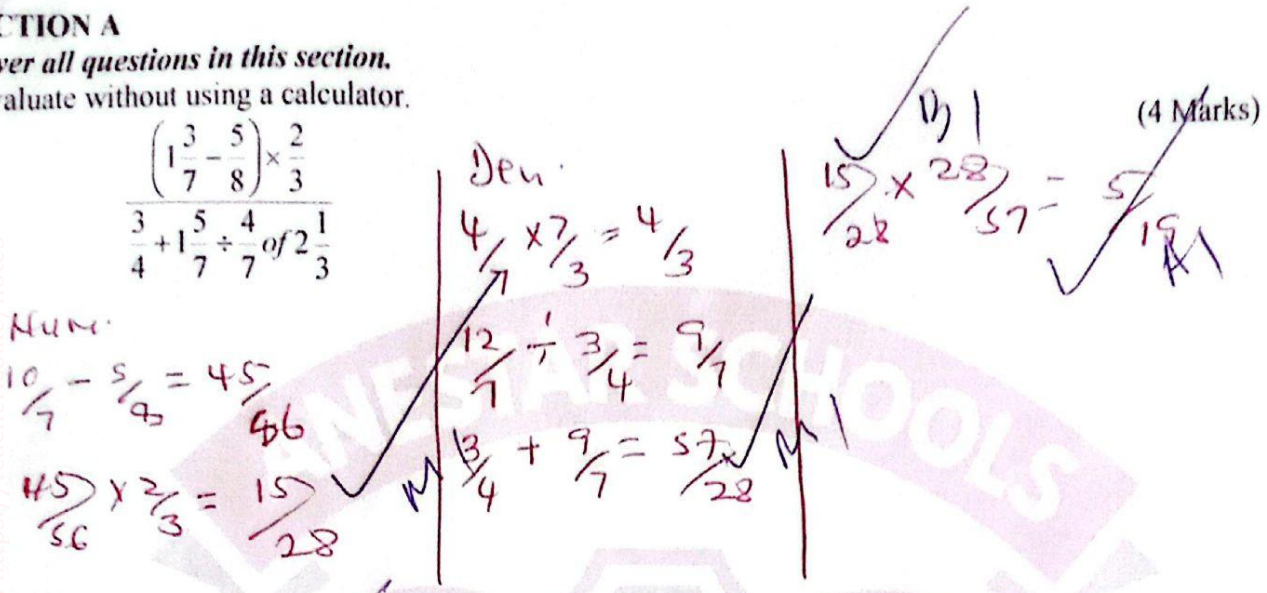
MATHEMATICS **FORM 3** **MID TERM 2 2026 EXAMINATION**

SECTION A

Answer all questions in this section.

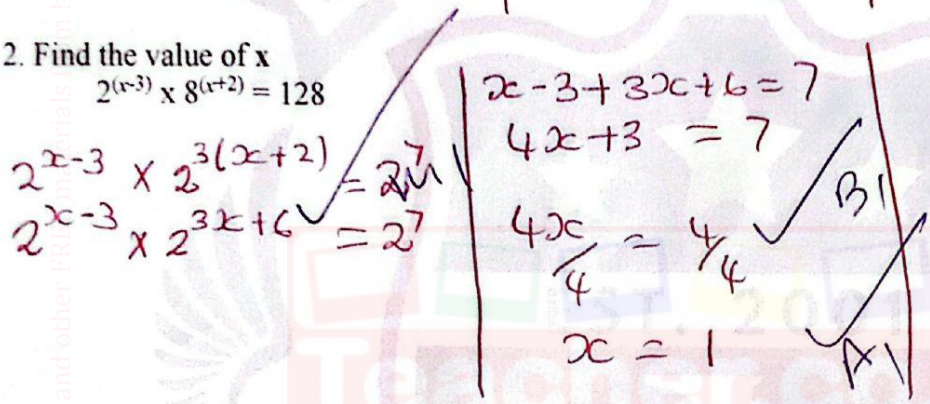
1. Evaluate without using a calculator. (4 Marks)

$$\frac{\left(1\frac{3}{7}-\frac{5}{8}\right)\times\frac{2}{3}}{\frac{3}{4}+1\frac{5}{7}\div\frac{4}{7}\ of\ 2\frac{1}{3}}$$



