



# NATIONAL MATHEMATICS TOURNAMENT

Identifying young global stars

## STUDY GUIDE

### JUNIOR SECONDARY CATEGORY 2025

1. Solve for  $x$ :  $3.5x + 2.8 = 17.3$  (A)  $x = 4.1$  (B)  $x = 4.3$  (C)  $x = 4.5$  (D)  $x = 4.7$
2. In a right-angled triangle, the length of the hypotenuse is 29 cm and one of the legs is 20 cm. What is the length of the other leg? (A) 9 cm (B) 49 cm (C) 21 cm (D) 41 cm
3. A shirt is marked at ₦7,500. If it is sold at a discount of 22.5%, what is the selling price?  
(A) ₦5,812.50 (B) ₦5,937.50 (C) ₦6,062.50 (D) ₦6,187.50
4. Simplify:  $14.4/24.8$  (A)  $3/5$  (B)  $7/10$  (C)  $6/10$  (D)  $18/31$
5. A bakery sells a total of 3,375 loaves of bread in five days. If each loaf costs ₦280.00, how much money does the bakery make in a day? (A) ₦189,000 (B) ₦191,250 (C) ₦193,500 (D) ₦945,000
6. What is the perimeter of a rectangle with length 18.9 cm and width 10.5 cm?  
(A) 58.8 cm (B) 60.0 cm (C) 61.2 cm (D) 62.4 cm
7. Solve for  $y$ :  $2.8y + 1.9 = 9.5$  (A)  $y = 2.7$  (B)  $y = 2.9$  (C)  $y = 3.1$  (D)  $y = 3.3$
8. A student scored 270 marks out of 375 in a test. What percentage did the student score?  
(A) 72.0% (B) 73.3% (C) 74.7% (D) 76.0%
9. A car travels from Lagos to Ibadan at an average speed of 95.5 km/h. If the distance between the two cities is 195.5 km, how long does the journey take? (A) 2.04 hours (B) 2.05 hours (C) 2.06 hours (D) 2.07 hours
10. Solve for  $x$ :  $4.2x - 3.1 = 15.7$  (A)  $x = 4.5$  (B)  $x = 4.7$  (C)  $x = 4.9$  (D)  $x = 5.1$
11. A shirt is marked at ₦9,500. If it is sold at a discount of 27.5%, what is the selling price?  
(A) ₦6,887.50 (B) ₦6,962.50 (C) ₦7,037.50 (D) ₦7,112.50
12. A bakery sells 975 loaves of bread per day. If each loaf costs ₦320.00, how much money does the bakery make in a day? (A) ₦312,000 (B) ₦315,000 (C) ₦318,000 (D) ₦321,000
13. What is the perimeter of a rectangle with length 22.5 cm and width 12.8 cm? (A) 70.6 cm (B) 72.0 cm (C) 73.4 cm (D) 74.8 cm
14. Solve for  $y$ :  $3.2y - 2.1 = 10.3$  (A)  $y = 3.8$  (B)  $y = 4.0$  (C)  $y = 4.2$  (D)  $y = 4.4$
15. A student scored 315 marks out of 450 in a test. What percentage did the student fail?  
(A) 69.0% (B) 70.0% (C) 71.0% (D) 30.0%

