THE UNINTED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

FORM TWO NATIONAL ASSESSMET

0041 **BASIC MATHEMATICS**

Time: 2:30 Hours **ANSWERS** **Year: 2013**

Instructions:

1. this paper consists of section A and B
2. Answer all questions
3. Each question carries Four marks.

1. The numbers 2, 3, 5, and Y have an average equal to 4. What is the number represented by the letter Y?

Solution
The average of four numbers is given by:
$(2 + 3 + 5 + Y) \div 4 = 4$
$(10 + Y) \div 4 = 4$
$10 + Y = 16$
$Y = 16 - 10$
$Y = 6$

2. Which numbers are equal to their squares?

Solution
A number x is equal to its square if:
$x = x^2$
Solving $x^2 - x = 0$ gives:
$x(x - 1) = 0$
So, $x = 0$ or $x = 1$

3. Simplify the expression $(5/3)^3$
Solution
$(5/3)^3 = (5^3)/(3^3) = 125/27$
125/27

4. The difference in the measure of two supplementary angles is 102^o. Find the two angles.

Solution
Let the two angles be x and y. Since they are supplementary:
$x + y = 180°$
Also, given that $x - y = 102°$

Solving for x and y:
Adding both equations:
$2x = 282°$
$x = 141°$
Substituting into $x + y = 180°$:
$141° + y = 180°$
$y = 39°$

5. In the year 2012, the population of the world was 6,760,000,000. Write this population number in scientific notation.

Solution
6,760,000,000 = 6.76×10^9

6.76×10^9

6. If N is a number such that when multiplied by 0.75 gives 1, find the value of N.

Solution
$0.75N = 1$
$N = 1 \div 0.75$
$N = 4/3$

7. What percent of 1 hour is 15 minutes?
Solution
15 minutes out of 60 minutes:
$(15/60) \times 100 = 25\%$

8. Write the fraction 31/8 as a mixed number.

Solution
$31 \div 8 = 3$ remainder 7
So, $31/8 = 3\ 7/8$

9. What is x if $x + 2y = 16$ and $y = 3$?

Solution
Substituting $y = 3$ into $x + 2y = 16$:
$x + 2(3) = 16$
$x + 6 = 16$
$x = 10$

10. If $x^2 - y^2 = 10$ and $x + y = 2$, find the value of $x - y$

Solution
Using the identity:
$(x + y)(x - y) = x^2 - y^2$
$(2)(x - y) = 10$
$x - y = 10/2$
$x - y = 5$

11. Rationalize the denominator of the expression $2/(3 - \sqrt{5})$

Solution

Multiply by the conjugate $(3 + \sqrt{5})$:
$[2(3 + \sqrt{5})] / [(3 - \sqrt{5})(3 + \sqrt{5})]$
$= (6 + 2\sqrt{5}) / (9 - 5)$
$= (6 + 2\sqrt{5}) / 4$
$= 3/2 + \sqrt{5}/2$

12. Simplify the algebraic expression $-2(x - 3) + 4(-2x + 8)$

Solution
Expanding:
$-2x + 6 - 8x + 32$
$= -10x + 38$

13. Write the number 2373695 in words

Two million three hundred seventy-three thousand six hundred ninety-five

14. Write $2 \log_3 x + \log_3 5$ as a single logarithmic expression

Solution
Using log properties:
$2 \log_3 x = \log_3 x^2$
$\log_3 x^2 + \log_3 5 = \log_3 (5x^2)$

15. Convert the expression 4×10^{-2} into decimal number.

Solution
$4 \times 10^{-2} = 4/100 = 0.04$

16. If the area of a square tomato garden is 361 m^2, find its perimeter.

Solution
Side of square $= \sqrt{361} = 19$ m
Perimeter $= 4 \times 19 = 76$ m

17. What is the denominator when 5/6 is multiplied by 7/8?
Solution
$(5/6) \times (7/8) = 35/48$
Denominator = 48

18. Without using mathematical tables simplify the expression $\sqrt{9}\sin(162° - 72°)$

Solution
$\sqrt{9} = 3$
$\sin(162° - 72°) = \sin 90° = 1$
$3 \times 1 = 3$

19. Find the Least Common Multiple of 24, 36, and 48.

Solution
Prime factorization:
$24 = 2^3 \times 3$
$36 = 2^2 \times 3^2$
$48 = 2^4 \times 3$
$LCM = 2^4 \times 3^2 = 16 \times 9 = 144$

