Approved

NAME MARKING SCHEME CLASS

DATE 11 SIGNATURE

MATHEMATICS
FORM TWO
1ST TERM 2013
2 ½ HRS.

Kenya Certificate of Secondary Education
MATHEMATICS
FORM TWO 1ST TERM EXAMINATION 2013

Instructions

- ***Write your name and your class in spaces provided***
- ***The paper contains two section. Section I and Section II***
- ***Answer all the questions in section I and any five questions from section II***
- ***All answers and working must be written on the question paper in the spaces provided below each question .***
- ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
- ***KNEC Mathematical tables may be used. Except where stated otherwise.***

For Examiner's Use Only

Questions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Marks																

Questions	17	18	19	20	21	22	23	24
Marks								

Grand Total

SECTION 1 (50 MARKS)
Answer all the questions in this section

1. Use logarithms to evaluate $\dfrac{34.33}{\sqrt{5.25 \times 0.042}}$ (4 marks)

ND	S.F	Log.
34.33	3.433×10^{1}	1.5367
5.25	5.25×10^{0}	0.7202
0.042	4.2×10^{-2}	$\bar{2}.6233$
		$\bar{1}.3435$

$\frac{-1.3435}{2}$

$\frac{-2+1.3435}{2}$

-1.6718

1.5367
$-\ 1.6718$
1.8649

$10^{1} \times 7.327$

73.27

2. Without using a calculator or mathematical tables, evaluate; (4marks)

$\frac{5}{6} - \frac{1}{3} of \frac{27}{20} \div 2$

$\frac{5}{6} - \frac{1}{3} \times \frac{9}{20} \div 2$

$\frac{5}{6} - \frac{9}{20} \times \frac{1}{2}$

$\frac{5}{6} - \frac{9}{40} = \frac{100-27}{120}$

$\frac{73}{120}$

3. Evaluate $\dfrac{-12 \div (-3) \times 4 - (-20)}{-6 \times 6 \div 3 + (-6)}$ (3 marks)

$\frac{-12 \div -3 \times 4 - -20}{-6 \times 6 \div 3 + -6}$

$\frac{4 \times 4 + 20}{-6 \times 2 - 6}$

$\frac{16+20}{-12-6}$

$\frac{36}{-18}$

-2

7. Solve for x in $9^x \times 3^{2x} = 27$ (3 marks)

$9^x \times 3^{2x} = 3^3$

$3^{2x} \times 3^{2x} = 3^3$

$2x + 2x = 3$

$4x = 3$

$x = 3/4$

8. A Kenyan businessman bought a car from Zimbabwe for 12,000 Zimbabwean dollars. He sold it in Kenya at a profit of 15%. Given that 1 Zimbabwean dollar is equal to KSh.9.8489, calculate his profit to the nearest Kenyan Shilling. (3marks)

$12,000 \times 115$

$120 \times 115 = 13,800$

1ZD = 9.8489

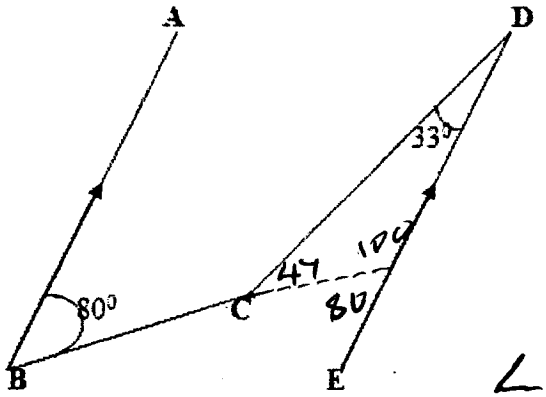
ZD 800 = ?

$= ZD\ 13800 \times 9.8489$

Sh. 135914.80

$1800 \times 9.8489 = 17728.02$

9. In the figure below AB parallel to DE, <ABC = 80° and <CDE = 33°. Find <BCD.



180 − 133 = 47°

$\angle BCD = 133°$

4. Find the equation of the perpendicular bisector of the line AB where the coordinates of A and B are (-3, 2) and (6, 4) respectively. (3marks)

$\left(\frac{-3+6}{2}, \frac{2+4}{2}\right)$

$(1.5, 3)$

$m_1 = \frac{4-2}{6+3} = \frac{2}{9}$

$m_2 = -\frac{9}{2}$

$\frac{y-3}{x-1.5} = -\frac{9}{2}$

$y-3 = -\frac{9}{2}x + 6.75$

$y = -\frac{9}{2}x + 9.75$

5. Three bells P, Q and R are programmed to ring after an interval of 15 minutes, 25 minutes and 50 minutes respectively. If they all rang together at 8.45 a.m, when will they next ring together again. (4marks)

$15 = 3 \times 5$

$25 = 5 \times 5$

$50 = 2 \times 5 \times 5$

$5^2 \times 2 \times 3$

25×6

$= 150$

~~60~~

2.5hrs.

