

P030/2&1 BECE

February 2021

MATHEMATICS 2&1

Essay and Objective

2 hours

**2&1**

Name.....

Index Number.....

THE WEST AFRICAN EXAMINATIONS COUNCIL

GHANA

**Basic Education Certificate Examination**

February 2021

MATHEMATICS 2 & 1

2 hours

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

*This booklet consists of two papers. Answer Paper 2 which comes first, in your answer booklet and Paper 1 on your Objective Test answer sheet. Paper 2 will last **1** hour after which the answer booklet will be collected. Do **not** start Paper 1 until you are told to do so. Paper 1 will last **1** hour.*

*The use of calculators is **not** allowed.*

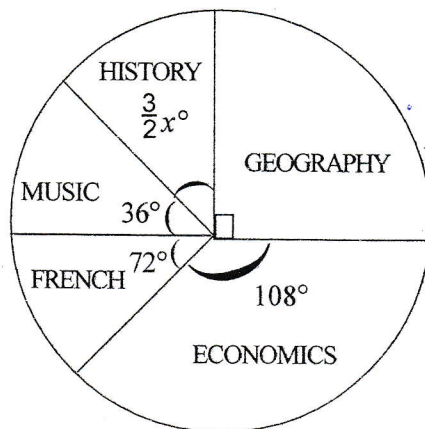
Answer **four** questions **only**.

All questions carry equal marks.

All working must be clearly shown. Marks will **not** be awarded for correct answers without corresponding working.

1. In an experiment, a sample of items with given numbers was selected for testing as follows:  
 $P = \{\text{item numbers divisible by 4 between 205 and 235}\};$   
 $Q = \{\text{item numbers which are multiples of 6 between 205 and 235}\}.$ 
  - (a) List the members of sets  $P$  and  $Q$ .
  - (b) Find:
    - (i)  $P \cup Q;$
    - (ii)  $P \cap Q.$
  - (c) How many items were selected?
  - (d) Which item numbers selected are divisible by 4 and 6?
2.
  - (a) Solve:  $1-2q = 2 + \frac{q}{3}.$
  - (b) Find the highest common factor of the following numbers: 20, 28 and 36.
  - (c) The base of an isosceles triangle is 9 cm and one of the other sides is  $x$  cm.
    - (i) Illustrate the information in a diagram.
    - (ii) If the perimeter of the triangle is 21cm, find the product of the other two sides.
3.
  - (a) If  $x = \frac{1}{5}$  and  $y = -\frac{1}{2}$ , find the value of  $2x - 3y.$
  - (b) Simplify:  $4\frac{3}{4} + 8\frac{1}{5} - 9\frac{1}{2}.$
  - (c) A bank granted Mr Obodan a loan of GH¢ 720.00. If the rate is  $24\frac{1}{2}\%$  per annum simple interest, calculate the
    - (i) interest at the end of the year;
    - (ii) total amount he had to pay at the end of the year;
    - (iii) remaining balance after paying GH¢ 500.00 at the end of the year.
4.
  - (a) If  $P = \frac{Q}{A+B}$ , express  $B$  in terms of  $P$ ,  $Q$  and  $A.$
  - (b) Afia and Esi contributed GH¢ 2,700.00 and GH¢ 1,800.00 respectively to start a business. They agreed to share the profit in the ratio 7 : 5 respectively. If the profit made was GH¢ 900.00, calculate:
    - (i) the total contribution;
    - (ii) Esi's share of the profit;
    - (iii) Afia's share as a percentage of the total profit.

5. (a) The length of the minute hand of a wall clock is 7 cm. What area will the minute hand cover after one hour. [ Take  $\pi = \frac{22}{7}$  ]
- (b) The pie chart shows the favourite subjects of 200 students in a school.



