FORM 2 MATHEMATICS
TERM 3 2017
MARKING SCHEMES:

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) (2 marks)

Distance between posts is the HCF of 608 and 264

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

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

$HCF = 2^3 = 8$

Distance between posts = 8 m

(ii) (2 marks)

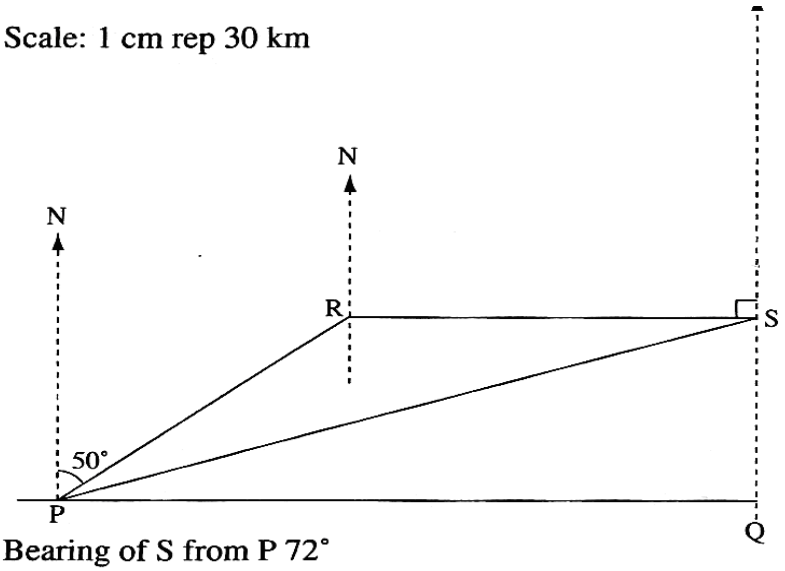
$$\text{Number of posts} = \frac{2(l + b)}{8}$$

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

$$= \frac{1\,744}{8} = 218$$

3. (4 marks)

Scale: 1 cm rep 30 km



Bearing of S from P 72°

Distance of S from P = 6.3 cm × 30 = 189 km

4. (3 marks)

$$= \frac{4a(c-4a)-b(c-4a)}{c-4a}+4$$

$$= \frac{(4a-b)(c-4a)}{c-4a}+4$$

$$= 4a-b+4$$

5. (4 marks)

$$\text{Buying price (BP)} = \frac{288}{12}\times 10 = \text{sh } 240$$

$$\text{Selling price (SP)} = \frac{288}{18}\times 20 = \text{sh } 320$$

$$\text{Percentage profit} = \frac{\text{SP}-\text{BP}}{\text{BP}}\times 100$$

$$= \frac{320-240}{240}\times 100$$

$$= 33\tfrac{1}{3}\,\%$$

6. (3 marks)

$3x - 2y = 7$ ..... (i) (mult. eqn. (i) by 1
$5x + y = 3$ ..... (ii) and eqn. (ii) by 2

$\Rightarrow \begin{matrix} 3x - 2y = 7 \\ 10x + 2y = 6 \end{matrix}$ add

$13x = 13$

$x = 1$

Subst. for x in eqn. (ii)

$5 \times 1 + y = 3$

$y = 3 - 5$

$= -2$

Hence $x = 1$, $y = -2$

7. .

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

$120:150 \Rightarrow 4:5$

(b)

(2 marks)

$$new\ width = \frac{4}{5} \times 140cm$$
$$= 112cm$$

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 US dollar ($) = Ksh 76.85
1 Sterling pound (£) = Ksh 115.30

Convert sterling pounds into Kenya shillings

25 Sterling pounds = Kshs 25×115.30

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

$= \$ 37.5$

9. .

(4 marks)

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

$= \frac{22}{7} \times \dfrac{70 \times 70 \times 80}{1\,000}$ litres

$= 1\,232$ litres

Fraction filled $= \dfrac{492.8}{1\,232}$

$= \dfrac{4\,928}{12\,320}$

$= \frac{2}{5}$

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

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

$3y + 12 = 2y + 24$

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

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

11. .

(3 marks)

$5.\dot{8}\dot{1} = 5.81818181\ldots\ldots$

Let $r = 5.81818181\ldots\ldots\ldots$ (i)

then $100\,r = 581.818181\ldots\ldots\ldots$ (ii)

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

$99r = 576$

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

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

12. . (3 marks)

Marked price (MP) = sh 450

Selling price (SP) = sh 393.75

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

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

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

$$= 12.5\%$$

13. . (3 marks)

4 cm on map represents 20 km

1 cm on map represents 5 km = 5 000 m

2.8 cm on map rep. $2.8 \times 5\,000$ = 14 000 m

1.6 cm on map rep. $1.6 \times 5\,000$ = 8 000 m

$\therefore$ Area of ranch = $14\,000 \times 8\,000$ m^2

$$= \frac{14\,000 \times 8\,000}{10^4}$$

= 11 200 ha

14. . (3 marks)

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

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

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

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

$\therefore \frac{1}{4}$ of salary = sh 1 800

15. . (4 marks)

$$base\ Area = \frac{22}{7} \times 14 \times 14 \times \frac{1}{2} \times 2 + 40 \times 28$$

$$= 1736 cm^2$$

$$curved\ surface\quad area = \left(\frac{22}{7} \times 28 \times \frac{1}{2} + 40 + \frac{22}{7} \times 28 \times \frac{1}{2} + 40\right) \times 30$$

$$= 5040 cm^2$$

$$total\quad area = 1736 + 5040 + 1736 = 8512 cm^2$$

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

16. .

