THE UNINTED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

FORM TWO NATIONAL ASSESSMET

0041   **BASIC MATHEMATICS**

Time: 2:30 Hours   **ANSWERS**   **Year: 2015.**

Instructions:

1. this paper consists of section A and B

2. Answer all questions

3. Each question carries Four marks.

1. Calculate the value of x + y + 2z + 12, when x = 5, y = 8 and z = 9.

Solution:
Substitute the given values into the expression:
x + y + 2 z + 12 = 5 + 8 + 2x9 + 12
= 43

2. The number of students who sat for the Primary School Leaving Examination (PSLE) in 2013 was 844,938. Express this number in standard notation.

Solution:
The number 844,938 in standard notation is 8.44938×10^5.

3. If A and B are complementary angles such that angle A is 18° less than angle B, determine the angles.

Solution:
Complementary angles add up to 90°. Let angle A = x and angle B = x + 18°
Then, x + (x + 18) = 90.
2x + 18 = 90.
2x = 90 − 18 = 72
x = 72/ 2 = 36
Therefore, angle A = 36° and angle B = 36° + 18° = 54°.

4. Find the value of x in the equation 6/(x + 1) = 12.

Solution:
Multiply both sides by (x + 1) to eliminate the denominator:
6 = 12(x + 1).
Expand the equation:
6 = 12x + 12.
Subtract 12 from both sides:
6 − 12 = 12x.
−6 = 12x.
Divide by 12:
x = −6 / 12 = −0.5.

5. Simplify the expression 9(a - 3b) + 5(4b + a) - b.
Solution:
The expression simplifies as:
9(a - 3b) + 5(4b + a) - b = 9a - 27b + 20b + 5a - b
= 9a + 5a - 27b + 20b - b
= 14a -8b

6. When 6 is subtracted from a certain number, the result is greater than 29. Write down an inequality that represents the possible values of this number.

Solution:

Let the number be x. The inequality is:

$x - 6 > 29$,

$x > 35$.

7. Without using mathematical tables, evaluate: $(0.136)^2 - (0.148)^2 / ((0.136) + (0.148))$

Solution:

By using the difference of two squares, $a^2 - b^2 = (a - b)(a + b)$

$(0.136-0.148)(0.136+0.148)/(0.136+0.148)$

$= 0.136-0.148$

$= -0.012$

8. The length of one side of a square is $(3x + 4)$ cm. If the side lengths of this square are doubled, find the equation for the perimeter after changing the length of the square.

Solution:

The perimeter of a square is 4 times the side length. Initially, the side length is $(3x) + 4$. When doubled, the side length becomes $2((3x) + 4) = 6x + 8$.

The perimeter after doubling the side length is:

$4(6x + 8) = 24x + 32$.

9. Find the value of a/ b, given that $3^a \times 5^b = 675$.

Solution:

$3a \times 5b = 675$

$= 5^2 \times 3^3$

By comparing, $a = 3$, $b = 2$.

Then, $a/b = 3/2$

10. The football ground at Merisa secondary school is 12½ times as long as the length of the basketball ground. If the football ground is 100 meters long, find the length of the basketball ground.

Solution:

Let the length of the basketball ground be x. The length of the football ground is 12½x, and it is given that the length of the football ground is 100 meters.

Therefore, $12½x = 100$,

$x = 8$ meters.

11. Represent the solution set of the inequality $3x + 4 \geq 25$ on a number line.

Solution:

The inequality $3x + 4 \geq 25$ simplifies to $x \geq 7$

12. In a certain animal farm, 10% of the animals are horses, 1/5 are goats, 1/4 are sheep, and 1/2 are cattle. Arrange these numbers in ascending order.

Solution:
Convert the percentages and fractions to decimals:
10% = 0.1, 1/5 = 0.2, 1/4 = 0.25, and 1/2 = 0.5.
The ascending order is: 0.1, 0.2, 0.25, 0.5.

13. Write 750 grams as a fraction of 5 kilograms.

Solution:
1 kilogram = 1000 grams, so 5 kilograms = 5000 grams.
750 grams as a fraction of 5000 grams is:
750 / 5000 = 3 / 20.

14. If John is x years old and Mary is 3 years older than John, write down an equation for the sum of their ages.

Solution:
John's age = x and Mary's age = x + 3.
The sum of their ages is:
x + (x + 3) = 2x + 3.

15. Determine the value of x that satisfies the equation x - y² / x + 2 = 7, given that y = 2.

Solution:
Substitute y = 2 into the equation:
x - 2² = 7(x + 2).
Expand the equation:
x - 2² = 7x − 14.
Subtract x and adding 14 from both sides:
6x = 10
x = 10/6

16. Write 4 log 2 − ½log 64 as a single logarithmic expression.
Use the logarithmic power rule:
  4 log 2 = log(2⁴) = log 16
  ½ log 64 = log(64¹ᐟ²) = log 8

4 log 2 − ½log 6 = log 16 − log 8
Apply the logarithmic subtraction rule:

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log 16 − log 8 = log(16 / 8)
= log 2

17. Find the product of the G.C.F and L.C.M of 4, 8 and 12.

Solution:
The G.C.F of 4, 8, and 12 is 4, and the L.C.M is 24.
The product of the G.C.F and L.C.M is:
$4 \times 24 = 96$.

