Name..... F2 M.S ..... ADM Number:.....

School:..... Candidate's Signature.....

121/1
Mathematics Alt.A
FORM TWO
NOVEMBER 2021.
2 ½ Hours.

URANGA MATHEMATICS ASSOCIATION-2021.

Kenya Certificate of Secondary Education
MATHEMATICS
121/1
FORM TWO.
TIME: 2 ½ HOURS

INSTRUCTIONS TO CANDIDATES:

- Write your name, school, admission number and sign in the spaces provided above.
- This paper contains **TWO** sections: Section **I** and Section **II**.
- Answer **ALL** the questions in Section **I** and **FIVE** questions from section **II**.
- All answers and working **MUST** be written on the question paper in the spaces provided below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II

17	18	19	20	21	22	23	24	Total

Grand Total

This paper consists of 14 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

F2 M-S

1. Use logarithm tables to evaluate: (4mks)

$$\left(\frac{35.7 \times 26.4}{342}\right)^2$$

No	log
35.7	$\bar{1}.5527$
26.4	1.4216 +
	2.9743
342	2.5340 −
	0.4403×2

$= 0.8806$

7.597 ← antilog

$= 7.597$

2. Express 1080 and 1000 in their prime factor hence evaluate. (3mks)

$$\frac{1080}{\sqrt[3]{1000}}$$

$1080 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5$

$1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$

$\sqrt[3]{1000} = 2 \times 5$

$$\frac{1080}{\sqrt[3]{1000}} = \frac{2^3 \times 3^3 \times 5}{2 \times 5}$$

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

$$= 108$$

3. A Forex Bureau in Kenya buys and sells Currencies as shown below

Currency	Buying (Ksh)	Selling (Ksh)
Us Dollar	104.16	104.38
Sterling Pound	140.52	140.82

A tourist from Us arrived in Kenya with 5000 Us dollars. He converted this amount to Kenyan shillings. While in Kenya he spent 80% of the amount and changed the remainder to sterling pounds. Calculate the amount he received in Sterling pounds. (3mks)

$5000 \times 104.16 = 520800$

$\frac{20\%}{100} \times 520800 = 104,160$

140.82

$= 739.66766$ sterling pounds

$= 739.67$ sterling pounds

2

F2 · M·S

4. The interior angles of a hexagon are 2x, ½ x, (x+40), 110°, 130° and 160°. Find the size of the smallest angle. (3mks)

$2x + \frac{1}{2}x + (x+40) + 110 + 130 + 160 = 720^\circ$

$3\frac{1}{2}x + 440 = 720$

$3.5x = 280$

$x = 80$

$\frac{1}{2}x = 40$

40°

5. Use reciprocal and square tables to evaluate to 4 significant figures the expression. (4mks)

$\frac{1}{24.56} + 4.362^2$

$\frac{1}{2.456 \times 10^1}$

0.4072×10^{-1}

0.04072

4.362^2

19.010

17+

19.027

$0.04072 + 19.027 = 19.06772$

$= 19.07$

6. The equation of Line L_1 is $5x - 2y + 8 = 0$ and line L_2 passes through the points (5,-4) and (-5,0). Show by calculation that the two lines are perpendicular. (3mks)

L_1 $-2y = -5x - 8$

$y = \frac{5}{2}x + 4$

$M_1 = \frac{5}{2}$

L_2: $\frac{0+4}{-5-5} = \frac{4}{-10} = -\frac{2}{5}$

$M_2 = -\frac{2}{5}$

$M_1 \times M_2 = -1$

$\frac{5}{2} \times -\frac{2}{5} = -1$

7. Calculate the value of a and b given that $\frac{1}{3^{-(5a-2b)}} = 81$ *and* $3^{2a-b} = \frac{1}{3^{-1}}$ (3mks)

$3^{5a-2b} = 3^4$

$3^{2a-b} = 3^1$

$5a - 2b = 4$

$2a - b = 1$

$10a - 4b = 8$

$10a - 5b = 5$

$b = 3$

$a = 2$

$a = 2$

$b = 3$

8. A two digit number is 18 more than the number formed by reversing the digits. If the sum of the digits is 10, find the number. (3mks)

xy

$10x+y=10y+x+18$

$x+y=10$

$x-y=2$

$x+y=10$

$-2y=-8$

$y=4,\ x=6$

~~$x+y$~~

64

9. The LCM and GCD of three numbers are 2520 and 6 respectively. If two of the numbers are 72 and 180, find the least possible value of the third number. (3mks)