NOT DRAWN TO SCALE

- (i) Find the value of  $x$ .
- (ii) Calculate the percentage of students whose favourite subject is economics.
- (iii) If a student is chosen at random, find the probability that his subject is French.
6. (a) A Ship sails due north from point **P** to a point **Q**, 4 km away. It then sails on a bearing of  $090^\circ$  to a point **R**, 3 km from **Q**.
- (i) Illustrate the information in a diagram.
- (ii) Find the length **PR**.
- (b) Mrs Adjei bought goods worth GH¢ 104,000.00 to sell in her shop. After taking stock at the end of the month, she realized that only GH¢ 4,059.00 worth of goods were left in the shop. Find the worth of goods sold.
- (c) The table shows the average monthly rainfall at Samproso from March, 2014 to September, 2014.

| Month         | March | April | May | June | July | August | September |
|---------------|-------|-------|-----|------|------|--------|-----------|
| Rainfall (mm) | 154   | 145   | 277 | 450  | 267  | 142    | 98        |

Use the table to answer the following:

- (i) Find the average rainfall for the last three months;
- (ii) Which month recorded the **least** amount of rainfall?
- (iii) What is the total amount of rainfall recorded over the period?

**END OF ESSAY 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 1  
OBJECTIVE TEST

1 hour

*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:  
Your **surname** followed by your **other names**, the *Subject Name*, your *Index Number*, *Centre Number* and the *Paper Code*.
3. In the boxes marked *Candidate Number*, *Centre Number* and *Paper Code*, **reshade** each of the shaded spaces.
4. An example is given below. This is for a female candidate whose name is Ellen Akua GARIBA. Her *index number* is 772384188 and she is writing the examination at *Centre Number* 77234. She is offering *Mathematics* 1 and the *Paper Code* is 0301.

**THE WEST AFRICAN EXAMINATIONS COUNCIL, GHANA  
BASIC EDUCATION CERTIFICATE EXAMINATION  
OBJECTIVE ANSWER SHEET**

|                                             |                                       |
|---------------------------------------------|---------------------------------------|
| CANDIDATE NAME:<br><b>GARIBA ELLEN AKUA</b> | SUBJECT NAME:<br><b>MATHEMATICS 1</b> |
|---------------------------------------------|---------------------------------------|

- |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. Use 2B pencil, Press firmly.</li> <li>2. Answer each question by choosing one letter and then, shade through the letter chosen like this: A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/></li> <li>3. If you want to change an answer, erase your first mark completely.</li> </ol> | <ol style="list-style-type: none"> <li>4. If only four alternative answers are given for each question, ignore the letter E.</li> <li>5. Your question paper may have fewer than 60 questions.</li> </ol> |
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| CANDIDATE NUMBER           |                            |                            |                            |                            |                            |                            |                            |                            |
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| PAPER CODE                 |                            |                            |                            |
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For Supervisors only.  
If candidate is absent shade this space.



Answer **all** questions.

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.

If  $3n + 2 = 8$ , find the value of  $n$ .

- A. 10
- B. 6
- C. 3
- D. 2

The correct answer is 2, which is lettered D and therefore answer space D would be shaded

☐ A ☐ B ☐ C ☒ D

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. If  $M = \{2, 4, 6, 8, 10\}$  and  $N = \{4, 5, 6, 7, 8, 9\}$ , find  $M \cap N$ .
  - A.  $\{4, 6, 8\}$
  - B.  $\{4, 8\}$
  - C.  $\{2, 4, 5, 6, 7, 8, 9, 10\}$
  - D.  $\{4, 6\}$

2. If  $0.000689 = 6.89 \times 10^n$ , find the value of  $n$ .
  - A. -4
  - B. -3
  - C. 3
  - D. 4

3. Evaluate:  $\frac{1}{2}[(7-3)-(4-10)]$ .
  - A. -5
  - B. -1
  - C. 1
  - D. 5

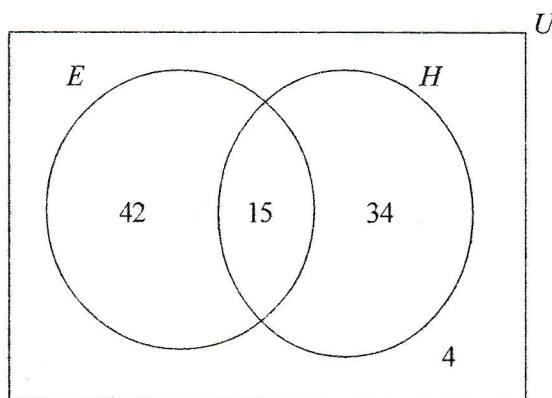
4. If  $-1(x-1) = -2$ , find the value of  $x$ .
  - A. 3
  - B. 2
  - C. -2
  - D. -3

