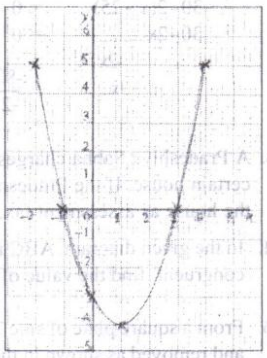
GCE O/L December 2002
Mathematics Paper 2
Duration 3 Hour

1. (a) (i) Simplify $\frac{(a^2)^2}{a^3b^{-2}}$ (ii) Find the value of $2\log_{10} 20 - \log_{10} 4$

(b) The diagram shows the graph of the function $y = x^2 - 2x - 3$ Using it,

(i) Write down the co-ordinates of the minimum point of the graph
(ii) Write down the equation of the axis of symmetry of the graph.
(iii) Write down range of values of x for which the function is negative
(iv) Write down the roots of the equation $x^2 - 2x - 3 = 0$



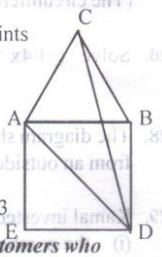
(c) Marks obtained by a group of students for mathematics at an examination are shown in the given stem and leaf diagram.

(i) Write down the individual marks represented in the fourth row.
(ii) Find the total number of students whose marks are represented in the stem and leaf diagram
Find
(iii) the mode (iv) the range (iii) the median of the given marks.

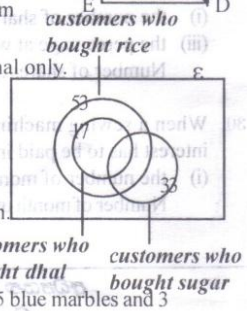
Stem	Leaf			
3	0,	1,	2	
4	3,	4		
5	5,	6,	8	
6	2,	7,	7,	8
7	3,	5,	9	

(d) In the given diagram the square ABDE is drawn on the side AB of the equilateral triangle ABC. The points C and D and the points A and D re joined.
Copy this diagram on to your answer script. Answer the following questions.

(i) Write down the value of $A\hat{B}C$ (ii) Write down the value of $A\hat{B}D$ (iii) Find the value $C\hat{B}D$
(iv) Give reasons why $B\hat{C}D = B\hat{D}C$. (v) find the value of $B\hat{D}C$. (vi) find the value of $A\hat{D}C$



(e) According to information collected about the customers who came to shop an hour on a certain day ;53 customers have bough rice 17 dhal and 33 sugar This information is shown in the venn diagram
(I) 20 customers bought rice and sugar find the number of customers who bought sugar only
(ii) 9 customers bouhgt allthres commodities rice ;dhal and sught the two commoditits rice and dhal only.
(iii) How many customers bought rice only.
(iv) If the toal number of customers who came to the shop durng that hour is 87 how many have come to buy other necesities?
(v) If A = {Customers who bought rice }
B = {Customers who bought dhal } Show the relation between A and B using set notation.



(f) There are some marbles which are equal in shape, size and weight but different in colour. Of them 5 blue marbles and 3

taken out at random from container X. The marble taken out of X is put into Y and a marble is taken out at random from Y.

(i) Draw a tree diagram to illustrate the above two stages.
(ii) Write down the probability that the marble taken out of the container X is a blue marble.
(iii) Find the probability of getting a blue marble at the second stage only.
(iv) Of the marbles taken out at the two stages find the probability that only one will be a blue marble.

2. (a) If a uniform metal rod of length 4 metres weighs 620.5 grammes, find to 2 places of decimals the weight of a 3 metre long metal rod of the same make.

(b) The following is a recipe given in a cookery book for the preparation of jak seed pittu.
200 grammes jak seed flour 300 grammes white rice flour
500 grammes scraped coconut In preparing jak seed pittu

(i) Write the ratio of jak seed flour white rice flour, and scraped coconut used.
(ii) Find the weight of scraped coconut needed to mix with 600 grammes of white rice flour
(iii) Find the number of grammes of Jak seed flour needed for a mixture of 3 kilogrammes of all three items.

(c) The marked price of an article which a trader bought for Rs 150 isg Rs 180. While selling, if the trader allowed a discount of 10% on its marked price, find his

(i) Profit (ii) Percentage Profit

3. Using a straight edge, a pair of compassess and a cm/mm scale **only**, and showing the construction lines clearly,
   (i) construct the triangle ABC in which AB = 8cm, CAB = 60^0 and ABC = 45^0
   (ii) measure and write down the length of the side BC
   (iii) construct the bisector of the angle CAB
   (iv) construct a line through C parallel to AB. Name the point it meets the bisector of the angle CAB as D.
   (v) constuct a triangle with AC as a side and equal in area to the quadrilateral; ABDC. Name this triangle as ACE.

4. (a) Kamal invests Rs 15 000 in a fixed deposit in a bank 10% compound interest per annum for two years. find the amount he gets at the end of the two years.

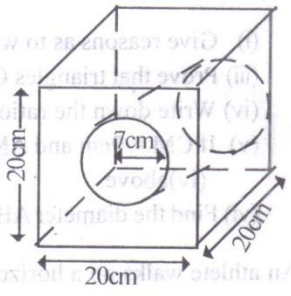
   (b) Ranjith prepared a few cards and wrote a number on each card. He wrote those numbers in such a way that they represent a progression as shown below. 2, 6, 18, 54 .....
   (i) State what kind of a progression it is Give reasons.
   (ii) If the sum of the numbers written on the cards is 728 ; find the number of cards that Ranjith prepared.