$\frac{2520\times6}{72}=210$

$\frac{2520\times6}{180}=84$

84

10. Solve for x in the equation $\frac{x-3}{4}-\frac{x+3}{6}=\frac{x}{3}$ (3mks)

$3(x-3)-2(x+3)=4x$

$-3x=15$

$x=-5$

11. Evaluate $\dfrac{\frac{3}{5}\text{ of }60-2\frac{2}{3}\times1\frac{1}{2}}{5\frac{5}{8}\times1\frac{7}{9}-\frac{5}{4}\text{ of }4\frac{4}{5}+2\frac{4}{5}\div\frac{7}{10}}$ (3mks)

$\frac{3}{5}\text{ of }60-\frac{8}{3}\times\frac{3}{2}$

$36-4$

$=32$

$\left(\frac{45}{8}\times\frac{16}{9}\right)\left(-\frac{5}{2}\text{ of }\frac{24}{5}\right)+\left(\frac{14}{5}\times\frac{10}{7}\right)$

$10-6+4$

$=8$

$\frac{32}{8}=4$

12. A copper plate is 14cm long, 9cm wide and 0.5cm thick. Find its mass if the density of copper is $8.9gcm^{-3}$. (3mks)

$M = \rho \times V$

$\rho = 8.9\ gcm^{-3}$

$M = 14 \times 9 \times 0.5 = 63$

$= 63 \times 8.9$

$= 560.7\ g$

13. Find the difference between the smallest and the largest of the fraction. (3mks)

$$\frac{4}{7}, \frac{3}{5} \text{ and } \frac{2}{3}$$

$\frac{4}{7} \times 105 = 60$

$\frac{3}{5} \times 105 = 63$

$\frac{2}{3} \times 105 = 70$

$\frac{3}{3} - \frac{4}{7} = \frac{3}{21}$

14. a) In a market Atieno sells her oranges at the rate of 10 for sh.65. Mary sells 20 oranges of the same type and size for sh.134. Whose oranges are cheaper? (2mks)

$\frac{65}{10} = 6.5$

$\frac{134}{20} = 6.7$

Mary's

b) A transport company charges sh.500 for a 600km journey, what is the charge per km? (1mk)

$\frac{500}{600}$

Sh. $\frac{5}{6}$ or 50 cents

15. Calculate the surface area of a closed cylinder of base radius 5.6cm and height 7.9cm. (3mks)

$2 \times \frac{22}{7} \times 5.6^2 + \frac{22}{7} \times 11.2 \times 7.9$

$475.2\ cm^2$

16. A manufacture sells a bottle of juice to a trader at a profit of 40%. The trader sells it for sh.84 at a profit of 20%. Find

a) The trader's buying price (1mk)

$$\frac{84 \times 100}{120}$$

$$= \text{Sh. } 70$$

b) The cost of manufacturing the bottle (2mks)

