**MBOGO HIGH SCHOOL**

**DEPARTMENT OF MATHEMATICS**

**REVISION QUESTIONS -2013-**

SUBJECT ; mathematics

CLASS ; s.4

DURATION ;

**INSTRUCTIONS :**

* ***Answer all questions in this paper***
* ***All necessary calculations must be shown on the same page as the rest of your answer***
* ***Mathematical tables and list of formulae and squared papers are provided.***
* ***Silent and non programming calculators may be used.***
* ***State the degree of accuracy at the end of each answer.***

**SECTION A (40 MARKS)**

1. Find the value of y if .
2. If  and , find the value of , without using tables or calculator.
3. A stretch of land on a map of scale 1: 50 000 has an area of 120 cm2. Determine the actual area of the land in km2.
4. A train leaves station A for station B 200 km away moving with a speed of 50 kmh-1. After 30 minutes, another train leaves station A for the same destination but moving with a speed of 80 kmh-1. Find the distance from station A to the point where the second train overtakes the first one.
5. Solve the pair of simultaneous equations below using the matrix method:

.

1. If  , state the values of , and .
2. A boy whose height is 1.5 m stands on the horizontal ground and observes that the top of a flag pole, 10 m away makes an angle of elevation of 400. Calculate the height of the flag pole.
3. Find the equation of the line that passes through the point of intersection of the lines and and the point.
4. Given that  and , find;

(i)  (ii)  .

1. Find the prime factors of 11025, and use your answer to find the square root of 11025.

**SECTION B .**

11. Using a pair of compasses and a ruler only

1. Construct triangle ABC such that ABC = 600. BC = 9.0cm, AC = 8.5cm Measure the length BA.
2. Bisect the side AB and AC. Produce the line bisectors to intersect at point M
3. Using the same centre, draw a circle to circumscribe triangle ABC. Measure the radius of the circle. Hence calculate the area of the circle.

12. A retail trader ordered for shirts from a Kampala whole sale shop as follows

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | S | M | L | E |
| Small | median | large | Extra large |
| Blue  Green  Yellow | 0  30  0 | 40  0  20 | 20  25  0 | O  O  10 |

Given below is the cost for each size of shirt.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | S | M | L | E |
| Small | median | large | Extra large |
| Cost (Ushs) | 3000 | 3600 | 4200 | 4800 |

1. (i) Write down a 4x3 matrix for the order of the shirts made.

(ii) Write down a 4 x 1 matrix to show the cost

1. Given that the trader had to pay a tax of 17% of the cost of the shirts purchased, find his expenditure on the order.

13. A school has a teaching staff of 22 teachers 8 of them teach mathematics (M), 7 teach physics (P) and 4 teach chemistry (C). three teach both Mathematics and physics, and one teaches mathematics and chemistry. No teacher teaches all the three subjects. The number of teachers who teach physics and chemistry is equal to that of those who teach chemistry but not physics.

1. Represent the above information on a Venn diagram
2. Find the number of teachers who teach
3. Mathematics only
4. Physics only
5. None of the three subjects
6. Find the probability that a teacher picked at random teaches only one or none of these subjects.

14. The table below shows the taxable and rate structure for coco cola bottling company. Mr. Kizza who earns 641,000/= as his gross monthly income is single with two dependants in the age brackets of (6 – 10) years and (11 – 19) years. In a month that had 30 days; the company allowed him the following benefits before subjecting his taxable income to taxation.

Electricity Shs. 35,000 per month

Water Shs. 1000 per month

Housing Shs. 50,000 per month

Medical up keep Shs. 240,000 per month

Transport Shs. 7000 per month

Insurance Shs. 20,000 per month

Marriage Shs. 420,000 per month

Single Shs 20,000 per month

|  |  |
| --- | --- |
| Monthly taxable income | Rate (%) |
| 0 – 30,000  30,001 – 80,000  80,001- 120,000  120,001 – 180,000  180,001 – 250,000  250,001 – 320,000  Above 320,000 | 12.0  16.8  20.0  24.0  28.5  32.5  35.0 |

|  |  |  |  |
| --- | --- | --- | --- |
| Children | | department | |
| Age (yrs) | Amm (shs) | Age (yrs) | Amm (shs) |
| 0 – 10  11 – 20  Above 20 | 15,000  8,000  7,000 | 0 – 5  6 – 10  11 – 19  Above 20 | 20,000  28,000  25,000  15,000 |

* 1. Help Mr. Kizza to calculate his

1. Allowance
2. Taxable income
3. Income tax
   1. Determine the percentage tax that goes to his taxable income

16. Using x values from -3 to 4, draw the graph y = x2 – x - 6. Use your graph to solve the equations.

1. x2 – x - 6 = 0
2. ­x2 – x - 6 = 6.