   (c) A trader exports flowers worh 2000 Singapore Dollars to Singapore. If he obtains foreign exchange in US Dollars, find the amount he gets for this order in US Dollars. Give the answer to the nearest Dollar. (1 Singapore Dollar = 53.80 Sri Lankan Rupees; 1 US Dollars = 94.80 Sri Lankan Rupees)

5. (a) Solve the following simultaneous equations :
   $2a + 3b = 12$
   $3a - 4b = 1$

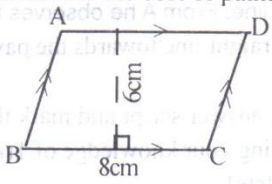
   (b) The area of a square is twice the area of a rectangle. The length of the rectangle is 3 cm greater than the length of a side of the square while the breadth of the rectangle is 4 cm less than the length of a side of the square. If the length of a side of the square is x : in terms of x,
   (i) Write down the length of the rectangle.
   (ii) Write down the breadth of the rectangle.
   (iii) Obtain an algebraic expression for the area of the rectangle and simplify it.
   (iv) Obtain an algebraic equation using the relation between the areas of the square and the rectangle. Solve the equation and find the length of a side of the square.

6. The diagram shows a solid metal cube of side 20 cm, from which a right circular cylindrical cavity of radius 7 cm is symmetrically carved out from one face of the cube to the opposite face.



   (i) Find the volume of the cube before carving out the cavity.
   (ii) Find the volume of metal removed from the cavity.
   (iii) Calculate the volume of the remaining part of the solid.
   (iv) Calculate the total surface area of the remaining part of the solid including the curved Surface of the cavity.
   (v) If the cost of painting one square centimetre area is 10 cents find the cost of painting the total surface area of the remaining part of the solid.

7. (a) Using the data shown in the diagram, find the area of the
   (i) Parallelogram ABCD
   (ii) traingle DBC



   (b) If the side BC is produced to E such that CE = x cm, find in terms of x
   (i) the length of BE (ii) the area of traingle DBE
   (iii) If the area of the triangle DBE is y cm^2, find the relationship between y and x.
   (iv) Copy the incomplete table given below on to your answer script and complete it using the relationship in (iii) above.

x	-8	-6	-3	0	3	6
y						

   (v) Accordingly draw a graph to represent the relation between x and y on the graph paper provided. Take **ten small** squares to represent **two units along the x-axis** and **ten small squares** to represent **five units along the y-axis**, as the scale.

(c) When the area of traingle DBE is 28.5cm^2, use your graph and find,

(i) the value of x

(ii) the length of base BE of the traingle DBE

(d) If the point E lies on BC and when the area of traingle DBE is 12cm^2, find the length of BE using the above graph.

8. Information collected from 100 houses in a housing scheme about the consumption of units of electricity by each house during a certain month is shown in the table below.

Number of units of electricity	71-80	81-90	91-100	101-110	111-120	121-130	131-140
Number of houses (frequency)	5	12	26	34	18	3	2

(i) Write down the modal class of the above distributon

(ii) Taking the mid -value of the model class as the assumed mean, find the mean number of units of electricity of the above group of data. If Rs 2 is charged for a unit of electricity, find the mean cost of electricity for a house.

(iii) The electric company intends to charge the consumers as follows:

1 - 50 units at Rs x per unit

51 - 100 units at Rs 2x per unit

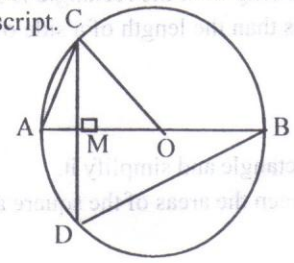
over 100 units at Rs. 4x per unit

and the monthly fixed charge is Rs P.

Accordingly write an algebraic expression for the mean electricity charge of a house, using the mean number of units of Elelctricity you obtained in (ii) above.

(iv) When x = Rs2, and P = Rs. 50 find the monthly mean electricity of a house.

9. The diagram given below shows a circle with centre O. The diameter AB and the chord CD intersect at right angles at M. Copy this diagram on to your answer script.



(i) Give reasons as to why CM = MD (ii) Name the angle in the same segment which is equal to $\hat{ACD}$

(iii) Prove that triangles CMA and BMD are equiangular

(iv) Write down the ratios of the sides of the traingles CMA and BMD

(v) If CM = 9cm and AM = 3cm, find the length of MB, using the rations of ths sides of the traingles that you obtained in (iv)above.

(vi) Find the diameter AB of the circle. (vii) Find the length of AC. Give the answer in surd form.

10. An athlete walks on a horizontal play ground along a straight line towards the pavilion which is situated at the end of the play He reaches the point A on the straight line. From A he observes the heighest point D of the pavilion an angle of elevation of 31°13'. He then, walks 8 m along the same straight line towards the pavilion and reaches the point B. The angle of elevation of D from B is 48°22'

(i) Copy the diagram on to your answer script and mark the data given above.

(ii) Mark BC = x and DC = y. Using your knowledge of Trigonometry write down two equations in terms of x and y. [Neglect the height of the athlete]

(iii) Using your knowledge of logarithms, find the height of the highest point of the pavilion from the horizontal ground.