5. Expand  $(t-1)(t+1) - 1$ .
  - A.  $t^2 + 1$
  - B.  $t^2 - 1$
  - C.  $t^2 + 2$

6. Ibrahim and Ama share GH¢1,500.00 between them in the ratio 2 : 3. Find Ama's share.
- GH¢ 300.00
  - GH¢ 500.00
  - GH¢ 600.00
  - GH¢ 900.00

7. If  $\frac{1}{t} = \frac{1}{3}$ , find the value of  $t$ .

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



The Venn diagram represents the number of people who speak English or Hausa or neither of the two languages in a Village. Use the information to answer questions 8 and 9.

8. How many people speak English **or** only Hausa?

- 42
- 57
- 76
- 91

9. Find the number of people in the Village.

- 53
- 80
- 91
- 95

10. What is the total cost of  $p$  books at GH¢ 7.00 each and  $q$  books at GH¢ 1.20 each?

- $7p + 1.20q$
- $7q + 1.20p$
- $7(p + 1.20q)$
- $1.2(7p + q)$

11. Write  $\frac{1}{2}\%$  as a decimal numeral.

- A. 0.5
- B. 0.05
- C. 0.005
- D. 0.0005

12. Solve:  $(3m - 1) + 2 \leq 14 + 4m$ .

- A.  $m \geq -14$
- B.  $m \leq -14$
- C.  $m \geq -13$
- D.  $m \leq -13$

13. What is the image of 3 under the mapping  $x \rightarrow 3x + 7$ ?

- A. 10
- B. 13
- C. 16
- D. 24

14. Simplify:  $4^4 \times 2^6$ .

- A.  $2^{10}$
- B.  $2^{14}$
- C.  $2^{15}$
- D.  $2^{16}$

15. Find the slope of the line  $x - 2y = 11$ .

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

16. Mr Ntim travelled a distance of 3 km in 60 minutes. What distance can he cover in 50 minutes, travelling at the same time?

- A. 2.2 km
- B. 2.5 km
- C. 2.8 km
- D. 3.2 km

The data shows the marks obtained by students in a class test:

21, 32, 16, 27, 22, 19, 10. Use the information to answer questions 17 and 18.

17. Find the median mark.

A. 16  
B. 19  
C. 21  
D. 22

18. Calculate the mean.

A. 16  
B. 19  
C. 21  
D. 22

19. There are 6 men and 4 women in an escalator. What is the probability that the **first** person that comes out is a woman?

A.  $\frac{7}{10}$

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

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

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

20. What is the area of a square whose diagonal is 14 cm?

A.  $7 \text{ cm}^2$   
B.  $28 \text{ cm}^2$   
C.  $49 \text{ cm}^2$   
D.  $98 \text{ cm}^2$

21. Factorize  $2x^2 + 4x + 3xy + 6y$  completely.

A.  $(x + 2)(2x + 3y)$   
B.  $(x + 2y)(2x + 3y)$   
C.  $(x + 3y)(2x + 3y)$   
D.  $(2x + y)(2x + 3y)$

22. Find the simple interest on GH¢ 2,448.00 invested for 2 years at a rate of  $2\frac{1}{2}\%$  per annum.

A. GH¢ 57.92  
B. GH¢ 97.92  
C. GH¢ 122.04  
D. GH¢ 122.40

23. Find the image of the point  $(-1, 4)$  under the transformation  $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} 2x \\ -1+y \end{pmatrix}$ .
- A.  $(2, -3)$   
 B.  $(-3, 2)$   
 C.  $(-2, 3)$   
 D.  $(3, -2)$

24. Factorize:  $\frac{1}{2}ty^2 + \frac{1}{4}ty$ .

- A.  $\frac{1}{4}ty(y+1)$   
 B.  $\frac{1}{4}ty(2y+1)$   
 C.  $\frac{1}{2}ty(\frac{1}{2}y+1)$   
 D.  $\frac{1}{2}ty(y+1)$

25. If the price of a motor-cycle is increased by 40 % to GH¢ 14,000.00, find the price of the motor-cycle before the increase?