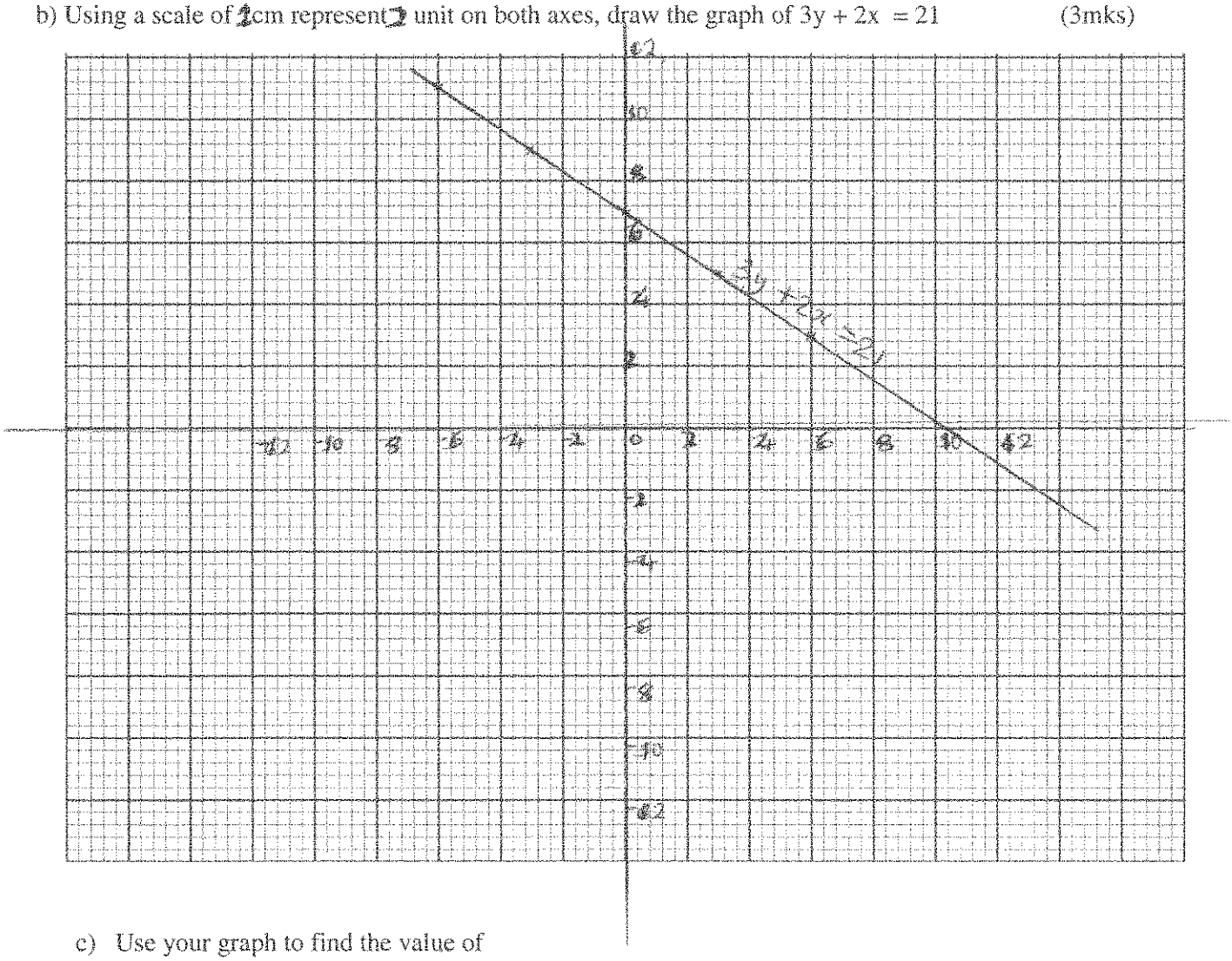
$$\frac{70 \times 100}{140}$$

$$= \text{Sh. } 50$$

17. a) Complete the table below for the equation $3y + 2x = 21$ (2mks)

X	-6	-3	0	3	6
Y	11	9	7	5	3

b) Using a scale of 1cm represent 2 unit on both axes, draw the graph of $3y + 2x = 21$ (3mks)



c) Use your graph to find the value of

i) y when $x = -1.5$ (1mk)

8

ii) x when $y = 4$ (2mks)

