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Mathematics, 2012 EC, Grade 8 model exam

Grade 8 · Mathematics · 2012 E.C.

MARKING KEY: CONFIDENTIAL

Time allowed: 120 minutes | **Questions:** 38 | **Total marks:** 38

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1. Which of the following statement is false about in the set of numbers? (1)

A. The sum of two natural numbers is always a natural number.

B. The product of two whole numbers is always a whole number.

C. ✓ **The quotient of two integers is always an integer.**

D. The difference of two integers is always an integer.

Answer: C
The set of integers is not closed under division; for instance, the quotient of 1 and 2 is 0.5, which is not an integer.

2. Which of the following isTrue? (1)

A. $\left|\frac{-9}{12}\right| = \frac{-3}{4}$

B. ✓ $|-10| + |6\text{-}17| = 21$

C. $\left|\frac{2}{7}\right| - \left|\frac{-3}{7}\right| = \frac{5}{7}$

D. $|9 + (-9)| = 18$

Answer: B
Evaluating the left-hand side gives |-10| + |6 - 17| = 10 + |-11| = 10 + 11 = 21, which is true.

3. Which of the following statement is False? (1)

A. $\frac{1}{5} < \frac{1}{4}$

B. $-4\frac{1}{3} < \left|-2\frac{1}{3}\right|$

C. $|0.4| = \left|\frac{2}{5}\right|$

D. ✓ $-0.98 \geq -0.89$

Answer: D
On the real number line, -0.98 is strictly to the left of -0.89, meaning -0.98 < -0.89, so the statement -0.98 >= -0.89 is false.

4. The simplified form of the expression $\frac{7}{2} - \frac{2}{3}\left[1 + \frac{5}{6}\right]$ is (1)

A. $\frac{-5}{2}$

B. $\frac{3}{5}$

C. $\frac{8}{9}$

D. ✓ $\frac{41}{18}$

Answer: D
Inside the brackets, 1 + 5/6 = 11/6. Then 7/2 - (2/3)(11/6) = 7/2 - 11/9 = (63 - 22)/18 = 41/18.

5. Which of the following numbers is between $\frac{4}{5}$ and $\frac{5}{6}$ (1)

A. $\frac{11}{15}$

B. ✓ $\frac{49}{60}$

C. $\frac{9}{5}$

D. $\frac{9}{30}$

Answer: B
Writing the fractions with a common denominator of 60 gives 4/5 = 48/60 and 5/6 = 50/60. The number 49/60 lies strictly between 48/60 and 50/60.

6. Which of the following statement is true about the set of numbers denoted by $\mathbb{N}$, $\mathbb{W}.\mathbb{Z}$ and $\mathbb{Q}$? (1)

A. $\mathbb{Q}^+ \subseteq \mathbb{N}$

B. $\mathbb{W} \subseteq \mathbb{Q}^+$

C. ✓ $\mathbb{W} \subseteq \mathbb{Q}$

D. $\mathbb{Q} \subseteq \mathbb{Q}^+$

Answer: C
Every whole number n can be written in the form n/1, so the set of whole numbers W is a subset of the set of rational numbers Q.

7. Which of the following equations is not equivalent to the equation $\frac{2}{3}x + 2 = 3$? (1)

A. $2x + 6 = 9$

B. $\frac{2}{3}x = 1$

C. $\frac{1}{3}x + 1 = \frac{3}{2}$

D. ✓ $\frac{4}{3}x + 8 = 12$

Answer: D
Multiplying both sides of the original equation by 2 yields (4/3)x + 4 = 6, not (4/3)x + 8 = 12 (which gives x = 3 instead of x = 3/2).

8. The perimeter of a rectangular filed is 320meters.If the length of the field exceeds its width by 10meters,then what is the length of the field? (1)

A. 75meters

B. ✓ **85meters**

C. 95meters

D. 79meters

Answer: B
The perimeter is 2(L + W) = 320, so L + W = 160. Since L = W + 10, substituting gives 2W + 10 = 160, which yields W = 75 m and L = 85 m.