8.45 AM

2.30

11.15 AM

6. Salim bought 4 pencils and 6 biro-pens for Sh.66 and Muhammad bought 2 pencils and 5 biro-pens for Sh.51. Find the price of each item. (3 marks)

$4p + 6b = 66$

$2p + 5b = 51$

$4p + 6b = 66$

$-4p + 10b = 102$

$4b = 36$

$b = 9$

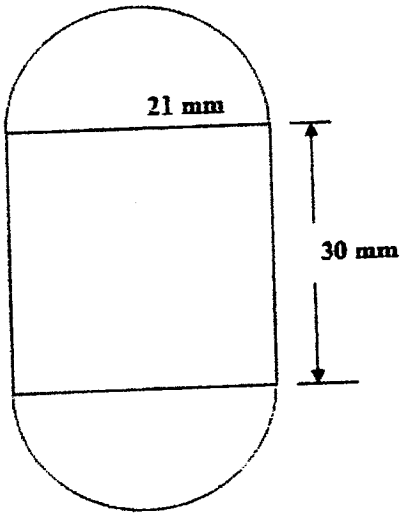
$4p + 54 = 66$

$4p = 12$

$p = 3$

$b = 9$

11. The figure below shows the cross section of a metal bar of length 40 mm. the ends are equal semi-circles. Determine its mass if the density of the metal is 8.8 g/cm³.



$3.142 \times 10.5 \times 10.5$

$= 346.4055$

$30 \times 21 = 630$

$976.4055 mm^2$

976.4055×40

$= \frac{39056.22 mm^3}{10 \times 10 \times 10}$

$= 0.03905622 cm^3$

$8.89 \times 0.03905622 cm^3$

$= 0.34379$

12(i) Express 98 and 72 as products of their prime factors. (1mark)

$98 = 2 \times 7 \times 7$

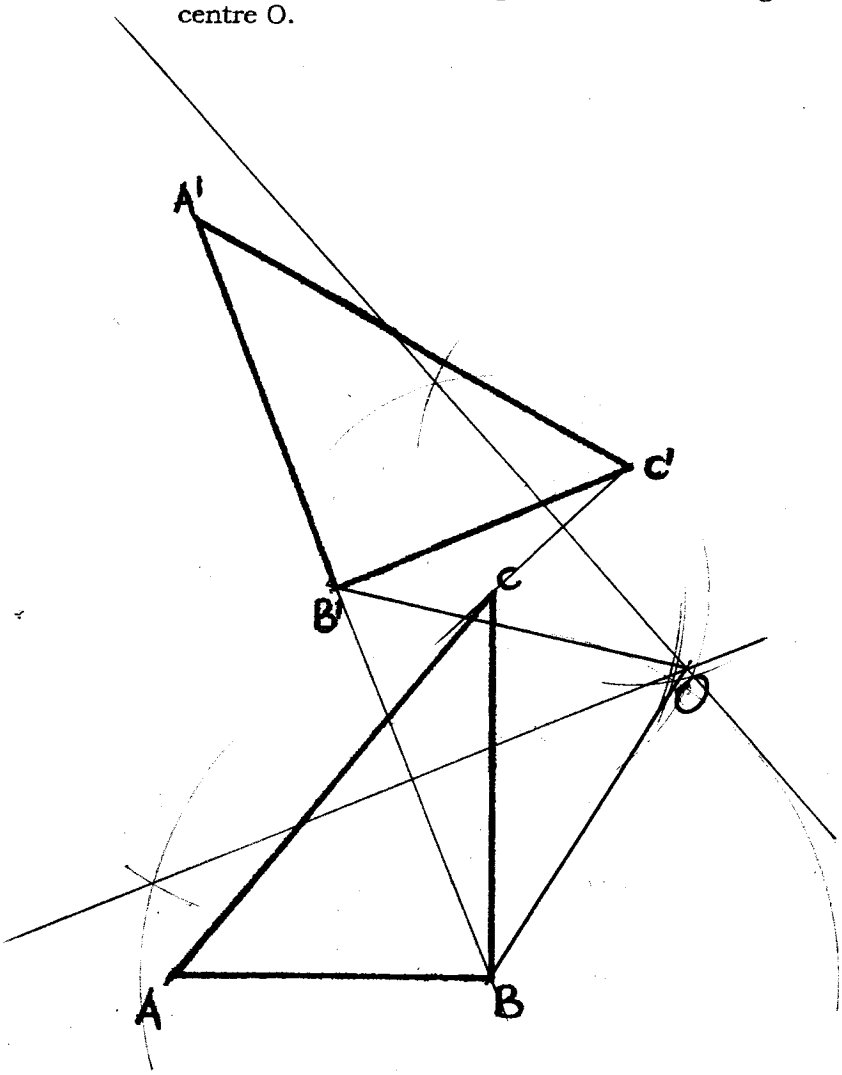
$72 = 2 \times 2 \times 2 \times 3 \times 3$