17. (a) A ladder whose base is 4m from the vertical wall reaches 6m up the wall. What is the angle between the ladder and the ground?

(b) A ship is observed moving away from the top of a cliff which is 80m high. With in a time span of 10sec, the angle of depression decreases from 300 to 200. Determine the distance covered with in this time range. Hence find the speed of the ship in metres per sec. (ms-1)

18. (a) A bag contains 3red balls and 4 blue balls. Two balls are selected at random one after another without replacement. Represent this information on a tree diagram and find the probability that;

1. both are blue balls
2. both are of the same colour
3. they are of different colours.

(b) Given that f(x) = 3x + 4, g(x) = 8 – x

X2 – 1

Find;

1. f-1(x)
2. the values of x for which g(x) is not defined.

19. (a) Using a ruler and a pair of compasses only construct quadrilateral ABCD where AB = 7.7cm, angle ABC = 450, angle BAD = 1500, AD = 8.8cm and BC = 6.8cm.

(b) Draw a circle with centre p that passes through A, C, and D

(c) Determine; (i) the length of BP

(ii) the area of the circle.

20. (a) The vertices of triangle ABC are A(1,0), B(1,2), C(5,2) are mapped onto the triangle A1B1C1 by the transformation matrix, M, which is 1 0

2 4

(a) Find the;

(i) Coordinates of A1B1C1

(ii) ratio of area of ABC to A1B1C1

(b) (i) Plot ABC and A1B1C1 on the same axes

(ii) Determine a matrix of the transformation which maps A1B1C1 back to ABC.

21. A helicopter flies from Kampala due North for 400 km. it then flies on a bearing of 2850 for 280km. From there it flies on a bearing of 0900 for 400km.Draw a sketch diagram to show the route of the helicopter. Hence draw an accurate diagram using a scale of 1cm to represent 50km.From your diagram, find the distance and bearing of Kampala from the final destination of the helicopter.

22. The table below shows the heights (in cm) of 140 students of a certain school with their corresponding frequencies.

Height frequency

145 – 149 8

150 – 154 15

155 – 159 25

160 – 164 40

165 – 169 33

170 – 174 12

175 – 179 5

180 – 184 2

1. Calculate:

(i) Mean

(ii) Median

1. Represent the heights of students on a cumulative frequency curve. Use your curve to estimate:
2. Lower quartile
3. Upper quartile

Hence deduce the semi – interquartile range.

