SC4021
WASSCE 2019
MATHEMATICS (CORE) 1
Objective Test
1½ hours

1

Name.....

Index Number.....

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination for School Candidates

SC 2019 — MATHEMATICS (CORE) 1 — 1½ hours

OBJECTIVE TEST

[50 marks]

Do **not** *open this booklet until you are told to do so. While you are waiting, read and observe the following instructions carefully. Write your* **name** *and* **index number** *in the spaces provided above.*

Answer **all** *the questions on your Objective Test answer sheet.*

1. Use 2B pencil throughout.
2. On the pre-printed answer sheet, check that the following details are **correctly** printed:
   (*a*) In the space marked *Name*, check your **surname** followed by your **other names.**
   (*b*) In the spaces marked *Examination, Year, Subject* and *Paper*, check 'WASSCE', 'SC 2019', 'MATHEMATICS (CORE)', and '1' in that order.
   (*c*) In the box marked *Index Number,* your **index number** has been printed vertically in the spaces on the left-hand side, and each numbered space has been shaded in line with each digit. **Reshade** each of the shaded spaces.
   (*d*) In the box marked *Subject Code*, the digits 402112 are printed vertically in the spaces on the left-hand side. **Reshade** the corresponding numbered spaces as you did for your index number.
3. An example is given below. This is for a female candidate whose *name* is Mariam Esi KWAO. Her *index number* is 7102143958 and she is offering *Mathematics* (*Core*) 1.

THE WEST AFRICAN EXAMINATIONS COUNCIL

ANSWER SHEET

PRINTED IN BLOCK LETTERS. Name: KWAO MARIAM ESI — GHA

Examination: WASSCE — Year: SC 2019

Subject: MATHEMATICS (CORE) — Paper: 1

INSTRUCTIONS TO CANDIDATES

1. Use grade 2B pencil throughout.
2. Answer each question by choosing one letter and shading it like this: ⊏A⊐ ▬ ⊏C⊐ ⊏D⊐ ⊏E⊐
3. Erase completely any answer you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right hand edge of your answer sheet.

INDEX NUMBER	0	1	2	3	4	5	6	7	8	9
7	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	▬	⊏8⊐	⊏9⊐
1	⊏0⊐	▬	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
0	▬	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
2	⊏0⊐	⊏1⊐	▬	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
1	⊏0⊐	▬	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
4	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	▬	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
3	⊏0⊐	⊏1⊐	⊏2⊐	▬	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
9	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	▬
5	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	▬	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
8	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	▬	⊏9⊐

SUBJECT CODE	0	1	2	3	4	5	6	7	8	9
4	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	▬	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
0	▬	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
2	⊏0⊐	⊏1⊐	▬	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
1	⊏0⊐	▬	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
1	⊏0⊐	▬	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
2	⊏0⊐	⊏1⊐	▬	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐

For Supervisors only
If candidate is absent shade this space. ☐

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. 12½ years
C. 13 years
D. 13½ years

The correct answer is 13½ years, *which is lettered* D, *and therefore answer space* D *would be shaded.* ⊏A⊐ ⊏B⊐ ⊏C⊐ ■ ⊏E⊐

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

Do all rough work on this question paper.

Now answer the following questions.

1. Express, correct to **three** significant figures, 0.003597.

A. 0.00359
B. 0.00360
C. 0.004
D. 0.359

2. Evaluate: $(0.064)^{-\frac{1}{3}}$.

A. $-\frac{5}{2}$

B. $-\frac{2}{5}$

C. $\frac{2}{5}$

D. $\frac{5}{2}$

3. Solve: $\frac{y+1}{2} - \frac{2y-1}{3} = 4$.

A. $y = 29$
B. $y = -29$
C. $y = -19$
D. $y = 19$

$4y+3 - 4y - 2 = 24$

$-y = 24+2-3$

$-y = 23$

$y = -23$

4. Simplify, correct to **three** significant figures, $(27.63)^2 - (12.37)^2$.
   A. 610
   B. 611
   C. 612
   D. 614

5. If $7 + y = 4 \pmod 8$, find the **least** value of y, $10 \leq y \leq 30$.
   A. 21
   B. 19
   C. 13
   D. 11

6. If T = {prime numbers} and M = {odd numbers} are subsets of μ = {x: $0 < x \leq 10$, and x is an integer}, find $(T' \cap M')$.
   A. {1, 2, 3, 5, 7, 8, 9}
   B. {1, 2, 4, 6, 8, 10}
   C. {1, 4, 6, 8, 10}
   D. {4, 6, 8, 10,}

