KENYA CERTIFICATE OF BASIC EDUCATION (K.C.B.E)

MARKING SCHEME

GRADE 10: CORE MATHEMATICS – TERM 1 – JANUARY 2026

SECTION A (40 MARKS)

1. A shopkeeper sold 15 boxes of sugar. Classify the number.

- ✓ 15 is **odd** (not divisible by 2).
- ✓ 15 is **composite** (factors are 1, 3, 5, 15).
  Answer: Odd and Composite

2. A machine produces 8 units per hour. Find the reciprocal.

$$\text{Reciprocal of } 8 = \frac{1}{8} \text{ hours/unit}$$

Answer: $\frac{1}{8}$ hours/unit

3. Determine rational or irrational:

(a) $\sqrt{49} = 7 \rightarrow$ **rational** (can be expressed as a fraction $\frac{7}{1}$)

(b) $\sqrt{2} \rightarrow$ **irrational** (cannot be expressed as a fraction, non-terminating, non-repeating)

4. Reciprocal of 0.25

$$\text{Reciprocal} = \frac{1}{0.25} = 4$$

As a fraction: $0.25 = \frac{1}{4} \rightarrow$ reciprocal $= \frac{4}{1} = 4$

5. Express $5^3 \times 5^4$ as a single power

$$5^3 \times 5^4 = 5^{3+4} = 5^7$$

6. Simplify $\frac{2^5 \times 2^3}{2^4}$

$$\frac{2^5 \times 2^3}{2^4} = \frac{2^{5+3}}{2^4} = 2^{8-4} = 2^4 = 16$$

7. Using logarithm tables, find $\log 250$ (4 d.p.)

$$\log 250 = \log(2.5 \times 10^2) = \log 2.5 + \log 10^2 = 0.3979 + 2 = 2.3979$$

8. Simplify $\log 100 + \log 0.1$

$$\log 100 + \log 0.1 = \log(100 \times 0.1) = \log 10 = 1$$

9. Evaluate $(27)^{2/3}$

$$27^{2/3} = (3^3)^{2/3} = 3^{3\cdot\frac{2}{3}} = 3^2 = 9$$

10. Expand and simplify $(x+3)(x-5)$

$$(x+3)(x-5) = x^2 - 5x + 3x - 15 = x^2 - 2x - 15$$

SECTION B (60 MARKS)

11. A trader invests Ksh 5000, $A = 5000 \times 2^n$

(a) Evaluate A after 3 months:

$$A = 5000 \times 2^3 = 5000 \times 8 = 40000$$

(b) Express $2^3 \times 2^4$ as a single power:

$$2^3 \times 2^4 = 2^{3+4} = 2^7$$

(c) Find n when $A = 80000$ using logarithms:

$80000 = 5000 \times 2^n \Longrightarrow 2^n = \frac{80000}{5000} = 16\ 2^n = 2^4 \Longrightarrow n = 4$

12. Rectangular garden: $A = x^2 + 5x - 24$

(a) Factorize:

$$x^2 + 5x - 24 = (x+8)(x-3)$$

(b) Solve $A = 0$:

$$(x+8)(x-3) = 0 \Longrightarrow x = -8 \text{ or } x = 3$$

(c) Verify:

- ✓ For $x = 3$: $3^2 + 5(3) - 24 = 9 + 15 - 24 = 0$
- ✓ For $x = -8$: $(-8)^2 + 5(-8) - 24 = 64 - 40 - 24 = 0$

13. Load on bridge: $P = 10^x$

(a) If $P = 1000$:

$$10^x = 1000 = 10^3 \Longrightarrow x = 3$$

(b) Simplify $\frac{10^6 \cdot 10^2}{10^3}$:

$$10^{6+2-3} = 10^5$$

(c) Evaluate $100^{3/2}$:

$$100^{3/2} = (10^2)^{3/2} = 10^{2\cdot\frac{3}{2}} = 10^3 = 1000$$

14. Cube $V = x^3$

(a) If $x = 2y$:

$$V = (2y)^3 = 2^3y^3 = 8y^3$$

(b) Simplify $(3^2)^4 = 3^{2\cdot4} = 3^8 = 6561$

(c) If $V = 512$:

$$x^3 = 512 \Longrightarrow x = \sqrt[3]{512} = 8$$

15. TV price reduced: 45000 → 36000

(a) Fraction of discount:

$$\text{Discount fraction} = \frac{45000 - 36000}{45000} = \frac{9000}{45000} = \frac{1}{5}$$

(b) Express $45000 - 36000$ as factorized quadratic:

$45000 - 36000 = 9000 = 1000(9)$ or as $100^2 - 60^2 = 100^2 - 60^2$?(context unclear)

(c) Price after 3 years with repeated discount:

$$P = 36000 \times \left(\frac{4}{5}\right)^2 \quad \text{(if discount repeats as fraction)}$$

16. Population $P = 5000(1.1)^t$

(a) After 5 years:

$$P = 5000(1.1)^5 \approx 5000 \times 1.61051 = 8052.55 \approx 8053$$

(b) Find t if $P = 10000$:

$10000 = 5000(1.1)^t \Longrightarrow 2 = (1.1)^t$ $t = \log_{1.1}2 = \frac{\log 2}{\log 1.1} \approx \frac{0.3010}{0.0414} \approx 7.27$ years

(c) Simplify $(1.1)^3 \times (1.1)^2 = (1.1)^{3+2} = (1.1)^5$

17. Rectangle length $x + 2$**, width** $x - 3$**, area** $2x^2 - 5x - 12$

(a) Form quadratic equation:

$$(x + 2)(x - 3) = x^2 - x - 6 \neq 2x^2 - 5x - 12?$$

- ✓ Let's use given area: $2x^2 - 5x - 12 =$ Area → quadratic equation: $2x^2 - 5x - 12 = 0$

(b) Solve by factorization:

$$2x^2 - 5x - 12 = 0$$

Multiply 2* -12 = -24 → factors of -24 adding to -5 → -8 and 3

$2x^2 - 8x + 3x - 12 = 0$ $(2x^2 - 8x) + (3x - 12) = 0 \Longrightarrow 2x(x-4) + 3(x-4) = 0 \Longrightarrow (2x+3)(x-4) = 0$ $x = -\frac{3}{2}$ or $x = 4$

(c) Interpret solutions:

- ✓ $x = -3/2$ → negative length → discard
- ✓ $x = 4$ → length $x + 2 = 6$, width $x - 3 = 1$

NOTE TO FACILITATORS (TEACHERS):

The marking scheme provided is not exhaustive. Facilitators are advised to use their professional judgment when awarding marks. Any correct, relevant, and scientifically or contextually acceptable answer that demonstrates understanding of the concepts should be credited. Where examples are required, learners may provide other valid examples apart from those listed in the scheme.

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