9. What is the solution set of the equation 3(7-2x)=14-8(x-1) ? (1)

A. ✓ **{1/2}**

B. {3/2}

C. {-5/6}

D. {-4}

Answer: A
Expanding both sides gives 21 - 6x = 14 - 8x + 8, which simplifies to 21 - 6x = 22 - 8x. Adding 8x and subtracting 21 yields 2x = 1, so x = 1/2.

10. What is the solution set of the inequality $\frac{-1}{2}(x+1) < 3$, where $x \in \mathbb{Z}$? (1)

A. $\{x \in \mathbb{Z} : x < 7\}$

B. $\{x \in \mathbb{Z} : x > 7\}$

C. $\{x \in \mathbb{Z} : x < -7\}$

D. ✓ $\{x \in \mathbb{Z} : x > -7\}$

Answer: D
Multiplying both sides of the inequality by -2 reverses the inequality sign, giving x + 1 > -6, which simplifies to x > -7.

11. Which of the following pairs of inequalities are equivalent? (1)

A. 3x>24 and x<8

B. -4x + 1 < 17 and x + 4 < 0

C. ✓ $\frac{2x}{3} > \frac{1}{2}$ **and** $x > \frac{3}{4}$

D. 2x + 4 < 6 and x >1

Answer: C
Multiplying both sides of $\frac{2x}{3} > \frac{1}{2}$ by $\frac{3}{2}$ gives $x > \frac{3}{4}$, making the two inequalities equivalent.

12. If 3:10 = 0.5: y then what is the value of y? (1)

A. 5/6
B. 3/5
C. 0.6
D. ✓ **5/3**

> **Answer:** D
> Setting up the proportion $\frac{3}{10} = \frac{0.5}{y}$ and cross-multiplying yields $3y = 5$, which gives $y = \frac{5}{3}$.

13. A student scored 25 out of 40 in mathematicstest. What is the student`s score in percent? (1)

A. 25%
B. ✓ **B. 62.5%**
C. 65.5%
D. 75%

> **Answer:** B
> The score in percentage is calculated as $\frac{25}{40} \times 100\% = 0.625 \times 100\% = 62.5\%$.

14. Which of the following is Not a way of collecting data? (1)

A. Using questionnaire
B. Carrying out an experiment
C. From records or data base
D. ✓ **Constructing a frequency table**

> **Answer:** D
> Constructing a frequency table is a technique for organizing and presenting already collected data, rather than a method of data collection.

15. The following pie chart shows the budget for asocial development program of a certain woreda. If the budget is 720,000 Birr. How much money is spent on education? (1)
[Figure: A pie chart: one circle outlined in orange, cut into three sectors by three blue radii drawn from the centre. Each sector carries its central angle in black text inside the circle. The upper-left sector is labelled 120 degrees and its name sits outside the circle to the left, on two lines, as "Public Health". The upper-right sector is labelled 80 degrees and its name sits outside the circle to the right; the circle overlaps the start of that label, so only "nity development" is legible (the full word is cut off by the graphic, evidently "Community development"). The lower sector is labelled 160 degrees and its name sits outside the circle at the bottom left as "Education". The three angles total 360 degrees. No other numbers or shading appear on the chart.]

A. 240,000 Birr
B. ✓ **320,000 Birr**
C. 160,000 Birr
D. 520,000 Birr

> **Answer:** B
> Education corresponds to a central angle of 160° out of 360°. The budget for education is $\frac{160}{360} \times 720,000 = \frac{4}{9} \times 720,000 = 320,000$ Birr.

16. When $\left(\frac{3}{2} + \frac{3}{4}\right) \div \left(\frac{7}{4} - \frac{5}{8}\right)$ is computed, it is equal to (1)

A. ✓ **2**
B. $\frac{3}{2}$
C. 4
D. $\frac{1}{2}$

> **Answer:** A
> The numerator simplifies to $\frac{3}{2} + \frac{3}{4} = \frac{9}{4}$, and the denominator simplifies to $\frac{7}{4} - \frac{5}{8} = \frac{9}{8}$. Dividing them gives $\frac{9/4}{9/8} = 2$.