16. A car travels from Lagos to Ibadan at an average speed of 105.0 km/h. If the distance between the two cities is 220.0 km, how long does the journey take? (A) 2.10 hours (B) 2.11 hours (C) 2.12 hours (D) 2.13 hours
17. Solve for  $x$ :  $2.9x + 1.8 = 12.1$  (A)  $x = 3.5$  (B)  $x = 3.7$  (C)  $x = 3.9$  (D)  $x = 4.1$
18. A shirt is marked at ₦9,500. If it is sold at a discount of 27.5%, what is the selling price? (A) ₦6,887.50 (B) ₦6,962.50 (C) ₦7,037.50 (D) ₦7,112.50
19. A survey of 30 students found that 12 liked football, 8 liked basketball, and 10 liked tennis. What is the most sparsely populated sport? (A) Football (B) Basketball (C) Tennis (D) Equal
20. A bag contains 12 red balls, 6 blue balls, and 4 green balls. What is the probability of picking a blue ball? (A)  $\frac{1}{4}$  (B)  $\frac{1}{3}$  (C)  $\frac{1}{2}$  (D)  $\frac{2}{3}$
21. A water tank can hold 3600 litres of water. If 2700 litres of water are already in the tank, what percentage of the tank is filled? (A) 40% (B) 45% (C) 50% (D) 75%
22. Simplify:  $24 \times 23$  (A) 212 (B) 21 (C) 27 (D) 29
23. A recipe for making cake requires a ratio of 3:5 of flour to sugar. If 300g of sugar is used, how many grams of flour is needed? (A) 800g (B) 120g (C) 500g (D) 180g
24. A set of exam scores has a mean of 85 and a range of 30. What is the highest possible score? (A) 105 (B) 110 (C) 115 (D) 120
25. A fair six-sided die is rolled, What is the probability of rolling an even number? (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$  (C)  $\frac{2}{3}$  (D)  $\frac{3}{4}$
26. A rectangular prism has a length of 12.0 cm, a width of 8.0 cm, and a height of 5.0 cm. What is its volume? (A)  $480 \text{ cm}^3$  (B)  $500 \text{ cm}^3$  (C)  $520 \text{ cm}^3$  (D)  $540 \text{ cm}^3$
27. A car travels 420 km in 6 hours. What is its average speed? (A) 65 km/h (B) 70 km/h (C) 75 km/h (D) 80 km/h
28. Simplify:  $\sqrt{841}$  (A) 17 (B) 27 (C) 31 (D) 29
29. A map is drawn to a scale of 1:75,000. If two towns are 30 cm apart on the map, how far apart are they in real life? (A) 22.5 km (B) 25.0 km (C) 27.5 km (D) 30.0 km
30. A set of data has a median of 18 and a range of 12. What is the lowest possible value? (A) 6 (B) 8 (C) 10 (D) 12
31. A bag contains 15 red balls, 8 blue balls, and 5 green balls. What is the probability of picking a red or blue ball? (A)  $\frac{2}{3}$  (B)  $\frac{3}{4}$  (C)  $\frac{4}{5}$  (D)  $\frac{5}{6}$
32. Convert 654seven to base two: (A) 1011001two (B) 101001101two (C) 1101011two (D) None
33. Convert 101101two to base 10: (A) 16 (B) 45 (C) 14 (D) None
34. Convert 123four to base six: (A) 43six (B) 55six (C) 45six (D) None
35. If a crate of eggs costs ₦3,000.00, how much will 60 eggs cost? (A) ₦180,000 (B) ₦18,000 (C) ₦6,000 (D) ₦15,000

36. If  $x$  varies directly as  $y$ , and  $k$  is a constant, write an equation relating  $x$  and  $y$ : (A)  $x=k+y$  (B)  $x=k-y$  (C)  $x=ky$  (D) None
37. Which of these angles is complementary to  $70^\circ$ ? (A)  $20^\circ$  (B)  $30^\circ$  (C)  $90^\circ$  (D)  $110^\circ$  E.  $150^\circ$
38. The sum of supplementary angles is: (A)  $90^\circ$  (B)  $180^\circ$  (C)  $240^\circ$  (D)  $270^\circ$  E.  $360^\circ$
39. Find the exterior angle of a regular decagon: (A)  $30^\circ$  (B)  $36^\circ$  (C)  $40^\circ$  (D)  $45^\circ$  E.  $60^\circ$
40. If the sum of the angles of a polygon is  $1440^\circ$ , find the number of the sides of the polygon: (A) 14 (B) 10 (C) 12 (D) 11
41. In a 30% off sale, if an antique clock has a sale price of ₦427, what was the original price? (A) ₦430 (B) ₦510 (C) ₦410 (D) ₦610
42. A woman buys a store for ₦300.00 and sells it at ₦400.00. What is the percentage gain? (A) 30% (B) 20% (C) 33.33% (D) 26% E. 25%
43. The scores were obtained by ten students in a mathematics test are; 11,13,15,16,14,17,15,16,17,14. Find the approximated mean: (A) 148 (B) 18.8 (C) 14 (D) 15
44. Find the median of the following numbers randomly selected by a statistician; 7.1,6.05,6.5,0.96,9.2,6.2,8.4,0.4,1.5: (A) 6.2 (B) 6.05 (C) 6.5 (D) 7.1
45. Find the mode of the following numbers; 14,14,23,7,67,32,14,0: (A) 14 (B) 7 (C) 171 (D) None
46. Find the range of the numbers; 113,101,81,76,255,103,73,247: (A) 183 (B) None (C) 3349 (D) 418.6
47. Convert  $\frac{23}{27}$  to decimal place: (A) 0.8519 (B) 23.27 (C) 0.7743 (D) 1.173
48. The length of sides of a trapezium are 12cm and 16cm respectively. If the area is  $98\text{cm}^2$ , what is the height? (A)  $7\text{cm}^2$  (B) 5cm (C) 4cm (D) 7cm
49. Find the square root of the perimeter of a scalene triangle whose sides are  $(2x+3)$ ,  $(3x-1)$  and  $(4x+2)$  all in cm when  $x$  is 5: (A) 49cm (B)  $(9x+4)$  cm (C) 7cm (D) None