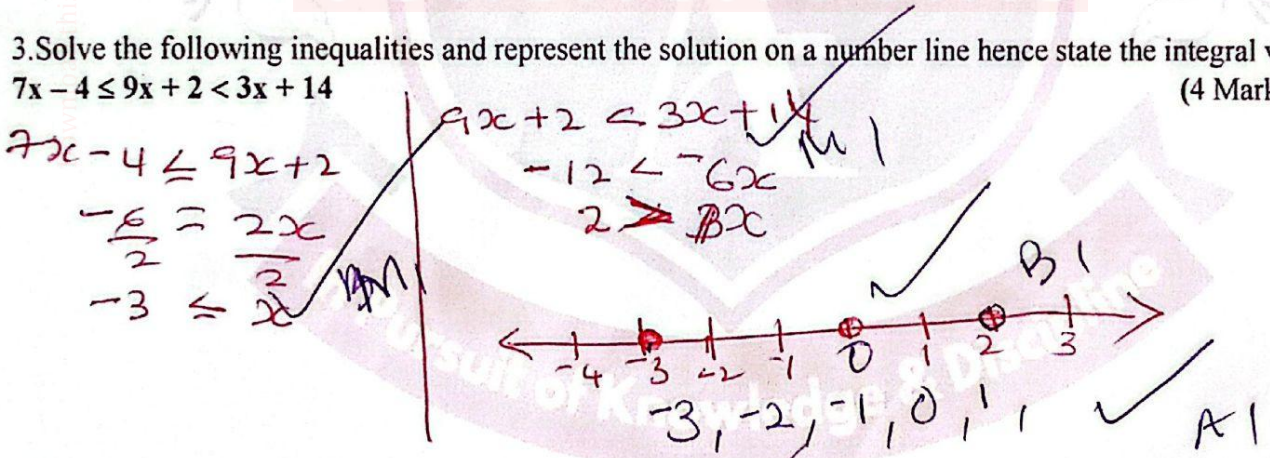
2. Find the value of x (3 Marks)

$$2^{(x-3)} \times 8^{(x+2)} = 128$$

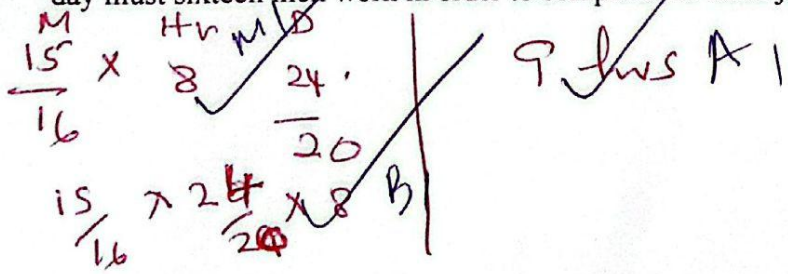


3. Solve the following inequalities and represent the solution on a number line hence state the integral values

$7x - 4 \leq 9x + 2 < 3x + 14$ (4 Marks)



4. Fifteen men working for eight hours a day can complete a certain job in exactly 24 days. For how many hours a day must sixteen men work in order to complete the same job in exactly 20 days .(3 Marks)



5 Use logarithms and antilogarithms to evaluate (3 Marks)

$$\sqrt{\frac{391 \times 687}{372}}$$

No.	std form	log
394	3.94×10^2	2.5955
627	6.27×10^2	2.8396 ✓ M1
		5.4351
372	3.72×10^2	2.5705
		2.8646 ✓ M1
		2
27.058 A1	$= 2.7058 \times 10^1$	← 1.4323

6. Mutua bought 160 trays of 8 eggs each at shs.150 per tray. On transportation 12 eggs broke. He later discovered that 20 eggs were rotten. If he sold the rest at shs.180 per tray, how much profit did he make? (3 Marks)

B.P = 160 × 150 = 24000

No. of eggs to be sold

= [(160 × 30) − 12 + 20]