7. Evaluate: $\dfrac{\log_3 9 - \log_2 8}{\log_3 9}$.
   A. $-\frac{1}{2}$
   B. $\frac{1}{3}$
   C. $\frac{1}{2}$
   D. $-\frac{1}{3}$

8. If $23_y = 1111_{\text{two}}$, find the value of y.
   A. 7
   B. 6
   C. 5
   D. 4

9. If 6, p and 14 are consecutive terms in an Arithmetic Progression (A.P), find the value of p.
   A. 8
   B. 6
   C. 10
   D. 9

10. Evaluate: $2\sqrt{28} - 3\sqrt{50} + \sqrt{72}$.

A. $4\sqrt{7} + \sqrt{2}$

B. $4\sqrt{7} - 9\sqrt{2}$

C. $4\sqrt{7} - 11\sqrt{2}$

D. $4\sqrt{7} - 21\sqrt{2}$

11. If $m : n = 2 : 1$, evaluate: $\dfrac{3m^2 - 2n^2}{m^2 + mn}$.

A. $\frac{3}{5}$

B. $\frac{3}{4}$

C. $\frac{5}{3}$

D. $\frac{4}{3}$

12. H varies directly as p and inversely as the square of y. If $H = 1$, $p = 8$ and $y = 2$, find H in terms of p and y?

A. $H = \dfrac{p}{y^2}$

B. $H = \dfrac{p}{2y^2}$

C. $H = \dfrac{2p}{y^2}$

D. $H = \dfrac{p}{4y^2}$

13. Solve $4x^2 - 16x + 15 = 0$.

A. $x = -1\frac{1}{2}$ or $-2\frac{1}{2}$

B. $x = 1\frac{1}{2}$ or $-1\frac{1}{2}$

C. $x = 1\frac{1}{2}$ or $2\frac{1}{2}$

D. $x = 1\frac{1}{2}$ or $-2\frac{1}{2}$

14. Evaluate $\frac{0.42 \div 2.5}{0.5 \times 2.05}$, leaving the answer in standard form.

A. 1.639×10^{-2}

B. 1.639×10^{-1}

C. 1.639×10^{1}

D. 1.639×10^{2}

15. Simplify: $\log_{10}6 - 3\log_{10}3 + \frac{2}{3}\log_{10}27$.

A. $2\log_{10}3$

B. $\log_{10}3$

C. $\log_{10}2$

D. $3\log_{10}2$

16. Bala sold an article for ₦6,900.00 and made a profit of 15 %. Calculate his percentage profit if he had sold it for ₦6,600.00.

A. 13 %

B. 12 %

C. 10 %

D. 5 %

17. If $3p = 4q$ and $9p = 8q - 12$, find the value of pq.

A. -12

B. -7

C. 7

D. 12

18. If $(0.25)^{y} = 32$, find the value of y.

A. $-\frac{5}{2}$

B. $-\frac{3}{2}$

C. $\frac{3}{2}$

D. $\frac{5}{2}$

19. There are 8 boys and 4 girls in a lift. What is the probability that the first person who steps out of the lift will be a boy?