## JUNIOR SECONDARY CATEGORY 2024

1.  $3\frac{1}{7} \times 4\frac{2}{3} \div 2\frac{1}{7} \times 3\frac{3}{5}$  A.  $\frac{44}{3}$  B.  $\frac{54}{7}$  C.  $\frac{154}{81}$  D. None
2. Find the square root of the perimeter of a scalene triangle whose sides are  $(2x+3)$ ,  $(3x-1)$  and  $(4x+2)$  all in cm when  $x$  is 5. A. 49cm. B.  $(9x+4)$ cm C. 7cm D. None
3. What is 78.25% of ₦78.25 in 2d.p A.53.25 B.61.31 C. 0.78 D. None
4. Subtract 37.5% of 6,400, and 75% of 1,000? A.1,875 B.4,737.50 C.1,400 D. 3,150
5. Convert  $\frac{5}{35}$  to percentage A.0.14% B.14.29% C.5.35% D.1.7%
6. The length of sides of a trapezium are 12cm and 16cm respectively. If the area is 98cmsq, what is the height? A. 7cm<sup>2</sup> B.5cm C.4cm D.7cm
7. Calculate the volume of a cylinder with height 7cm and diameter 14cm using  $\frac{22}{7}$  for pi. A.1078cm<sup>3</sup> B.154cm<sup>3</sup> C.7546cm<sup>3</sup> D. None
8. If the circumference of a circle is 132m, calculate its diameter taking  $\pi=\frac{22}{7}$  A. 21m B.6.42m<sup>2</sup> C.6m D.42m
9. The area of a square is 289cm<sup>2</sup>, find the perimeter A.17cm B.68cm<sup>2</sup> C.68cm D. None
10. Convert  $\frac{23}{27}$  to decimal place. A.0.8519 B.23.27 C. 0.7743 D. 1.173
11. Find the 6th multiple of the numerator and 9th multiple of the denominator of  $\frac{19}{23}$ . A.  $\frac{6}{9}$  B.  $\frac{104}{138}$  C.  $\frac{114}{207}$  D.  $\frac{114}{138}$
12. Convert 654seven to base two A.1011001two B.101001101two C.1101011two D. None
13. Convert 1011012 to base 10 A.16 B.45 C.14 D. None
14. Convert 123four to base six \_\_\_\_\_ (a) 43six (b) 55six (c) 45six (d)None
15. What is the range of the numbers; 113,101,81,76,255,103,73,247 A.183 B. None C.3349 D.418.6
16. The scores were obtained by ten students in a mathematics test are; 11,13,15,16,14,17,15,16,17,14. Find the approximated mean. A.148 B.18.8 C.14 D.15
17. Find the median of the following numbers randomly selected by a statistician; 7.1,6.05,6.5,0.96,9.2,6.2,8.4,0.4,1.5 A.6.2 B.6.05 C.6.5 D.7.1
18. Find the mode of the following numbers; 14,14,23,7,67,32,14,0 A.14 B.7 C.171 D. None
19. Find  $x$  in this equation:  $27 = \frac{1}{x}$  A.27 B.-27 C. $\frac{1}{27}$  D.27x
20. A supermarket increased the price of bread by 27.5%. What will be the total cost of 3 loaves if the former price was ₦450 each A.150 B.1,271.25 C.326.25 D. None
21. A mechanic buys 45 litres of fuel for ₦780 per litre. If he was given a discount of 40k per litre, how much change will he get? A.1,800 naira B.18 kobo C.18 naira D.31,200
22. Calculate the sum of interior angles of a regular Nonagon in degrees A.1260 B.720 C.540 D.1080
23. If the sum of the angles of a polygon is 1440, find the number of the sides of the polygon.  
(a) 14 (b) 10 (c) 12 (d) 11
24. Find the sum of the square of a score and the square of a baker's dozen. Leave your answer in Base two (a) 11011101two (b) 1000111001two (c) 1001000111two (d) none
25. A bus containing fourteen passengers had an accident and only one person survived. What is the probability that it was the driver? (a) 1 (b)  $\frac{1}{14}$  (c)  $\frac{1}{15}$  (d) None
26. Simplify the expression  $-x-2x-2x+16x$  A.-21x B.11x C.-x+12x D.16x

