

MARKING SCHEMES: FORM 2 MATHEMATICS

1.

(3 marks)

$$\frac{\frac{4}{5}(3\frac{1}{4} - 1\frac{3}{8}) \div (2\frac{1}{2} \div 5\frac{1}{3})}{\frac{3}{5} \text{ of } 3\frac{1}{5}}$$

$$\text{Numerator} = \frac{4}{5} (2 + \frac{1}{4} - \frac{3}{8}) \div (\frac{5}{2} \times \frac{3}{16})$$

$$= \frac{4}{5} \times 1\frac{7}{8} \div \frac{15}{32}$$

$$= \frac{4}{5} \times \frac{15}{8} \times \frac{32}{15} = \frac{16}{5}$$

$$\text{Denominator} = \frac{3}{5} \times \frac{16}{5} = \frac{48}{25}$$

$$\text{Expression} = \frac{16}{5} \div \frac{48}{25} = \frac{16}{5} \times \frac{25}{48} = \frac{5}{3} = 1\frac{2}{3}$$

2. (i) Distance between posts is the HCF of 608 and 264 (2 marks)

$$608 = 2 \times 2 \times 2 \times 2 \times 2 \times 19$$

$$264 = 2 \times 2 \times 2 \times 3 \times 11$$

$$\text{HCF} = 2^3 = 8$$

Distance between posts = 8 m

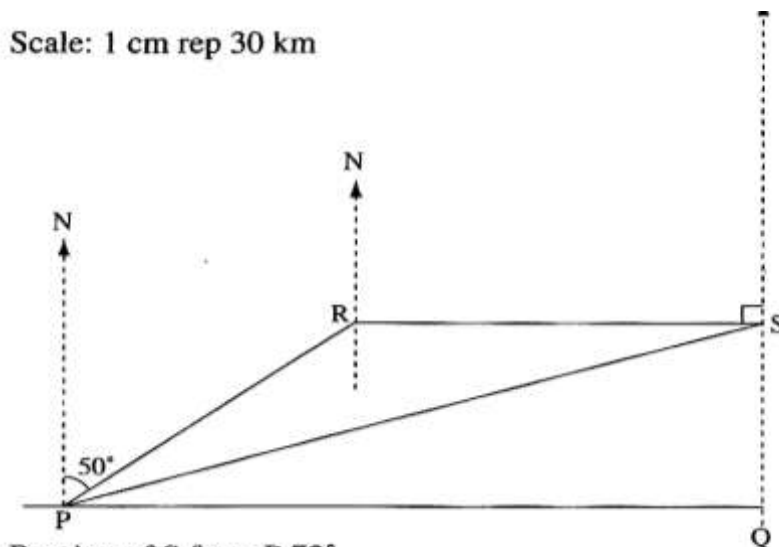
(ii) Number of posts = $\frac{2(l + b)}{8}$ (2 marks)

$$= \frac{2(608 + 264)}{8}$$

$$= \frac{1744}{8} = 218$$

3. (4 marks)

Scale: 1 cm rep 30 km



Bearing of S from P 72°

Distance of S from P = $6.3 \text{ cm} \times 30 = 189 \text{ km}$

4. (3 marks)

$$\begin{aligned}
 &= \frac{4a - 4a - b - 4a}{c - 4a} + 4 \\
 &= \frac{-b - 4a}{c - 4a} + 4 \\
 &= 4a - b + 4
 \end{aligned}$$

5. (4 marks)

$$\begin{aligned}
 \text{Buying price (BP)} &= \frac{288}{12} \times 10 = \text{sh } 240 \\
 \text{Selling price (SP)} &= \frac{288}{18} \times 20 = \text{sh } 320 \\
 \text{Percentage profit} &= \frac{\text{SP} - \text{BP}}{\text{BP}} \times 100 \\
 &= \frac{320 - 240}{240} \times 100 \\
 &= 33\frac{1}{3} \%
 \end{aligned}$$

6. (3 marks)

$$\begin{aligned}
 3x - 2y &= 7 \quad \dots\dots\dots \text{(i)} && \text{(mult. eqn. (i) by 1)} \\
 5x + y &= 3 \quad \dots\dots\dots \text{(ii)} && \text{and eqn. (ii) by 2} \\
 \Rightarrow \left. \begin{array}{l} 3x - 2y = 7 \\ 10x + 2y = 6 \end{array} \right\} && \text{add} \\
 13x &= 13 \\
 x &= 1 \\
 \text{Subst. for } x \text{ in eqn. (ii)} \\
 5 \times 1 + y &= 3 \\
 y &= 3 - 5 \\
 &= -2 \\
 \text{Hence } x &= 1, y = -2
 \end{aligned}$$