A. $\frac{1}{4}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. $\frac{3}{4}$

20. Simplify: $\frac{x^2 - 5x - 14}{x^2 - 9x + 14}$.

A. $\frac{x+2}{x-2}$

B. $\frac{x-2}{x+4}$

C. $\frac{x+7}{x-7}$

D. $\frac{x-7}{x+7}$

21. Which of these values would make $\frac{3p-1}{p^2 - p}$ undefined?

A. -1

B. $-\frac{1}{3}$

C. $\frac{1}{3}$

D. 1

22. The total surface area of a solid cylinder is 165 cm^2. If the base diameter is 7 cm, calculate its height. [Take $\pi = \frac{22}{7}$]

A. 2.0 cm

B. 4.0 cm

C. 4.5 cm

D. 7.5 cm

23. If $2^a = \sqrt{64}$ and $\frac{b}{a} = 3$, evaluate $a^2 + b^2$.

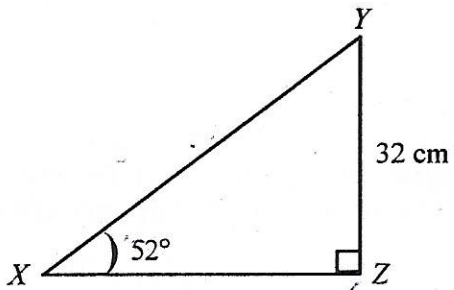
A. 48

B. 90

C. 160

D. 250

24.



NOT DRAWN TO SCALE

In ΔXYZ, $|YZ| = 32$ cm, $\angle YXZ = 52°$ and $\angle XZY = 90°$. Find, correct to the **nearest** centimetre, $|XZ|$.

A. 13 cm

B. 20 cm

C. 25 cm

D. 31 cm

25. If $\log_x 2 = 0.3$, evaluate $\log_x 8$.

A. 0.6

B. 0.9

C. 1.2

D. 2.4

26. An arc subtends an angle of 72° at the centre of a circle. Find the length of the arc if the radius of the circle is 3.5 cm. [Take $\pi = \frac{22}{7}$]

A. 2.2 cm

B. 4.4 cm

C. 8.8 cm

D. 6.6 cm

27. Make b the subject of the relation $lb = \frac{1}{2}(a + b)h$.

A. $\frac{al}{2 - h}$

B. $\frac{al}{2l - h}$

C. $\frac{2l - h}{al}$

D. $\frac{ah}{2l - h}$

$2lb = (a+b)h$

$\frac{2lb}{2l} = \frac{ah + bh}{2l}$

$b = \frac{ah + bh}{2l}$

$2lb - bh = ah$

$b(2l - h) = ah$

$\frac{b(2l-h)}{2l-h} = \frac{ah}{2l-h}$

28. Eric sold his house through an agent who charged 8 % commission on the selling price. If Eric received \$ 117,760.00 after the sale, what was the selling price of the house?

A. \$ 120,000.00

B. \$ 125,000.00

C. \$ 128,000.00

D. \$ 130,000.00

$\frac{92}{100} \times 117760$

29. Find the angle which an arc of length 22 cm subtends at the centre of a circle of radius 15 cm. [Take $\pi = \frac{22}{7}$]

A. 156°

B. 96°

C. 84°

D. 70°

30. A rectangular board has length 15 cm and width x cm. If the sides are doubled, find its new area?

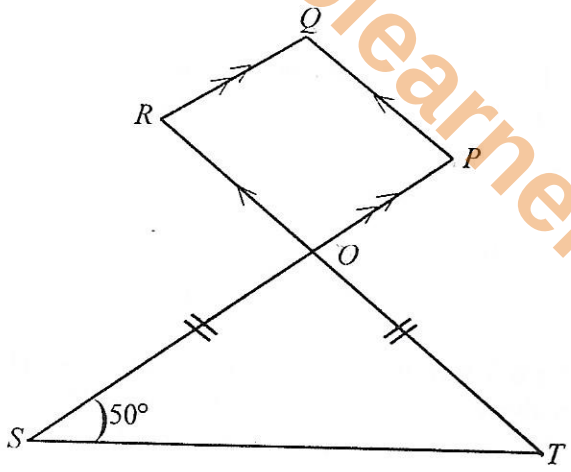
A. $15x$ cm^2

B. $30x$ cm^2

C. $45x$ cm^2

D. $60x$ cm^2

31.



