper, draw the graph of  $y = \frac{8}{x}$ , using a scale of  $2\text{cm} = 1$  unit on both axes.
- (ii) On the same graph paper, draw the line  $y = 3$ .
- (iii) Use your graphs to solve the equation  $\frac{8}{x} = 3$ .

x = \_\_\_\_\_.

(8 marks)



13. A (1, 1), B (2, 3) and C (4, 3) form the triangle shown.



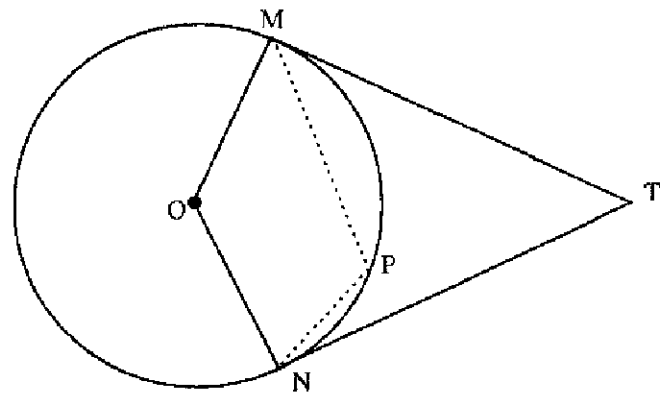
(i) Transform the  $\triangle ABC$  into  $\triangle A'B'C'$  using the matrix  $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$ .

(ii) On the grid, plot the points  $A'$ ,  $B'$ ,  $C'$  and then join them to form a new triangle.

(iii) Why is this transformation **not** a REFLECTION?

(8 marks)

14.  $TM$  and  $TN$  are tangents from  $T$  to the circle whose centre is  $O$ .  $P$  is a point on the circumference and  $\angle MTN = 40^\circ$ .



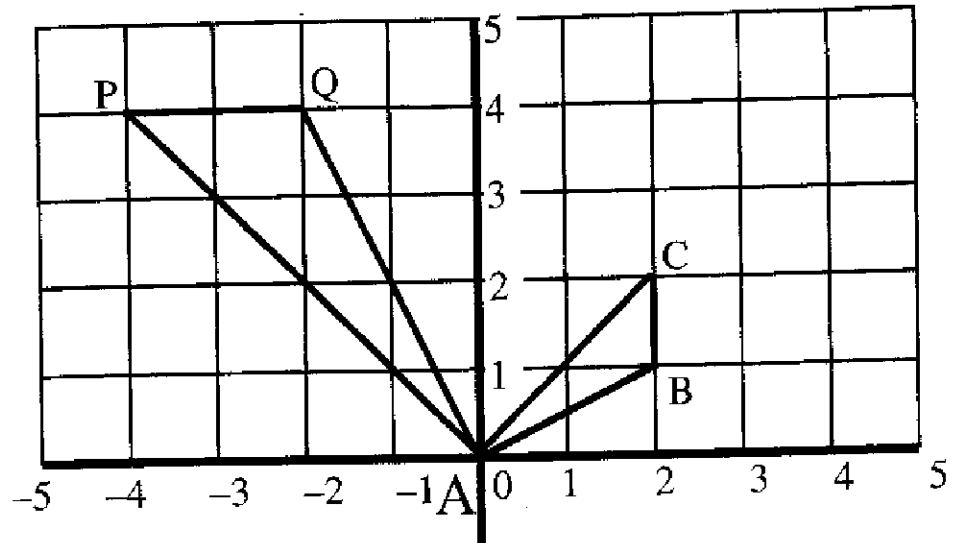
(i) Show that  $\triangle TMO$  and  $TNO$  are congruent. (Hint : Join  $OT$ )

(ii) Find the size of **reflex** angle  $MON$ .

(iii) Hence find the size of **obtuse** angle  $MPN$ .

(8 marks)

15.



(i) Describe the compound transformation that maps  $\triangle ABC$  into  $\triangle AQP$ .

The transformation is an \_\_\_\_\_, centre \_\_\_\_\_, with scale factor \_\_\_\_\_  
and a \_\_\_\_\_ of \_\_\_\_\_ degrees anticlockwise about A.

(ii)  $M$  is the matrix  $\begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix}$  which maps  $\triangle ABC$  into  $\triangle AQP$ . Work out the matrix that transforms  $\triangle AQP$  back to  $\triangle ABC$ .

Inverse of matrix  $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

(8 marks)