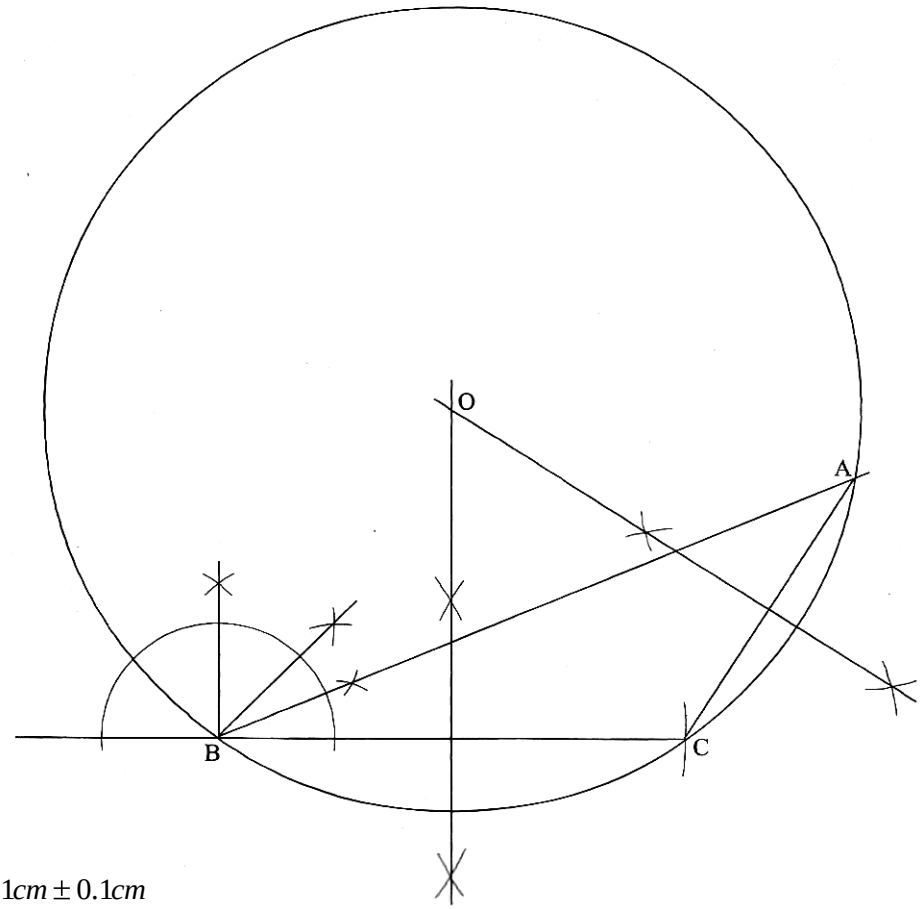
(a) $angle\quad PTR = 15 + 20 = 35°$ (2 marks)

(b) (2 marks)

$$\angle 20 + 90 + \angle QYP + (180 - 35) = 360$$

$$\angle QYP = 105°$$

17. (a) (4 marks)



(b) (2 marks)

$AC = 4.1cm \pm 0.1cm$

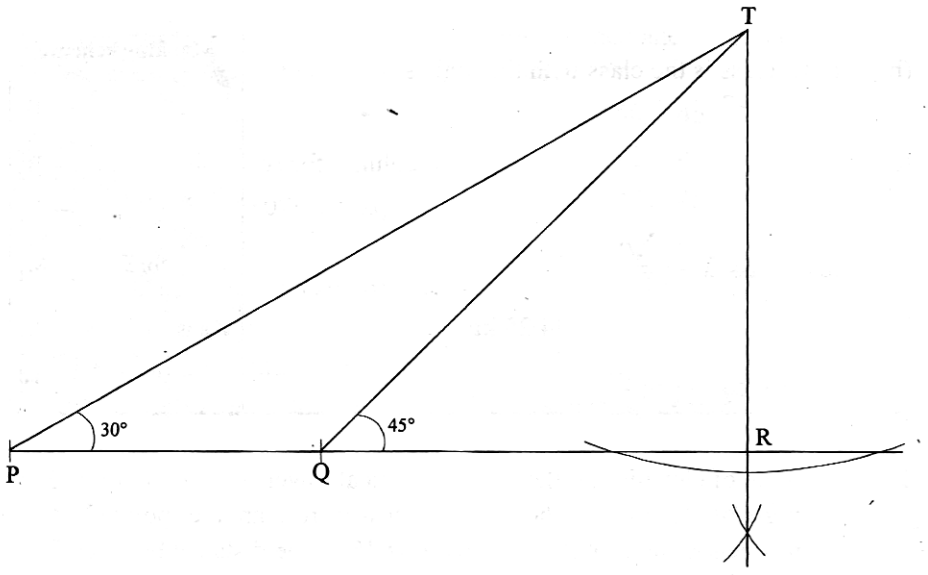
$\angle ACB = 122° \pm 1°$

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

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

$radius = 5.2 \pm 0.1cm$

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)