NOT DRAWN TO SCALE

In the diagram, POS and ROT are straight lines. $OPQR$ is a parallelogram, $|OS| = |OT|$ and $\angle OST = 50°$. Calculate the value of $\angle OPQ$.

A. 160°
B. 140°
C. 120°
D. 100°

32. Factorize completely: $(2x + 2y)(x - y) + (2x - 2y)(x + y)$.

A. $2(x - y)$
B. $2(x - y)(x + y)$
C. $4(x - y)$
D. $4(x - y)(x + y)$

33. The interior angles of a polygon are $3x°$, $2x°$, $4x°$, $3x°$ and $6x°$. Find the size of the **smallest** angle of the polygon.

A. 30°
B. 40°
C. 60°
D. 80°

34. A box contains 2 white and 3 blue identical balls. If two balls are picked at random from the box, one after the other with replacement, what is the probability that they are of different colours.

A. $\frac{12}{25}$
B. $\frac{7}{20}$
C. $\frac{3}{5}$
D. $\frac{2}{3}$

35. Find the equation of a straight line passing through the point $(1, -5)$ and having gradient of $\frac{3}{4}$.

A. $3x - 4y - 23 = 0$

B. $3x - 4y + 23 = 0$

C. $3x + 4y + 23 = 0$

D. $3x + 4y - 23 = 0$

36. The foot of a ladder is 6 m from the base of an electric pole. The top of the ladder rests against the pole at a point 8 m above the ground. How long is the ladder?

A. 7 m

B. 10 m

C. 12 m

D. 14 m

37. If $\tan x = \frac{3}{4}$, $0 < x < 90$, evaluate $\frac{\cos x}{2\sin x}$

A. $\frac{2}{3}$

B. $\frac{4}{3}$

C. $\frac{3}{4}$

D. $\frac{8}{3}$

38. From the top of a vertical cliff 20 m high, a boat at sea can be sighted 75 m away and on the same horizontal position as the foot of the cliff. Calculate, correct to the **nearest** degree, the angle of depression of the boat from the top of the cliff.

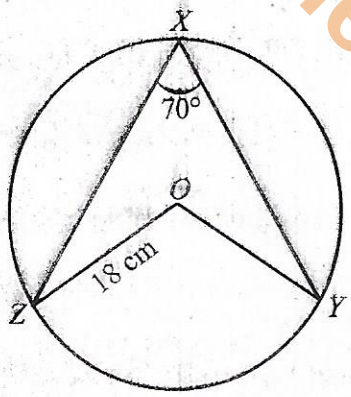
A. 15°

B. 16°

C 75°

D. 56°

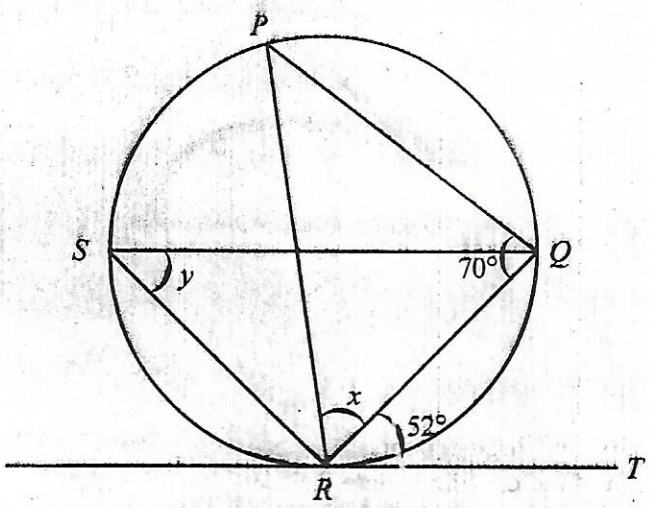
39.



NOT DRAWN TO SCALE

In the diagram, O is the centre of the circle with radius 18 cm. If the angle $\angle ZXY = 70°$, calculate the length of arc ZY. [Take $\pi = \frac{22}{7}$]

A. 80 cm
B. 44 cm
C. 22 cm
D. 11 cm



NOT DRAWN TO SCALE

In the diagram, RT is a tangent to the circle at R, $\angle PQR = 70°$, $\angle QRT = 52°$ $\angle QSR = y$ and $\angle PRQ = x$. *Use the diagram to answer questions* **40** *and* **41**.