7. (a) In what ratio did it decrease? (1 mark)

$$120 : 150 \Rightarrow 4 : 5$$

(b) (2 marks)

$$\begin{aligned}
 \text{new width} &= \frac{4}{5} \times 140\text{cm} \\
 &= 112\text{cm}
 \end{aligned}$$

8. Given the following currency exchange rate, calculate to 3 significant figures the number of dollars that can be exchanged for 25 Sterling pounds.

$$1 \text{ US dollar (\$)} = \text{Ksh } 76.85$$

$$1 \text{ Sterling pound (£)} = \text{Ksh } 115.30$$

Convert sterling pounds into Kenya shillings

$$25 \text{ Sterling pounds} = \text{Kshs } 25 \times 115.30$$

$$\text{Now convert Ksh. into dollars} = \frac{25 \times 115.30}{76.85}$$

$$= \$ 37.5$$

9. .

(4 marks)

$$\text{Volume of tank} = \pi r^2 h \text{ where } r = 70 \text{ cm, } h = 80 \text{ cm}$$

$$= \frac{22}{7} \times \frac{70 \times 70 \times 80}{1000} \text{ litres}$$

$$= 1232 \text{ litres}$$

$$\text{Fraction filled} = \frac{492.8}{1232}$$

$$= \frac{4928}{12320}$$

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

10. .

(3 marks)

Let daughter's age be y years $\Rightarrow$ man's age is $3y$ years.

In 12 years time: daughter will be $(y + 12)$ years old

and man will be $(3y + 12)$ years old

$$\therefore 3y + 12 = 2(y + 12)$$

$$3y + 12 = 2y + 24$$

$$3y - 2y = 24 - 12 \Rightarrow y = 12$$

Hence daughter's age is 12 years and man's age is 36 years.

$$11 \quad 5.\dot{8}\dot{1} = 5.81818181\dots (3 \text{ marks})$$

$$\text{Let } r = 5.81818181\dots (i)$$

$$\text{then } 100r = 581.818181\dots (ii)$$

Subtract eqn. (i) from eqn. (ii).

$$99r = 576$$

$$r = \frac{576}{99}$$

$$= \frac{64}{11} \text{ or } 5\frac{9}{11}$$

12.

(3 marks)

$$\text{Marked price (MP)} = \text{sh } 450 \quad 3\text{mks}$$

$$\text{Selling price (SP)} = \text{sh } 393.75$$

$$\% \text{ discount} = \frac{\text{MP} - \text{SP}}{\text{MP}} \times 100$$

$$= \frac{450 - 393.75}{450} \times 100$$

$$= \frac{56.25}{450} \times 100$$

$$= 12.5\%$$

$$13. \quad 4 \text{ cm on map represents } 20 \text{ km}$$

$$1 \text{ cm on map represents } 5 \text{ km} = 5000 \text{ m}$$

$$2.8 \text{ cm on map rep. } 2.8 \times 5000 = 14000 \text{ m}$$

$$1.6 \text{ cm on map rep. } 1.6 \times 5000 = 8000 \text{ m}$$

$$\therefore \text{Area of ranch} = 14000 \times 8000 \text{ m}^2$$

$$= \frac{14000 \times 8000}{10^4}$$

$$= 11200 \text{ ha}$$

$$14. \quad \text{Fraction spent on food \& rent} = \frac{1}{3} + \frac{1}{4} = \frac{4+3}{12} = \frac{7}{12}$$

$$\text{Remainder} = 1 - \frac{7}{12} = \frac{5}{12}$$

$$\text{Fraction spent on transport} = \frac{3}{5} \text{ of } \frac{5}{12} = \frac{3}{5} \times \frac{5}{12} = \frac{1}{4}$$

$$\text{Fraction saved} = \frac{5}{12} - \frac{1}{4} = \frac{5-3}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

$$\therefore \frac{1}{4} \text{ of salary} = \text{sh } 1800$$

Comp

3mks

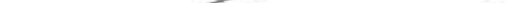
(4 marks)