Solution

(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 (3 marks)

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

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

$= \text{sh } 1\,560$

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

$= 35\%$

20. . (a). (5 marks)

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

$= 40.32 \text{ m}^2$

Area of side walls $= 4.5 \times 3.2 \times 2$

$= 28.8 \text{ m}^2$

Area of floor $= 6.3 \times 4.5$

$= 28.35 \text{ m}^2$

Total area of floor and walls

$= 40.32 + 28.8 + 28.35$

$= 97.47 \text{ m}^2$

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

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

Total area not cemented $= 1.48 + 4.2$

$= 5.68 \text{ m}^2$

$\therefore$ Area to be cemented $= 97.47 - 5.68$

$= 91.79 = 91.8 \text{ m}^2$ (2 marks)

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

(c) Cost of labour $= 20\%$ of sh 45 900
$= \frac{20}{100} \times 45\,900$
$= \text{sh } 9\,180$ (3 marks)

Total cost of cementing $= 45\,900 + 9\,180$
$= \text{sh } 55\,080$

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

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

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

(iv) Nakuru to Kisumu time
$= (2400 - 2015) + 9{:}00 = 3.45 + 9$
$= 12 \text{ h } 45 \text{ min}$

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

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

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

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

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

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

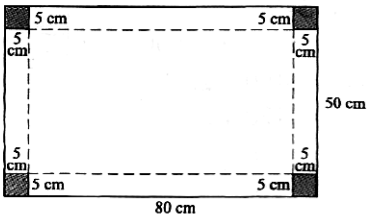
Time for whole journey
$= 33 \text{ h } 40 \text{ min} + 3\text{h } 50 \text{ min}$
$= 37 \text{ h } 30 \text{ min}$

(2 marks)

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

22. .

(a) The diagram b ·low is a sketch of the metal sheet with the removed parts. To form the cuboid the remaining part is folded along the dotted lines. (2 marks)



(i) Area of whole sheet $= 80 \times 50\ cm^2$

Area of sheet removed $= 5 \times 5 \times 4\ cm^2$

$\therefore$ area of remaining part

$= (80 \times 50) - (5 \times 5 \times 4)$

$= 4\,000 - 100$

$= 3\,900\ cm^2$

(ii) Volume of metal in cuboid $= 3\,900 \times 0.2$

$= 780\ cm^3$

Mass of empty cuboid = mass of metal

= volume × density

$= 780 \times 2.5$ g

$= \frac{780 \times 2.5}{1000}$ kg

$= 1.95$ kg (4 marks)

(b) Dimensions of cuboid are $l = 80 - 10 = 70$ cm,

$w = 50 - 10 = 40$ cm, $h = 5$ cm (4 marks)

Capacity of cuboid $= 70 \times 40 \times 5\ cm^3$

Mass of water = volume × density

$= 70 \times 40 \times 5 \times 1$ g

$= \frac{70 \times 40 \times 5 \times 1}{1\,000}$ kg

$= 14$ kg

$\therefore$ Mass of cuboid and water $= 14 + 1.95$

$= 15.95$ kg

23. .

$y = 7 - 3x$

(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:

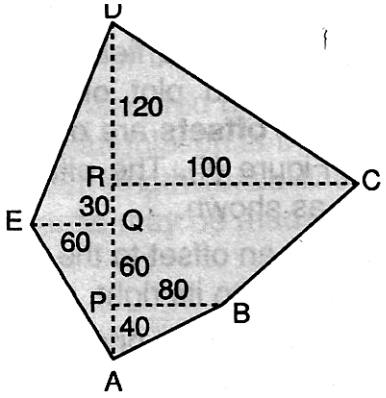
Horizontal axis: 1 cm rep. 2 units

Vertical axis : 2 cm rep. 5 units (4 marks)

(c) Both graphs are straight lines (1 mark)
(d) $x = 3, y = -2$ (1 mark)

24.

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 $= \frac{1}{2} \times 40 \times 80\ m^2 = 1\,600\ m^2$
Area of triangle AQE $= \frac{1}{2} \times 100 \times 60\ m^2 = 3\,000\ m^2$
Area of trapezium BPRC $= \frac{1}{2} (80 + 100)\ 90\ m^2 = 8\,100\ m^2$
Area of triangle DQE $= \frac{1}{2} \times 150 \times 60\ m^2 = 4\,500\ m^2$
Area of triangle DRC $= \frac{1}{2} \times 120 \times 100\ m^2 = 6\,000\ m^2$
By addition, area of ABCDE $= 23\,200\ m^2$
$\therefore$ area of field = 2·32 ha