301 S. H. S. C. E.
MAY 2012
MATHEMATICS **1&2**
Objective and Essay Tests
3hours

Name:.....

Identification Number: .....

THE WEST AFRICAN EXAMINATIONS COUNCIL

Senior High School Certificate Examination

May 2012 — **MATHEMATICS** — 3 hours

*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 **identification number** in the space provided above.*

*This paper consists of **two** parts: Papers 1 and 2. Answer Paper 1 on your Objective Test Answer Sheet **and Paper 2** in your Answer Booklet. **Paper 1** will last for 1 ½ **hours** after which the answer sheet will be collected.*
*Do **not** start Paper 2 until you are told to do so. **Paper 2** will last for **1½ hours**.*

PAPER 1

OBJECTIVE TEST

[40 marks] — **1½ hours**

1. Use **2B** pencil throughout.
2. On the objective answer sheet supplied, provide the following details **correctly:**
   (a) Supply the information required in the spaces marked *CENTER NAME, CENTER No, SCHOOL NAME and SCHOOL No.*
   (b) In the space marked *STUDENT'S NAME,* write your **surname** followed by your **other names. Write your identification number** in the space marked *STUDENT No.*
   (c) In the spaces marked *SUBJECT and GRADE,* write MATHEMATICS and 12TH in that order.
   (d) In the box marked *IDENTIFICATION NUMBER,* provide your **identification number** vertically in the spaces on the left-hand side, and shade each numbered space in line with each digit. This identification number must be the same as the one indicated on your Admission Slip. Repeat the process with the correct information for the box marked *YEAR OF FIRST ENTRY.*
   (e) In the box marked *Subject Code,* write the digits 301 vertically in the spaces on the left-hand side. **Shade** the corresponding numbered spaces as you did for your identification number.
3. An example is given below. This is for a male candidate whose *name* is Michael J. GAYFLOR
   His *identification number* is 101123456, his first entry is in 2012 and he is offering *MATHEMATICS.*

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SOMAH TAMBA INSTITUTE	500104
CENTER NAME	CENTER No.
TUKPEI PREPARATORY SCHOOL	101123
SCHOOL NAME	SCHOOL No.
GAYFLOR, MICHEAL J.	456
STUDENT NAME	STUDENT No.
PHYSICS	12TH
SUBJECT	GRADE

IDENTIFICATION NUMBER

1	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
0	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
1	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
1	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
2	⇦	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦
3	⇦	⇦	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦
4	⇦	⇦	⇦	⇦	■	⇦	⇦	⇦	⇦	⇦
5	⇦	⇦	⇦	⇦	⇦	■	⇦	⇦	⇦	⇦
6	⇦	⇦	⇦	⇦	⇦	⇦	■	⇦	⇦	⇦

YEAR OF FIRST ENTRY

2	⇦	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦
0	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
1	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
2	⇦	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦

SUBJECT CODE

3	⇦	⇦	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦
0	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦
1	⇦	■	⇦	⇦	⇦	⇦	⇦	⇦	⇦	⇦

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

Shade the space marked
M (for Male) or F(for Female) M ■ F ☐
In this box

PAPER 1
OBJECTIVE
[40 marks]

Answer **all** *questions.* **1½ hours**

Paper 1 consists of ***fifty*** *questions. Each question is followed by* ***four*** *options lettered* ***A*** *to* ***D****. Determine 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 a question.*

An example is given below.

Find three tenths of 120
A. 0.36
B. 3.60
C. 36.0
D. 360

The correct answer is 36.0, *which is lettered* C, *and therefore answer space* C *would be shaded.*

[A] [B] [C] [D]

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. Simplify : $\dfrac{(0.000006)(0.03 \times 10^{16})}{(30,000)(600 \times 10^{-11})}$

A. 10^{13}
B. 10^{32}
C. 10^{-32}
D. 10^{-24}

2. Sonsiama had some money saved. Starting the first week in June, he saved \$6.00 a week for a new bicycle. At the end of 16 weeks he had a total of \$141.00 saved. How much did he save before June?