4.5

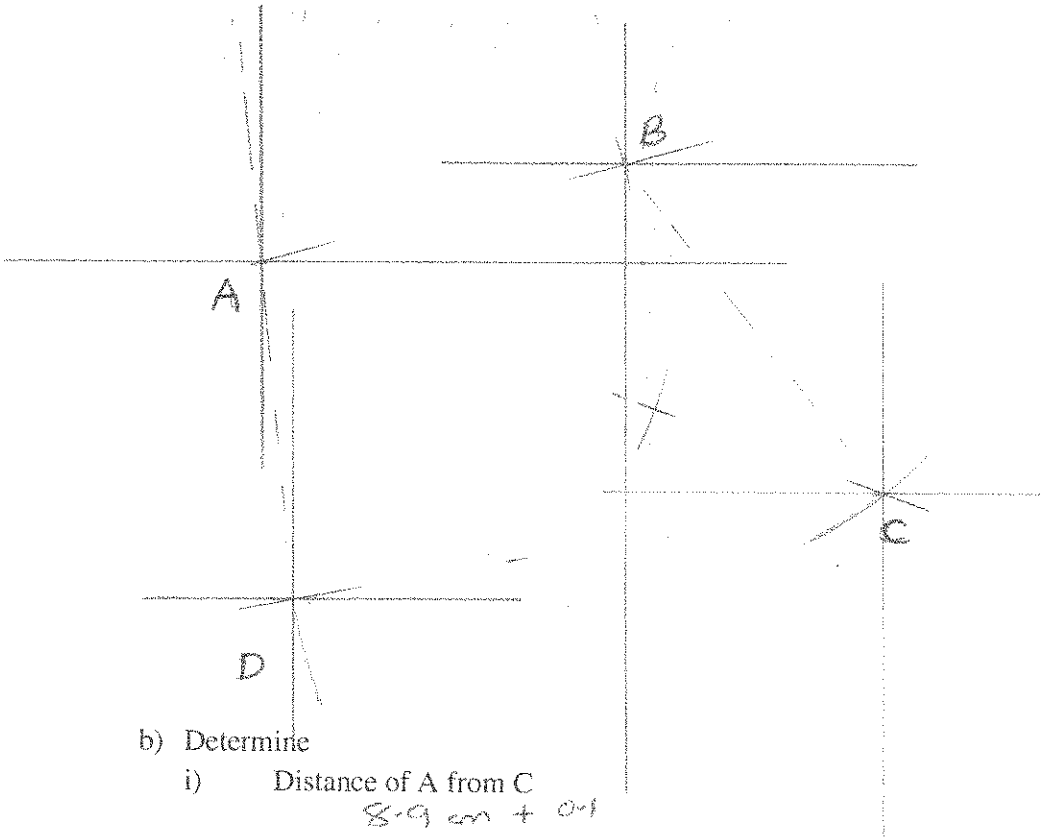
d) Write down the co-ordinates of the points where the line cuts the axes. (2mks)

y axes at (0, 7)

x axes at (10.5, 0)

18. In a safari rally, drivers are to follow route ABCDA. B is 250km from A on a bearing of 075° from A. C is on 110° from A and 280km from B. The bearing of D from B is ~~140°~~ 260° and a distance of 400km. By scale drawing, 1cm rep 50km.

a) Show the positions of point A,B,C and D (4mks)



b) Determine

i) Distance of A from C (2mks)

8.9 cm ± 0.1

445 km ± 5 km

ii) The bearing of B from C (1mk)