- A. GH¢ 7,200.00  
 B. GH¢ 8,400.00  
 C. GH¢ 9,260.00  
 D. GH¢ 10,000.00

26. Write down the rule for the mapping

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| $x$          | 1            | 2            | 3            | 4            |
| $\downarrow$ | $\downarrow$ | $\downarrow$ | $\downarrow$ | $\downarrow$ |
| $y$          | 1            | 5            | 9            | 13           |

- A.  $x \rightarrow 2x + 3$   
 B.  $x \rightarrow 2x - 3$   
 C.  $x \rightarrow 4x - 3$   
 D.  $x \rightarrow 4x + 3$

27.  $A(3, 6)$  and  $B(2, -3)$  are points in the cartesian plane. Find the vector  $\vec{AB}$ .

- A.  $\begin{pmatrix} 1 \\ 9 \end{pmatrix}$   
 B.  $\begin{pmatrix} -1 \\ 9 \end{pmatrix}$   
 C.  $\begin{pmatrix} 1 \\ -9 \end{pmatrix}$   
 D.  $\begin{pmatrix} -1 \\ -9 \end{pmatrix}$

28. Kofi paid GH¢ 460.00 including 15 % VAT for goods he bought from a shop. Find the VAT he paid.
- GH¢ 50.00
  - GH¢ 59.00
  - GH¢ 60.00
  - GH¢ 69.00

29. Find the  $y$ -intercept of the equation  $5x - 2y = 28$ .
- 14

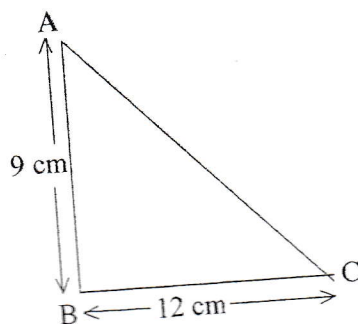
B.  $-\frac{5}{2}$

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

D. 14

30. A car travels 480 km using 15 gallons of petrol. How many kilometers per gallon does it travel?
- 28 km/gallon
  - 30 km/gallon
  - 32 km/gallon
  - 35 km/gallon

31.



NOT DRAWN TO SCALE

In the diagram,  $ABC$  is a right-angle triangle with  $AB = 9$  cm and  $BC = 12$  cm. Find the length  $AC$ .

- 8.0 cm
- 10.0 cm
- 15.0 cm
- 21.0 cm

32. If the image of  $P$  under the translation vector  $\begin{pmatrix} 3 \\ 7 \end{pmatrix}$  is  $P^1(6, 8)$ , find the coordinates of  $P$ .
- (9, 15)
  - (3, 1)
  - (-3, -1)
  - (-9, -15)

33. Given that  $2^n = 32$ , find the value of  $n$ .
- A. 2
  - B. 3
  - C. 4
  - D. 5
34. A point  $Q(-4, 6)$  is rotated anticlockwise through  $180^\circ$ . Find the image  $Q_1$ .
- A.  $Q_1(-6, 4)$
  - B.  $Q_1(6, -4)$
  - C.  $Q_1(-4, -6)$
  - D.  $Q_1(4, -6)$
35. A school has 400 pupils of whom 160 are girls. What is the ratio of boys to girls?
- A. 2 : 5
  - B. 3 : 2
  - C. 5 : 2
  - D. 8 : 5
36. If  $x + 6 = -6$ , find the value of  $\frac{x}{4}$ .
- A. 3
  - B. -3
  - C.  $\frac{3}{2}$
  - D.  $-\frac{3}{2}$
37. Find the product of  $p^2qr$  and  $pq^4$ .
- A.  $p^3q^4r$
  - B.  $p^3q^5r$
  - C.  $p^2q^4r$
  - D.  $p^2q^4$
38. What is the value of 6 in 95.683?
- A. 6 ones
  - B. 6 tens
  - C. 6 tenths
  - D. 6 thousandths
39. If two parallel lines are cut by a transversal, the interior angles on the same side of the transversal are
- A. congruent.
  - B. vertical.
  - C. complementary.
  - D. supplementary.

40. Which of the following is arranged in descending order?

- A.  $-63, -24, 5, 18$
- B.  $-24, -63, 5, 18$
- C.  $18, 5, -24, -63$
- D.  $-63, -24, 18, 5$

***END OF PAPER***