$98 = 2 \times 7^2$

$72 = 2^3 \times 3^2$

(ii) A rectangle of side 98cm by 72cm is subdivided into small squares each of side x cm. Find the values of x. (2marks)

10. In the figure below, triangle A^{1} B^{1} C^{1} is the image of triangle ABC under a rotation, centre O.



-70°

By construction, find and label the centre O of the rotation, hence, determine the angle of the rotation. (3 marks)

13. Solve the equation $\frac{2x+1}{3}+\frac{5x-2}{4}=2$ (3marks)

$4(2x+1)+3(5x-2)=24$

$8x+4+15x-6=24$

$23x-2=24$

$23x=26$

$x=\frac{26}{23}$

14. A rally car traveled for 2 hours 40 minutes at an average speed of 120km/h. The car consumes an average of 1 litre of fuel for every 4 kilometers. A litre of fuel costs ksh.59. Calculate the amount of money spent on the fuel. (3marks)

$\frac{40}{60}=\frac{2}{3}$

$2\frac{2}{3}$ hrs.

$\frac{8}{3}\times 120^{40}=320$KM.

~~320KM~~

~~4KM~~

80

$8\times 59=4720/=$

15. A two-digit number is such that the sum of the ones digit and the tens digit is 10. If the digits are reversed, the number formed exceeds the original number by 54. Find the number xy. (3 marks)

$x+y=10$

$(10y+x)-(10x+y)=54$

$9y-9x=54$

$y-x=6$

$y+x=10$

$2y=16$

$y=8$

$x=2$

16. A farmer made a loss of 28% by selling a goat for Sh.1440. What percentage profit would he have made if he had sold the goat for Sh.2100? (3marks)

$1448=72\%$

$1=100$

1448×100

~~72~~

Sh 2010.10

2100

$-2010.$

90

$\frac{90}{2010}\times 100$

~~900~~

~~201~~

4.48%

SECTION II (50 MARKS)

Answer *any five* questions in this section

17. (a) Copy and complete the tables (i) and (ii) below for the functions $y = 7 - 3x$ and $y = 2x - 8$ respectively.

$y = 7 - 3x$

x	-2	-1	0	1	2	3	4	5
y	13	10	7	4	1	-2	-5	-8

(2 marks)

$y = 2x - 8$

x	-4	-2	0	4	6	8	10
y	-16	-12	-8	0	4	8	12

(2 marks)

a) On the graph provided and on the same grid draw the graph of $y = 7 - 3x$ and $y = 2x - 8$. (4 marks)

b) What is the nature of the two graphs you have drawn? (1 mark)

c) Use your graph to solve the simultaneous equations. (1 mark)

