THE UNINTED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

FORM TWO NATIONAL ASSESSMET

0041 **BASIC MATHEMATICS**

Time: 2:30 Hours **ANSWERS** **Year: 2024.**

Instructions:

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

1. (a) List the first twelve multiples of 4 and 5 and hence identify the common multiples.

Solution:
Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48
Multiples of 5: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60
Common multiples: 20, 40

(b) Evaluate (2/25) × 0.73 correct to:
(i) one significant figure
(ii) three decimal places

Solution:
(2/25) × 0.73 = 0.0584

(i) Correct to one significant figure:
0.06

(ii) Correct to three decimal places:
0.058

2. (a) Arrange the given fractions in ascending order of magnitude: 2/3, 4/7, 3/8, 5/9.

Solution:
Convert all fractions to decimal form:
2/3 = 0.6667
4/7 = 0.5714
3/8 = 0.375
5/9 = 0.5556

Ascending order: 3/8, 5/9, 4/7, 2/3

(b) In the year 2016 the population of Mericho village was 2800. In 2017 the population increased by 8%. What was the population in 2017?

Solution:
Population increase = 8% of 2800
Population increase = (8/100) × 2800
Population increase = 224

Population in 2017 = 2800 + 224
Population in 2017 = 3024

3. (a) If 1,000 tonnes of maize were shared equally among 25 schools, how many kilograms did each school get?

Solution:
1 tonne = 1,000 kilograms
Total maize = 1,000 tonnes × 1,000 = 1,000,000 kilograms

Kilograms per school = Total kilograms ÷ Number of schools
Kilograms per school = 1,000,000 ÷ 25
Kilograms per school = 40,000 kilograms

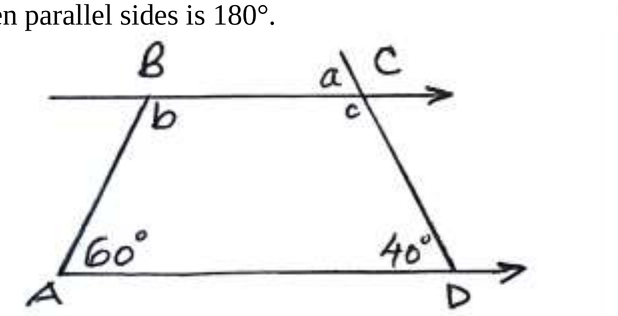
(b) A shopkeeper bought a radio for sh. 80,000 and sold it at a profit of 20%. What were the profit and selling price?

Solution:
Profit = Cost price × Profit percentage
Profit = 80,000 × (20/100)
Profit = 16,000

Selling price = Cost price + Profit
Selling price = 80,000 + 16,000
Selling price = 96,000

4. (a) If ABCD is a trapezium, find the values of the angles marked a, b, and c.

Solution:
In a trapezium, the sum of consecutive angles between parallel sides is 180°.
Angle A = 60°, Angle D = 40°
Angle a = 40°
Angle c = 180° - Angle D = 180° - 40° = 140°
The sum of angles in a quadrilateral = 360°
Angle b = 360° - (Angle A + Angle D + Angle c)
Angle b = 360° - (60° + 40° + 140°)
Angle b = 120°



(b) The floor of a room is a square of length 5 metres. Find its perimeter and area.

Solution:
Perimeter of a square = 4 × Side length
Perimeter = 4 × 5 = 20 metres

Area of a square = Side length²

Area = 5^2 = 25 square metres

5. (a) If $(6y + 1)/4 = 5(y + 5)/6$, find the value of y correct to three significant figures.

Solution:
Start by eliminating the fractions by multiplying through by the least common denominator (LCD = 12):
$12 \times (6y + 1)/4 = 12 \times 5(y + 5)/6$
$3(6y + 1) = 2 \times 5(y + 5)$
$18y + 3 = 10y + 50$
Simplify:
$18y - 10y = 50 - 3$
$8y = 47$
$y = 47/8$
$y = 5.875$
Correct to three significant figures:
$y = 5.88$

(b) Solve the equation $3x^2 - 7x - 6 = 0$ by completing the square.

