OBJECTIVES

1. Use HB pencil throughout.

2. If you have got a blank answer sheet, complete its top section as follows.
   (a) In the space marked Name, write in capital letters your surname followed by your other names.
   (b) In the spaces marked Examination, Year, Subject and Paper, write ‘WASSCE’, ‘SC 2016’, ‘GENERAL MATHEMATICS/MATHEMATICS (CORE)’ and ‘1’ respectively.
   (c) In the box marked Index Number, write your index number vertically in the spaces on the left-hand side. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
   (d) In the box marked Paper Code, write the digits 402112 in the spaces on the left-hand side. Shade the corresponding numbered spaces in the same way as for your index number.
   (e) In the box marked Sex, shade the space marked M if you are male, or F if you are female.

3. If you have got a pre-printed answer sheet, check that the details are correctly printed, as described in 2 above. In the boxes marked Index Number, Paper Code and Sex, reshape each of the shaded spaces.

4. An example is given below. This is for a male candidate, whose name is Chukwuma Adegkunle CIROMA, whose index number is 4251102068 and who is offering General Mathematics/Mathematics (Core) 1.
Answer all the questions.

Mathematical tables may be used in any question.

The use of non-programmable, silent and cordless calculator is allowed.

Each question is followed by four options lettered A to D. Find the correct option for each question and shade in pencil, on your answer sheet, the answer space which bears the same letter as the option you have chosen. Give only one answer to each question. An example is given below.

The ages, in years, of four boys are 10, 12, 14 and 18. What is the average age of the boys?

A. 12 years
B. 12$\frac{1}{2}$ years
C. 13 years
D. 13$\frac{1}{2}$ years

The correct answer is 13$\frac{1}{2}$ years, which is lettered D, and therefore answer space D would be shaded.

Think carefully before you shade the answer spaces; erase completely any answer you wish to change.

Do all rough work on this question paper.

Now, answer the following questions.

1. If $23_x + 101_x = 130_x$, find the value of $x$.

   A. 7
   B. 6
   C. 5
   D. 4

2. Simplify: \( \left( \frac{3}{4} \right) \times \frac{2}{3} \times 1\frac{1}{2} \).

   A. \( \frac{1}{60} \)
   B. \( \frac{5}{72} \)
   C. \( \frac{1}{10} \)
   D. \( \frac{7}{10} \)
3. Simplify: \( \left( \frac{10\sqrt{3}}{\sqrt{5}} - \sqrt{15} \right)^2 \).
   A. 75.00
   B. 15.00
   C. 8.66
   D. 3.87

4. The distance, \( d \), through which a stone falls from rest varies directly as the square of the time, \( t \), taken. If the stone falls 45 cm in 3 seconds, how far will it fall in 6 seconds?
   A. 90 cm
   B. 135 cm
   C. 180 cm
   D. 225 cm

5. Which of the following is a valid conclusion from the premise:
   “Nigerian footballers are good footballers”?
   A. Joseph plays football in Nigeria therefore he is a good footballer.
   B. Joseph is a good footballer therefore he is a Nigerian footballer.
   C. Joseph is a Nigerian footballer therefore he is a good footballer.
   D. Joseph plays good football therefore he is a Nigerian footballer.

6. On a map, 1 cm represents 5 km. Find the area on the map that represents 100 km².
   A. 2 cm²
   B. 4 cm²
   C. 8 cm²
   D. 16 cm²

7. Simplify: \( \frac{3^{n-1} \times 2^n + 1}{81^n} \).
   A. 3²ⁿ
   B. 9
   C. 3ⁿ
   D. 3ⁿ⁺¹

Turn over
8. What sum of money will amount to D10,400.00 in 5 years at 6% simple interest?
   A. 8,000.00 *
   B. D10,000.00
   C. D12,000.00
   D. D16,000.00

9. Which of the following number lines illustrates the solution of the inequality \(4 \leq \frac{1}{3}(2x - 1) < 5\)?
   A. 
   B. 
   C. 
   D. 

10. The roots of a quadratic equation are \(\frac{2}{3}\) and \(-\frac{2}{3}\). Find the equation.
    A. \(21x^2 - 19x - 12 = 0\)
    B. \(21x^2 + 37x - 12 = 0\)
    C. \(21x^2 - x + 12 = 0\)
    D. \(21x^2 + 7x - 4 = 0\)

11. Find the values of \(y\) for which the expression \(\frac{y^2 - 9y + 18}{y^2 + 4y - 21}\) is undefined.
    A. 6, -7
    B. 3, -6
    C. 3, -7
    D. -3, -7

12. Given that \(2x + y = 7\) and \(3x - 2y = 3\), by how much is \(7x\) greater than \(10\)?
    A. 1
    B. 3
    C. 7
    D. 17
13. Simplify: \( \frac{2}{1-x} - \frac{1}{x} \).