$3x + y = 7$

$2x - 7 = 8$

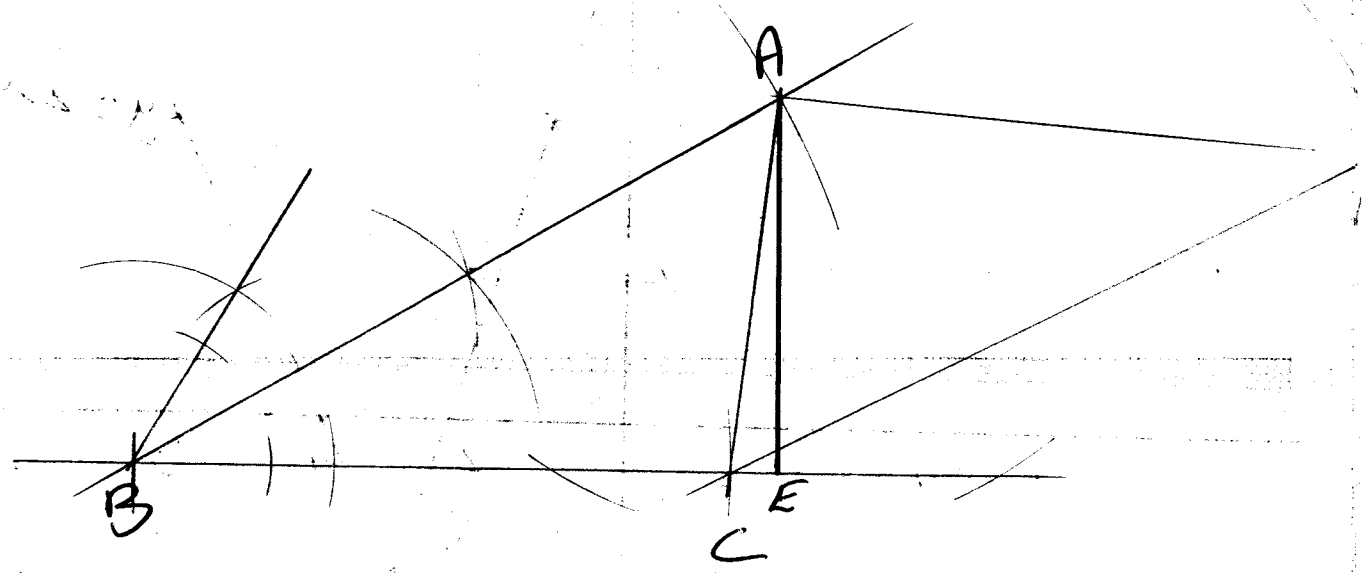
18. Use ruler and a pair of compasses only in this question.

(a) On the line BC given below, construct triangle ABC such that ABC = 30^0 and line BA = 10 cm. (3 marks)

(b) Construct a perpendicular for A to meet BC produced at E. Measure AE. (2 marks)

(c) Calculate the area of triangle ABC. (2 marks)

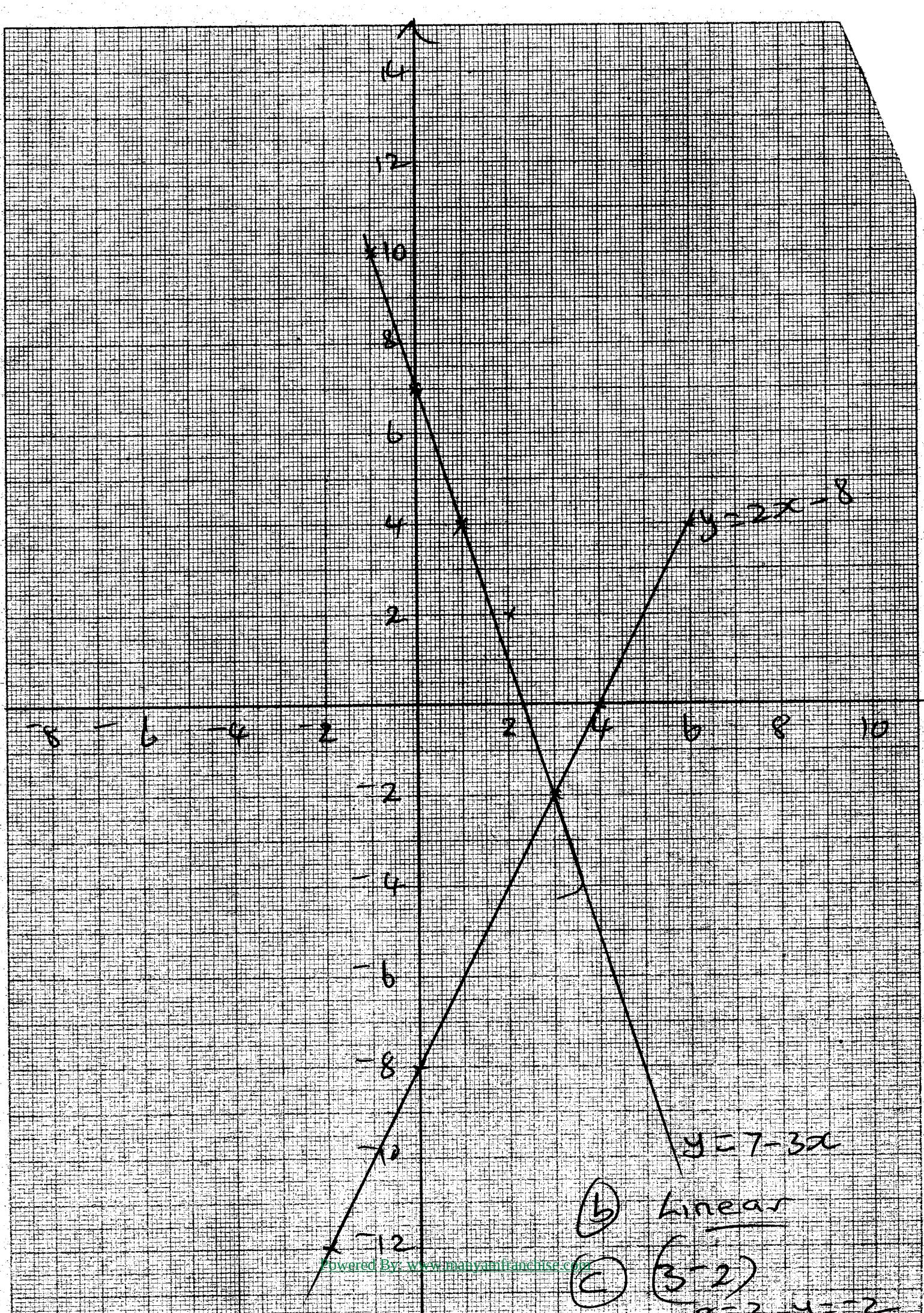
(d) Using a ruler and a set square only construct a trapezium ABCD such that AB = DC and AD = BC. Measure angle ACD. (3 marks)