= 4766 eggs

S.P = $\frac{4766}{30} \times 180$ = 28608 ✓ B1

Profit

= 28,608 − 24000

= 4608 ✓ A1

7. The x and y –intercepts of a line are given as -2 and -2 respectively determine the equation of the line 3mks. (3 Marks)

(−2, 0) (0, −2)

$\frac{-2-0}{0--2} = \frac{-2}{2}$

= −1 ✓ M1

y = mx + c

0 = −1x − 2 + c

0 = 2 + c

c = −2 ✓ M1

y = −x − 2 ✓

8.The surface area of two similar bottles are 12cm² and 108cm² respectively. If the larger one has a volume of 810cm³. Find the volume of the smaller one. (3 Marks)

A.S.F = 12 : 108

1 : 9 M1

L.S.F = 1 : 3

V.S.F = 1 : 27

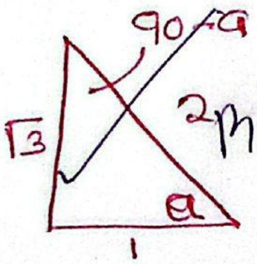
27 → 810

1

$\frac{1 \times 810}{27}$ = 30 cm³ ✓ A1

B1

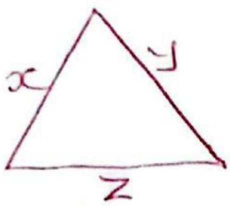
9.Given sin (90 - a) = ½, find without using trigonometric tables the value of cos a (2 Marks)



M1

Cos a = ½ ✓ A1

10. The sides of a triangle are in the ratio 3:5:6. If its perimeter is 56 cm, use the Heroes formula to find its area. (4 Marks)



$x : y : z$

$3 : 5 : 6$

14

$x = \frac{3}{14} \times 56 = 12$ M1

$y = \frac{5}{14} \times 56 = 20$

$z = \frac{6}{14} \times 56 = 24$

$s = \frac{56}{2} = 28$ B1

$= \sqrt{28(28-12)(28-20)(28-24)}$ M1

$= 119.7330$ A1

11 A map of a certain town is drawn to scale of 1/50000. On the map the railway quarters cover an area of 10 cm2. find the area of the railway in hectares (3Marks)

The linear scale factor is 50,000 = 50,000

Area scale factor is $50,000^2$

$10cm \times 50,000^2 = \frac{25000000000}{10^8} = 250$ B1

1 hect = 10,000 A1

12.A piece of metal has a volume of 20 cm^3 and a mass of 300g. Calculate the density of the metal in kg/m^3.(3 Marks)

Volume $V = 20\ cm^3$

Mass $= 300g$ M1

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

$D = \frac{300}{20}$ B1

$= 15g/cm^3$

$= 15 \times 1000\ kg/m^3$

$= 15000\ kg/m^3$ A1

13.A van left Nairobi for Kakamega at an average speed of 80km \hr. After half an hour a car left left Nairobi for kakamega at a speed of 100 km\hr

i) Find relative speed of two vehicles 1mk

$100 - 80$

$20 km/h$ B1

ii) Find how far from Nairobi the car overtook the van (3marks)

Distance covered by van in 30 min

$= \frac{30}{60} \times 80$

$= 40km$ M1

Time taken car to overtake

$= \frac{40}{20}$ B1

$= 2hr$

Distance from Nairobi

$2 \times 100 = 200$

14. Use reciprocal table to evaluate giving your answer to three significant figures. (3 Marks)

$$\frac{10}{0.834} - \frac{3}{129.64}$$

$10\left(\frac{1}{0.834}\right) - 3\left(\frac{1}{129.64}\right)$ M1

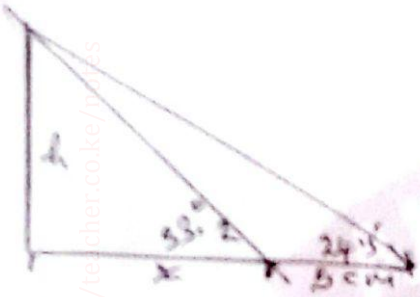
$10(\text{rec } 8.34 \times 10^{-1}) - 3(1.2964 \times 10^{2})$

