03001/2&1 BECE
June 2021
MATHEMATICS 2&1
Essay and Objective
2 hours

2&1

Name...

Index Num...

THE WEST AFRICAN EXAMINATIONS COUNCIL

GHANA

Basic Education Certificate Examination

June 2021   MATHEMATICS 2 & 1   2 hours
.   Essay and Objective

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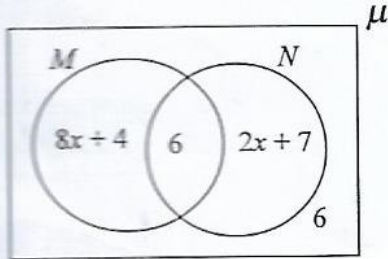
The use of calculators is **not** allowed.

PAPER 2

1 hour

Essay

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 the Venn diagram, M and N are intersecting sets in the universal set μ.

(a) Express n(M) and n(N) in terms of x.

(b) Given that n(M) = n(N), find the:
   (i)   value of x;
   (ii) n(μ).

(c) Simplify: $2^6 \div (2^2 \times 2^1) \div 2^5$.

2. (a) Factorize the expression $5ay - by + 15a - 3b$.

   (b) Solve: $\dfrac{6}{4p - 1} = \dfrac{4}{3(p + 4)}$.

   (c) Esi and Kofi shared an amount of GH¢21, 000.00 in the ratio of 2 : 5 respectively. How much more did Kofi receive than Esi?

3. (a) If $\mathbf{r} = \begin{pmatrix} -4 \\ -5 \end{pmatrix}$ and $\mathbf{m} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$, find $\mathbf{p}$ given that $\mathbf{p} = \mathbf{r} - \mathbf{m}$.

   (b) The sum of two numbers is 81. If the second number is twice the first, find the second number.

   (c) The floor of a rectangular hall is of length 9 m and width 4 m. How many tiles of 20 cm by 30 cm can be used to cover the floor completely.

4. (a) Antwiwaa bought 25 mangoes, 7 of which were unripe. What percentage of the mangoes were ripe?

   (b)

x	1	2	3	4	... 8 ...	n
$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$
y	-1	2	5	8	m	29

   The mapping shows the relationship between x and y. Find the:
   (i)   rule for the mapping;
   (ii) values of m and n.

(c) A bus left town **X** at 6:30 am and arrived at town **Y** at 1:00 pm. If the bus travelled at an average speed of 100 km per hour, calculate the distance from town **X** to town **Y**.

5. (a) Simplify: $(4x + 2)(x - 2) - 3x^2$

(b) The following are the angles formed at the centre of a circle: 40°, 60°, 100°, $3x^o$ and $5x^o$. Find the value of x.

(c) The cost (C) in Ghana Cedis of producing a book of x pages is given by $C = 25 + 0.6x$.
   (i) Find the cost of producing a book with 220 pages.
   (ii) How many pages are in a book produced at a cost of GH¢145.00?

6. The table shows the number of marbles students sent to class for Mathematics lesson.

Number of Marbles (x)	Number of Students (f)	fx
1	4	
2	5	
3		42
4	9	
5		30
6	2	12

(a) Copy and complete the table.

(b) How many:
   (i) students were in the class?
   (ii) marbles were brought altogether?
   (iii) marbles did **most** of the students bring?

(c) Calculate, correct to the **nearest** whole number, the mean number of marbles brought for the lesson.

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   1 hour

OBJECTIVE TEST

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 Abena Aku DERY. 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: DERY ABENA ABLAH

SUBJECT NAME: MATHEMATICS 1

1.   Use 2B pencil. Press firmly.
2.   Answer each question by choosing one letter and then, shade through the letter chosen like this ⊏A⊐ ▬ ⊏C⊐ ⊏D⊐ ⊏E⊐
3.   If you want to change an answer, erase your first mark completely.
4.   If only four alternative answers are given for each question, ignore the letter E.
5.   Your question paper may have fewer than 60 questions.

CANDIDATE NUMBER: 7 7 2 3 8 4 1 8 8

CENTRE NUMBER: 7 7 2 3 4

PAPER CODE: 0 3 0 1

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

fad/fboea/bec/03001/2&1/21/sc

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.   Simplify $3y - \dfrac{(2y - 3)}{4}$.