A. \$8.44
B. \$8.81
C. \$45.00
D. \$96.00

3. The equation $ax = a + 2x$ has solution for all values of a **except**

A. $a = 2$
B. $a = 0$
C. $a = -1$
D. $a = -2$

4. In a class of 36 students, 30 students like rice, 12 students like cassava and 1 student like neither cassava nor rice. How many students like both cassava and rice?

A. 1
B. 7
C. 12
D. 13

5. If $y = 3x + 1$, $z = 3x - 4$, and $3x + y + z = 96$, find the numerical value of x.

A. 11
B. 12
C. 13
D. 14

6. A car which cost \$8,998 when brand new depreciates by about 13% in the first 6 months. Find its value after 6 months to the **nearest** \$100.

A. \$6,900
B. \$7,700
C. \$7,800
D. \$8,800

7. An athlete runs to the top of a hill and backs down. His average speed uphill is $6km/hr$ and his average speed downhill is $12km/hr$. What is the average speed for the whole journey?

A. 6 km/hr
B. 7 km/hr
C. 8 km/hr
D. 9 km/hr

8. Simplify $4\sqrt{50}+10\sqrt{200}-16\sqrt{288}$.

A. $-192\sqrt{2}$
B. $-72\sqrt{2}$
C. $120\sqrt{2}$
D. $312\sqrt{2}$

9. Nunneh sold an article to Bondo at a profit of 20%. Bondo sold it to Fania at a loss of 20% of what it cost him. What is the ratio *final price: original price?*

A. 25:36
B. 24:25
C. 5:7
D. 4:5

10. Which of the following is equal to $\frac{5}{\sqrt{5}-\sqrt{2}}$?

A. $\frac{5}{7}(\sqrt{5}+\sqrt{2})$
B. $\frac{5}{7}(\sqrt{5}-\sqrt{2})$
C. $\frac{5}{3}(\sqrt{5}-\sqrt{2})$
D. $\frac{5}{3}(\sqrt{5}+\sqrt{2})$

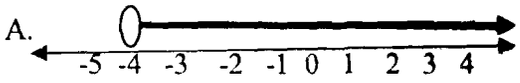
11. Evaluate $36^{\log_6 5}$

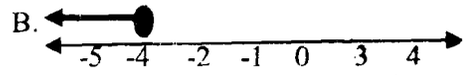
A. 16
B. 25
C. 36
D. 49

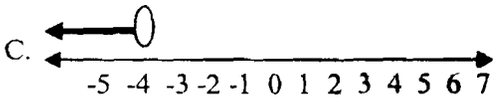
12. Find the coefficient of the term containing x^7 in the expression $(x-y)^{10}$.

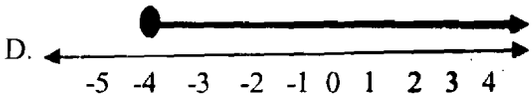
A. -240
B. -120
C. 120
D. 240

13. Find and graph the solution set: $2(2x-8)-8x \leq 0$.

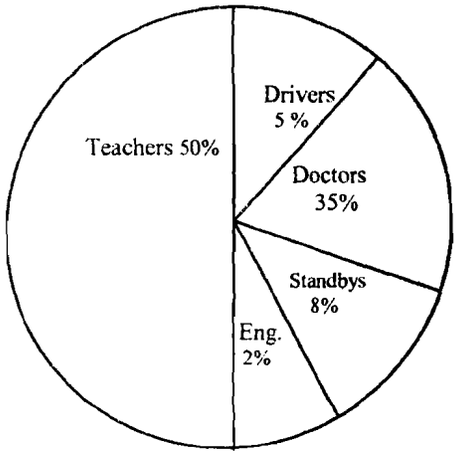
A.


B.


C.


D.


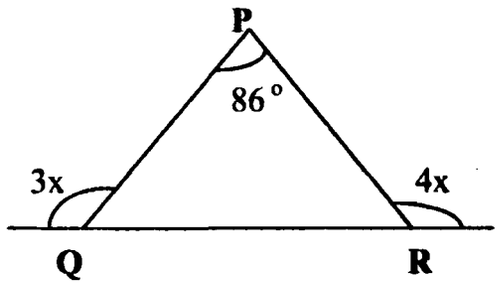
14. The pie chart below shows how a company intents to employ 500 persons in 2012 as drivers, engineers, doctors, teachers, and standbys. How many persons will be on standby?



