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

MARKING SCHEME

GRADE 10: ESSENTIAL MATHEMATICS – TERM 1 – JANUARY 2026

SECTION A (50 MARKS)

1. Chapati purchase – even numbers >10
Even numbers greater than 10: 12, 14, 16, …
Two possible answers: **12, 14**

2. Prime numbers between 30 and 50
Prime numbers: 31, 37, 41, 43, 47
Three possible answers: **31, 37, 43**

3. Land division
Total land = $\frac{25}{3}$ hectares, 4 children:

$$\text{Land per child} = \frac{25/3}{4} = \frac{25}{3} \times \frac{1}{4} = \frac{25}{12} \text{ hectares}$$

4. Irrational radius examples
Given radius = $\sqrt{3}$ → irrational
Other possible irrationals: $\sqrt{2}, \pi, \sqrt{5}$
Two examples: **√2, π**

5. Express $4\frac{1}{2}$ kg as improper fraction

$$4\frac{1}{2} = \frac{4 \cdot 2 + 1}{2} = \frac{9}{2}$$

6. Reciprocal of $\frac{5}{6}$

$$\text{Reciprocal} = \frac{6}{5}$$

7. Express 2.5×10^3 J in ordinary form

$$2.5 \times 10^3 = 2500 \text{ J}$$

8. Four consecutive integers between –3 and 3
-3, -2, -1, 0, 1, 2, 3 → pick any four consecutive: **-2, -1, 0, 1**

9. Factorize $x^2 + 7x + 6$

$$x^2 + 7x + 6 = (x + 6)(x + 1)$$

10. Factorize $9x^2 - 1$ (difference of squares)

$$9x^2 - 1 = (3x)^2 - 1^2 = (3x - 1)(3x + 1)$$

11. Express $5 \times 5 \times 5 \times 5 \times 5$ **in indices**

$$5^5$$

12. Simplify $\frac{a^3b^5}{ab^2}$

$$\frac{a^3b^5}{ab^2} = a^{3-1}b^{5-2} = a^2b^3$$

13. Factorize $v = 4x^2 + 4x$

$$4x^2 + 4x = 4x(x + 1)$$

14. Solve $n^2 + n - 20 = 0$
Factorize: $n^2 + n - 20 = (n + 5)(n - 4) = 0$

$$n = -5 \text{ or } n = 4$$

Only positive makes sense for goals: **n=4**

15. Expand $(3x + 2)(x - 4)$

$$(3x + 2)(x - 4) = 3x^2 - 12x + 2x - 8 = 3x^2 - 10x - 8$$

SECTION B (50 MARKS)

16. Water usage
(a) Total usage:

$$\sqrt{5} + 2\sqrt{5} + 3\sqrt{5} = (1 + 2 + 3)\sqrt{5} = 6\sqrt{5} \text{ litres}$$

(b) Cost:

$$6\sqrt{5} \times 15 = 90\sqrt{5} \approx 90 \times 2.236 = 2012.4 \approx \text{KSh } 2012$$

17. Battery life
(a) Total time for 8 phones:

$$8 \times \sqrt{11} = 8\sqrt{11} \text{ hours}$$

(b) Rationalize $\frac{4}{\sqrt{11}}$:

$$\frac{4}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}} = \frac{4\sqrt{11}}{11}$$

18. Factorize $h = 2x^2 - 13x + 20$

Multiply 2*20=40, factors of 40 that sum to -13: -8, -5

$$2x^2 - 8x - 5x + 20 = 2x(x-4) - 5(x-4) = (2x-5)(x-4)$$

(b) Solve $2x^2 - 13x + 20 = 0$

$$(2x-5)(x-4) = 0 \Rightarrow x = \frac{5}{2} \text{ or } x = 4$$

19. Simplify $F = \frac{64a^7b^9}{8a^3b^3}$

$$F = \frac{64}{8}a^{7-3}b^{9-3} = 8a^4b^6$$

(b) If a=2, b=3:

$$F = 8 \times 2^4 \times 3^6 = 8 \times 16 \times 729 = 128 \times 729 = 93312$$

20. Factorize $A = x^2 - 4x - 21$

$$x^2 - 4x - 21 = (x-7)(x+3)$$

Dimensions: x-7, x+3

(b) Fencing cost: perimeter = 2(l+w) = 2((x-7)+(x+3))=2(2x-4)=4x-8 m

Cost = $(4x - 8) \times 150 = 600x - 1200$ KSh

21. Drone height $h(t) = t^2 - 6t + 8$

(a) t=4: $h = 16 - 24 + 8 = 0$

(b) Complete the square:

$$t^2 - 6t + 8 = (t^2 - 6t + 9) - 9 + 8 = (t-3)^2 - 1$$

Minimum height = -1 m at t=3 s

22. Solve $x^2 - 2x - 8 = 0$

Factorize: factors of -8 adding to -2: -4, 2

$$x^2 - 4x + 2x - 8 = (x-4)(x+2) = 0 \Rightarrow x = 4, x = -2$$

(b) Dimensions: **4 units or -2 units** (discard negative if context)

23. Simplify $w = 3x^3y^2 \times 4x^5y^4$
(a) Combine coefficients and powers:

$3 \cdot 4 = 12, x^{3+5} = x^8, y^{2+4} = y^6\ w = 12x^8y^6$

(b) If x=2, y=3:

$$w = 12 \cdot 2^8 \cdot 3^6 = 12 \cdot 256 \cdot 729 = 12 \cdot 186624 = 2239488$$

24. Composite numbers 20–40
(a) 20, 21, 22, 24

(b) Prime factorization: 24 = 2^3 × 3

25. Profit $P = 5x^2 - 20x$
(a) Factorize: $P = 5x(x - 4)$

(b) If x=7:

$$P = 5 \cdot 7 \cdot (7 - 4) = 35 \cdot 3 = 105$$

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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