JUNIOR LYCEUMS ANNUAL EXAMINATIONS – 2001
Educational Assessment Unit – Education Division.

FORM 4 **MATHEMATICS (MENTAL)** **TIME: 15 min.**
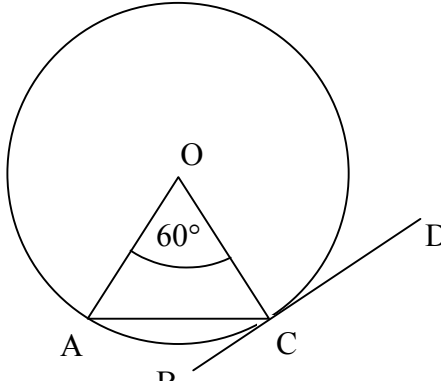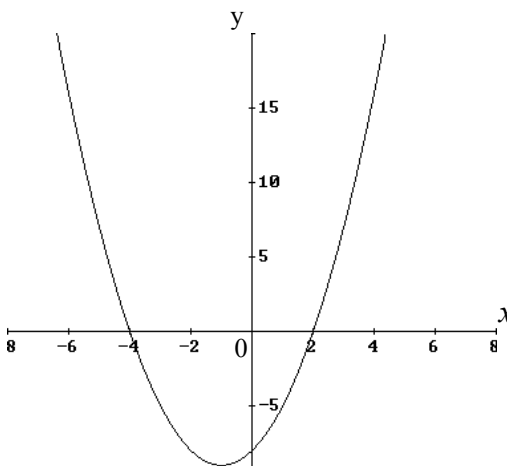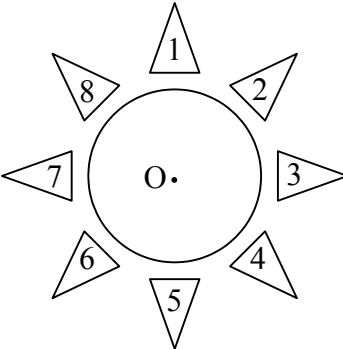
Name _____ Class _____

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.

	QUESTION	ANSWER
1.	Give an estimate for $(41.5 - 28.95)^2$.	
2.	Paul has 550 stamps. Rita has 750 stamps. Find, in its simplest form, the ratio of the number of Paul's stamps to the number of Rita's stamps.	
3.	Lm1 is equivalent to 488.8 Pesetas (PTE). The value of a pair of shoes that costs Lm32.99 is roughly: **(A)** 160000 PTE **(B)** 1600 PTE **(C)** 16000 PTE **(D)** 10600 PTE.	
4.	Simplify $\dfrac{x^2 - 4}{2(x - 2)}$.	
5.	The sides of four different triangles are: **(A)** 2 cm, 3cm, and 4 cm **(B)** 0.3 m, 0.4 m and 0.5 m **(C)** 5 m, 6 m and 7 m **(D)** 6 m, 4 m and 3 m. Which one of these triangles is right angled ?	

6.		BCD is a tangent to the circle centre O and $\angle AOC = 60°$. What is the size of $\angle ACB$?	

7.	A match can either be won, lost or drawn. The probability that team A wins a match is $\frac{2}{7}$. The probability that team A obtains a draw is $\frac{4}{7}$. What is the probability that team A loses the match ?	

8.

Which one of the following equations represents the given graph ?

(A) $y = x^2 - 8$
(B) $y = 2x - 8$
(C) $y = 8 - 2x - x^2$
(D) $y = x^2 + 2x - 8$.

9.

	A	**B**	**C**	**D**
1		7.5		
2		11		
3		21.5		
4	Total			
5				

The figure shows part of a spreadsheet.
Cell **B4** contains the formula =sum(B1:B3).
What result will be displayed in cell **B4** ?

10.

Which triangle shows a clockwise rotation of triangle number 2 by 90° about O ?

| FORM 4 | | | | | MATHEMATICS (MAIN) | | | | | | | | TIME: 1h 45 min. | | | |

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL MAIN	MENTAL MARK	GLOBAL MARK

DO NOT WRITE ABOVE THIS LINE

Name _____   Class _____

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

1.   Use your calculator to evaluate $\left(\dfrac{215.6}{12.5} + \dfrac{82.94}{32.5} \right)^{3}$.

Give your answer:-
a)   correct to 3 significant figures;
b)   in standard form.
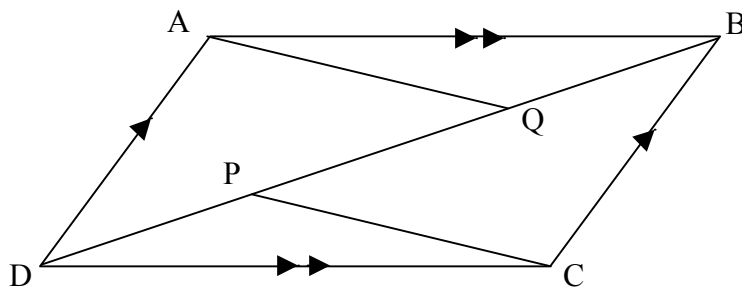
(4 marks)

