

**OPENER EXAMS**  
**MATHEMATICS FORM FOUR**  
**TERM ONE 2025**  
**TIME 1 HOUR 30 MIN**

Marking scheme:

**ANSWER ALL QUESTIONS IN SECTION A AND THREE QUESTIONS IN SECTION B**

1 Find the value of  $x$  in the equation.

$$\log_3(3x-3) - 3 = 2\log_3(x-1)$$

$$\log_3(3x-3) - \log_3 27 = 2\log_3(x-1)$$

$$\left(\frac{3x-3}{27}\right) = (x-1)^2$$

$$3x-3 = (x^2-2x+1) \cdot 27$$

$$3x-3 = 27x^2 - 54x + 27$$

$$27x^2 - 57x + 30 = 0$$

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$$-b \pm \sqrt{b^2 - 4ac}$$

$$\frac{-57 \pm \sqrt{57^2 - 4 \cdot 27 \cdot 30}}{2 \cdot 27}$$

(3 marks)

$$\frac{57 \pm \sqrt{57^2 - 4 \cdot 27 \cdot 30}}{54}$$

$$\frac{57 \pm 3}{54}$$

$$x = 10/9 \text{ or } 1$$

3. A businessman deposited Ksh. 80,000 in a savings account at the beginning of the year, which pays 10.5% interest per annum compounded quarterly. Find the amount in the account at the beginning of 5<sup>th</sup> year. (3 marks)

$$10.5\% \times \frac{1}{4} = 2.625\%$$

$$5 \text{ years} \times 4 = 20$$

$$80000 \left(1 + \frac{2.625}{100}\right)^{20}$$

$$= 134,323.9299$$

134,323.93 shillings

4. Two quantities  $Q$  and  $R$  are such that  $Q$  varies partly as  $R$  and partly varies as the square root of  $R$ . Determine the equation connecting  $Q$  and  $R$  given that  $Q = 500$  when  $R = 16$  and  $Q = 800$  when  $R = 25$ . (3 marks)

$$500 = 16m + 4c$$

$$800 = 25m + 5c$$

$$2500 = 80m + 20c$$

$$3200 = 100m + 20c$$

$$\hline 700 = 20m$$

$$m = 35$$

$$2500 = (80 \times 35) + 4c$$

$$2500 - 2800 = 4c$$

$$4c = -300$$

$$c = -75$$

$$Q = 35R - 75\sqrt{R}$$