40. Find the value of y.

A. 18°
B. 52°
C. 60°
D. 70°

41. Calculate the value of x.

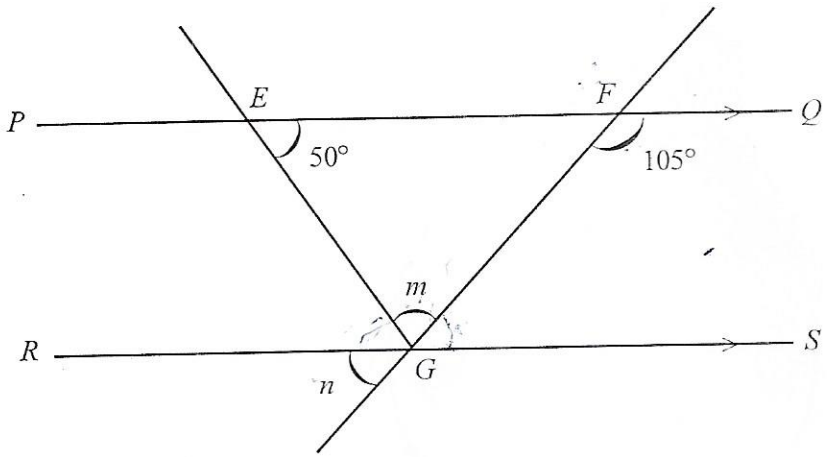
A. 48°
B. 55°
C. 58°
D. 70°

42. Calculate the variance of 2, 4, 7, 8 and 9.

A. 2.6
B. 3.5
C. 6.8
D. 7.2

43. The fourth term of an Arithmetic Progression (A.P) is 37 and the first term is – 20. Find the common difference.

A. 17
B. 19
C. 57
D. 63



NOT DRAWN TO SCALE

In the diagram $\overline{PQ}$ is parallel to $\overline{RS}$, $\angle QFG = 105°$ and $\angle FEG = 50°$.
Use the diagram to answer questions **44** *and* **45**.

44. Find the value of m.

A. 55°
B. 75°
C. 105°
D. 130°

45. Find the value of n.

A. 130°
B. 75°
C. 55°
D. 40°

46. A box contains 5 red, 6 green and 7 yellow pencils of the same size. What is the probability of picking a **green** pencil at random?

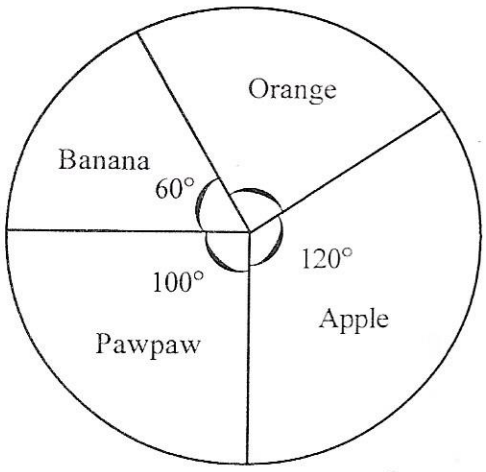
A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. $\frac{1}{6}$

47.



NOT DRAWN TO SCALE

The pie chart represents fruits on display in a grocery shop. If there are 60 oranges on display, how many apples are there.

A. 40
B. 80
C. 90
D. 70

The following are scores obtained by some students in a test:

8	18	10	14	18	11	13
14	13	17	15	8	16	13

Use this information to answer questions **48** *to* **50**.

48. Find the mode of the distribution.

A. 8
B. 13
C. 14
D. 18

49. Find the median score.
A. 13.0
B. 13.5
C. 14.0
D. 14.5

50. How many students scored above the mean score?
A. 7
B. 8
C. 9
D. 10

END OF PAPER