27. If a crate of eggs cost ₦3,000.00, how much will 60 eggs cost? A. ₦180,000 B. ₦18,000 C. ₦6,000 D. ₦15,000
28. Find the area of a circle whose diameter is 7cm with  $\pi = 22/7$  A.  $77\text{cm}^2$  B.  $154\text{cm}^2$  C.  $22\text{cm}^2$  D.  $38.5\text{cm}^2$
29. Ade is 6 years old and Bisi is double his age but one-third of their mum's age. If their mum becomes 50 years old, how old will Ade be? (a) 10 (b) 15 (c) 20 (d) 36
30. Find one fourth of the product of one hundred and two and thirty eight A. 3,876 B. 969 C. 23 D. 13
31. My flight kicks off at 3.45pm, what will be the time after 7 hours and 53 minutes? A. 11.38pm B. 10.18pm C. 12.38pm D. 11.48pm
32. Find the volume of a cuboid of height 4cm, length 7cm and breadth 15cm  
A.  $616\text{cm}^2$  B.  $429\text{cm}^3$  C.  $205.3\text{cm}^2$  D.  $420\text{cm}^3$
33. Find 37.5% of 75 (a) 28.2 (b) 12.5 (c) 25.1250 (d) none
34. Find  $2\frac{1}{2}\%$  of 1 ton in gram (a) 250g (b) 2500g (c) 25000g (d) 250000g
35. Calculate the value of  $256 \times 3.25 \div 0.875$  to 2d.p (a) 950.00 (b) 950.85 (c) 950.86 (d) 95
36. Express 45mins as a percentage of 3h (a) 45% (b) 25% (c) 55% (d) 15%
37.  $(1 \div 1 - 2x) - (3 \div 24 + x)$  (a) -3 (b) -2 (c) -1 (d) None
38. A pencil costs ₦10.00 while a dozen costs ₦100.00. How much would Mrs. Musa save if she buys ninety-six pencils at dozen price? A. ₦150.00 B. ₦160.00 C. ₦180.00 D. ₦200.00 E. ₦250.00
39. In a 30% off sale, if an antique clock has a sale price off ₦427, what was the original price? (a) ₦430 (b) ₦510 (c) ₦410 (d) ₦610
40. Multiply the edges of a cubed room by the vertices of a cuboid, subtract the faces and leave your answer in base 2. (a) 1011011two (b) 1011010two (c) 1001011two (d) None
41.  $3/8 = 9/\square = \square/72$  A.  $9/24 = 27/72$  B.  $9/16 = 8/72$  C.  $9/21 = 18/72$  D.  $9/25 = 81/72$
42. A woman buys a store for ₦300.00 and sells it at ₦400.00. What is the percentage gain? (a) 30% (b) 20% (c) 33.33% (d) 26% (e) 25%
43. If x varies directly as y, and k is a constant, write an equation relating x and y. (a)  $x = k + y$  (b)  $x = k - y$  (c)  $x = ky$  (d) None
44. If 20 is divided by the sum of x and 2, the result is 4, find the value of x. (a) 3 (b) 4 (c) 5 (d) 6 (e) 10
45. A basket contains 40 mangoes, out of which 22 are good. Find the percentage of the mangoes that are bad. A. 18 B. 22 C. 24 D. 45 E. 60
46. Which of these angles is complementary to 700? A. 200 B. 300 C. 900 D. 1100 E. 1500
47. The sum of supplementary angles is A. 900 B. 1800 C. 2400 D. 2700 E. 3600
48. Find the exterior angle of a regular decagon. A. 300 B. 360 C. 400 D. 450 E. 600
49. A rhombus is of side 13cm. if the length of one of its diagonals is 24cm, now long is the other? A. 5cm B. 10cm C. 12cm D. 13cm E. 26cm