AE = 5cm.

$\frac{1}{2} \times 5 \times 8^4$

20sq.



(b) Linear

(c) (3, -2)

19.(a) On the grid provided draw triangle ABC such that A (2, 6), B (3, 3) and C(5, 3). (1 mark)

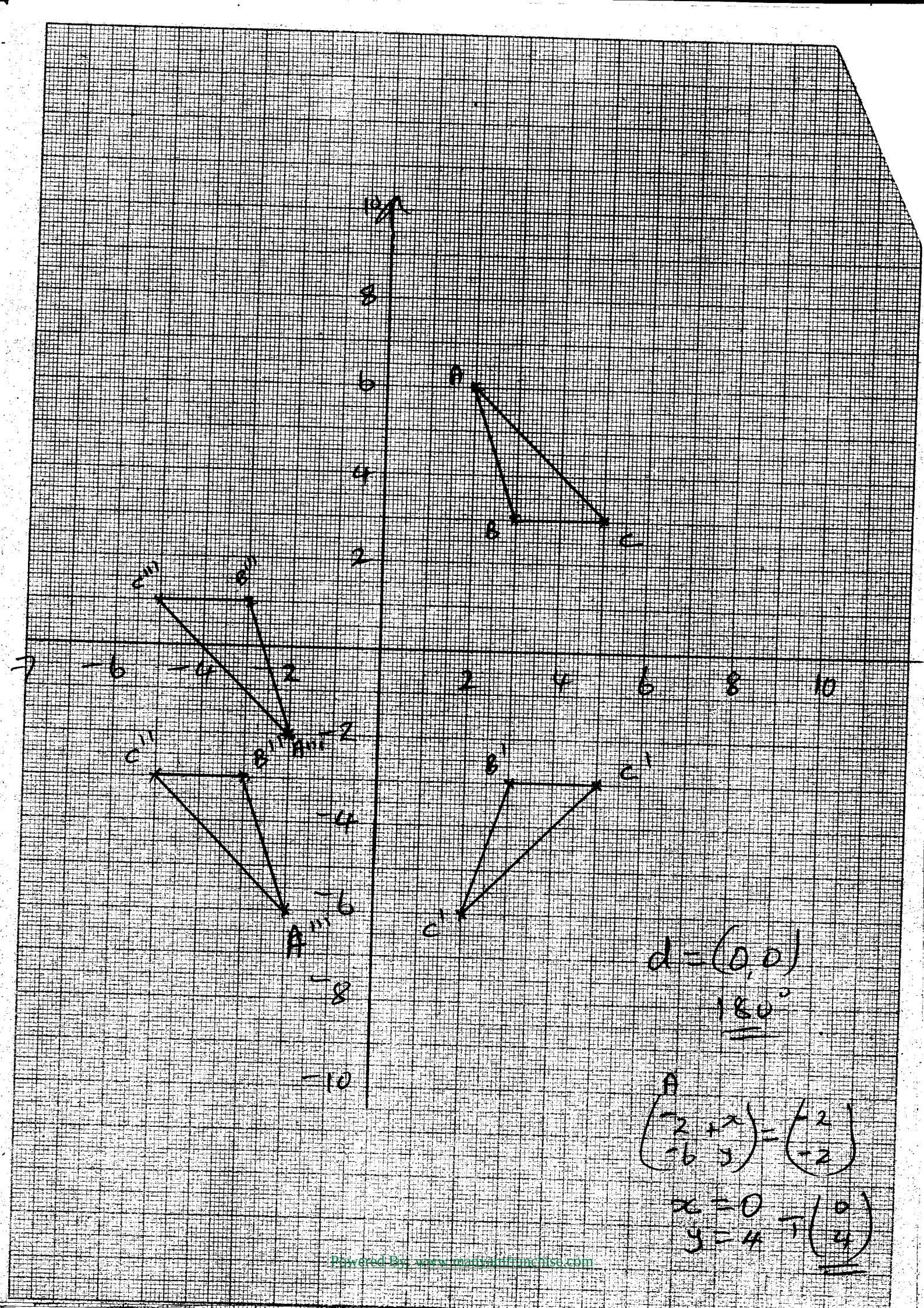
(b) Triangle $A^{I}B^{I}C^{I}$ is the image of triangle ABC under the reflection y = 0. Construct and label triangle $A^{I}B^{I}C^{I}$. (2 marks)