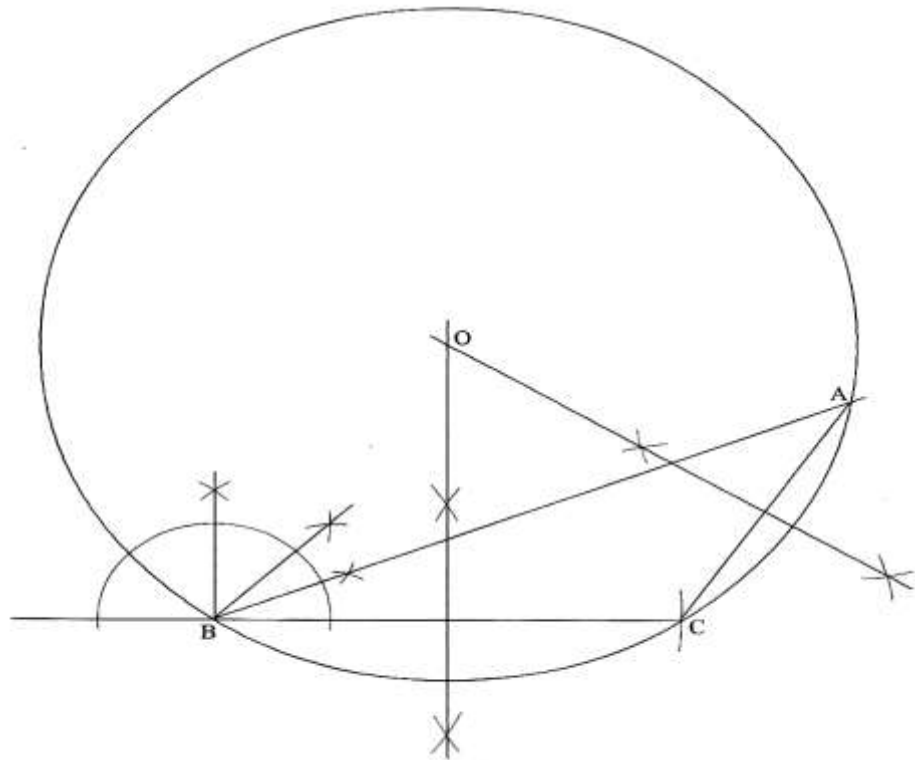
$$\text{Metal needed} = \frac{110}{100} \times 8512 = 9363.2 \text{ cm}^2$$

(a) *angle PTR* = $15 + 20 = 35^\circ$ (2 marks)

(b) (2 marks)

$$\begin{aligned}\angle 20 + 90 + \angle QYP + (180 - 35) &= 360 \\ \angle QYP &= 105^\circ\end{aligned}$$

17. (a)  (4 marks)



(b)  (2 marks)

$$AC = 4.1\text{cm} \pm 0.1\text{cm}$$

$$\angle ACB=122^{\circ}\pm1^{\circ}$$

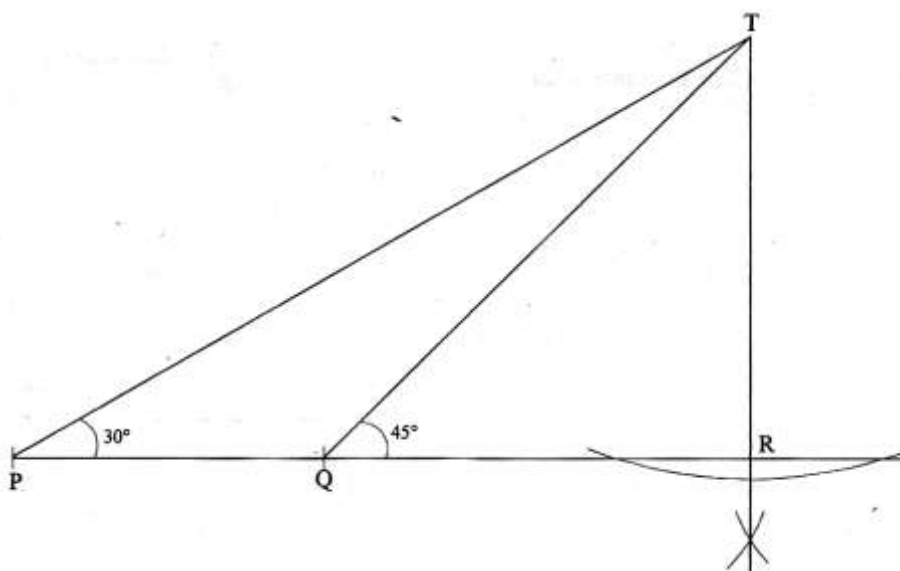
(c) Construct a circle that passes through A, B and C. (3 marks)

(d) What is the radius of this circle? (1 mark)

$$radius = 5.2 \pm 0.1 cm$$

18.(a)

(4 marks)



(b) (i) height $TR = 5.5 \times 5 = 27.5 \pm 0.5$ m.