Solution:
Start by dividing through by the coefficient of x^2 (3):
$x^2 - (7/3)x - 2 = 0$
Move the constant to the other side:
$x^2 - (7/3)x = 2$

To complete the square, add $[(\text{coefficient of } x)/2]^2$ to both sides:
Coefficient of x = -7/3
$(-7/6)^2 = 49/36$

$x^2 - (7/3)x + 49/36 = 2 + 49/36$
$(x - 7/6)^2 = 72/36 + 49/36$
$(x - 7/6)^2 = 121/36$

Take the square root of both sides:
$x - 7/6 = \pm\sqrt{(121/36)}$
$x - 7/6 = \pm 11/6$

Solve for x:
$x = 7/6 + 11/6 = 18/6 = 3$
$x = 7/6 - 11/6 = -4/6 = -2/3$
Solutions:
$x = 3$ or $x = -2/3$

6. (a) Find the gradient of a straight line joining the points (-1, 2) and (3, -5).

Solution:
Gradient (m) = $(y_2 - y_1) / (x_2 - x_1)$
m = (-5 - 2) / (3 - (-1))
m = -7 / 4

Gradient = -7/4

(b) Find the image of point P(-3, 7) after a reflection in the x-axis and y-axis.

Solution:
Reflection in the x-axis:
The y-coordinate changes sign.
Image after reflection in the x-axis: P(-3, -7)

Reflection in the y-axis:
The x-coordinate changes sign.
Image after reflection in the y-axis: P(3, 7)

After both reflections:
Image of P(-3, 7) = P(3, -7)

7. (a) Solve for n in the equation $16^{(n+1)} \times 2^{4n} = 1/2$. Leave the answer in improper fraction form.

Solution:
Rewrite $16^{(n+1)}$ as $(2^4)^{(n+1)} = 2^{4(n+1)}$:
$2^{4(n+1)} \times 2^{4n} = 1/2$

Combine the powers of 2:
$2^{4(n+1)} + 4^n = 2^{8n+4} = 2^{-1}$

Equating exponents:
8n + 4 = -1

Solve for n:
8n = -1 - 4
8n = -5
n = -5/8

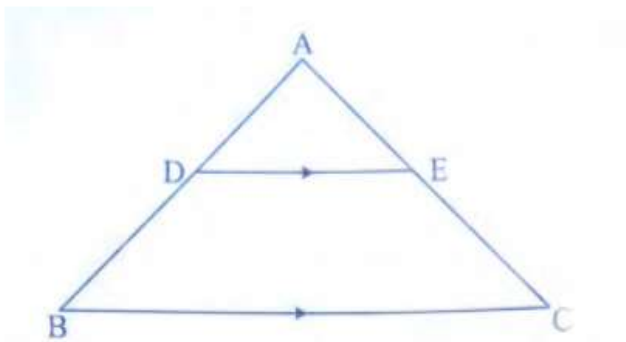
(b) Find the value of x in the equation $\log(2x^2 + 1) + \log 4 = \log(7x^2 + 8)$.

Solution:
Combine the logarithms on the left-hand side using the product rule log(a) + log(b) = log(ab):
$\log[(2x^2 + 1) \times 4] = \log(7x^2 + 8)$
Simplify:
$\log(8x^2 + 4) = \log(7x^2 + 8)$

Since log(a) = log(b) implies a = b:
$8x^2 + 4 = 7x^2 + 8$

Simplify:
$8x^2 - 7x^2 = 8 - 4$
$x^2 = 4$
Solve for x:
$x = \pm\sqrt{4}$
$x = \pm 2$

8. (a) In the given figure, AD/BD = 3/5 and AC = 9.6 cm. Find the length of AE.
Solution:
The ratio AD/BD = 3/5 means AD:BD = 3:5.
Thus, AC = AD + BD = 3x + 5x = 8x.



Given AC = 9.6:
$8x = 9.6$
$x = 9.6/8$
$x = 1.2$

Length of AE:
Since AE corresponds to AD:
$AE = 3x = 3 \times 1.2$
AE = 3.6 cm

8. (b) ABC is a triangle in which AB = AC, and D is the midpoint of BC. Prove that ∠ABD = ∠ACD.