17. The mean of five numbers is 8. Four of the numbers are 6,9,10 and 13. Find the value of the other number. (1)

A. 5
B. ✓ **2**
C. 8
D. 6

> **Answer:** B
> The sum of all five numbers is $5 \times 8 = 40$. The sum of the given four numbers is $6 + 9 + 10 + 13 = 38$, so the missing number is $40 - 38 = 2$.

18. Which of the following is False about the data given below? 8,3,5,6,8,5,7 (1)

A. ✓ **The mean is 8**
B. 5 and 8 are modal values
C. the median is 6
D. the range is 5

> **Answer:** A
> The sum of the seven values is 42, giving a mean of $\frac{42}{7} = 6$, not 8, which makes statement A false.

19. If a quadrilateral ABCD is rhombus, then which one of the following statement is False about the rhombus? (1)

A. All sides of a rhombus are congruent
B. The diagonal of a rhombus bisect each other at right angle.
C. ✓ **All angles of a rhombus are right angles.**
D. Opposite sides of a rhombus are parallel.

> **Answer:** C
> A rhombus has all four sides equal and its diagonals bisect each other at right angles, but its angles do not have to be right angles (only a square has right angles).

20. A regular polygon has an interior angle of 160°. How many sides does it have? (1)

A. 12
B. 16
C. ✓ **18**
D. 15

> **Answer:** C
> Each exterior angle of the regular polygon is 180° - 160° = 20°. The number of sides is 360° / 20° = 18.

21. Which of the following quadrilaterals is necessarily a rectangle? (1)

A. A parallelogram
B. ✓ **A square**
C. A rhombus
D. A trapezium

> **Answer:** B
> By definition, a square is a quadrilateral with four right angles and four equal sides, which makes every square a rectangle.

22. What is the radius of a circle whose circumference is 32π cm (1)

A. ✓ **16cm**
B. 24cm
C. 8cm
D. 12cm

> **Answer:** A
> The circumference of a circle is given by C = 2πr. Setting 2πr = 32π yields r = 16 cm.

23. Which of the following is false about an equilateral triangle? (1)

A. All sides are equal
B. ✓ **All angles are right angle.**
C. The sum of the interior angle is 180°
D. All angles are equal

> **Answer:** B
> An equilateral triangle has three equal sides and three equal interior angles of 60° each, not right angles.

24. ABCD is a trapezium with AB//CD as shown in the figure below. What is the area of the trapezium ABCD? (1)

[Figure: A trapezium drawn in thick blue outline, wider at the bottom, with the two horizontal sides parallel. The short top side is labelled 10cm above it. The left slanting side is labelled 4cm. Two thin vertical lines drop from the two top vertices to the bottom side, each closing on a small square right-angle mark where it meets the bottom side; the space between those two verticals carries the label "4 cm", giving the height. Under the bottom side, the piece from the bottom-left vertex to the foot of the left vertical is labelled 3cm and the piece from the foot of the right vertical to the bottom-right vertex is labelled 2cm, so the drawn bottom side reads 3 + 10 + 2. A further label "10CM" is printed at the bottom-left vertex, immediately left of where the slanting side meets the bottom side. No letters A, B, C or D are marked on the drawing.]

A. 100cm²
B. 23 cm²
C. ✓ **50cm²**
D. 60cm²

> **Answer:** C
> The parallel sides have lengths 10 cm and (3 + 10 + 2) = 15 cm, and the height is 4 cm. The area is ((10 + 15) / 2) × 4 = 25 × 2 = 50 cm².

25. In the figure below the radius of a right circular cone is 6cm and its height is 8cm. what is the volume of the cone? (1)

[Figure: A right circular cone drawn in blue. The base is an ellipse (the circle in perspective) outlined in thick blue. Two thin slant lines run from the apex at the top down to the left and right edges of the ellipse. A thin vertical line runs from the apex down to the centre of the base and is labelled "h= 8cm", the label sitting to the left of that line about two thirds of the way down. A short horizontal line runs from the base centre to the right edge of the ellipse and is labelled 6cm below it. No other markings or values appear.]

A. 216πcm³
B. ✓ 96π**cm³**
C. 84πcm³
D. 120πcm³

> **Answer:** B
> The volume of a cone is V = (1/3)πr²h. Substituting r = 6 cm and h = 8 cm gives V = (1/3)π(36)(8) = 96π cm³.