$= 10(1.199) - 3(0.0077)$ B1

$= 11.9669$ A1

15. The angle of elevation of the top of a tree from a point P on the horizontal ground is 24.5°. From another point Q, five metres nearer to the base of the tree, the angle of elevation of the top of the tree is 33.2°. Calculate to one decimal place, the height of the tree (3 Marks)

The angle of elevation



$\tan 24.5 = \frac{h}{x+5}$

$h = 0.4557x + 2.2786$ B1

$\tan 33.2 = \frac{h}{x}$

$h = x \tan 33.2$ M1

$= 0.6544x$

$0.6544x = 0.4557x + 2.2786$

$0.1987x = 2.2786$

$x = 11.468$

$= 11.5$ A1

16. Solve the equation $\frac{1}{4x} = \frac{5}{6x} - 7$ (2 Marks)

$1 = \frac{5}{6x} \times 4x - 7 \times 4x$

$0 = \frac{5}{6x} - 7 - \frac{1}{4x}$

$0 = \frac{5}{6x}(24x^2) - 7(24x^2) - \frac{1}{4x}(24x^2)$

$= 20x - 168x^2 - 6x$

$0 = x(14 - 168x)$

Either

$x = 0$

or

$14 - 168x = 14$

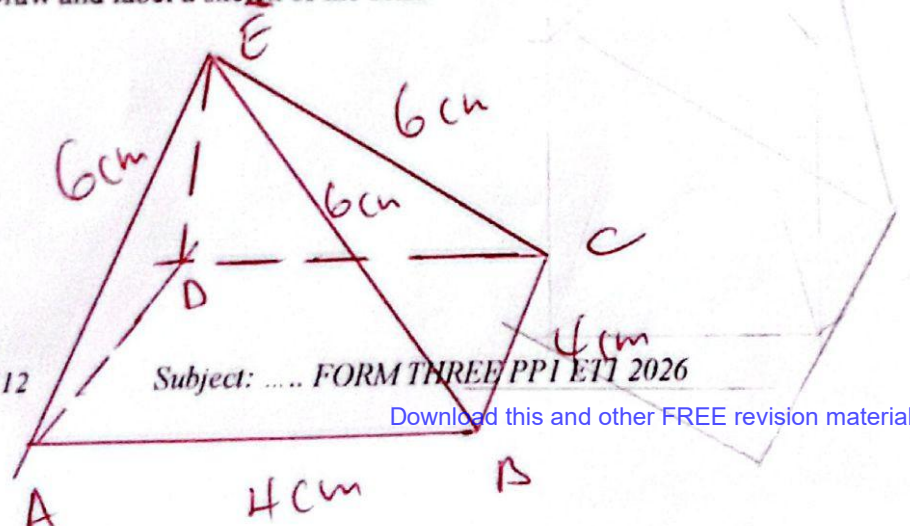
$x = \frac{1}{12}$ A1

SECTION B

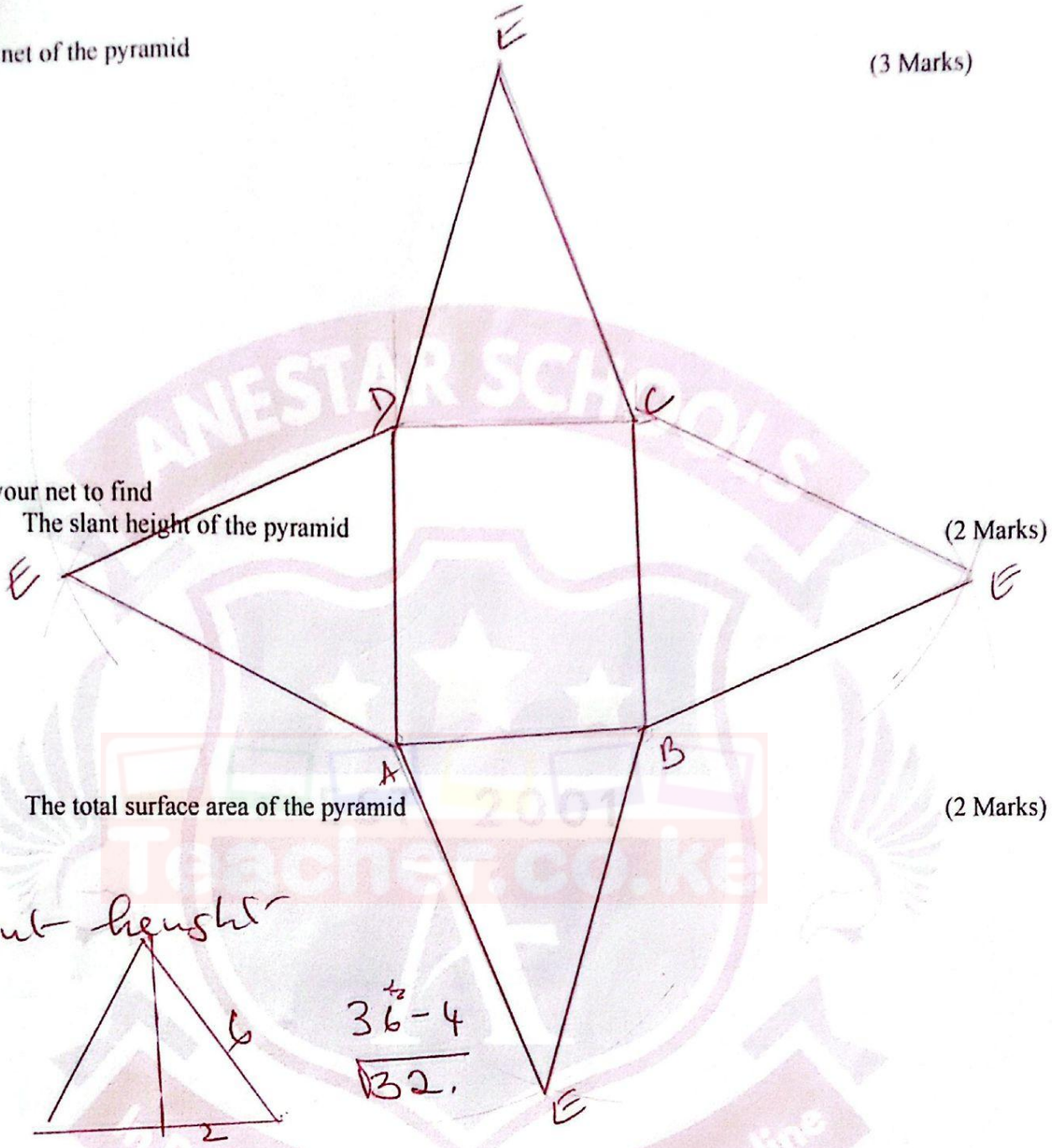
Anser any five questions in this section.

17 The base of a right pyramid is a square of sides 4 cm .the slant edges are all 6cm long. ABCDE

(a) Draw and label a sketch of the solid. (3 Marks)



Draw the net of the pyramid (3 Marks)



(b) Use your net to find

(i) The slant height of the pyramid (2 Marks)

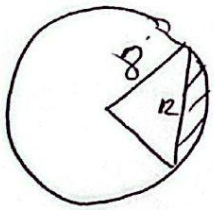
(ii) The total surface area of the pyramid (2 Marks)

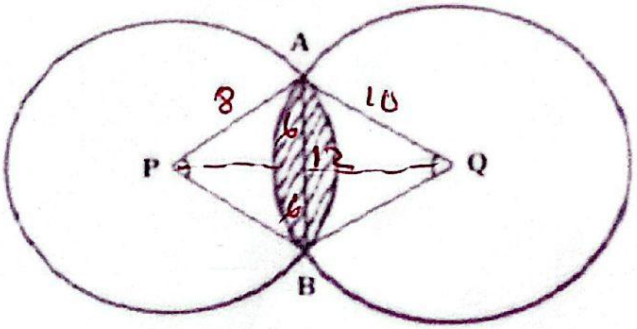
Slant height

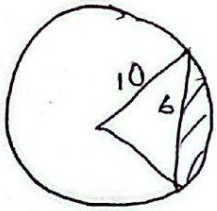
$36 - 4$

$32.$

18. The figure below shows two intersecting circles with centres P and Q of radius 8cm and 10cm respectively.
Length AB = 12cm