A. 250
B. 175
C. 40
D. 25

15. Calculate the value of **x** in ΔPQR below.

A. 13.4
B. 14.9
C. 38
D. 39



16. If $i^2 = -1$ and a is a positive integer, which of the following must be equal to i^a ?

A. i^{a+1}
B. i^{a+2}
C. i^{a+4}
D. i^{2a}

17. If $4^x(2^2) = \frac{1}{16}$, what is the value of x ?

A. −4
B. −3
C. 1
D. 2

18. If $y = mx + 3$ and $y = nx - 1$ are equations of perpendicular lines, then $mn =$

A. −2
B. −1
C. 1
D. 2

19. Only 86% of the guests at a wedding reception was invited. How many people attended the reception if 147 of those present had been uninvited?

A. 1005
B. 1050
C. 1264
D. 6450

20. Solve for x: $\frac{3}{x-7} + 5 = \frac{8}{x-7}$

A. 4
B. 5
C. 6
D. 8

21. Bakeri is 2 inches taller than Gayei and Tambo is 3 inches shorter than Bakeri. If Tambo is 4ft 9 inches tall, how tall is Gayei'

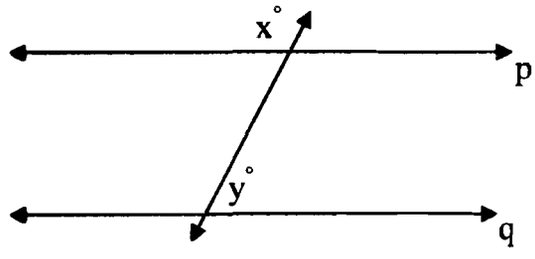
A. 5ft 1 in.
B. 5 ft
C. 4 ft 11 in.
D. 4 ft 10 in.

22. Which of the following is **not** in the solution set of $x - 4y \leq 4$?

A. (0,3)
B. (7,1)
C. (−4,−1)
D. (3,−2)

23. In the figure below, $p // q$ and $110 < x < 150$. Which is **true** of y?

A. $30 < y < 70$
B. $40 < y < 70$
C. $30 < y < 40$
D. $0 < y < 40$



24. If f and g are inverse functions and $f(x) = 2x - 6$, then

A. $g(x) = \frac{1}{2}x - 3$
B. $g(x) = \frac{1}{2}x + 3$
C. $g(x) = 2x - 3$
D. $g(x) = 2x + 3$

25. Three circles of radii 2,4, and 6 are tangent to each other externally. Find the area of the triangle formed by connecting their centers.

A. 4
B. 6
C. 12
D. 24

26. If $3x = 4y - 15$, then $12y - 9x =$

A. 60
B. 45
C. -45
D. -60

27. When using Cramer's Rule to solve the system $\begin{cases} 3x-7y=11 \\ 5x+2y=-8, \end{cases}$

what determinant would be used as denominator of both x and y?