18. If the straight line BA that is passing through the points A(2, 6) and B(t, 3) has a gradient of −1, find the value of t.

Solution:
The formula for the gradient of a line is $(y_2 − y_1) / (x_2 − x_1)$.
Using the points A(2, 6) and B(t, 3), the gradient is:
$(3 − 6) / (t − 2) = −1$.
Simplifying:
$−3 / (t − 2) = −1$.
Multiply both sides by $(t − 2)$:
$−3 = −(t − 2)$,
$3 = t − 2$,
$t = 5$.

19. If a triangle has two equal sides of length x cm each and the third side measures 6 cm more than the length of these congruent sides, write down an equation that represents the perimeter of this triangle.

Solution:
The perimeter of the triangle is the sum of the lengths of all three sides:
$x + x + (x + 6) = 3x + 6$.

20. Kapona bought a computer for 250,000/= and sold it after one year at a loss of 5 percent. Calculate the amount of the loss.

Solution:
The loss is 5% of 250,000:
Loss = $5 / 100 \times 250,000 = 12,500$.

21. The area of a rectangular room is 1125 cm². If its length is five times its width, find its perimeter.

Solution:
Let the width be w, then the length is 5w.
The area is length × width, so:

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5w × w = 1125,
5w² = 1125,
w² = 1125 / 5 = 225,
w = √225 = 15 cm.
The length is 5w = 75 cm.
The perimeter is 2(length + width) = 2(75 + 15) = 2 × 90 = 180 cm.

22. Evaluate using logarithmic tables: $(1.34 × 5.804)/√0.4391$

Find the logarithms of the individual terms:
  - log(1.34)
  - log(5.804)
  - log(√0.4391) = ½ log(0.4391)
Use the logarithmic addition and subtraction rules:
  - For multiplication: log(a × b) = log a + log b
  - For division: log(a / b) = log a − log b
  - For square roots: log(√a) = ½ log a

3. Compute each part:
- log(1.34) = 0.1260
- log(5.804) = 0.7630
- log(0.4391) = -0.3571
Now, apply the operations:

- log(1.34 × 5.804) = log(1.34) + log(5.804) = 0.1260 + 0.7630 = 0.8890
- log(√0.4391) = ½ log(0.4391) = ½ × -0.3571 = -0.1786

log[(1.34 × 5.804) / √0.4391] = log(1.34 × 5.804) − log(√0.4391) = 0.8890 − (-0.1786) = 0.8890 + 0.1786 = 1.0676
Find the antilog of the result:
The antilog of 1.0676 is 11.714.

Thus, the value of the expression is approximately 11.714.

23. A ladder 15m long leans against a vertical wall such that the top of the ladder makes an angle of 63 degrees with the vertical wall. Find the height of the wall.

Solution:
Use the sine function:
sin(63°) = height / 15.
height = 15 × sin(63°) ≈ 15 × 0.891 = 13.365 meters.

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24. In a class of 50 students, 16 like watching television, 41 like reading story books, and 7 do not like neither watching television nor reading story books. Find the number of students who like both watching television and reading story books using the formula.

Solution:
Let A be the students who like television and B be those who like books.
Using the formula:
$|A \cup B| = |A| + |B| - |A \cap B|$,
$50 - 7 = 16 + 41 - |A \cap B|$,
$43 = 57 - |A \cap B|$,
$|A \cap B| = 57 - 43 = 14$.
Therefore, 14 students like both.

25. In the figure below EF = F G and EH = HG . Show that triangles EFH and GFH are similar.
Given:
EF = FG
EH = HG

Angle EFH and Angle GFH:
Since EF = FG, triangle EFG is isosceles with Angle E = Angle G. H is on EG, and since EH = HG, H is the midpoint of EG.

Angle EHF and Angle GHF:
Because H is the midpoint and EH = HG, FH is a median, altitude, and angle bisector of triangle EFG. Therefore, Angle EHF = Angle GHF.
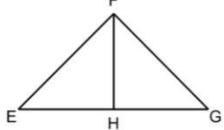
Angle FEH and Angle FGH:
Since FH is an angle bisector, Angle FEH = Angle FGH.

Now, we have:
Angle EFH = Angle GFH
Angle EHF = Angle GHF
Angle FEH = Angle FGH
Since all corresponding angles of triangle EFH and triangle GFH are equal, by the Angle-Angle-Angle (AAA) similarity criterion, triangles EFH and GFH are similar.

Thus, we have shown that triangles EFH and GFH are similar.

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