2.   Make X the subject of the formula $\dfrac{1}{R} = \dfrac{1}{X} + \dfrac{1}{Y}$.

(4 marks)

3. Twelve cards are numbered from 1 to 12.
   a) Maria picks a card at random. What is the probability that this card shows a square number ?
   b) Maria replaces the card. Then she picks two cards together at random. What is the probability that **both** cards show a square number ?
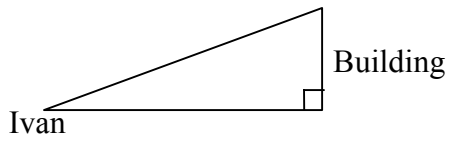
<div align="right">(4 marks)</div>

4.

ABCD is a parallelogram. P and Q are points on DB such that DP = QB. Show that Δ ABQ and Δ CDP are congruent.

<div align="right">(4 marks)</div>

5. Ivan stands 65 metres from a building which is 25 metres high.
    a) Using a scale of 1 cm for 5 m, make a scale drawing to show this information.
    b) Measure and write down the angle of elevation of the top of the building from Ivan's position.
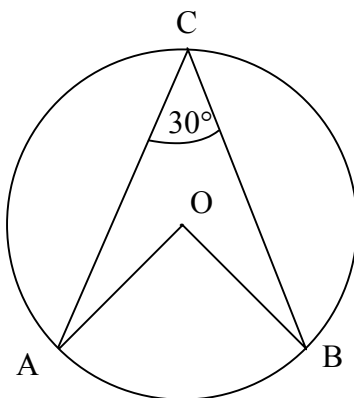   (*The diagram shows a rough sketch to help you.*).

(4 marks)

6. a) Simplify $y^{10} \div y^{-2}$.
    b) Work out the value of $9^{\frac{1}{2}} - 9^{-\frac{1}{2}}$.
    c) $a^x = \dfrac{1}{a^8}$. Write down the value of x.

(6 marks)

7.


O is the centre of the circle. The length of the minor arc AB is 12.57 cm and $\angle ACB = 30°$.
Calculate, giving the answers correct to 2 significant figures:
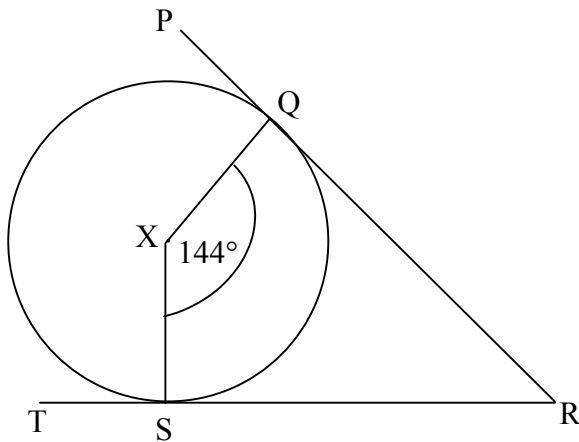a) the radius of the circle;
b) the area of the minor sector AOB.

(6 marks)