    A. $10y + 3$

    B. $10y - 3$

    C. $\dfrac{10y - 3}{4}$

    D. $\dfrac{10y + 3}{4}$

2.   A bag contains 5 red and 7 black balls of the same size. What is the probability of picking a black ball?

    A. $\dfrac{5}{7}$

    B. $\dfrac{5}{12}$

    C. $\dfrac{7}{12}$

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

3. Kofi and Ama shared an amount of GH¢ 3,000.00 in the ratio 2 : 3. Find the amount received by Kofi.

    A.   GH¢ 1,000.00

    B.   GH¢ 1,200.00

    C.   GH¢ 1,500.00

    D.   GH¢ 1,800.00

4. The image of $P(10, -3)$ when translated by the vector **r** is $P'(4, 5)$. Find **r**.

    A. $\begin{pmatrix} 14 \\ 2 \end{pmatrix}$

    B. $\begin{pmatrix} 6 \\ -8 \end{pmatrix}$

    C. $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$

    D. $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$

5. Given that $x = 8$, what type of angle is $(9x \div 8)°$?

    A.   Straight angle

    B.   Obtuse angle

    C.   Acute angle

    D.   Right angle

6. Find the image of $p(-3, 5)$ when rotated through $360°$ about the origin.

    A. $(5, -3)$

    B. $(-3, -5)$

    C. $(-3, 5)$

    D. $(-5, -3)$

7. On a map, $\frac{1}{3}$ cm represents 5 km. If two towns A and B are 18 cm apart on the map, what is the actual distance between them?

    A.   27 km

    B.   30 km

    C.   240 km

    D.   270 km

8. Express 134.78 correct to the **nearest tenth**.

    A.   130.0

    B.   134.7

    C.   134.8

    D.   135.0

Turn over

9. Find the difference between the values of $(2d)^2$ and $2d^2$, when $d = 3$.

    A.   0

    B. ✓ 18

    C.   24

    D.   54

10. The area of a rectangle is 18 cm². If one of its sides is 2 cm long, find its perimeter.

    A.   18 cm

    B.   20 cm

    C. ✓ 22 cm

    D.   36 cm

11. Express 7352.4658 correct to **three** significant figures.

    A.   7352465.8

    B.   7352.47

    C. ✓ 7350

    D.   735

12. Make h the subject of the relation $V = \pi r^2 h$.

    A. ✓ $h = \dfrac{V}{\pi r^2}$

    B. $h = \sqrt{\pi r^2}$

    C. $h = \dfrac{\pi r^2}{V}$

    D. $h = (\pi r^2)^2$

13. Given that $x = 4$, $y = 7$, evaluate $2xy + 3(x + y)$.

    A.   79

    B. ✓ 89

    C.   99

    D.   109

14. Expand $(7r - 5)(3r + 4)$.

    A. ✓ $21r^2 + 13r - 20$

    B. $21r^2 - 13r - 20$

    C. $21r^2 - 43r - 20$

    D. $21r^2 + 43r - 20$

X	1	2	3	4	5
↓	↓	↓	↓	↓	↓
Y	5	9	13	17	21

Use the mapping above to answer questions 15 and 16.

15. What is the rule for the mapping?

 A. $y = x + 4$

 B. $y = 3x + 2$

 C. $y = 4x + 1$

 D. $y = 5x + 1$

16. Find x when $y = 37$.

 A. 6

 B. 7

 C. 8

 D. 9

17. Which property of arithmetic is shown in the equation $(6 + x) + 5 = 6 + (x + 5)$?

 A. Commutative

 B. Associative

 C. Closure

 D. Distributive

18. If $A = \{1, 3, 5, 7, 9, 11, 13, 15\}$ and $B = \{3, 6, 9, 12, 15\}$, find $n(A \cap B)$.

 A. 3

 B. 5

 C. 10

 D. 15

19. Find the gradient of the line that joins the points $A\ (-3, 5)$ and $B\ (7, -2)$.

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

 B. $-\dfrac{5}{12}$

 C. $-\dfrac{7}{10}$

 D. $\dfrac{12}{5}$

Turn over

20. Solve: $(1 - x) \div 3 < 4$.

   A. $x < -11$

   B. $x > -11$

   C. $x < 11$

   D. $x > 11$

21. Factorize: $3ax + 6a - x - 2$.

   A. $(3a + 1)(x + 2)$

   B. $(3a + 1)(x - 2)$

   C. $3a(x - 2)$

   D. $(3a - 1)(x + 2)$

22. If the average of 5, 6, 7 and x is 8, find the value of x.

   A.   12

   B.   14

   C.   16

   D.   24

23. Divide 0.5445 by 0.09.

   A.   5.05

   B.   6.05

   C.   6.50

   D.   60.50

24. Find the simple interest on GH¢ 600.00 which was saved for 8 months at 5 % per annum.

   A.   GH¢ 20.00

   B.   GH¢ 40.00

   C.   GH¢ 45.00

   D.   GH¢ 240.00

25. An amount of GH¢ 375,000.00 was needed to build a clinic for a community of twelve towns. Each community contributed GH¢ 25,000.00. If the District Assembly also contributed GH¢ 30,500.00, how much more is needed to build the clinic?