(c) $A^{II}B^{II}C^{II}$ is the image of $A^{I}B^{I}C^{I}$ after a reflection on the y-axis.Draw triangle $A^{II}B^{II}C^{II}$. (1 mark)

(d) State the angle and centre of rotation that maps ABC onto $A^{II}B^{II}C^{II}$. (2 marks)

(e) $A^{III}B^{III}C^{III}$.is the image of $A^{II}B^{II}C^{II}$ under a translation **T** such that A^{III} (-2,-2) ,B^{III} (-3,1), C^{III} (-5,1). Construct $A^{III}B^{III}C^{III}$.Hence determine the translation **T**. (3 marks)

(f) State the order of symmetry of triangle ABC. (1 mark)



$d = (0, 0)$

$180°$

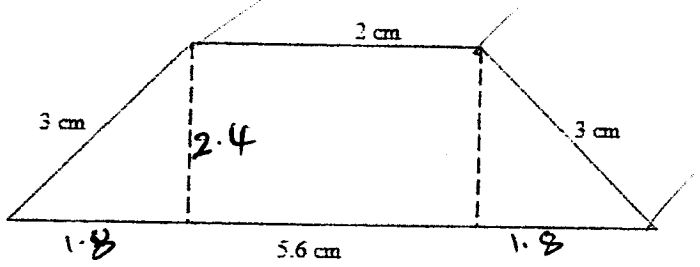
$$\begin{pmatrix} -2 + x \\ -6 + y \end{pmatrix} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$

$x = 0$

$y = 4$

$$\begin{pmatrix} 0 \\ 4 \end{pmatrix}$$

20. The diagram below (not drawn to scale) represents the cross section of a solid metal prism of height 8.0 cm.



5.6 − 2 = 3.6 ÷ 2 = 1.8

√9 − 3.24

√5.76

(a) Calculate the volume of the prism. (4 marks)

$\frac{1}{2} \times 1.8 \times 2.4 \times 2$

4.32cm^2

$+ 2 \times 2.4 = 4.8$

9.12×8

$= 72.96\text{cm}^3$

(b) Given that the density of the prism is 5.75 g/cm², calculate its mass in grams. (2 marks)

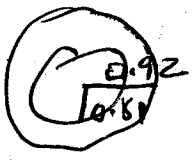
$D = \frac{M}{V}$

$M = D \times V$

5.75×72.96

419.523

(c) The prism above is recast into a small cylindrical pipe with the external and internal diameter 1.84 cm and 1.62 cm respectively. Determine the length of the pipe. (Use π = 3.142) (4 marks)



$V = \pi r^2 h$

$3.142 \times 0.92 \times 0.92 \times h$

$2.66h$

$3.142 \times (0.81)^2 \times h$

$2.06h$

$2.66h - 2.06h = 72.96$

$0.6h = 72.96$

$h = \frac{72.96}{0.6}$

$= 121.6\text{ cm}$

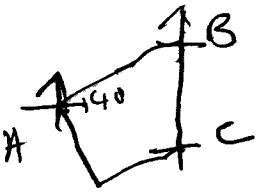
21. Former Electricity posts A, B, C and D stand on a level ground such that B is 21 m on a bearing of 060° from A, C is 15 m to the south of B and D is 12 m on a bearing of 140° from A.