(2 marks)

(ii) distance $QR = 5.5 \times 5 = 27.5 \pm 0.5$ m.

(2 marks)

(iii) distance $PR = 9.5 \times 5 = 47.5 \pm 0.5$ m.

(2 marks)

19.. (a)

(3 marks)

3mks

(a) Wholesaler paid $\frac{120}{100} \times 500 = \text{sh } 600$
 Retailer paid $\frac{130}{100} \times 600 = \text{sh } 780$
 Customer paid $\frac{150}{100} \times 780$
 $= \text{sh } 1\,170$

(b) Let the amount paid by wholesaler be x

Retailer paid $\frac{130}{100}x = 1.3x$

Customer paid $\frac{150}{100} \times 1.3x = 1.95x$

$\therefore 1.95x = 1\,560$

$x = \frac{1\,560}{1.95}$

$= \text{sh } 800$

(c) Without the sale customer would have paid

(4 marks)

$1\,000 \times \frac{120}{100} \times \frac{130}{100} \times \frac{150}{100} = \text{sh } 2\,340$

Less 10% reduction $= \frac{90}{100} \times 2\,340$

$\Rightarrow$ Selling price (SP) $= \text{sh } 2\,106$

Buying price (BP) for retailer

$= 1\,000 \times \frac{120}{100} \times \frac{130}{100}$
 $= \text{sh } 1\,560$

$\therefore \% \text{ profit} = \frac{2\,106 - 1\,560}{1\,560} \times 100$
 $= 35\%$

20. (a)(a) Area of front & back walls = $6.3 \times 3.2 \times 2$ (5 marks)

$$= 40.32 \text{ m}^2$$

$$\text{Area of side walls} = 4.5 \times 3.2 \times 2$$

$$= 28.8 \text{ m}^2$$

$$\text{Area of floor} = 6.3 \times 4.5$$

$$= 28.35 \text{ m}^2$$

Total area of floor and walls

$$= 40.32 + 28.8 + 28.35$$

$$= 97.47 \text{ m}^2$$

$$\text{Area of door} = 1.85 \times 0.8 = 1.48 \text{ m}^2$$

$$\text{Area of windows} = 1.5 \times 0.7 \times 4 = 4.2 \text{ m}^2$$

$$\text{Total area not cemented} = 1.48 + 4.2$$

$$= 5.68 \text{ m}^2$$

$$\therefore \text{Area to be cemented} = 97.47 - 5.68$$

$$= 91.79 = 91.8 \text{ m}^2$$

2 marks)

3mks

$$\begin{aligned} \text{(b) Cost of cementing materials} &= 91.8 \times 500 \\ &= \text{sh } 45\,900 \end{aligned}$$

$$\begin{aligned} \text{(c) Cost of labour} &= 20\% \text{ of sh } 45\,900 \\ &= \frac{20}{100} \times 45\,900 \\ &= \text{sh } 9\,180 \end{aligned}$$

$$\text{Total cost of cementing} = 45\,900 + 9\,180$$

$$= \text{sh } 55\,080$$

$$\begin{aligned} \text{(a) (i) Mombasa to Mtito Andei time} \\ &= (2400 - 1930) + 2:50 = 4:30 + 2:50 \\ &= 7 \text{ h } 20 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{(ii) Mtito Andei to Nairobi time} \\ &= 1050 - 0335 = 7 \text{ h } 15 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{(iii) Nairobi to Nakuru time} \\ &= 1900 - 1240 = 6 \text{ h } 20 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{(iv) Nakuru to Kisumu time} \\ &= (2400 - 2015) + 9:00 = 3:45 + 9 \\ &= 12 \text{ h } 45 \text{ min} \end{aligned}$$

(4 marks)

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

(4 marks)

$$\begin{aligned} \text{(b) Stoppage time at Mtito Andei} \\ &= 0335 - 0250 = 45 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{Stoppage time at Nairobi} \\ &= 1240 - 1050 = 1 \text{ h } 50 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{Stoppage time at Nakuru} \\ &= 2015 - 1900 = 1 \text{ h } 15 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{Total stoppage time} \\ &= 45 \text{ min} + 1 \text{ h } 50 \text{ min} + 1 \text{ h } 15 \text{ min} \\ &= 3 \text{ h } 50 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{Travelling time from Mombasa to Kisumu} \\ &= 7 \text{ h } 20 \text{ min} + 7 \text{ h } 15 \text{ min} + \\ &\quad 6 \text{ h } 20 \text{ min} + 12 \text{ h } 45 \text{ min} \\ &= 33 \text{ h } 40 \text{ min} \end{aligned}$$