## JUNIOR SECONDARY CATEGORY 2023

- $2\frac{1}{4} \times 3\frac{1}{2} \div 4\frac{3}{8}$  A.  $\frac{9}{5}$  B.  $\frac{5}{9}$  C.  $\frac{18}{5}$  D.  $\frac{5}{18}$
- Find the perimeter of an equilateral triangle of side  $(2y+1)\text{cm}$ . A.  $3(2y+1)\text{cm}$  B.  $(2y+3)\text{cm}$  C.  $2(3y+1)\text{cm}$  D.  $(y+1)\text{cm}$
- What is 42.5% of ₦180.90 A. 76.8825 B. 54.27 C. 218.90 D. 8,2285
- A student spends 37.5% of her money on food, 28.75% on rent and 15% on books. How much is left if the original money is 8,000? A. 1,875 B. 1,765 C. 1,500 D. 6500
- Convert  $\frac{3}{24}$  to percentage A. 12.5% B. 8% C. 27.7% D. 100%
- The length of a diagonal rectangle are sides 6cm and 7cm respectively. Find the area of the rectangle. A.  $42\text{cm}^2$  B.  $252\text{cm}^2$  C.  $21\text{cm}^2$  D.  $10.5\text{cm}^2$
- Calculate the volume of a cuboid with length 7cm, width 5cm and height 4cm. A.  $70\text{cm}^3$  B.  $280\text{cm}^3$  C.  $140\text{cm}^3$
- If the circumference of a circle is  $121\text{m}^2$ , calculate its radius taking  $\pi=3.14$   
A. 12.40m B. 6.20m C. 19.25m D. 38.50m
- The area of a parallelogram is  $361\text{ cm}^2$  with base 19cm. Find the height  
A. 38cm B. 9.5cm C. 19cm D. 35cm
- $\frac{3}{8} = \frac{9}{\square} = \frac{\square}{72}$  A.  $\frac{9}{24} = \frac{27}{72}$  B.  $\frac{9}{16} = \frac{8}{72}$  C.  $\frac{9}{21} = \frac{18}{72}$  D.  $\frac{9}{25} = \frac{81}{72}$
- Convert  $7\frac{1}{8}$  to decimal place. A. 7.25 B. 7.18 C. 7.125 D. 57.8
- Reduce  $\frac{81}{625}$  to its lowest term. A.  $\frac{9}{25}$  B.  $\frac{3}{5}$  C.  $\frac{27}{125}$  D.  $\frac{81}{625}$
- Convert 2510 to base two A. 11001two B. 1001two C. 10011two D. 11001two
- Convert 10012 to base 10 A. 16 B. 4 C. 9 D. 13
- Convert 647eight to base six \_\_\_\_\_ (a) 14003 (b) 1543 (c) 11433 (d) 1420
- What is the range of the following numbers; 11, 10, 11, 6, 5, 13, 7, 6 A. 8 B. 13 C. 5 D. 10
- The scores were obtained by ten students in a mathematics test are; 1, 3, 5, 6, 4, 7, 5, 6, 7, 4. Find the approximated mean. A. 5 B. 3.7 C. 6 D. 7
- Find the median of the following age recorded in elderly people's home; 71, 30, 42, 96, 92, 62, 84, 70  
A. 62 B. 94 C. 42 D. 70.5
- Find the mode of the following numbers; 73, 39, 50, 64, 45, 59, 47 A. 64 B. 54 C. 50 D. None
- Find x in this equation:  $7 = \frac{1}{6}x$  A. 42 B. 24 C.  $\frac{1}{42}$  D.  $\frac{3}{6}$
- A salesman reduces his price by 27.5%. What will be the cost of a stereo tape that was originally priced ₦1,500 A. 412.5 B. 1,087.5 C. 1,225 D. 1,350
- A student buys as many pencil as she can for ₦3.00. If the pencils cost 40k each, how many can she buy and how much change will she get? A. 7 pencils, 20k B. 13 pencils, 1k C. 10 pencils, 10k D. 11 pencils, 7k
- Calculate the size of a regular hexagon in degrees A. 1080 B. 720 C. 360 D. 165
- If the sum of the angles of a polygon is 1620, find the number of the sides of the polygon. (a) 7 (b) 10 (c) 12 (d) 1