26. Which of the following is a perfect square? (1)

A. 27
B. 125
C. ✓ **64**
D. 181

> **Answer:** C
> 64 is a perfect square because 8² = 64, while 27 and 125 are perfect cubes but not squares, and 181 is prime.

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

A. $\sqrt{48}+\sqrt{27}-\sqrt{12}=5\sqrt{3}$
B. $\frac{1}{\sqrt{5}}=\frac{\sqrt{5}}{5}$
C. $\sqrt{7\frac{1}{9}}=\frac{8}{3}$
D. ✓ $\frac{3\sqrt{9}}{4\sqrt{25}}=\frac{27}{100}$

> **Answer:** D
> (3√9) / (4√25) = (3 × 3) / (4 × 5) = 9/20 = 45/100, which is not equal to 27/100.

28. The simplified form of the expression $\sqrt[3]{0.027}-\sqrt[3]{\frac{8}{125}}+\sqrt[3]{0.001}$ (1)

A. 0.3
B. ✓ **0**
C. 0.8
D. 0.1

> **Answer:** B
> Evaluating the cube roots gives ∛0.027 = 0.3, ∛(8/125) = 2/5 = 0.4, and ∛0.001 = 0.1. Thus, 0.3 - 0.4 + 0.1 = 0.

29. What is the value of $\frac{xy-x}{x+y}$ when evaluated at $x = \frac{1}{3}$ and $y = \frac{3}{4}$? (1)

A. ✓ $\frac{-1}{13}$ B. $\frac{12}{13}$

C. $\frac{13}{12}$ D. $\frac{3}{12}$

Answer: A

30. What is the HCF of the expression $21p^3q - 14p^2q^2 + 35p^2q^3$? (1)

A. ✓ $7p^2q$ B. $7pq$

C. $7pq^2$ D. $7p^2q^2$

Answer: A

31. $(2a - 3b)^2 - (a - b)^2$ is equal to (1)

A. $3a^2 + 8b^2$ B. $3a^2 - 8b^2$

C. ✓ $3a^2 - 14ab + 8b^2$ D. $3a^2 - 10ab + 8b^2$

Answer: C

32. What is the solution set of the equation $\frac{x+2}{3} + \frac{2x-1}{4} = \frac{25}{12}$? (1)

A. {1} B. {-2}

C. ✓ **{2}** D. $\left\{\frac{1}{2}\right\}$

Answer: C

33. What is the value of x, if x-2 (x-1)= 1-4(x+1)? (1)

A. $\frac{-1}{3}$ B. $\frac{-5}{2}$

C. ✓ $\frac{-5}{3}$ D. $\frac{5}{3}$

Answer: C

34. What is the solution set of the inequality $2(3 - x) > 3 + 5x - (x + 2)$, where $x \in \mathbb{Q}^+$? (1)

A. $\{x \in \mathbb{Q}^+ : x < \frac{-5}{6}\}$ B. { }

C. ✓ $\{x \in \mathbb{Q}^+ : x < \frac{5}{6}\}$ D. $\{x \in \mathbb{Q}^+ : x \leq \frac{3}{4}\}$

Answer: C

35. If eight times a natural number increased by six less than thirty,then what is the solution set? (1)

A. {1,2,3} B. {0,1,2}

C. $\{x \in \mathbb{N} : x > 3\}$ D. ✓ $\{x \in \mathbb{N} : x < 3\}$

Answer: D

36. What is the slope of the line passing through the point (-3.5,-1.7) and (0.5, 4.3)? (1)

A. $\frac{2}{3}$ B. ✓ $\frac{3}{2}$

C. $\frac{-5}{3}$ D. $\frac{3}{4}$

Answer: B

37. Which of the following is true about the equation 2y=4x+2? (1)

A. The slope is -4.

B. The line passes through the origin.

C. The y- intercept is 2

D. ✓ **Point (1,3) is on the line**

Answer: D

38. Which families of plane figures given below are NOT always similar? (1)

A. Squares

B. Circles

C. Equilateral triangles

D. ✓ **rectangle**

Answer: D

END OF THE MARKING KEY

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