8.   A boat travelled due North from A to B for 2 hours at a speed of 6.5 km/h. Then it travelled
due East from B to C for 1½ hours at a speed of 4 km/h. Calculate the bearing of C from A,
giving the answer correct to the nearest degree as a three figure bearing.
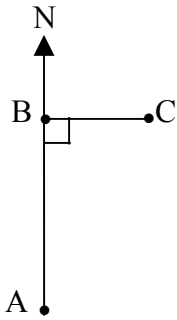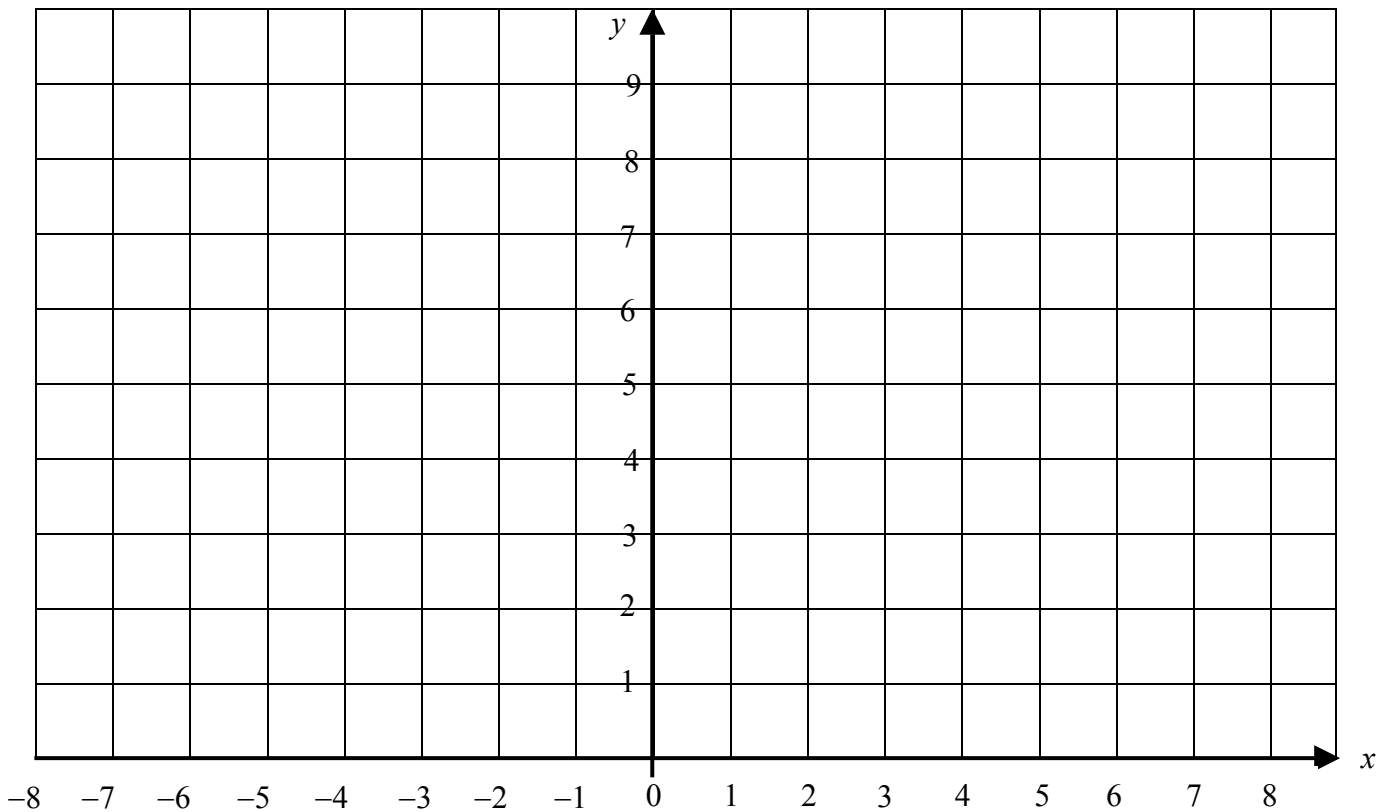

(6 marks)

9.

PQR and TSR are two tangents to a circle
centre X. Angle QXS = 144°.
Giving a reason for each answer work out the
size of : a) angle XSQ;
           b) angle SQR;
           c) angle QRS.

(6 marks)

10. *In this question take the values of x from − 8 to 8 and the values of y from 0 to 9.*

    a) Draw a triangle with coordinates (1,1) , (3,1) and (1,4) and label it A.

    b) Triangle A is enlarged by a scale factor of 2 about (0,0).
       Draw this enlargement and label it B.

    c) Triangle B is reflected in the line $x = -1$. Draw the reflection of B and label it C.

    d) The longest side of triangle A is 3.5 cm. Calculate the length of the longest side in triangle C.

(6 marks)

11. On one side of a car park there are 10 red cars and 6 black cars.
   a) A car leaves the car park.
      What is the probability that it is :
   (i) a red car;   (ii) a black car ?
   b) Two cars leave the car park. Complete the tree diagram to show the probability
      for a car leaving the car park being red or black .

