03001/2&1 BECE
June 2024
MATHEMATICS 2&1
Essay and Objective
2 hours

2&1

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Index Number 012002100124

THE WEST AFRICAN EXAMINATIONS COUNCIL

GHANA

Basic Education Certificate Examination

June 2024 | MATHEMATICS 2 & 1 Essay and Objective | 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.*

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. (*a*) A fair die and a fair coin are thrown together **once**.

(i) Write down the set of all possible outcomes.

(ii) Find the probability of obtaining a prime number and a tail.

(*b*) The map of a field is drawn to a scale of 1 : 100. If the width and area of the field on the map are 8 cm and 88 cm^2 respectively, find in m^2, the area of the actual field.

(*c*) Copy and complete the 3 × 3 magic square such that the sum of the numbers in **each** row, column and diagonal is equal to 21.

10	3	8
5	7	9
6	11	4

2. (*a*) Given the vectors $\mathbf{p} = \begin{pmatrix} m+3 \\ 2-n \end{pmatrix}$, $\mathbf{q} = \begin{pmatrix} 3m-1 \\ n-8 \end{pmatrix}$ and $\mathbf{p} = \mathbf{q}$,

find the values of m and n.

(*b*) A man shared an amount of money between his children Baaba and William in the ratio 6 : 5. Baaba received GH¢1,200.00.

(i) Find the total amount shared.

(ii) William invested his share in an account at the rate of 20 % simple interest per annum for 2 years. Find the total amount in his account at the end of the 2 years.

3. (*a*) Simplify: $3\sqrt{50} + 2\sqrt{45} - \sqrt{2} + \sqrt{5}$.

(*b*) A wire of length 38 cm is bent into the shape of a rectangle whose length is 7 cm **more than** the width. Find the area of the rectangle.

(*c*) If 15 % of the length of a rope is 720 metres, find half of the length of the rope.

4. (*a*) Using a ruler and a pair of compasses **only**, construct ΔPQR such that angle $PQR = 90°$, $|PQ| = 5.5$ cm and $|QR| = 8$ cm.

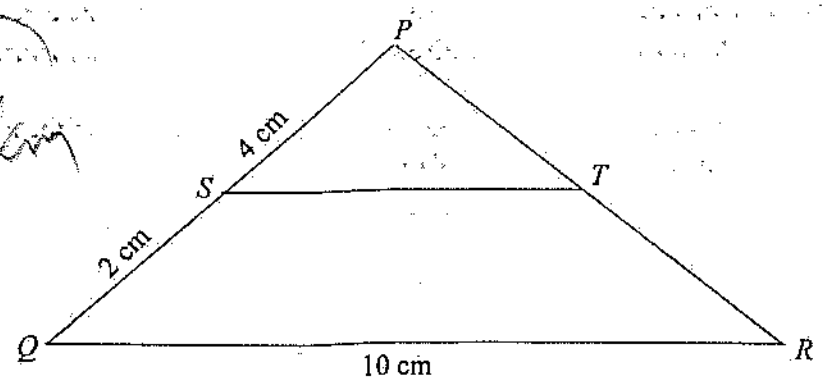
(*b*) Construct a perpendicular of $\overline{PR}$ from Q.

(*c*) Locate M, the intersection of the perpendicular and $\overline{PR}$.

(*d*) Measure :
(i) $|MR|$;
(ii) $|QM|$.

(*e*) Calculate, correct to the **nearest** whole number, the area of triangle QMR.

5.



NOT DRAWN TO SCALE

(*a*) In the diagram, ΔPQR is an enlargement of ΔPST, $|PS| = 4$ cm, $|QS| = 2$ cm and $|QR| = 10$ cm.
(i) Find the length of $\overline{ST}$.
(ii) If $|\overline{PQ}| = |\overline{PR}|$, find the area of ΔPQR.

(*b*) The total area of a school compound is $900\frac{1}{2}$m^2. The school has Administration and Classroom block, Library, School Park, Roads and Walkways. The areas of the Administration and Classroom block, Library and School Park are $300\frac{1}{4}$m^2, $200\frac{1}{2}$m^2, and $120\frac{1}{8}$ m^2 respectively. Find the area covered by Roads and Walkways altogether.

6. (*a*) Copy and complete the table for the relation $F = \frac{9}{5}C + 32$.

where F and C are degrees Fahrenheit and degrees Celsius respectively.