   A.   GH¢ 44,500.00

   B.   GH¢ 45,500.00

   C.   GH¢ 34,500.00

   D.   GH¢ 75,000.00

26. What is the Highest Common Factor (HCF) of 24, 32 and 64?

   A.   4

   B.   6

   C.   8

   D.   16

27. Esi bought a television set for GH¢ 1,500.00. If she sold it at a profit of 20 %, find the selling price.
    - A. GH¢ 1,200.00
    - B. GH¢ 1,500.00
    - C. GH¢ 1,750.00
    - D. GH¢ 1,800.00 ✓

28. If $P = \{ 4, 8, 12, 16, 20 \}$, $Q = \{ 16, 4, 12, k, 20 \}$ and $P = Q$, find the value of k.
    - A. 20
    - B. 16
    - C. 8 ✓
    - D. 4

29. The area of a trapezium is 36 cm². If the parallel sides are 10.5 cm and 9.5 cm, calculate the distance between the two parallel sides.
    - A. 1.0 cm
    - B. 1.8 cm
    - C. 3.2 cm
    - D. 3.6 cm ✓

30. Simplify $3(5a^2 + 2c) - 2a(1 - 3a) - 6c$
    - A. $21a^2 - 2a - 6c$
    - B. $13a^2 - 2a - 12c$
    - C. $13a^2 - 2a$
    - D. $21a^2 - 2a$ ✓

31. A trader bought 100 tubers of yam for GH¢ n each. All the yams were sold at GH¢ m each. Find the profit.
    - A. GH¢ $100(m - n)$
    - B. GH¢ $100(m + n)$
    - C. GH¢ $100(n - m)$
    - D. GH¢ $100(nm)$ ✓

32. A box can take 12 pencils. If 156 pencils are packed into such boxes, how many boxes will be fully packed?
    - A. 10
    - B. 11
    - C. 12
    - D. 13 ✓

Turn over

33. Find the next two terms of the sequence: 2, 5, 10, 17, ..., ...
   - A. 24, 35
   - B. 26, 35
   - C. 26, 37
   - D. 27, 38

34. If $2x - 1 = 5$, find the value of x.
   - A. 3
   - B. 4
   - C. 5
   - D. 6

35. Priscilla's age is k years while Mary's age is b years. If Mary is 15 years older than Priscilla, which of the following statements is **correct**?
   - A. $2k + b = 15$
   - B. $b - k = 15$
   - C. $k - b = 15$
   - D. $2b + k = 15$

36. If the median of the numbers 9, 10, 12, x, 20 and 25 is 14, find the value of x.
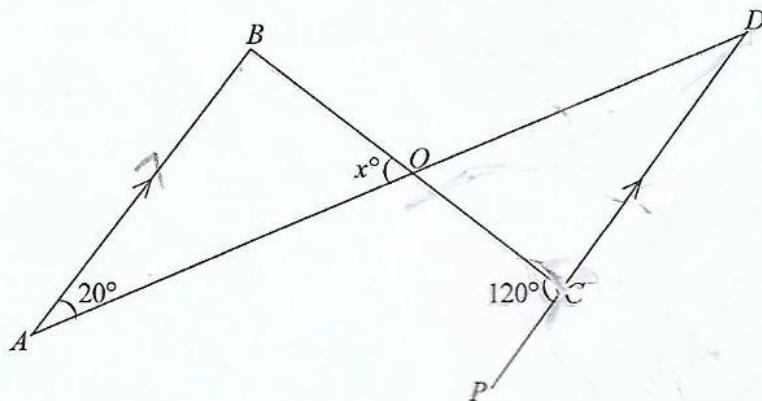   - A. 14
   - B. 16
   - C. 18
   - D. 22

37. Simplify $2(-\frac{1}{2})^2 + (-\frac{1}{2}) - 1$.
   - A. -1
   - B. 0
   - C. 1
   - D. 2

38. Express 0.725 as a fraction in its lowest term.
   - A. $\frac{19}{40}$
   - B. $\frac{21}{40}$
   - C. $\frac{29}{40}$
   - D. $\frac{39}{40}$

39.

NOT DRAWN TO SCALE

In the diagram, line *AB* is parallel to line *PD*. Find the value of *x*.

A. 20°

B. 80°

C. 100°

D. 120°

40. A car covered a distance of 150 km at a speed of 18 km/h. Find the time taken.

A. 7 hours 33 minutes

B. 7 hours 53 minutes

C. 8 hours 13 minutes

D. 8 hours 20 minutes

END OF PAPER