MATHEMATICS
FORM 3
MID TERM 2 2025
MARKING SCHEME

1. Evaluate; (3 marks)

$$\frac{\left(\frac{2}{3}-1\frac{1}{4}+\frac{5}{6}\right)}{\frac{2}{3}\ of\ 2\frac{1}{4}-1\frac{1}{7}}$$

Numerator

$\frac{2}{3}+\frac{5}{6}-\frac{5}{4}=\frac{3}{12}=\frac{1}{4}$ M_1

Denomenator:

$\frac{2}{3}\times\frac{9}{4}-\frac{8}{7}=\frac{3}{2}-\frac{8}{7}=\frac{5}{14}$ M_1

$\frac{N}{D}=\frac{1}{4}\div\frac{5}{14}=\frac{7}{10}$ A_1

2. (a) Without using mathematical tables and calculators simplify; (1 mark)

$(3-\sqrt{7})(3+\sqrt{7})$.

$3(3+\sqrt{7})-\sqrt{7}(3+\sqrt{7})$

$9+3\sqrt{7}-3\sqrt{7}-7$

$=2$ M_1

(b) Hence evaluate; (2 marks)

$$\frac{2}{3-\sqrt{7}}-\frac{2}{3+\sqrt{7}}$$

$\frac{2}{3-\sqrt{7}}-\frac{2}{3+\sqrt{7}}=\frac{2(3+\sqrt{7})-2(3-\sqrt{7})}{2}$ M_1

$6+2\sqrt{7}-6+2\sqrt{7}$.

$\frac{4\sqrt{7}}{2}=2\sqrt{7}$ A_1

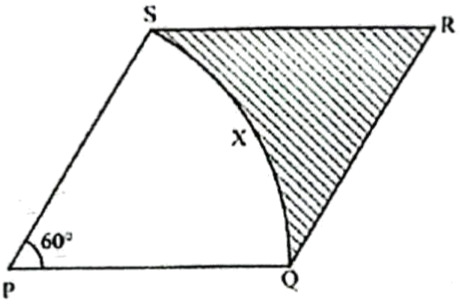
3. Given that $2^x \times 3^y = 108$. Solve the value of x and y (3 marks)

$2^x\times3^y=4\times27$ M_1

$2^x=2^2 \rightarrow x=2$ M_1

$3^y=3^3 \rightarrow y=3$ M_1

4. The figure below shows a rhombus PQRS with PQ = 9 cm, and $\angle SPQ = 60°$. SXQ is a circular arc, centre P.



Calculate the area of the shaded region correct to 2 decimal places. (Take $\pi = \frac{22}{7}$)

Area of rhombus $= 2 \times 0.5 \times 9 \times 9 \times \sin 60°$ (3 marks)

$= 70.14 cm^2$

Area of Sector $= \frac{60}{360} \times \frac{22}{7} \times 81 = 42.43 cm^2$

Area of Shaded region $= 70.14 - 42.43 = 27.71 cm^2$

5. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790.40 while in Kenya and converted the rest of the money into U.S dollars. The exchange rates were as follows.

	Buying (Ksh)	Selling (Ksh)
US dollar ($)	147.16	147.36
Sterling pound (£)	182.13	182.43

a) Convert (£) 4680 into Kenya shilling (2 marks)

$4680 \times 182.13 =$ Sh 852 368.40

b) Calculate the amount he received to the nearest U.S dollars (2 marks)

$852\,368.40 - 51\,790.40 =$ Sh 800 578

Amount in dollars $= \frac{800578}{147.36} = 5432.8$

$= 5432$ dollars.

6. Kamau leaves home for school at 10:00 a.m. He walked for 30 minutes, then took a rest for two hours. He then boarded a matatu for 4 hours. At what time did he arrive in school? (2 marks)

Total time = 30mins + 2hrs + 4hrs = 6hr 30min

Arrival time = 10:00am + 6 hr 30min = 4:30 pm.

7. A refrigerator can be bought in cash for Ksh. 35,000. The same refrigerator can be purchased on hire purchase terms by first paying a deposit of Ksh 6,000 followed by 24 equal monthly instalments of Ksh. 1,500. Calculate the hire purchase price and the carrying charge. (3 marks)

hpp = 6000 + (1500 × 24) = Sh 42,000

Carrying charge = 42000 − 35000 = Sh 7000.

8. Given that; $3 - 2x < x - 3 \leq 4$

a) Form two inequalities (2 marks)

$3 - 2x < x - 3$

$x - 3 \leq 4$

b) Solve for the value of x (1 mark)

$6 < 3x \Rightarrow x > 2$

$x \leq 4 + 3 \Rightarrow x \leq 7$

c) State all the integral values satisfying the inequalities. (1 mark)

3, 4, 5, 6, 7

9. Line L1 passes through the point (2, 6) and (4, 8). Find the equation of L2 which is a perpendicular bisector of line L1. (3 marks)

$m_1 = \frac{8-6}{4-2} = 1$

$m_2 = -1$

Mid point of AB $= \frac{2+4}{2}, \frac{6+8}{2}$

$= (3, 7)$

$\frac{y-7}{x-3} = -1$

$y = -x + 10$

10. The sum of interior angles of two regular polygons of sides; n and n + 2 are in the ratio 3:4. Calculate the sum of the interior angles of the polygon with n sides. (3 marks)

$\frac{(2n)90}{(2n-4)90} = \frac{4}{3}$

$6n = 8n - 16$

$n = 8$

Sum $= (2(8) - 4)90$

$= 1080°$

11. Solve the following equation. (3 marks)

$1 + \log_5 x = \log_5 12$

$\log_5 5 + \log_5 x = \log_5 12$

$5x = 12$

$x = \frac{12}{5} = 2.4$

12. Find the volume of the cone whose slant height is 15 cm and a height of 9 cm. (3 marks)

$15^2 = 9^2 + b^2$

$225 = 81 + b^2$

$b^2 = 144$

$b = 12\ cm$

Volume of cone $= \frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times 9$

$= 1357.71\ cm^3$

13. Convert the recurring decimal 12. 18 into fraction (3 marks)

$r = 12.1818181818\ldots$ i)

$100r = 1218.181818\ldots$

$99r = 1206$

$r = \frac{1206}{99} = 12\frac{2}{11}$

14. The angle of elevation of the top of a tower from a point X on the horizontal is 28.5°. From another point Y, 8 meters near to the base of the tower, the angle of elevation of the top of the tower is 37.2°. Calculate, to one decimal place, the length of the tower. (3 marks)

$\tan 28.5 = \frac{h}{8+x} \Rightarrow h = (x+8)\tan 28.5$

$\tan 37.2 = \frac{h}{x} \Rightarrow h = x \tan 37.2$

$(x+8)\tan 28.5 = x \cdot \tan 37.2$

$x = 20.11\ m$

$h = 20.11 \times 0.7590 = 15.3m$.