THE UNINTED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

FORM TWO SECONDARY EDUCATION EXAMINATION, 2008

0041 BASIC MATHEMATICS

Time: 2:30 Hours ANSWERS .

Instructions:

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

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1. Find the value of $(2670)^2 - (670)^2$.
Solution:
Use the difference of squares formula:
$a^2 - b^2 = (a + b)(a - b)$.

Let a = 2670 and b = 670:
$(2670)^2 - (670)^2 = (2670 + 670)(2670 - 670)$.
Simplify:
(2670 + 670) = 3340,
(2670 - 670) = 2000.

$(2670)^2 - (670)^2 = 3340 \times 2000 = 6,680,000$.
Answer: 6,680,000.

2. The circumference of a circular mirror is 110 cm. Find its diameter.
Solution:
The formula for the circumference of a circle is:
$C = \pi d$,
where C is the circumference and d is the diameter.
Rearrange for d:
$d = C / \pi$.

Substitute:
$d = 110 / 3.1416 \approx 35.0$ cm.
Answer: The diameter is 35.0 cm.

3. Subtract the sum of 4.69 and 1.743 from 8.72.

Solution:
First, find the sum of 4.69 and 1.743:
4.69 + 1.743 = 6.433.
Now subtract this sum from 8.72:
8.72 - 6.433 = 2.287.
Answer: 2.287.

4. One teaspoonful of sugar is added to every 80 g of coffee. How many teaspoons of sugar will be added to 2 kg 400 g of coffee?
Solution:
Convert 2 kg 400 g to grams:
2 kg 400 g = 2400 g.
Divide the total amount of coffee by 80 g per teaspoon:
2400 / 80 = 30 teaspoons.
Answer: 30 teaspoons.

5. Find the sum of G.C.F and L.C.M of 12, 18, and 24.
Solution:
The G.C.F (greatest common factor) of 12, 18, and 24 is 6.
The L.C.M (least common multiple) of 12, 18, and 24 is 72.
Sum of G.C.F and L.C.M:
6 + 72 = 78.
Answer: 78.
6. Mr. Jumbe has a rectangular farm of opposite sides 1/4 (q - 6) metres and 48 metres. Find the value of q.

Solution:
For a rectangle, opposite sides are equal:
1/4 (q - 6) = 48.

Multiply through by 4 to eliminate the fraction:
q - 6 = 192.
Add 6 to both sides:
q = 198.
Answer: q = 198.

7. Write 3388 as a product of prime factors.
Solution:
Perform prime factorization of 3388:
$3388 \div 2 = 1694$,
$1694 \div 2 = 847$,
$847 \div 7 = 121$,
$121 \div 11 = 11$,
$11 \div 11 = 1$.

$3388 = 2^2 \times 7 \times 11^2$.
Answer: $3388 = 2^2 \times 7 \times 11^2$.

8. 1/5 of the total number of periods per week of a class timetable is given to English and 1/8 to Mathematics. What fraction is left for the other subjects?

Solution:
Let total number be 1.
Fraction for English and Mathematics:
1/5 + 1/8 = 8/40 + 5/40 = 13/40.

Fraction left for other subjects:
1 - 13/40 = 27/40.
Answer: 27/40.

9. Calculate the following and express the final answer in the form of $a \times 10^n$, where $1 \leq a < 10$ and n is any integer:
$0.000321 \times 10^3 \times 200 \times 10^2$.

Solution:
First, multiply the coefficients:
$0.000321 \times 200 = 0.0642$.

Now multiply the powers of 10:
$10^3 \times 10^2 = 10^5$.
Combine:
$0.0642 \times 10^5 = 6.42 \times 10^{-2}$.
Answer: 6.42×10^{-2}.

10. The Mathematics teacher of a certain school bought 124 pens to be distributed to 39 Form Two students who scored "A". How many pens will each student get?

Solution:
Divide the total number of pens by the number of students:
$124 \div 39 \approx 3.18$

If distributed in whole units, each student will receive approximately 3 pens.
Answer: 3 pens.

11. Find the value of t if $2^t = 1/4$.

Solution:
Given $2^t = 1/4$, apply laws of exponents,
$= 1/2^2$
$= 2^{-2}$
Comparing LHS, and RHS, t = -2
Answer: t = -2.