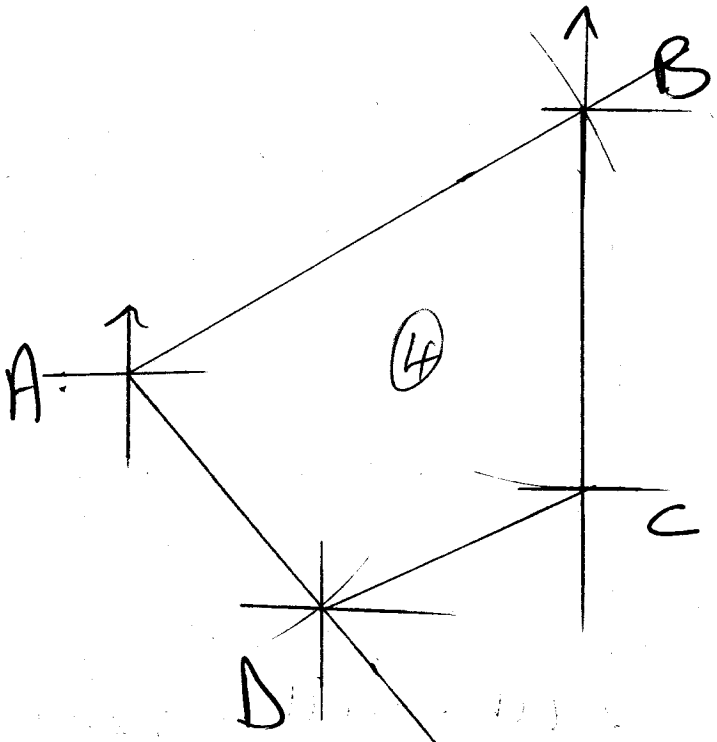
(a)(i) Using a scale of 1 cm represent 3 m, draw a diagram to show the relative position of the posts. (4 marks)

(ii) Find the distance and the bearing of C from D. (2 marks)

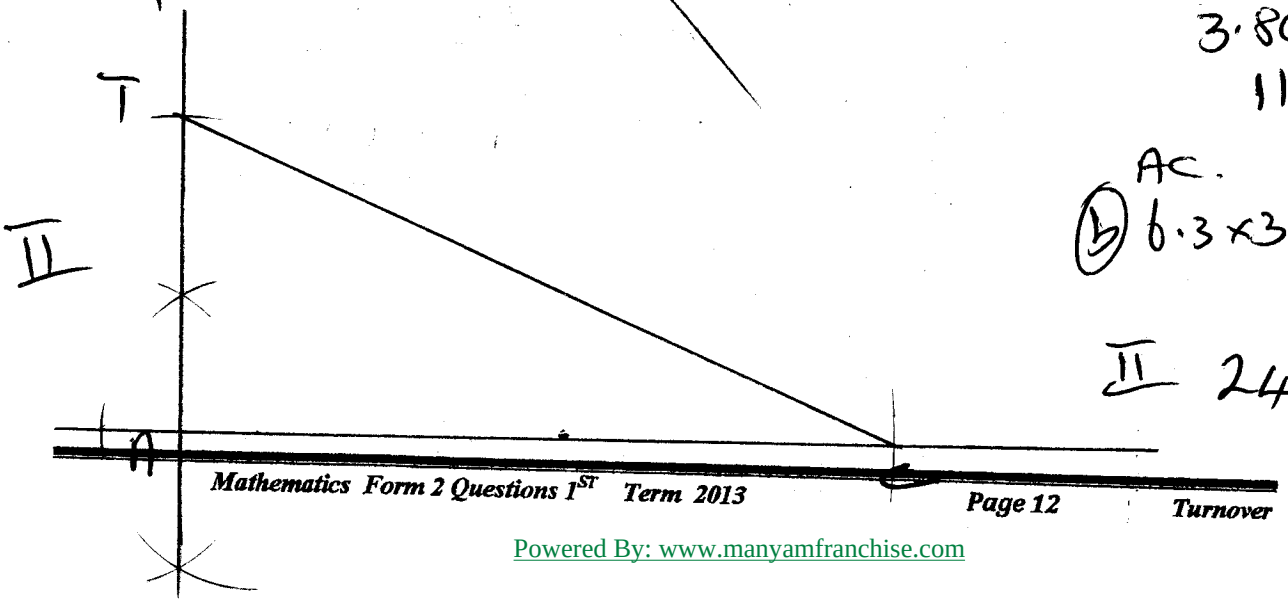
(b)(i) Find the distance of AC in meters. (1 mark)

(ii) The height of the post at A is 8.4 m on a separate scale drawing, mark and determine the angle of depression of the foot of the post at C from the top of the post at A. (3 marks)





1cm rep 2M.