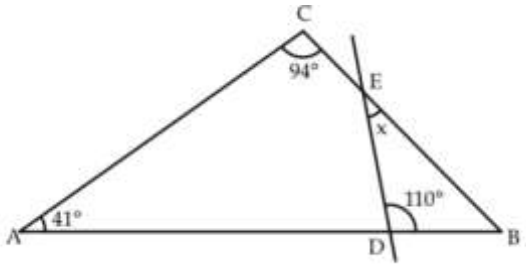
20. In a class of 75 form two students, 50 like Physics and 10 like Physics and Chemistry. Apply the general formula to find the number of students who like Chemistry.

Solution
Using the formula:
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$75 = 50 + n(B) - 10$
$n(B) = 75 - 40$
$n(B) = 35$

21. In a bag containing small balls, 1/4 are green, 1/8 are blue, 1/12 are yellow and the remaining 26 are white. How many balls are blue?

Solution
Let total balls be N:
$(1/4)N + (1/8)N + (1/12)N + 26 = N$
LCM of 4, 8, 12 is 24. Rewriting fractions:
$(6/24)N + (3/24)N + (2/24)N + 26 = N$
$(11/24)N + 26 = N$
$(13/24)N = 26$
$N = 26 \times 24 / 13$
$N = 48$
Blue balls $= (1/8) \times 48 = 6$

22.Find the size of angle x in the figure below.



since A+C+B = 180°
41° + 94° + B = 180°
B = 45°
Also, in ΔBDE,
110° + B + x = 180°
110° + 45° + x = 180°
x = 25°

23. In a right-angled triangle, tan A = 3/4. Find sin A and cos A.

Solution

Given tan A = opposite/adjacent = 3/4, let the opposite side be 3k and the adjacent side be 4k.

Using the Pythagorean theorem:

Hypotenuse² = Opposite² + Adjacent²

$r^2 = (3k)^2 + (4k)^2$

$r^2 = 9k^2 + 16k^2$

$r^2 = 25k^2$

r = 5k

Now,

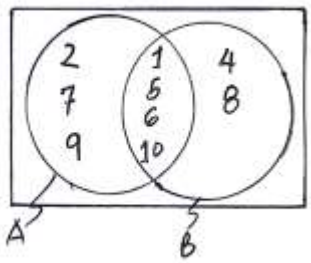
sin A = opposite/hypotenuse = 3k/5k = 3/5

cos A = adjacent/hypotenuse = 4k/5k = 4/5

sin A = 3/5, cos A = 4/5

24. Draw a Venn diagram to represent the relationship between the sets
A = {1, 2, 5, 6, 7, 9, 10} and B = {1, 3, 4, 5, 6, 8, 10}

This visually represents the relationship between sets A and B.



25.The following pie chart shows a survey of the number of cars, buses and motorcycles which pass a particular junction. The survey shows that there were 150 buses which were passing the junction.
(i) The fraction of motorcycles.
(ii) The percentage of cars which were passing the junction.
(iii) The total number of the vehicles (motorcycles, cars and buses).
Solution:.
Let the totan number of vehicles be x.

Consider what we have given, buses
Sum of degree from he pie chart = 210° + 30° + 120° = 260°
Then, if 360°/360° = x
30°/360° = 150
Cross-multiplication,
360°/360° x 150 x 360°/30°
x = 1800 vehicles
Then,
(i) Fraction of motorcycle.
motorcycle = 210°/360 = 0.583
(ii) Percentage of car = 120°/360° x 100% = 33.3%
(iii) Total number of vehicles = 1800