12. A map is drawn to a scale of 1:25000. The length of a river on the map is 20 cm. What is the actual length of the river in km?
Solution:
Scale: 1 cm on the map = 25000 cm in reality.
Actual length:
$20 \times 25000 = 500000$ cm
Convert cm to km:
$500000 \div 100000 = 5$ km
Answer: 5 km.

13. Without using Mathematical tables, evaluate:
tan 45° × cos 60° ÷ (sin 30° × tan 45°).
Solution:
Substitute the known trigonometric values:
tan 45° = 1, cos 60° = 1/2, sin 30° = 1/2.
Simplify:
(1 × 1/2) ÷ (1/2 × 1) = (1/2) ÷ (1/2) = 1.

Answer: 1.

14. Cake A contains some wheat flour and some sugar in the ratio 3:5, while Cake B contains some wheat flour and some sugar in the ratio 3:4. From the two cakes, which one contains a greater ratio of the mixture?
Solution:
Compare the total parts in each ratio:
- Cake A: 3 + 5 = 8 parts.
- Cake B: 3 + 4 = 7 parts.

Cake A has more total parts, meaning it contains a greater ratio of the mixture.
Answer: Cake A.

15. Given that m * p = mp + 2m - 3p, find the value of r if 5*r = 20.
Compare
m*p and 5*r, we see that:
m = 5, p = r. Then put into the equation;
5 * r = 5r + 2x5 - 3r
But 5 * r = 20, then
20 = 5r + 2x5 - 3r
r = 5

16. The following pie chart shows the expenditure of Peter's monthly salary. How much money did he spend on vouchers if his monthly salary was Tshs. 360,000?

Solution:
The voucher expenditure is 90° of the pie chart.
The full circle is 360°.
Fraction spent on vouchers:
90/360 = 1/4.

Amount spent:
1/4 × 360000 = 90000 Tshs.
Answer: 90000 Tshs.

17. The following table shows marks scored by Form Two students in a Mathematics test:

Marks (%)	40	45	50	55	60	65	70
Students	6	8	13	6	4	3	3

(i) If 50% was the pass mark, how many students passed the test?
(ii) What mark was scored by the majority of students?
Solution:
(i) Students scoring 50% and above:
50%: 13
55%: 6
60%: 4
65%: 3
70%: 3
Total: 13 + 6 + 4 + 3 + 3 = 29 students.

(ii) The majority scored 50% (highest frequency = 13).
Answer:
(i) 29 students.
(ii) 50%.

18. The sides of a triangle are 2 cm, 3 cm, and 4 cm. The length of the longest side of a similar triangle is 5 cm. Find the lengths of the other sides.

Solution:
Scale factor = 5/4 (longest side of the similar triangle ÷ longest side of the original triangle).

Find the other sides:
$2 \times (5/4) = 2.5$ cm
$3 \times (5/4) = 3.75$ cm
Answer: 2.5 cm and 3.75 cm.

19. Given that $x = 3/2$ and $y = 2/3$, simplify $(x^2 + y^2) / (x - y)$ in the form of $a/c + b/d$, where a, b, c, and d are real numbers.

Solution:
Substitute $x = 3/2$ and $y = 2/3$:
$(x^2 + y^2) / (x - y) = ((3/2)^2 + (2/3)^2) / (3/2 - 2/3)$.
Simplify the numerator:
$(3/2)^2 = 9/4$, $(2/3)^2 = 4/9$.
$9/4 + 4/9 = (81/36) + (16/36) = 97/36$.

Simplify the denominator:
$3/2 - 2/3 = (9/6) - (4/6) = 5/6$.
Final expression:
$(97/36) / (5/6) = (97 \times 6) / (36 \times 5) = 97 / 30$.
Answer: 97 / 30.

20. If the two sides of a right-angled triangle are (2k - 1) cm and k cm, find the value of k if 1/2(4k + 2) cm is the hypotenuse.

Solution:
The hypotenuse is $1/2(4k + 2) = 2k + 1$.
Using Pythagoras' theorem:
$(2k - 1)^2 + k^2 = (2k + 1)^2$.

Expand:
$(2k - 1)^2 = 4k^2 - 4k + 1$,
$k^2 = k^2$,
$(2k + 1)^2 = 4k^2 + 4k + 1$.