II C from D
63°

3.8CM x 3
11.4M

(b) AC.
6.3 x 3 = 18.9M

II 24°

22. Three business men Onyango, Abdul and Mwangi decided to buy a bus. The marked price of the bus was Sh.2, 800, 000. The dealer agreed that the three men could pay a deposit of 60% of the money and the rest to be paid within one year. Onyango, Abdul and Mwangi raised the deposit in the ratio 3:2:5 respectively. The balance was to be paid to the dealer from the proceeds of the bus in the same ratio as the deposits. During the year the bus realized Sh. 2,080,000

a) How much of the deposit did Abdul contribute? (3 marks)

2800000 × 60/100

1680000 =

2/10 × 1680000

336,000

b) By how much more did Mwangi pay than of the remaining amount at the end of the year than Onyango. (4 marks)

5/10 × 2,080,000

MW Sh. 1,040,000

Sh 3/10 × 2,080,000

O Sh. 624,000

5/10 × 1,120,000

MW Sh 560,000

3/10 × 1120000

Sh 336,000

560,000
336000
224000

Sh 224,000

c) After paying the remaining amount at the end of the year, how much money was Onyango left with. (3 marks)

624,000
- 336 000
Sh 288,000

23. A train left Mombasa on Monday evening and traveled to Kisumu according to the travel time table below. The train arrived in Kisumu on Wednesday morning of the same week.

Mombasa		
Mtito Andei	Dep.	1930 h
	Arr.	0250 h
Nairobi	Dep.	0335 h
	Arr.	1050 h
Nakuru	Dep.	1240 h
	Arr.	1900 h
Kisumu	Dep.	2015 h
	Arr.	0900 h

a) i) Determine the time the train took to travel between Mombasa and Mtito Andei (1 mark)

24 00
19.30
4.30

4.30
2.50
7.20 hrs.

ii) Mtito Andei and Nairobi (1 mark)

10.50
- 03.35
7.15 hrs.

iii) Nairobi and Nakuru (1 mark)

1900
- 1240
6.20 hrs.

iv) Nakuru and Kisumu (1 mark)

24.00
2015
3.45

3.45
+ 9.00
12.45 hrs.

b) Calculate the total time for the whole journey. (4 marks)

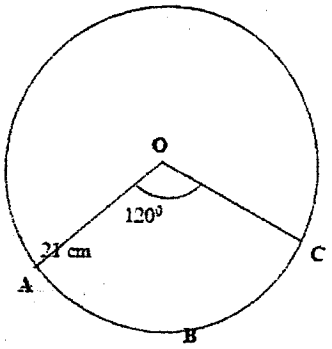
4.30 hrs.
24 00 hrs.
9 00
37.30 hrs.

c) Given that the railway road distance between Mombasa and Kisumu is 1200 km, calculate the average speed for the whole journey. (2 marks)

1200 km
37.5 hrs.

32 km/h.

24. The figure below shows a circle centre O and radius 21 cm. The minor arc ABC subtends an angle of 120^0 at the centre of the circle. (Take $\pi = \frac{22}{7}$).



(a) Find the area of the minor sector OABC. (2 marks)

$\frac{120}{360} \times \frac{22}{7} \times 21 \times 21$

$22 \times 21 = 462 cm^2$

(b) Find the length of the minor arc ABC. (2 marks)

$\frac{120}{360} \times 2 \times \frac{22}{7} \times 21$

$= 44 cm$

(c) The sector is cut off and folded to form a hollow cone. Find the base radius of the cone. (2 marks)

$2\pi r = 44$

$\pi r = 22$

$r = \frac{22 \times 7}{22}$

$r = 7$

(d) Calculate to one decimal place the vertical height of the cone. (2 marks)

$h = \sqrt{(21)^2 - 7^2}$

$h = \sqrt{441 - 49}$

$h = \sqrt{392}$

$19.8 cm$

(e) Calculate to the nearest whole number the capacity of the cone. (2 marks)

$\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 19.8$

$\frac{22 \times 7 \times 19.8}{3}$

$\frac{3049.2}{3}$

$1016.4 cm^3$

$1 L$