321° ± 2°

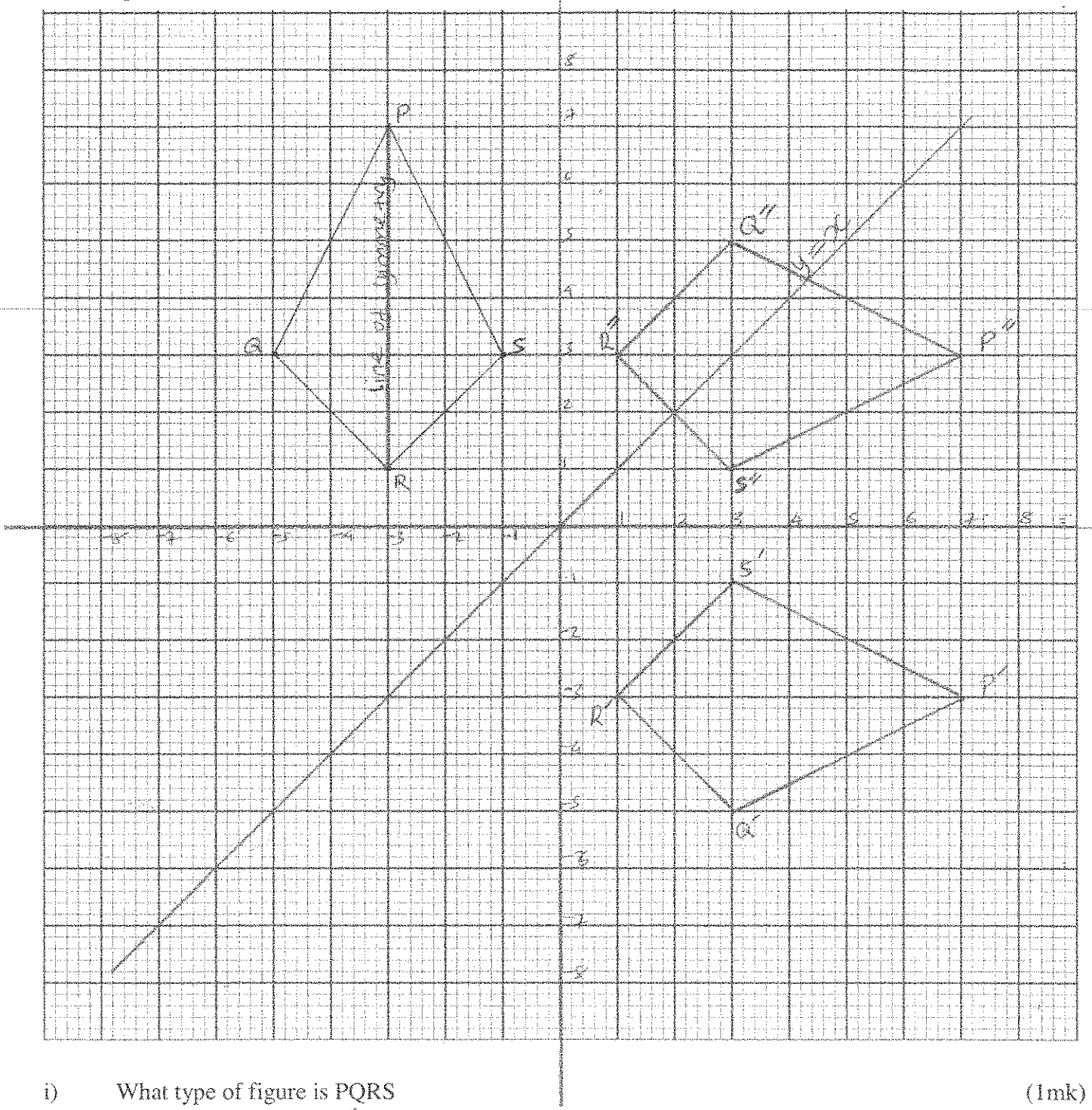
iii) The distance and the bearing of A from D (3mks)

4.5 × 50

= 225 km ± 5 km.

= 354° ± 2°

19. Plot points P(-3,7), Q (-5,3),R (-3,1) and S (-1,3) (1mk)



i) What type of figure is PQRS (1mk)

Kite.

ii) How many lines of symmetry does PQRS have (indicate then if any) (2mks)

One (1)

iii) Reflect figure PQRS in the line y = x followed by a reflection on x axis.

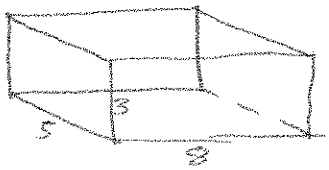
a) Find the co-ordinates of the first image (4mks)

P'(7,-3), Q'(3,-5), R'(1,-3) & S'(3,-1)

b) Find the co-ordinates of the second image (2mks)

P''(7,3), Q''(3,5), R''(1,3) & S''(3,1)

20. a) A classroom measures 8m long, 5m wide and 3m high. Calculate the total surface area of all walls and floor. (4mks)