23. The speed Vm/s of a car after t seconds is given by the following table.

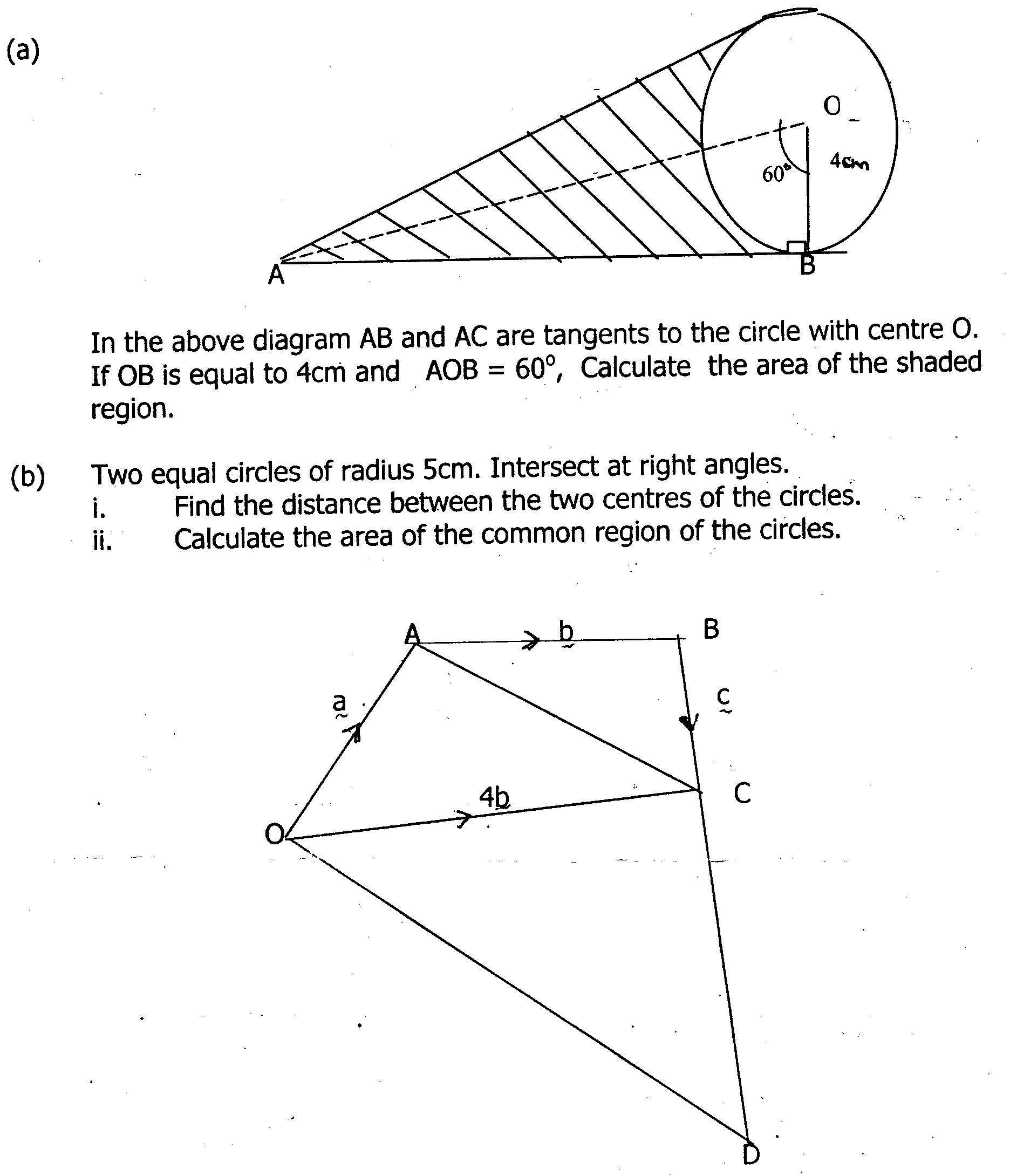
|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T(s) | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| V(m/s) | 0 | 15 | 26 | 35 | 39 | 40 | 36 | 28 | 16 | 0 |

Represent the information in a graph using 1cm: 2 s on the x-axis and 1cm: 5m/s on the y-axis.

1. Estimate the rate at which the speed is changing when t = 14s.
2. Find the average rate of change of speed between t = 2 s and t = 7s.

24. Uganda airlines agree to provide a flight on a special occasion for 160 first class passengers and 600 tourist passengers. The company must use two or more of its type A planes. Each type A plane has 20 first class seats and 30 tourist seats. Each type B plane has 20 first class seats and 60 tourist seats. The flight costs are $10,000 for each type A plane and $15,000 for each type B plane. If the total cost is to be held to a minimum, how many of each of plane should be used?

25.