25. Find the square of a baker's dozen divided by the baker's dozen. Leave your answer in Base two (a) 1100two (b) 1101two (c) 10010000two (d) none
26. A man had an accident and lost a tooth. What is the probability that he lost an incisor (a)  $\frac{1}{5}$  (b)  $\frac{1}{4}$  (c)  $\frac{2}{5}$  (d) None
27. Simplify the expression  $-32e-6f+2e+4f$  A.  $34e+10f$  B.  $-30e - 2f$  C.  $-34e-10f$  D.  $32ef$
28. If five books cost ₦21.00, how much is nine similar books A. ₦36 B. ₦105 C. ₦21 D. ₦37.8
29. Find the area of a circle whose radius is 3.5cm with  $\pi=22/7$  A.  $77\text{cm}^2$  B.  $154\text{cm}^2$  C.  $22\text{cm}^2$  D.  $38.5\text{cm}^2$
30. Ade is 10 years old and Bisi is half his age. If Ade becomes 100 years old, how old will Bisi be? (a) 50 (b) 5 (c) 55 (d) 95
31. Find one fifth of the difference between one hundred and three and thirty eight A. 43 B. 33 C. 23 D. 13
32. If it is now 3.15pm, what will be the time after 7hours and 53 minutes? A. 11.18pm B. 10.48pm C. 12.08pm D. 11.08pm
33. Find the volume of a cylinder of height 4cm and base radius 7cm taking  $\pi$  as  $22/7$  A.  $616\text{cm}^2$  B.  $308\text{cm}^3$  C.  $205.3\text{cm}^2$  D.  $316.7\text{cm}^3$
34. Find 37.5% of 37.5 (a) 14.1 (b) 6.25 (c) 12.0625 (d) none
35. Find  $2\frac{1}{2}\%$  of 6kg in gram (a) 0.15g (b) 150g (c) 15g (d) 1.5g
36. Calculate the exact value of  $6.75 \times 7.5 \div 0.375$  (a) 1.35 (b) 13.5 (c) 135 (d) 0.135
37. Express 20 min as a percentage of 2h (a) 20% (b) 100% (c) 16.6% (d) 0.2%
38.  $(1 \div 1 - 2x) - (3 \div 24 + x)$  (a) -3 (b) -2 (c) -1 (d) None
39. Find the area of a trapezium is  $154\text{cmsq}$ . If the height is 7cm, find the length of the longer side which has a difference of 6 against the shorter side. (a) 22cm (b) 30cm (c) 25cm (d) None
40. Find the area that an audience covers in a stadium if the pitch is measured 7cm by 22cm and the stadium is 10cm by 30cm (a)  $300\text{cmsq}$  (b)  $454\text{cmsq}$  (c)  $156\text{cmsq}$  (d)  $146\text{cmsq}$
41. Multiply the edges of a cubed room by the vertices of a cuboid, subtract the faces and leave your answer in base 2. (a) 1011011two (b) 1011010two (c) 1001011two (d) None