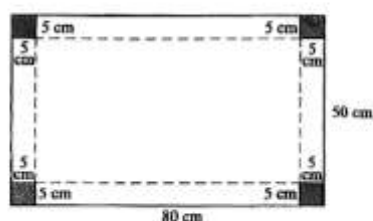
$$\begin{aligned} \text{Time for whole journey} \\ &= 33 \text{ h } 40 \text{ min} + 3 \text{ h } 50 \text{ min} \end{aligned}$$

$$= 37 \text{ h } 30 \text{ min}$$

$$\begin{aligned} \text{(c) Average speed} &= \frac{\text{Distance covered}}{\text{Time taken}} = \frac{1\,200}{37.5} \\ &= 32 \text{ km/h} \end{aligned}$$

(2 marks)

21. (a) The diagram below is a sketch of the metal sheet with the removed parts. To form the cuboid the remaining part is folded along the dotted lines.



- (i) Area of whole sheet = $80 \times 50 \text{ cm}^2$
 Area of sheet removed = $5 \times 5 \times 4 \text{ cm}^2$
 $\therefore$ area of remaining part
 $= (80 \times 50) - (5 \times 5 \times 4)$
 $= 4000 - 100$
 $= 3900 \text{ cm}^2$

- (b) Dimensions of cuboid are $l = 80 - 10 = 70 \text{ cm}$,
 $w = 50 - 10 = 40 \text{ cm}$, $h = 5 \text{ cm}$
 Capacity of cuboid = $70 \times 40 \times 5 \text{ cm}^3$
 Mass of water = volume $\times$ density
 $= 70 \times 40 \times 5 \times 1 \text{ g}$
 $= \frac{70 \times 40 \times 5 \times 1}{1000} \text{ kg}$
 $= 14 \text{ kg}$
 $\therefore$ Mass of cuboid and water = $14 + 1.95$
 $= 15.95 \text{ kg}$

(2 marks)

(4 marks)

(ii) Volume of metal in cuboid = 3900×0.2
 $= 780 \text{ cm}^3$
 Mass of empty cuboid = mass of metal
 $= \text{volume} \times \text{density}$
 $= 780 \times 2.5 \text{ g}$
 $= \frac{780 \times 2.5}{1000} \text{ kg}$
 $= 1.95 \text{ kg}$

(4 marks)

22.

$$y = 7 - 3x$$

(i)

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

$$y = 2x - 8$$

(ii)

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

- (b) Scale used:
 Horizontal axis: 1 cm rep. 2 units
 Vertical axis: 2 cm rep. 5 units

(4 marks)

- (c) Both graphs are straight lines

(1 mark)

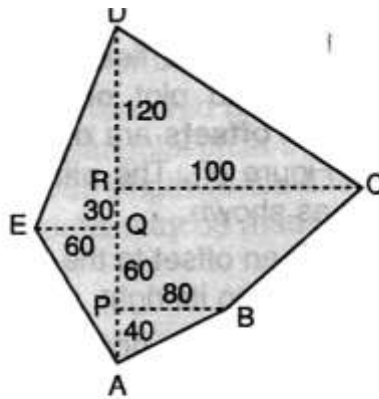
- (d) $x = 3, y = -2$

(1 mark)

11.

AP = 40 m
 AQ = 100 m
 AR = 130 m
 AD = 250 m
 PB = 80 m
 QE = 60 m
 RC = 180 m

(10 marks)



Area of triangle APB	$= \frac{1}{2} \times 40 \times 80 \text{ m}^2$	$= 1\,600 \text{ m}^2$
Area of triangle AQE	$= \frac{1}{2} \times 100 \times 60 \text{ m}^2$	$= 3\,000 \text{ m}^2$
Area of trapezium BPRC	$= \frac{1}{2} (80 + 100) 90 \text{ m}^2$	$= 8\,100 \text{ m}^2$
Area of triangle DQE	$= \frac{1}{2} \times 150 \times 60 \text{ m}^2$	$= 4\,500 \text{ m}^2$
Area of triangle DRC	$= \frac{1}{2} \times 120 \times 100 \text{ m}^2$	$= 6\,000 \text{ m}^2$
By addition, area of ABCDE		$= \underline{23\,200 \text{ m}^2}$
$\therefore$ area of field	$= 2.32 \text{ ha}$	