$(5\times8)+2(5\times3)+2(8\times3)$

$= 118\ m^2$

b) Calculate the total surface area of a closed cube of side 5cm (2mks)

$6(5^2) = 150\ cm^2$

c) A cube of side 20cm is full of milk. All this milk is packed into packets each of capacity 3.2dl. How many packets were obtained. (4mks)

$Vol = 20\times20\times20 = 8000\ cm^3 = 8$ litres

$\frac{8000}{1000}$

$10dl = 1L$

$8L$

$= 80\ dl$

$3.2\ dl$

$= 25$ packets

21. The table below is the travel time table for Nairobi – Mombasa passenger train.

STATION	ARRIVAL	DEPARTURE
NAIROBI		1930h
ATHI RIVER	2025h	2030h
SULTAN HAMUD	2310h	2315h
MAKINDU	2335h	2340h
KIBWEZI	0010h	0015h
MAZONGALENI	0045h	0050h
MTITO ANDEI	0155h	0240h
VOI	0450h	0505h
MARIAKANI	0745h	0750h
MAZERAS	0810h	0815h
MOMBASA	0905h	

a) How long does the train take from Athi River to Kibwezi. (2mks)

0010h + 2400h = 2410h

2410 − 2030h

3hrs 40min

b) Find the time taken by the train from

i) Nairobi to Makindu (1mk)

2335 − 1930

4hrs 5mins

ii) Sultan Hamud to Voi (1mk)

2850h − 2315

5 hrs 35 mins

c) i) How long does the journey take from makindu to Mariakani (1mk)

3145h − 2340

8hrs 5 mins

ii) Athi River to mtitioAndei (1m)

2555h − 2030h

5hrs 25mins

d)Find the time the train takes to travel from

i) MtitioAndei to Mombasa (2mk)

0905 − 0240

= 6hrs 25mins − (Voi 15mins + Mariakani 5mins + Mazeras 5mins)

= 6 hrs

ii) Nairobi to Masongaleni (2mk)

2445h − 1930h

5hrs 15mins − (Athi 5mins + Sultan 5mins + Makindu 5mins + Kibwezi 5mins)

4hrs 55mins

22. A business lady bought 100 quails and 80 rabbits for Sh. 25,600. If she had bought twice as many ~~rabbits~~ quails and half as many ~~quails~~ rabbits she would have paid Sh. 7,400 less. She sold each quail at a profit of 10% and each rabbit at a profit of 20%.

(a) Form two equations to show how much she bought the quails and the rabbits (2 Marks)

$100q + 80r = 25600$

$200q + 40r = 18200$

$5q + 4r = 1280$

$5q + r = 455$

(b) Find the cost of each (3 Marks)

$5q + 4r = 1280$

$-\ 5q + r = 455$

$3r = 825$

$\frac{3r}{3} = \frac{825}{3}$

$r = 275$

$q = 36$

Rabbit = Sh. 275

Quails = Sh. 36

(c) Calculate the profit she made from the sale of the 100 quails and 80 rabbits (3 Marks)

$100\left(\frac{110}{100} \times 36\right) + 80\left(\frac{120}{100} \times 275\right)$

$= 30360$

$= 30360 - 25600$

$= \text{Sh. } 4760$

(d) What percentage profit did she make from the sale of the 100 quails and 80 rabbits (2 Marks)