Calculate:

a) ∠APB (2 Marks)

$\sin\theta = 6/8$

$\theta = 48.59$ B1

$\angle APB = 2 \times 48.59$

$= 97.18°$ B1

b) ∠AQB (2 Marks)

$\sin\theta = 6/10$

$\theta = 36.87$ B1

$\angle AQB = 2 \times 36.87$

$= 73.74°$ B1

c) Area of the shaded region (6 Marks)

$\frac{97.18}{360} \times \frac{22}{7} \times 8^2 = 54.1962$ M1

$\frac{1}{2} \times 8 \times 8 \sin 97.18 = 31.749$ B1

22.5483

$\frac{73.74}{360} \times \frac{22}{7} \times 10^2 = 64.3762$ M1

$\frac{1}{2} \times 10^2 \sin 73.74 = 48.0001$ B1

16.3761

two segs. B1

$= 22.5483 + 16.3761$

$= 38.9244\ cm^2$ A1

19. (a) copy and complete the table below: (2 Marks)

x	0	1	2	3	4	5	6
$y = 2x - 4$							
$y = 12 - 2x$							

(b) (i) On the grid provided and using the same axes, draw the lines y = 2x + 4 and y = 12 – 2x (3 Marks)

(ii) Hence use your graphs to solve the simultaneous equations

½ x – ¼ y = 1

x + ½ y = 6 (2 Marks)

$4 \times \frac{1}{2}x - \frac{1}{4}y \times 4 = 1 \times 4$

$2x - y = 4$

$2x - 4 = y$.

$2 \times x + \frac{1}{2}y = 6 \times 2$

$2x + y = 12$

$y = 12 - 2x$

$2x - 4 = y$

$-2x + 12 = y$

$0 + 8 = 2y$

$4 = y$.

$2x - 4 = 4$

$2x = 8$

$x = 4$.

2

(c) By use of substitution method, solve the simultaneous equations.

$6x + 4y = 36$

$x + 3y = 13$ (3 Marks)

