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Mathematics, 2016 EC, Grade 8 model exam, Addis Ababa, Arada

Grade 8 · Mathematics · 2016 E.C.

MARKING KEY: CONFIDENTIAL

Time allowed: 120 minutes | **Questions:** 28 | **Total marks:** 28

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1. Which one of the following is not true regarding the set of numbers? (1)

A. $1 \in \mathbb{N}$
B. $0 \in \mathbb{W}$
C. $\frac{1}{2} \in \mathbb{Q}$
D. ✓ $0.5 \in \mathbb{Z}$

Answer: D
The set $\mathbb{Z}$ represents integers $\{\ldots, -2, -1, 0, 1, 2, \ldots\}$. Since 0.5 is a decimal and not a whole number, it does not belong to $\mathbb{Z}$, making D the false statement.

2. If $a = -4$, $b = 3$, and $c = -2$, then which one of the following is the value of $3a - 2b + 3c$? (1)

A. 12
B. -12
C. 0
D. ✓ -24

Answer: D
Substituting $a = -4$, $b = 3$, and $c = -2$ into $3a - 2b + 3c$ gives $3(-4) - 2(3) + 3(-2) = -12 - 6 - 6 = -24$.

3. Which one of the following is the correct increasing order of the following decimals: 6.606, 0.6, 0.66, and 6.06? (1)

A. ✓ $0.6, 0.66, 6.06, 6.606$
B. $0.6, 0.66, 6.606, 6.06$
C. $0.66, 0.6, 6.06, 6.606$
D. $0.66, 0.6, 6.606, 6.06$

Answer: A
Comparing the numbers by alignment of their decimal places gives $0.600 < 0.660 < 6.060 < 6.606$, which corresponds to option A.

4. Which one of the following is the list of the elements of the set $\{x : -2 \leq x \leq 1, x \in \mathbb{Z}\}$ on the number line? (1)

A. ✓ $\{-2, -1, 0, 1\}$
B. $\{-2, -1, 0\}$
C. $\{-1, 0, 1\}$
D. $\{-1, 0\}$

Answer: A
The set contains all integers x from -2 to 1 inclusive, which are $-2, -1, 0, 1$.

5. Which one of the following is not true? (1)

A. $-8 > -100$
B. $0 > -99$
C. ✓ $-34.5 < -35.8$
D. $15.03 < 15.104$

Answer: C
On the real number line, -34.5 lies to the right of -35.8, meaning $-34.5 > -35.8$. Therefore, the statement $-34.5 < -35.8$ is false.

6. A number is added to 9 and divided by 5 gives 3. What is the number? (1)

A. ✓ 6 **B.** 7

C. 8 **D.** 5

> **Answer:** A
> Letting the number be x, the problem translates to the equation $\frac{x+9}{5} = 3$. Multiplying by 5 gives $x + 9 = 15$, which simplifies to $x = 6$.

7. If $x = 5$ and $y = 3$, then the value of the expression $\frac{5x-2y}{x+y}$ is _____. (1)

A. $\frac{21}{8}$ **B.** $\frac{29}{8}$

C. ✓ $\frac{19}{8}$ **D.** $\frac{5}{8}$

> **Answer:** C
> Substituting $x = 5$ and $y = 3$ into the expression gives $\frac{5(5)-2(3)}{5+3} = \frac{25-6}{8} = \frac{19}{8}$.

8. Which one of the following are not true properties of the sign of the product? (1)

A. The product of an even number of negative factors is positive.

B. The product of an odd number of negative factors is negative.

C. ✓ **The product of an even number of negative factors is negative.**

D. The product of zero and any rational numbers is zero.

> **Answer:** C
> The product of an even number of negative factors is always positive (e.g., $(-1) \times (-1) = 1$), which directly contradicts the statement in C.

9. A farmer increases the yield on his farm by 15%. If his previous yield was 6500 tons, what is his present yield? (1)

A. ✓ 7475 **tons** **B.** 7150 tons

C. 7100 tons **D.** 7400 tons

> **Answer:** A
> An increase of 15% on 6500 tons is calculated as $6500 \times 1.15 = 7475$ tons.

10. How long would it take birr 15000 loans to generate birr 3000 simple interest if it is charged at a rate of 10% per annum? (1)

A. 3 years **B.** 4 years

C. ✓ 2 **years** **D.** 5 years

> **Answer:** C
> Using the simple interest formula $I = P \cdot r \cdot t$, we have $3000 = 15000 \times 0.10 \times t$, which simplifies to $3000 = 1500t$, giving $t = 2$ years.

11. Which one of the following is the square of 0.01? (1)

A. 0.001 **B.** ✓ 0.0001

C. 0.00001 **D.** 0.01

> **Answer:** B
> The square of 0.01 is $(0.01)^2 = 0.01 \times 0.01 = 0.0001$.

12. What is the approximate value of $(9.9)^2$? (1)

A. 81
B. 121
C. 144
D. ✓ 100

> **Answer:** D
> Since 9.9 is very close to 10, the value of $(9.9)^2$ is approximately $10^2 = 100$.

13. If $(4.56)^2 = 20.79$, then $(0.456)^2$ is _____. (1)

A. ✓ 0.2079
B. 207.9
C. 2079
D. 2.079

> **Answer:** A
> Since $0.456 = 4.56 \times 10^{-1}$, its square is $(0.456)^2 = (4.56)^2 \times 10^{-2} = 20.79 \times 0.01 = 0.2079$.

14. Which one of the following is not a perfect square? (1)

A. 169
B. ✓ 125
C. 196
D. 121

> **Answer:** B
> The numbers $169 = 13^2$, $196 = 14^2$, and $121 = 11^2$ are all perfect squares, whereas $125 = 5^3$ is a perfect cube but not a perfect square.