Combine:
$4k^2 - 4k + 1 + k^2 = 4k^2 + 4k + 1$.
$5k^2 - 4k + 1 = 4k^2 + 4k + 1$.

Simplify:
$k^2 - 8k = 0$.
$k(k - 8) = 0$.

Thus, $k = 0$ or $k = 8$. Since k must be positive:
$k = 8$.

Answer: $k = 8$.

21. The total price of three Daily News and two Jitambue News papers is Tshs. 1,900, while the total price of five Daily News and three Jitambue News papers is Tshs. 3,000. Calculate the price for each newspaper.

Solution:
Let the price of Daily News = x and Jitambue News = y.

From the problem:
$3x + 2y = 1900$ (1),
$5x + 3y = 3000$ (2).

From (1):

$2y = 1900 - 3x$,
$y = (1900 - 3x)/2$.

Substitute y into (2):
$5x + 3[(1900 - 3x)/2] = 3000$.
$5x + (5700 - 9x)/2 = 3000$.

Multiply through by 2:
$10x + 5700 - 9x = 6000$.
$x = 300$.

Substitute $x = 300$ into $y = (1900 - 3x)/2$:
$y = (1900 - 900)/2 = 500$.
Answer: Daily News = Tshs. 300, Jitambue News = Tshs. 500.
22. Find the y-intercept of the line joining the points (-5, 3) and (3, 2).

Solution:
The slope of the line is:
$m = (2 - 3) / (3 - (-5)) = -1 / 8$.
The equation of the line is:
$y - y_1 = m(x - x_1)$.
Substitute (-5, 3):
$y - 3 = (-1/8)(x + 5)$.
$y = (-1/8)x - 5/8 + 24/8$.
$y = (-1/8)x + 19/8$.
The y-intercept is 19/8.
Answer: 19/8.

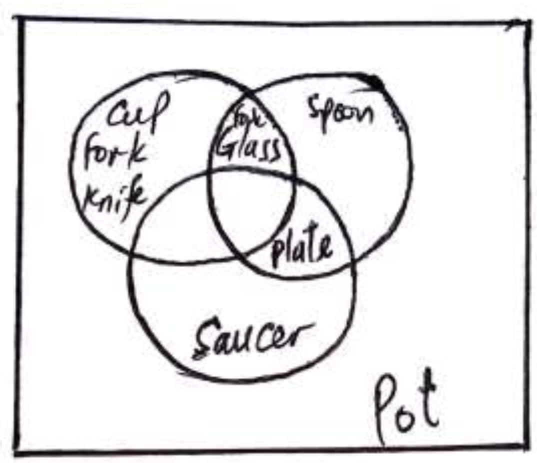
23. A man is four times as old as his son. In four years, the product of their ages will be 520. Find the present age of the son.

Solution:
Let the son's age = x.
The man's age = 4x.
In 4 years:
$(x + 4)(4x + 4) = 520$.
Expand:
$4x^2 + 16x + 4x + 16 = 520$.
$4x^2 + 20x + 16 = 520$.
$4x^2 + 20x - 504 = 0$.
$x^2 + 5x - 126 = 0$ (divide by 4).
Solve using the quadratic formula:
$x = [-5 \pm \sqrt{(5^2 - 4(1)(-126))}]/2(1)$.

$x = [-5 \pm \sqrt{529}]/2$.
$x = [-5 \pm 23]/2$.

$x = (23 - 5)/2 = 18/2 = 9$.
Answer: The son's age is 9 years.

24. A kitchen cupboard of three drawers contains various items. Represent the given information in a Venn diagram.
Solution:



25. If $\tan\theta = 5/12$, find the value of $(\sin\theta - 2\cos\theta) / (1 + \sin\theta)$.
Solution:
From $\tan\theta = 5/12$:
Opposite = 5, Adjacent = 12, Hypotenuse = $\sqrt{(5^2 + 12^2)} = 13$.

$\sin\theta = 5/13$, $\cos\theta = 12/13$.
Substitute into the expression:
$(\sin\theta - 2\cos\theta) / (1 + \sin\theta) = (5/13 - 2(12/13)) / (1 + 5/13)$.
Simplify:
Numerator = $(5/13 - 24/13) = -19/13$.
Denominator = $(13/13 + 5/13) = 18/13$.
$(-19/13) / (18/13) = -19/18$.
Answer: $-19/18$.

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