$x = (3 - 3y)$

Subst in Eqn 1

$6(13 - 3y) + 4y = 36$ M1

$78 - 18y + 4y = 36$

$78 - 14y = 36$

$\frac{-14y}{-14} = \frac{-42}{-4}$

$y = 3$

but B1

$x = 13 - 3y$

$x = 13 - 3$

$= 4$ A1

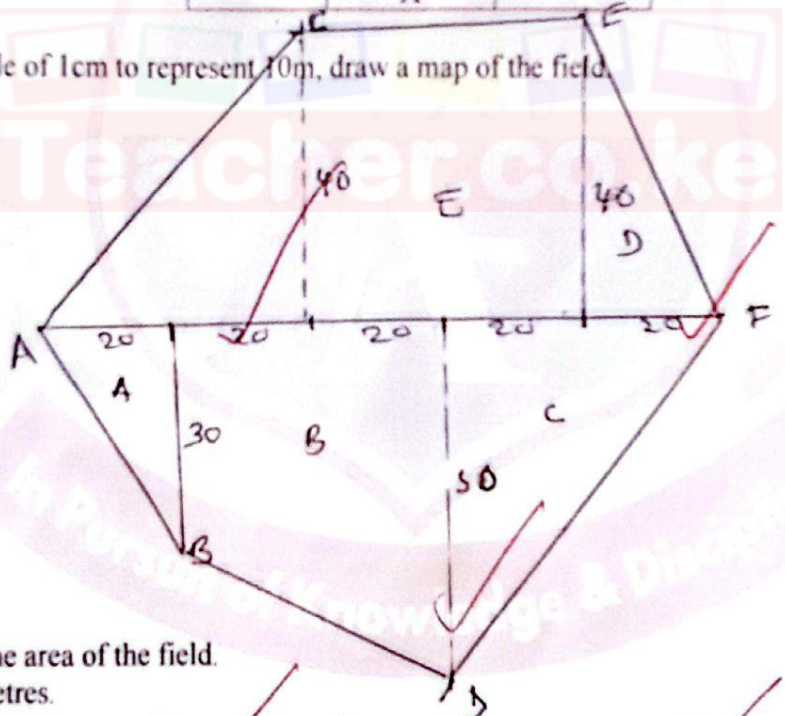
$x = 3$

$y = 4$

20 A field was surveyed and its measurements recorded in a field book as shown below.

	F 100	
E 40	80	
	60	D 50
C 40	40	
	20	B 30
	A	

(a) Using a scale of 1cm to represent 10m, draw a map of the field. (4 Marks)



Lab B1

Scale B1

(b) Calculate the area of the field.

(i) in square metres. (4 Marks)

A $\frac{1}{2} \times 20 \times 30 = 300M^2$

B $40 \times \left(\frac{30+50}{2}\right) = 1600M^2$

C $\frac{1}{2} \times 40 \times 50 = 10,000M^2$

D $\frac{1}{2} \times 40 \times 20 = 400M^2$

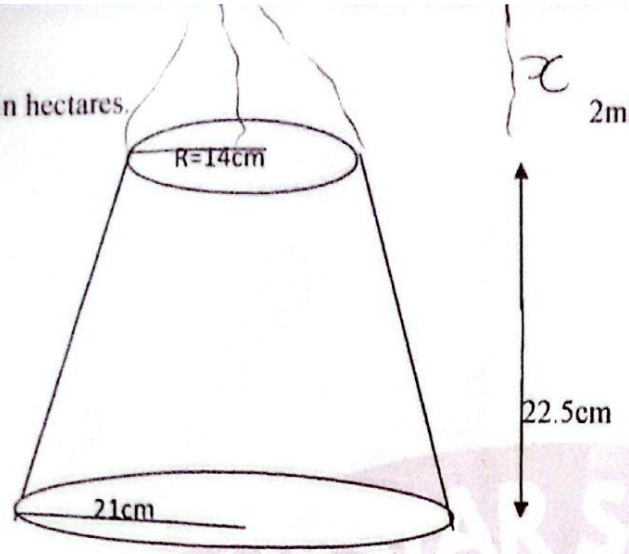
E $40 \times 40 = 1600M^2$

F $\frac{1}{2} \times 40 \times 40 = 800M^2$

Total $= 5700M^2$ 4 M

(ii) in hectares. 2marks

21



The diagram represents a solid frustum with base radius 21cm and top radius 14cm. The frustum is 22.5cm high and is made of a metal whose density is 3g/cm3 $\pi = 22/7$.

a) Calculate

(i) The volume of the metal in the frustrum. (5 marks)

$\frac{22.5+x}{x} = \frac{21}{14}$

$x = 45$

$V = \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$

$\frac{1}{3} \times \frac{22}{7} \times 21^2 \times 67.5 = 31185$

$\frac{1}{3} \times \frac{22}{7} \times 14^2 \times 45 = 9240$

$V = 31,185 - 9240$

$= 21,945\ cm^2$

(ii) The mass of the frustrum in kg. (2 marks)

$D \times M/V$

$M = D \times V$

$= 3g/cm^3 \times 21945\ cm^3$

$= 65,835\ g$

$1000g \rightarrow 1kg$

$\frac{65,835 \times 1kg}{1000}$

$= 65.835\ kg$

b) The frustrum is melted down and recast into a solid cube. In the process 20% of the metal is lost. Calculate to 2 decimal places the length of each side of the cube. (3 marks)

$\frac{80}{100} \times 21945 = 17556$

$L = \sqrt[3]{17556}$

$= 25.99\ cm$

3

22. Jane is a sales executive earning a salary of Ksh. 20,000 and a commission of 8% for the sales in excess of Ksh 100,000. If in January 2010 she earned a total of Ksh.48, 000 in salaries and commissions.

a) Determine the amount of sales she made in that month (4 Marks)

B.S = 20,000

COM = 8% over 100,000

Jan. 2010

COMM.