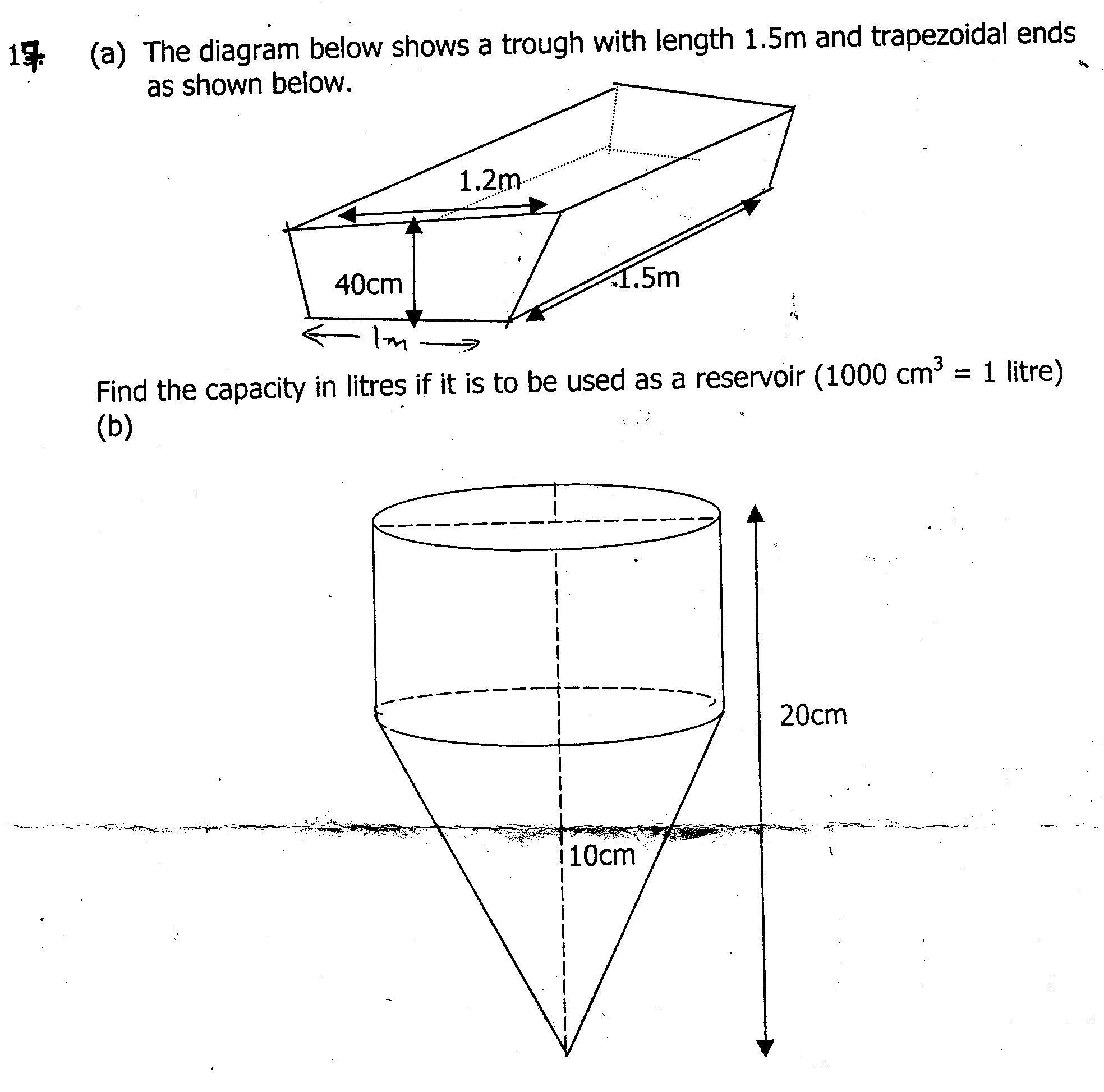
26. It is given that **OA** = *a*, **AB** = *b*, **BC** = *c*, **OC** = 4*b.*

(a) Express in terms of b and c.

(b) Given that **OD =** 4 **AC**, express OD in terms of b and c. Hence express CD in terms of b and c.

(c) What is the ratio of the area of triangle OCD to ABC?

(d) Show that BCD is a straight line.



The diagram above shows a toy-cup whose total height is 20cm and top radius 14cm.

* 1. The amount of water the cup can hold.
  2. Total surface area of the cup.

28. (a) A sum of Shs. 40,000 is invested at 15% pa compound interest, interest being added half yearly. Find the amount after two years.

29. (a) Given that matrices A = 1 2 -3 and B = -1 1 1

Find 4 5 6 3 1 2.

(i) A + B

(ii) B + A

(b) N = 2 -2 and M = 1 1

5 4 5 2

Find;

(i) NM

(ii) MN

(iii) does NM = MN

(iv) MN-1

30.(a) On the same axes, draw graphs of and for , using a suitable scale.