$P(R) = \dfrac{9}{15}$

$P(B) =$

$P(R) =$

$P(B) =$

$P(R) =$

$P(B) = \dfrac{5}{15}$

1st car   2nd car
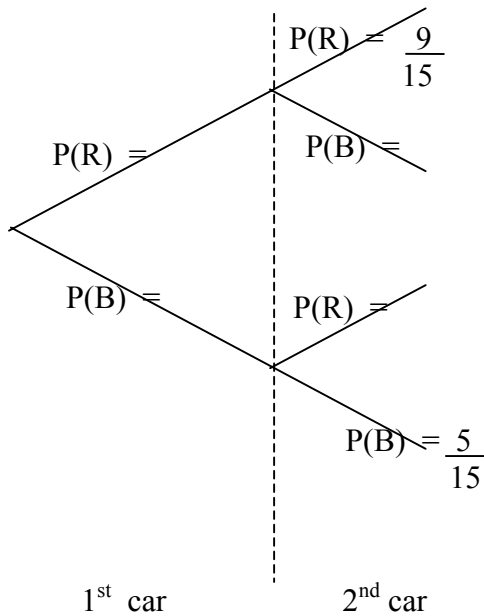
c) Use the tree diagram to work out
   the probability that two cars leaving
   the car park are:
   (i)   both black;
   (ii)   both of the same colour;

(8 marks)

12. a) Solve the equation $2x^2 - x - 3 = 0$.

   b) The following **LOGO** commands are used to draw a rectangle with a perimeter of
      100 turtle steps. Fill in the missing number:
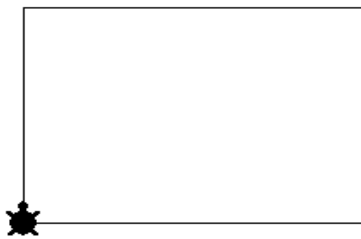
      REPEAT 2 [FD 20 RT 90 FD____ RT 90].

   c) A rectangle has a perimeter of 100 cm. One side of the rectangle is of length x cm.
      (i)   Write down a quadratic equation for the area A of the rectangle.
      (ii)   Given that the area of the rectangle is 400 cm^2, form a quadratic equation
               in x, and solve it to find the dimensions of the rectangle.

(8 marks)

13. A car was bought for Lm8500. For the first year, the owner of the car paid an insurance premium of 2.5% on its cost price.
   a) Calculate the premium that he paid for his insurance.
   b) The value of the car depreciates by 5% at the end of the first year and by 8% at the end of each successive year. Calculate the value of the car after (i) 1 year (ii) 2 years.
   c) For the second year the insurance premium decreased by 15%. How much did he pay for his premium in the second year ? Give your answer correct to the nearest cent.

(8 marks)

14. VABCD is a right pyramid on a square base of side 16 cm. V is the vertex of the pyramid and M is the mid-point of BC. VA = VB = VC = VD = 17 cm.
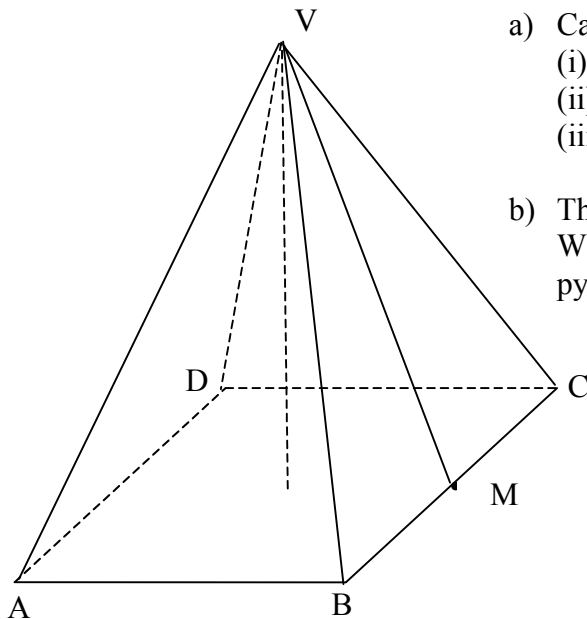
a) Calculate:
   (i)   the length of VM;
   (ii) the area of triangle VBC;
   (iii) the total surface area of the pyramid.

b) The volume of the pyramid is 1075.2 cm^2. Work out the perpendicular height of the pyramid.

Volume of a pyramid = $\dfrac{1}{3}$ area of base × height.   (8 marks)

15.   The table shows the values of x and y for the equation $y = 2x^2 + x - 6$
       for values of x from -3 to 2

.

x	-3	-2	-1	0	1	2
y	9	0	-5	-6	-3	4

   a)   On the graph paper provided draw the graph of $y = 2x^2 + x - 6$.
        Use a scale of 2 cm for 1 unit on x-axis, and 1 cm for 1 unit on y-axis.

   b)   From the graph, write down:
        (i)   the y-intercept;
        (ii)   the **positive** solution of $2x^2 + x - 6 = 0$.

   c)   On your graph, draw a suitable straight line to solve the equation $2x^2 + x - 6 = 2$.
        Hence write down the two solutions of $2x^2 + x - 8 = 0$.

                                                                          (8 marks)

END OF PAPER.