A. $\begin{vmatrix} 3 & 11 \\ 5 & -8 \end{vmatrix}$

B. $\begin{vmatrix} 11 & -7 \\ -8 & 2 \end{vmatrix}$

C. $\begin{vmatrix} 3 & -7 \\ 5 & 2 \end{vmatrix}$

D. $\begin{vmatrix} 5 & 3 \\ 2 & -7 \end{vmatrix}$

28. If $\frac{a}{b} = \frac{5}{6}$, find the value of $\frac{b}{2a}$.

A. 5/12
B. 3/5
C. 5/3
D. 12/5

29. If the average of x,y, and 32 is 28, then the average of x and y would be

A. 24
B. 26
C. 28
D. 30

30. Simplify: $\sqrt[4]{27x^2 \cdot \sqrt{9x^4}}$

A. $3\sqrt[4]{x}$
B. $3\sqrt{x}$
C. $3x$
D. $\sqrt{3x}$

31. An isosceles triangle with base 10 cm has an area of 60 cm^2. Find its perimeter.

A. 23 cm
B. 26 cm
C. 36 cm
D. 41 cm

32. If the graph of $y = 2(x-1)^2 + k$ passes through the point (3,–7), then k equals ?

A. -15
B. -1
C. 1
D. 15

33. Solve the following:

$$\frac{a}{a-b} + \frac{b}{b-a}$$

A. -1
B. $\frac{a+b}{a-b}$
C. 1
D. $\frac{b+a}{b-a}$

34. Find the sum of 14 terms of $-8,-3,2,7,...$

A. 57
B. 77
C. 343
D. 378

35. If M is the midpoint of $\overline{AB}$ and $M(-4.2,-1.9)$, $A(-3.4,2.5)$ are given, then $\boldsymbol{B}$ is ?

A. $(-3.8,-0.6)$
B. $(-5,-6.3)$
C. $(-3.8,.3)$
D. $(1.3,-3.45)$

36. John left a certain amount of money to be shared among his children: Esther, Mary, and Ruth in the ratio of 2:3:4. If Mary received \$210.00, how much did Esther receive?

A. \$280.00
B. \$140.00
C. \$70.00
D. \$46.67

37. Find the values of x in $112_x = 22$.

A. 4 and 5
B. 4 and -5
C. -4 and -5
D. -4 and 5

38. Given that
$U = \{1,2,3,4,5,6,7,9,11,13,17,19\}$,
$A = \{1,2,3,4,5,6,7\}$, *and*
$B = \{1,3,5,7,9,11\}$, *find* $A' \cap B'$.

A. $\{9,11,13,17,19\}$
B. $\{2,4,6,13,17,19\}$
C. $\{13,17,19\}$
D. $\{11,13,17,19\}$

39. Solve for x in the equation:
$\frac{3}{4}(x-2)+\frac{1}{2}=x-1$.

A. -4
B. 0
C. 1.5
D. 2

40. What is the solution set of
$10-|2x-9|=7$?

A. -6 *and* -3
B. -6 *and* 3
C. -3 *and* 6
D. 3 *and* 6

41. Find the value of x in the below equation:
$3x+\begin{bmatrix}-9 & 2\\ 1 & -5\end{bmatrix}=\frac{1}{3}\begin{bmatrix}9 & -3\\ -6 & 12\end{bmatrix}$.

A. $\begin{bmatrix}-4 & -1\\ -1 & 3\end{bmatrix}$
B. $\begin{bmatrix}4 & -1\\ -1 & 3\end{bmatrix}$
C. $\begin{bmatrix}4 & -1\\ 1 & 3\end{bmatrix}$
D. $\begin{bmatrix}12 & -3\\ -3 & 9\end{bmatrix}$

42. The two geometric means between 4 and 108 are ?

A. -12 and -36
B. -36 and 12
C. -12 and 36
D. 12 and 36

43. A circular based pyramid has a height of 10cm and a diameter 5cm. What could be the volume of this pyramid?
(*Note: Volume of pyramid* $= \frac{1}{3} \times$ *base area* $\times$ *height*). [Use $\pi = 3.14$]

A. 785cm^3
B. 654cm^3
C. 261.7cm^3
D. 65.4cm^3

44. A line with slope $\frac{-5}{2}$ passes through points $(7,-4)$ and $(x,6)$. What is the value of x ?

A. 11
B. 3
C. -3
D. -11

45. If the circumference of a circle is 25.12cm, find the area of the circle. (use $\pi = 3.14$)

A. 5.02cm^2
B. 50.24cm^2
C. 200.96cm^2
D. 502.4cm^2

46. Six boys and 3 girls are eligible for a 5 member team. In how many ways can the team be formed with exactly 3 boys?

A. 720
B. 100
C. 60
D. 23

47. A bag of 30 fruits contains oranges, mangoes, and grapes. The probability of picking an orange is $\frac{1}{2}$.
If there are 5 mangoes, find the probability that a fruit picked at random is an orange or a grape.