(b) Use your graphs to solve the equations;

(i)  (ii) .

31.(a) z varies partially as and partially as . Given that z = 7 when = 1 and z = 22 when = 2, find the value of z when = 4.

(b) The cost of milling wheat flour is partly fixed but partly varies directly as the mass of the flour. Given that the cost of milling 2 kg of wheat flour is Shs. 500, while that of milling 4 kg of the flour is shs. 800, determine:

1. The cost of milling 6 kg of wheat.
2. The quantity of wheat milled when the cost is sh. 1400.

32. OAPB is a parallelogram and Q is the midpoint of AP. OP meets BQ at X.

1. If **OA = a** and **OB = b**, find  in terms of **a** and **b**.
2. If R is point on BQ produced such that. Show that the points O, A and R are co-linear.
3. Given that OX= rOP and  , find the scalars r and s.
4. Find the ratios  and  .

33. A radio company has two sections A and B that produce different radios. Section A produces a radio that requires 80 components and costs sh. 24,000. Section B produces a radio that requires 250 components and costs sh. 20,000. The company to stay in business must have a minimum of 1200 components every time production takes place and sh. 240,000 to meet the expenditures involved. The number of radios from section B should be at least three quarters those from section A. If section A and B produces x and y radios respectively,

1. Represent this information by inequalities.
2. Represent your inequalities graphically.
3. If both sections are producing radios, state the combination that utilizes all the available money.
4. Find the maximum amount saved.

1.4 m

2.45 m

34.

The diagram above shows a closed water tank comprising of a hemispherical part surmounted on a top of a cylindrical part. The two parts have the same diameter of 2.45 m and the cylindrical part is 1.4 m high as shown.

1. Calculate the total surface area of the tank.
2. Calculate the capacity of the tank.
3. Calculate the number of 200 litre drums required to empty a full tank of water.

35. (a) PQRS is a square with A (0, 5), B (0, 3), C (2, 3) and D (2, 5). It is rotated through 2700 about O (0, 0). Find the coordinates of A, B, C and D the images of A, B, C and D respectively.

(b) Given that is the reflectedonto in the line, find the coordinates of and.

(c) Determine the matrix of a single transformation which maps  onto. Describe the matrix fully.

36. James cycles from his home to town P starting at 8:00 a.m. After one hour while cycling at a uniform speed of 30 kmhr -1, he reached town Q and rested for half an hour. He then continued cycling at the same speed for another 30 km to town P.

1. (i) Using a suitable scale, draw a distance time graph showing James’s journey.

(ii) What is James’s average speed?

1. If the elder sister Mary hours later decided to follow him by bodaboda,moving steadily at 80 kmh -1, show her journey on the same axes and use it to determine:
2. When and where Mary overtook James.
3. Their times of arrival at town P.
4. How long Mary waited at town P before James arrived.

37. St. John SS School has 1020 students. According to the school rules and regulations, students should bathe everyday (B), wash their clothes every week (W) and iron their clothes (C). During a certain month, it was found out that out of the 102 S4 students, 41 obeyed B, 35 obeyed W and 52 obeyed C. 9 students obeyed B and W, 10 students obeyed C and W only and 24 students obeyed B and C. If 17 students obeyed neither rules.

1. Represent this information on a Venn- diagram.
2. From the Venn –diagram, find the number of students who:
3. Obeyed all the three rules
4. Ironed clothes only.
5. If a student is picked at random from S4, find the probability that he/she obeyed at least two of the rules.

38. B C

F

G

H

E

S

Q

D

A

P

R

P

Q H

Q

In the figure above, R and S are midpoints of BF and CG respectively and all dimensions are in cm. Given that EQ = 3, QH = 5, AP = 5, PD = 3, AE = 6 and HG = 10, find:

1. The lengths PQ, QR, FH and PH.
2. The angle between QR and plane EHGF.
3. The angle between HB and EHDA.
4. The angle between EDCF and the base.

39. Draw a graph of for the values of in the range, using intervals of 300. Use your graph to solve:

i) ,

ii) ,

iii) .

***\*\*\* End\*\*\****