A. \( \frac{x+1}{x(1-x)} \)
B. \( \frac{3x-1}{x(1-x)} \)
C. \( \frac{3x+1}{x(1-x)} \)
D. \( \frac{x-1}{x(1-x)} \)

14. Make \( s \) the subject of the relation: \( p = s + \frac{sm^2}{nr} \).

A. \( s = \frac{nrp}{nr + m^2} \)
B. \( s = \frac{nr + m^2}{nrp} \)
C. \( s = \frac{nrp}{nr + m^2} \)
D. \( s = \frac{nrp}{nr + m^2} \)

15. Factorize: \( (2x + 3y)^2 - (x - 4y)^2 \).

A. \( (3x - y)(x + 7y) \)
B. \( (3x + y)(2x - 7y) \)
C. \( (3x + y)(x - 7y) \)
D. \( (3x - y)(2x + 7y) \)

16. The curved surface area of a cylinder, 5 cm high, is 110 cm\(^2\). Find the radius of its base.

\[ \text{[Take } \pi = \frac{22}{7} \text{]} \]

A. 2.6 cm
B. 3.5 cm
C. 3.6 cm
D. 7.0 cm
17. The volume of a pyramid with height 15 cm is 90 cm³. If its base is a rectangle with dimensions x cm by 6 cm, find the value of x.
A. 3
B. 5
C. 6
D. 8

18.

\[
\begin{array}{c}
U \\
V \\
W \\
\end{array}
\]

\[
\begin{array}{c}
Y \\
X \\
\end{array}
\]

\[
\overline{YW}\text{ is a tangent to the circle at }X, |UV| = |VX| \text{ and } \angle VXW = 50^\circ.
\]

Find the value of \(\angle UXY\).
A. 70°
B. 80°
C. 105°
D. 110°

19.

\[
\begin{array}{c}
P \\
Q \\
R \\
T \\
G \\
\end{array}
\]

In the diagram, \(\overline{PF}\), \(\overline{QT}\), \(\overline{RG}\) intersect at S and \(\overline{PQ}||\overline{RG}\). If \(\angle SPQ = 113^\circ\) and \(\angle RST = 22^\circ\), find \(\angle PSQ\).
A. 22°
B. 45°
C. 67°
D. 89°
20. In the diagram, $O$ is the centre of the circle, $\angle XOZ = (10 \ m)^{\circ}$ and $\angle XWZ = m^{\circ}$. Calculate the value of $m$.
   A. 30
   B. 36
   C. 40
   D. 72

21. Kweku walked $8 \ m$ up a slope and was $3 \ m$ above the ground. If he walks $12 \ m$ further up the slope, how far above the ground will he be?
   A. 4.5 $m$
   B. 6.0 $m$
   C. 7.5 $m$
   D. 9.0 $m$

22. In the diagram, $TS$ is a tangent to the circle at $S$. $|PR| = |RS|$ and $\angle PQR = 117^{\circ}$. Calculate $\angle PST$.
   A. $54^{\circ}$
   B. $44^{\circ}$
   C. $34^{\circ}$
   D. $27^{\circ}$

Turn over
23. In the diagram, $PR \parallel SV \parallel WY$, $TX \parallel QY$, $\angle PQT = 48^\circ$, and $\angle TXW = 60^\circ$. Find $\angle TQU$.

A. $120^\circ$
B. $108^\circ$
C. $72^\circ$
D. $60^\circ$

A straight line passes through the points $P(1, 2)$ and $Q(5, 8)$.

Use this information to answer questions 24 and 25.

24. Calculate the gradient of the line $PQ$.

A. $\frac{3}{5}$
B. $\frac{2}{3}$
C. $\frac{3}{2}$
D. $\frac{5}{3}$

25. Calculate the length $PQ$.

A. $4\sqrt{11}$
B. $4\sqrt{10}$
C. $2\sqrt{17}$
D. $2\sqrt{13}$
26. In the diagram, \( TX \) is perpendicular to \( UW \), \( |UX| = 1 \text{ cm} \) and \( |WX| = \sqrt{3} \text{ cm} \). Find \( \angle UTW \).

A. 135°  
B. 105°  
C. 75°  
D. 60°

27. If \( \cos \Theta = x \) and \( \sin 60^\circ = x + 0.5, \) \( 0^\circ < \Theta < 90^\circ \), find, correct to the nearest degree, the value of \( \Theta \).

A. 66°  
B. 67°  
C. 68°  
D. 69°

<table>
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<tr>
<th>Age (Years)</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>10</td>
<td>24</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

The table shows the ages of students in a club. *Use it to answer questions 28 and 29.*

28. How many students are in the club?

A. 50  
B. 55  
C. 60  
D. 65

29. Find the median age.

A. 13  
B. 14  
C. 15  
D. 16
The figure is a pie chart which represents the expenditure of a family in a year. If the total income of the family was Le 10,800,000.00, how much was spent on food?