= 48,000 - 20,000

= 28,000

Sales 28000 = 8/100 × x

x = 100/8 × 28000

x = 350,000

Total

= 350,000 + 100,000

= 450,000

4

b) If the total sales in the month of February and March increased by 18% and then dropped by 25% respectively. Calculate

(i) Jane's commission in the month of February (3 Marks)

Feb Sales

= 118/100 × 450000

= 531000

COMMISSION = 8/100 × (531000 - 100,000)

= 34,480

3

(ii) Her total earning in the month of March (3 Marks)

March Sales = 75/100 × 531000 = 398250

COMMISSION = 8/100 × 298,250 = 23,860

Total earning = 20,000 + 23,860

= 43860

3

(i) the value of **X**. (1marks)

$x = (100 - (4+6+10+14+24+14+6))$

$= 22$ ✓ 1

(ii) The modal class. (1marks)

Modal class = 55-59 ✓ 1

(b) Calculate the mean. (2marks)

class	Mid Point	frequency	fx	cf
30-34	32	4	128	4
35-39	37	6	222	10
40-44	42	16	420	20
45-49	47	14	658	34
50-54	52	22	1144	56
55-59	57	24	1368	80
60-64	62	14	868	94
65-69	67	6	402	100

$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{5210}{100}$

$= 52.1$ ✓ 2

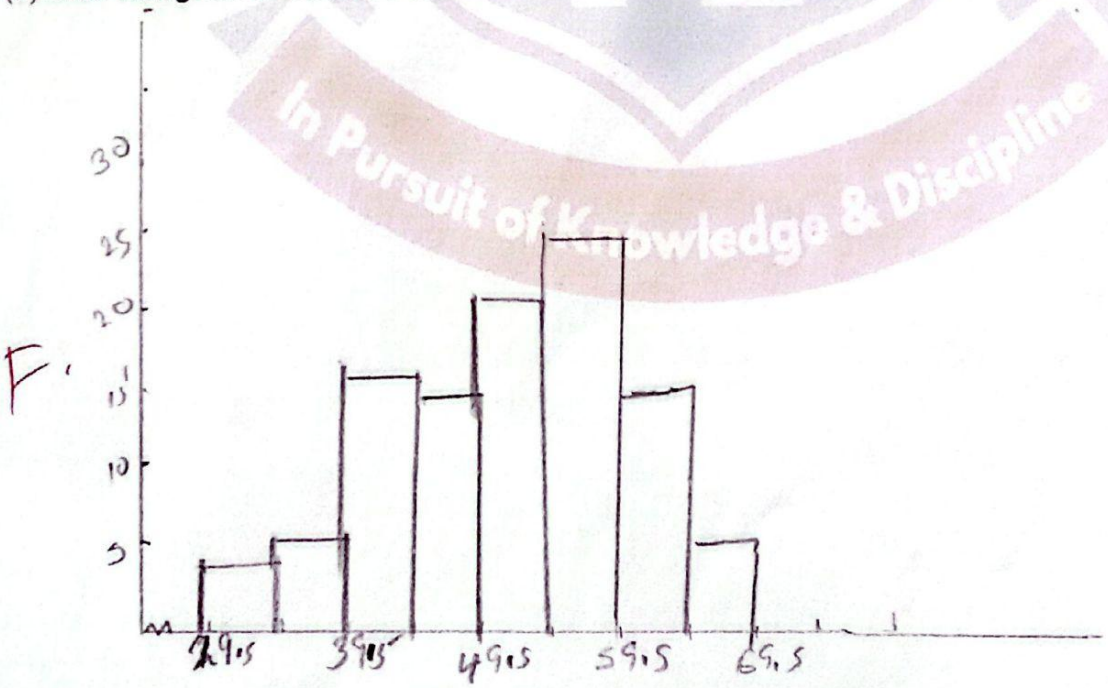
(c) The median. (2marks)

$L + \left(\frac{\frac{N}{2} - cf}{f}\right) I$

$49.5 + \frac{(50-34)}{22} 5$ ✓

53.1364 ✓ 2

(d) Draw histogram for the above data (4marks)



upper class boundary