15. Which one of the following is not a perfect cube number? (1)

A. 512
B. 125
C. ✓ 252
D. 343

> **Answer:** C
> The numbers $512 = 8^3$, $125 = 5^3$, and $343 = 7^3$ are all perfect cubes, while 252 is not.

16. Which one of the following is the cube root of 0.008? (1)

A. 0.002
B. 0.02
C. ✓ 0.2
D. 2

> **Answer:** C
> Since $0.2 \times 0.2 \times 0.2 = 0.008$, the cube root of 0.008 is 0.2.

17. Which one of the following is equal to the cube of $\frac{3}{5}$? (1)

A. ✓ $\frac{27}{125}$
B. $\frac{9}{25}$
C. $\frac{9}{15}$
D. $\frac{6}{10}$

> **Answer:** A
> The cube of $\frac{3}{5}$ is calculated as $(\frac{3}{5})^3 = \frac{3^3}{5^3} = \frac{27}{125}$.

18. Which one of the following is true about $a = b^3$? (1)

A. b is the cube of a
B. a is the cube root of b
C. Both are correct
D. ✓ **None are correct**

> **Answer:** D
> From $a = b^3$, it follows that a is the cube of b and b is the cube root of a. Since options A and B state the exact opposite relationships, neither is correct, making D the right choice.

19. What is the value of x in the equation $\sqrt[3]{4x+3} = 3$? (1)

A. 9 **B.** ✓ 6

C. 27 **D.** 24

> **Answer:** B
> Cubing both sides of the equation gives $4x + 3 = 3^3 = 27$. Solving for x yields $4x = 24$, which simplifies to $x = 6$.

20. What is the length of the side of a square whose area is $441\ \text{cm}^2$? (1)

A. ✓ $21\ \text{cm}$ **B.** $22\ \text{cm}$

C. $20\ \text{cm}$ **D.** $12\ \text{cm}$

> **Answer:** A
> The area of a square is given by $A = s^2$, where s is the side length. Solving $s^2 = 441\ \text{cm}^2$ gives $s = \sqrt{441} = 21\ \text{cm}$.

21. If the volume of a cube is $216\ \text{cm}^3$, then what is the length of the edge of the cube? (1)

A. ✓ $6\ \text{cm}$ **B.** $5\ \text{cm}$

C. $7\ \text{cm}$ **D.** $8\ \text{cm}$

> **Answer:** A
> The volume of a cube is given by $V = e^3$, where e is the edge length. Since $e^3 = 216$, taking the cube root of both sides gives $e = \sqrt[3]{216} = 6\ \text{cm}$.

22. If point $P(x, y)$ lies in the IV quadrant, then which one of the following is true about the coordinates of x and y ? (1)

A. ✓ $x > 0$ **and** $y < 0$ **B.** $x > 0$ and $y > 0$

C. $x < 0$ and $y < 0$ **D.** $x < 0$ and $y > 0$

> **Answer:** A
> The Cartesian plane is divided into four quadrants; in Quadrant IV, the x-coordinates are positive ($x > 0$) and the y-coordinates are negative ($y < 0$).

23. Which one of the following equations represents a horizontal line? (1)

A. $y = -3x + 2$ **B.** $y = 3x$

C. ✓ $2y + 4 = 6$ **D.** $\frac{1}{2}x = 4$

> **Answer:** C
> A horizontal line has the equation form $y = c$, where c is a constant. Simplifying $2y + 4 = 6$ gives $2y = 2$, which simplifies to $y = 1$, representing a horizontal line.

24. Which one of the following is not true about the equation $y = -2x - 3$? (1)

A. The y-intercept is -3. **B.** ✓ **The graph passes through the origin.**

C. The slope is -2. **D.** The graph touches quadrants II and IV.

> **Answer:** B
> A line passes through the origin if and only if its y-intercept is 0. The given line $y = -2x - 3$ has a y-intercept of -3, meaning it does not pass through the origin.

25. If point $P(3, 2)$ lies on the line $ax + 2y = 10$, then what is the value of a? (1)

A. ✓ 2
B. 3
C. $\frac{4}{3}$
D. $\frac{10}{7}$

> **Answer:** A
> Substituting the coordinates of the point $P(3, 2)$ into the line equation gives $a(3) + 2(2) = 10$, which simplifies to $3a + 4 = 10$, and solving for a yields $a = 2$.

26. Which one of the following is not equivalent to $10x - 6 = 5x + 4$? (1)

A. $5x = 10$
B. $10x = 20$
C. $8x - 2 = 14$
D. ✓ $6x + 2 = 12$

> **Answer:** D
> The original equation $10x - 6 = 5x + 4$ simplifies to $5x = 10$, which has the unique solution $x = 2$. Option D simplifies to $6x = 10$, which yields $x = 5/3$ and is therefore not equivalent.

27. A man is 28 years older than his son. Ten years ago, he was three times as old as his son. What is the present age of the man? (1)

A. 14
B. 30
C. 24
D. ✓ 52

> **Answer:** D
> Letting the son's age be S, the man's age is $S + 28$. Ten years ago, $(S + 28) - 10 = 3(S - 10)$, which solves to $S = 24$, making the man's present age $24 + 28 = 52$ years.

28. Three-fourths of a number is greater than 12. The mathematical expression for this sentence is: (1)

A. $\frac{4}{3} > 12a$
B. ✓ $\frac{3}{4}a > 12$
C. $\frac{3}{4} > 12a$
D. $\frac{4}{3}a > 12$

> **Answer:** B
> Three-fourths of a number a is written mathematically as $\frac{3}{4}a$, and 'is greater than 12' translates to the inequality sign > 12.

END OF THE MARKING KEY

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