A. Le 2,250,000.00
B. Le 2,700,000.00
C. Le 3,600,000.00
D. Le 4,500,000.00

31. A fair die is thrown two times. What is the probability that the sum of the scores is at least 10?

A. \( \frac{5}{36} \)
B. \( \frac{1}{6} \)
C. \( \frac{5}{18} \)
D. \( \frac{2}{3} \)

32. The marks of eight students in a test are: 10, 4, 5, 3, 14, 13, 16 and 7. Find the range.

A. 16
B. 14
C. 13
D. 11
33. If \( \log_2(3x - 1) = 5 \), find \( x \).
   A. 2.00
   B. 3.67
   C. 8.67
   D. 11.00

34. A sphere of radius \( r \) cm has the same volume as a cylinder of radius 3 cm and height 4 cm. Find the value of \( r \).
   A. \( \frac{2}{3} \)
   B. 2
   C. 3
   D. 6

35. Express 1975 correct to 2 significant figures.
   A. 20
   B. 1,900
   C. 1,980
   D. 2,000

36. In the diagram, \( MOPQ \) is a trapezium with \( QP \parallel MO, MQ \parallel NP, NO \parallel OP \). \( QP \) = 9 cm and the height of \( \Delta ONP \) = 6 cm, calculate the area of the trapezium.
   A. 96 cm\(^2\)
   B. 90 cm\(^2\)
   C. 81 cm\(^2\)
   D. 27 cm\(^2\)
37. The perimeter of a sector of a circle of radius 21 cm is 64 cm. Find the angle of the sector.

[ Take \( \pi = \frac{22}{7} \) ]

A. 70°
B. 60°
C. 55°
D. 42°

38. Determine \( M' \cap N \) from the Venn diagram.

A. \{f, g\}
B. \{e\}
C. \{c, f, g\}
D. \{e, f, g\}

39. If \( 20 \text{ (mod } 9) \) is equivalent to \( y \text{ (mod } 6) \), find \( y \).

A. 1
B. 2
C. 3
D. 4

40. Simplify: \( \frac{(p-r)^2 - r^2}{2p^2 - 4pr} \).

A. \( \frac{1}{2} \)
B. \( p - 2r \)
C. \( \frac{1}{p-2r} \)
D. \( \frac{2p}{p-2r} \)
In the diagram, $O$ is the centre of the circle, $\angle QPS = 100^\circ$, $\angle PSQ = 60^\circ$ and $\angle QSR = 80^\circ$. Calculate $\angle SQR$.

A. $20^\circ$
B. $40^\circ$
C. $60^\circ$
D. $80^\circ$

A bag contains 5 red and 4 blue identical balls. If two balls are selected at random from the bag, one after the other, with replacement, find the probability that the first is red and the second blue.

A. $\frac{2}{9}$
B. $\frac{5}{18}$
C. $\frac{20}{81}$
D. $\frac{5}{9}$

The relation $y = x^2 + 2x + k$ passes through the point $(2, 0)$. Find the value of $k$.

A. $-8$
B. $-4$
C. $4$
D. $8$

Find the next three terms of the sequence: 0, 1, 1, 2, 3, 5, 8, ... .

A. 13, 19, 23
B. 9, 11, 13
C. 11, 15, 19
D. 13, 21, 34
Find the lower quartile of the distribution illustrated by the cumulative frequency curve.
A. 17.5
B. 19.0
C. 27.5
D. 28.0

46. The ratio of the exterior angle to the interior angle of a regular polygon is 1:11. How many sides has the polygon?
A. 30
B. 24
C. 18
D. 12

47. Halima is \( n \) years old. Her brother's age is 5 years more than half of her age. How old is her brother?
A. \( \frac{n}{2} + \frac{5}{2} \)
B. \( \frac{n}{2} - 5 \)
C. \( 5 - \frac{n}{2} \)
D. \( \frac{n}{2} + 5 \)
48. In the diagram $\overline{MN}$ is a chord of a circle $KMN$ centre $O$ and radius 10 cm. If $\angle MON = 140^\circ$, find, correct to the nearest cm, the length of the chord $MN$.

A. 19 cm  
B. 18 cm  
C. 17 cm  
D. 12 cm

49. An object is 6 m away from the base of a mast. If the angle of depression of the object from the top of the mast is $50^\circ$, find, correct to 2 decimal places, the height of the mast.

A. 8.60 m  
B. 7.83 m  
C. 7.51 m  
D. 7.15 m

50. From the diagram, which of the following is true?

A. $m + n + p = 180^\circ$  
B. $m + n = 180^\circ$  
C. $m = p + n$  
D. $n = m + p$