Solution:
1. Since AB = AC, triangle ABC is isosceles.
2. The line segment AD bisects the base BC (as D is the midpoint of BC).
3. The angles opposite the equal sides (AB and AC) are equal, i.e., ∠ABD = ∠ACD.
Thus, ∠ABD = ∠ACD.

9. (a) The angle of elevation of the top of a building from a point on the ground is 25°. If the point on the ground is 80 m from the base of the building, find the height of the building correct to one decimal place.

Solution:
Let h be the height of the building. Using the tangent function:
$\tan(25°) = h / 80$

Rearranging for h:
$h = 80 \times \tan(25°)$

Using a calculator:
$\tan(25°) \approx 0.4663$
$h = 80 \times 0.4663$
$h \approx 37.3$ m

The height of the building is 37.3 m.

(b) Calculate the length of BC in the following figure (a right triangle with AB = 6 m, AC = 8 m).

Solution:
Using the Pythagorean theorem:
$BC^2 = AB^2 + AC^2$
$BC^2 = 6^2 + 8^2$
$BC^2 = 36 + 64$
$BC^2 = 100$
$BC = \sqrt{100}$
BC = 10 m

The length of BC is 10 m.

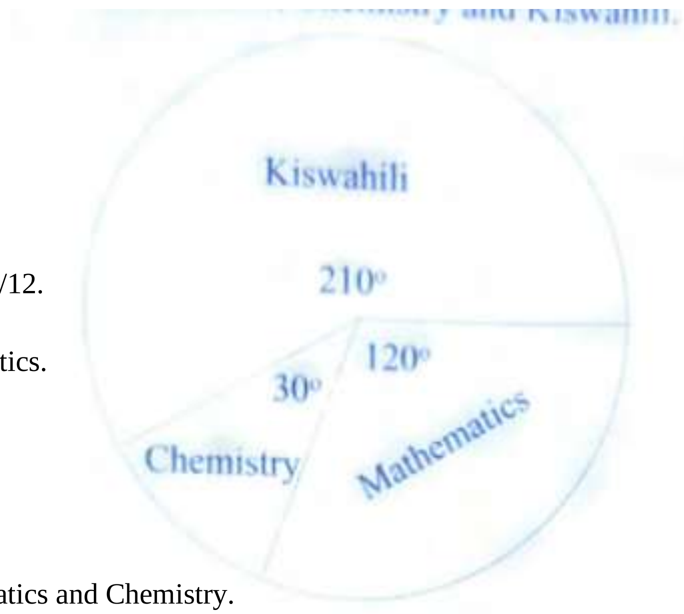
10. (a) At a certain school, 250 students attended on the first day of reopening, 350 students attended on the second day, and 150 students attended on both the first and second day. It was further noted that 10 students were absent on both days. If all registered students were supposed to attend school on both days, how many students does the school have?

Solution:
Let the total number of students in the school be \(N \).
Using the principle of inclusion and exclusion:
Number of students present on at least one day = Students on the first day + Students on the second day - Students on both days.
Number of students present on at least one day = 250 + 350 - 150 = 450.

Adding the 10 students who were absent on both days:
$N = 450 + 10 = 460$.

The total number of students in the school is 460.

(b) The given pie chart represents the number of students who passed a qualifying test in Mathematics, Chemistry, and Kiswahili.



(i) Find the fraction of students who passed Kiswahili.

Solution:
The angle representing Kiswahili = 210°.
Total angle in the pie chart = 360°.
Fraction of students who passed Kiswahili = 210/360 = 7/12.

(ii) Find the percentage of students who passed Mathematics.

Solution:
The angle representing Mathematics = 120°.
Percentage = (120/360) × 100 = 33.33%.

(iii) Find the percentage of students who passed Mathematics and Chemistry.

Solution:
The angles representing Mathematics and Chemistry = 120° + 30° = 150°.
Percentage = (150/360) × 100 = 41.67%.