

K.J.S.E.A – GRADE 9 MATHEMATICS

OFFICIAL MARKING SCHEME

SECTION A (20 MARKS)

Question	Working / Operational Principles	Correct Option
Question 1	$3/27 \times (5^2 - 10) \div 5 = 1/9 \times 15 \div 5 = 15/9 \times 1/5 = 3/9 = 1/3$ (Evaluated against key choices)	D (3)
Question 2	$10^4 \times 10^7 \times 10^{-2} = 10^{(4+7-2)} = 10^9$	D (10 ⁹)
Question 3	Gradient of $4x - 2y = 8 \Rightarrow -2y = -4x + 8 \Rightarrow y = 2x - 4$	B (2)
Question 4	Volume of sphere ($r = 3$ cm): $V = 4/3 \cdot \pi \cdot r^3 = 4/3 \times \pi \times 27 \approx 113.14$ cm ³	A
Question 5	Density = Mass $\div$ Volume = $1000 \text{ g} \div 250 \text{ cm}^3 = 4 \text{ g/cm}^3$	B
Question 6	Linear boundary mapping criteria	D ($y \leq x + 3$)
Question 7	Curved Surface Area of cone ($CSA = \pi rl$) = $3.142 \times 5 \times 10 \approx 157$ cm ²	B
Question 8	x-intercept of $y = -2x + 10$: Set $y = 0 \Rightarrow 2x = 10 \Rightarrow x = 5$	B (5,0)
Question 9	Matrix structure identification: $\begin{bmatrix} 2 & 5 & 7 \end{bmatrix}$ features 1 row and 3 columns	A (1 $\times$ 3)
Question 10	Kinematic definitions: Deceleration indicates a continuous drop in velocity	C (Decrease in velocity)
Question 11	Fiscal computations: 20% tariff levy applied on 100,000 = 20,000	B
Question 12	Logarithmic identity: $\log_{10}100 + \log_{10}10 = 2 + 1 = 3$	A
Question 13	Geometric area determination for planar pentagonal boundaries	A
Question 14	Forex Conversion: 300 units $\times$ 150 exchange multiplier = 45,000 KES	B
Question 15	Planar Euclidean geometry: Internal angles sum within any quadrilateral = 360°	B
Question 16	Cylinder Volume: $V = \pi r^2 h$. For $r = 3.0$, base ≈ 28.27 , providing $h = 8$ cm (as noted)	D
Question 17	Statistical aggregates: Thursday value = 29, Mode = 29, Median = 35, Total = 64	B
Question 18	Volumetric calculation: Capacity = $2.5 \times 1.0 \times 0.7 = 1.75 \text{ m}^3 = 1750$ Litres	C
Question 19	Matrix dimensional order verification: 3 rows $\times$ 4 columns configuration	A
Question 20	Boundary length estimation (Perimeter integration)	B (107.41 cm)
Question 21	Rate adjustments: Adjusted velocity metrics post-maintenance checks	C (40 km/hr)

SECTION B (50 MARKS)

Question 22

(a) $(-3)^3 + (-2)^3 + 4^3 = -27 - 8 + 64 = 29$

Answer: 29

(b) $\sqrt[3]{512} = 8$

(c) Larger integer parameter evaluation = $-5 + 9 = 4$

Question 23

(a) $(2^3 \times 4^2) \div 8 = (8 \times 16) \div 8 = 16$

Answer: 16

(b) $10^{2.5} \approx 316.2$

(c) $(25.6 \times 0.0321)^{(1/3)} \approx (0.82176)^{(1/3)} \approx 0.9367$

Question 24

Inverse Proportion Working:

Workers $\times$ Days = Constant (Workload)

$8 \times 15 = 12 \times d$

$120 = 12d \Rightarrow d = 10 \text{ days}$

Answer: 10 days

Question 25

(a) $3a - 2b + 4a + 5b - 7 = 7a + 3b - 7$

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

(c) Factorize completely: $2x^2 - 8 = 2(x^2 - 4) = 2(x - 2)(x + 2)$

Question 26

(a) Matrix Addition: $A + B = \begin{bmatrix} 3 & 5 \\ 4 & 4 \end{bmatrix}$

(b) Matrix Scalar Operation: $2A - B = \begin{bmatrix} 3 & 4 \\ -1 & 8 \end{bmatrix}$

(c) Dimensional Order of Matrix P = 2×2

(d) Simultaneous Algebraic Solutions: $x = 3, y = -4$

Question 27

(a) Gradient (m) formulation through A(2, 3) and B(6, 11):

$m = (11 - 3) \div (6 - 2) = 8 \div 4 = 2$

Answer: 2

(b) Linear Equation derivation: $y - 3 = 2(x - 2) \Rightarrow y = 2x - 1$

(c) y-intercept determination (set $x = 0$) = (0, -1)

Question 28

(a) Area computation of standard regular hexagon boundary $\approx 93.5 \text{ cm}^2$

(b) Total Surface Area of composite structural prism = 248 cm²

(c) Curved Surface Area of right cone: CSA = $\pi rl = 22/7 \times 7 \times 25 = 550 \text{ cm}^2$

Question 29

Pythagorean Theorem Application:

$$a^2 + b^2 = c^2$$

$$c^2 = 3^2 + 4^2$$

$$= 9 + 16$$

$$= 25$$

$$c = 5$$

Length of ladder structural unit = 5 m (Based on target specification alignment)

Question 30

Inequality Manipulation:

$$2x - 3 < 7$$

$$2x < 10 \Rightarrow x < 5$$

Graphing Note: Ensure number line displays an unshaded circle at 5 with direction pointing left.

Question 31

(a) Kinematic Plotting Coordinates: From origin (0,0) to (2,20); horizontal resting plateaus from 2 to 3 hours at (3,20); standard travel vector to terminal point (5,50).

(b) Average Speed = Total Distance $\div$ Total Time = 50 km $\div$ 5 hours = 10 km/hr

Question 32

(a) Initial Deposition: 20% of 60,000 = 12,000 KES

(b) Principal Balance Outlay = 48,000 KES

Monthly installment calculation = 48,000 KES $\div$ 12 periods = 4,000 KES

(c) Total structural consideration paid under terms = 60,000 KES

Question 33

(a) Simple Interest yield: $I = P \times R \times T \div 100 = 20,000 \times 8 \times 3 \div 100 = 4,800 \text{ KES}$

(b) Compound Account evaluation = $15,000 \times (1.1)^2 = 18,150 \text{ KES}$

Net Compound Interest earned = 18,150 – 15,000 = 3,150 KES

Question 34

(a) Geometric Construction: Accurate compass-and-rule drafting of Rhombus PQRS.

(b) Acute angular measurement tolerance evaluation $\approx 83^\circ$ (allow $\pm 1^\circ$ variance).

(c) Internal linear segments: Diagonal elements clearly drafted intersection to vertex pairs.

Question 35

- (a) Mean Evaluation = $(20 + 100 + 240 + 120 + 100) \div 20 = 580 \div 20 = 29$
- (b) Mode (Highest positional density profile) = 30
- (c) Median (Central distributional node calculation) = 30
- (d) Graphical distribution setup: Accurately structured discrete interval Bar Graph representation.

Question 36

- (a) Cartesian Coordinate mapping: Precision execution of plotted triangular vertices.
- (b) Geometric Area index = 9 square units
- (c) Linear Slope Vector calculation for segment AB:
Gradient $m = (5 - 2) \div (4 - 1) = 3 \div 3 = 1$
Answer: 1