A. 1/3
B. 5/6
C. 1/2
D. 1/6

48. The terminal side of an angle contains the point $(-4, 4\sqrt{3})$. The cosine of this angle is ?

A. $\frac{\sqrt{3}}{2}$
B. $-1/2$
C. $-\sqrt{3}$
D. -2

49. Simplify: $\frac{c^2-cd}{d^2-de} \div \frac{d^2-cd}{cd-ce}$

A. c^2/d^2
B. d^2/c^2
C. $-c^2/d^2$
D. $-d^2/c^2$

50. A student scores 74%, 81%, 62%, 58% and 77% in five subjects. How much should the student score in the sixth test to make an average of 74%?

A. 96%
B. 92%
C. 89%
D. 82%

END OF OBJECTIVE TEST.

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

YOU WILL BE PENALIZED SEVERELY IF YOU ARE FOUND LOOKING AT THE NEXT PAGE BEFORE YOU ARE TOLD TO DO SO.

PAPER 2 1½ **hours**

ESSAY

[60 marks]

Paper 2** consists of* **seven** *questions divided into* **two** *sections,* **A** *&* **B**. *Section* **A** *contains* **four** ***compulsory** questions and section* **B** *contains* **three** *questions from which you are required to answer* ***any **two.** *Write your answers in* **ink** *(blue or black)* **only.** *Credit will be given for clarity of expression* ***and orderly** presentation of material.*

SECTION **A**

COMPULSORY

[36 marks]

There are **four** *questions in this section and you are required to answer* **all** *the questions.*

1. *(a)* Find $log_{10} 40$ given that $log_{10} 2 = 0.3010$.

(b) Find the value of k if $(k, 1)$ is a solution of $y = 2^x$

2. *(a)* A man is 20cm taller than his wife. The wife is 68cm taller than half the man's height. How tall is the man?

(b) Given that $12x - 8y = \frac{44}{3}$, find the value of $9x - 6y$.

3. *(a)* Find the remainder when $2x^4 - x^3 + 3x - 1$ is divided by $x + 2$.

(b) Solve the system of equations for x and y:

$$\begin{cases} 3(x + y) = 7(y - x) \\ 5(3x - y) = x + 3 \end{cases}$$

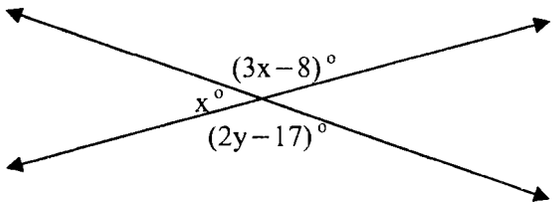
4. *(a)* Solve for x in $7^x = \frac{49}{\sqrt[3]{7}}$

(b) The chord of a circle is 16cm long. If it is 6cm from the center of the circle, find the radius of this circle.

SECTION **B**
[24 marks]

Section **B** *contains* **three** *questions. You are required to answer any* **two**.

5. From the given diagram below, find the

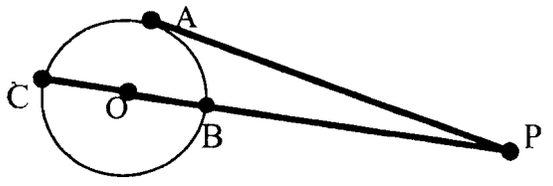


(a) measure of $\angle x$.

(b) measure of $\angle(3x - 8)$.

(c) value of y .

6. In the diagram below, $\overline{PA}$ is a tangent to circle O at A and secant $\overline{PC}$ passes through O. If $PA = 15$m and $PB = 9$m, find the



(a) radius of the circle.

(b) length of secant $\overline{PC}$.

7. (a) Find the value of x for which $(x - 2)^2 : (x + 3)^2 = 1 : 4$

(b) A triangle has sides of length x cm, $(2x-1)$ cm and $(2x + 1)$ cm. If its perimeter is 40 cm, find the probability that an ant, which continuously crawls round the perimeter of the triangle at a steady speed, is on the shortest side at any given moment.

END OF PAPER