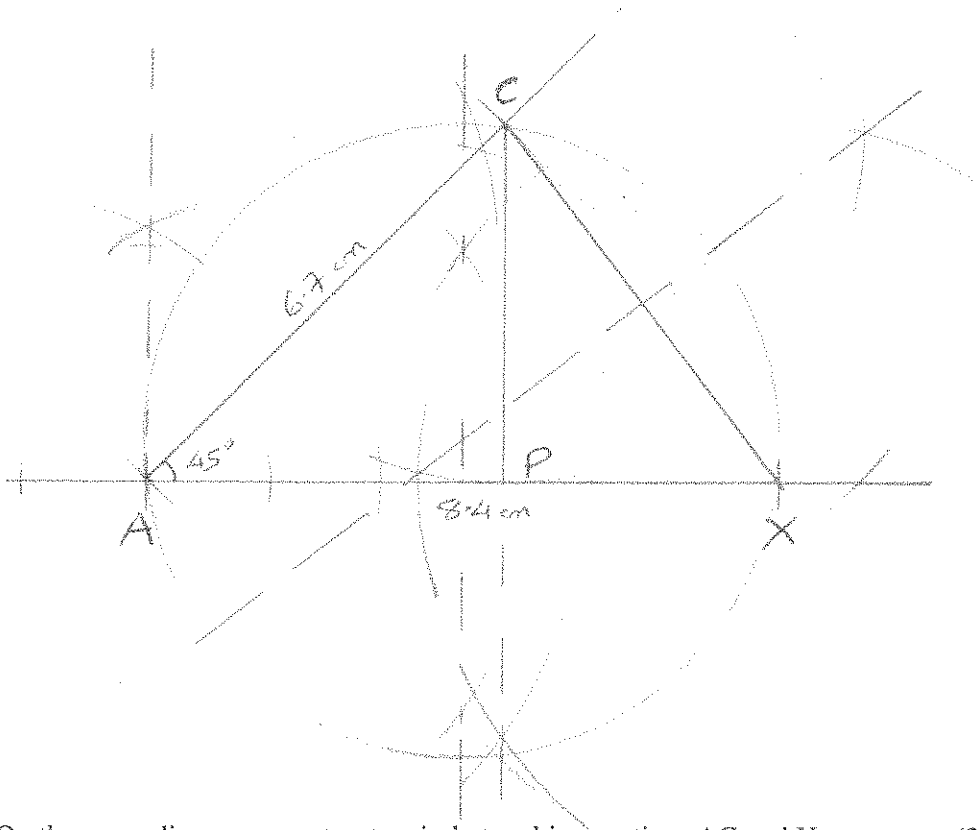
$\frac{4760}{25600} \times 100$

$= 18.59375$

$= 18.59\%$

23. Use ruler and compasses only for all constructions in this question.

(a) Construct triangle ACX such that AC = 6.7cm, AX = 8.4cm and <CAX = 45^0. (4mks)



(b) (i) On the same diagram, construct a circle touching vertices AC and X. (2mks)

(ii) Measure the radius: (1mk)

4.2 cm ± 0.1

(c) Drop a perpendicular from point C to meet line AX at P. measure line CP. (2mks)

4.8 cm ± 0.1

(d) Find the ratio of the radius of the circle to the length of line CP. (1mk)

4.2 : 4.8
42 : 48
7 : 8

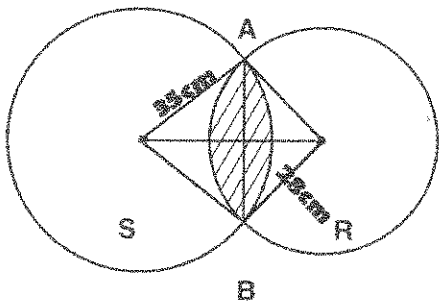
or

41 : 47
41 : 48
41 : 49

and

43 : 47
43 : 48
43 : 49

24. The intersecting circles centres S and R have radii 28 and 35 respectively. A common chord AB = 38cm.



a) Calculate to 1 d.p;

i) Angle ASB (2 marks)

$\sin^{-1}$ of $\frac{19}{35} = 32.878 \times 2 = 65.76°$

$= 65.8°$

ii) Angle ARB (2 marks)

$\left(\sin^{-1}\frac{19}{28}\right) \times 2 = 85.46°$

$= 85.5°$

b) Calculate the area of the shaded region. (6 marks)

$\frac{65.8°}{360} \times \frac{22}{7} \times 35^2 - \frac{1}{2} \times 35^2 \sin 65.8° = 145.02$

$\frac{85.5}{360} \times \frac{22}{7} \times 28^2 - \frac{1}{2} \times 28^2 \sin 85.5 = 194.408$

$145.02 + 194.408$

339.428

$339.43cm$