°C	0	5	10	15	20	25	30
°F	32				68		

(*b*) Using a scale of 2 cm to 10 units on the vertical axis (°*F*) and 2 cm to 5 units on the horizontal axis (°*C*), draw a linear graph for the relation.

(*c*) Use the graph to find the temperature in degrees celsius when $F = 55$ degrees.

(*d*) Interpret the slope of the relation.

END OF ESSAY TEST

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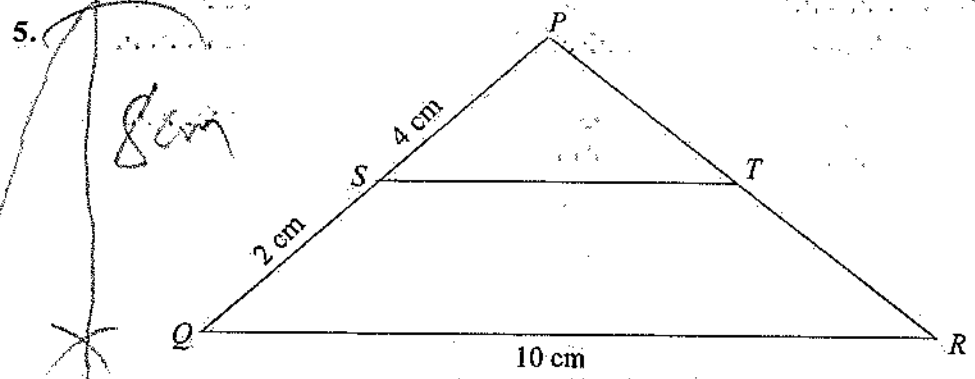

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END OF ESSAY TEST

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 Erica Afiba MANU. 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:	SUBJECT NAME:
MANU ERICA AFIBA	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⊐ ⊏B⊐ ⊏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.

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. Madam Nancy wants to know which of the teachers in her school is liked best by most of the students. Which of the following methods is **most suitable** for collecting the data?

A. Database
B. Experiment
C. Observation
D. Questionnaire

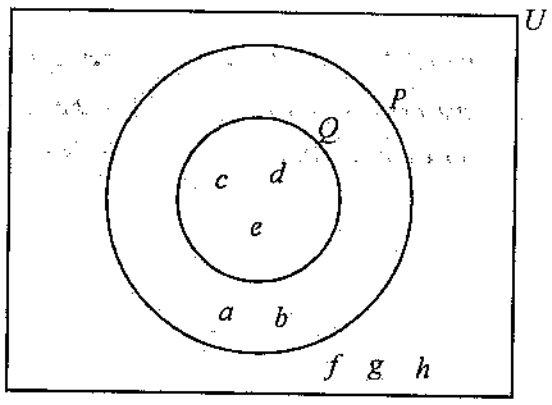
2. A hawker is carrying a basket load of three types of fruits: oranges, mangoes and pears.

If $\frac{2}{5}$ of the fruits are oranges and $\frac{6}{25}$ mangoes, what percentage of the fruits are pears?

A. 18 %
B. 9 %
C. 36 %
D. 64 %

3. The cost of three items at a shop are GH¢ 72.00, GH¢ 1,105.00 and GH¢216.00.
If a customer bought all the three items and received a change of GH¢ 107.00, how much did he initially give the shopkeeper?

A. GH¢1,400.00
B. GH¢1,300.00
C. GH¢1,500.00
D. GH¢2,000.00



In the diagram, P and Q are two sets and U is the universal set.

Use the information to answer questions **4** *and* **5**.

4. Find $P \cap Q$.

A. $\{a, b\}$

B. $\{c, d, e\}$

C. $\{f, g, h\}$

D. $\{a, b, c, d, e\}$

5. How many members are in set Q?

A. 3

B. 2

C. 5

D. 8

6. Amadu walked to a point such that he is **always** the same distance from two villages P and Q.

Which of the following **best** describes the locus of Amadu?

A. Perpendicular bisector of line PQ

B. A circle passing through line PQ

C. An arc passing through line PQ

D. Straight line PQ

7. The locus of points equidistant from a fixed point is called a

A. circle.

B. chord.

C. diameter.

D. mediator.

8. Which of the following is an example of quantitative data?
   A. Gender
   B. Colour
   C. Length
   D. Marital status

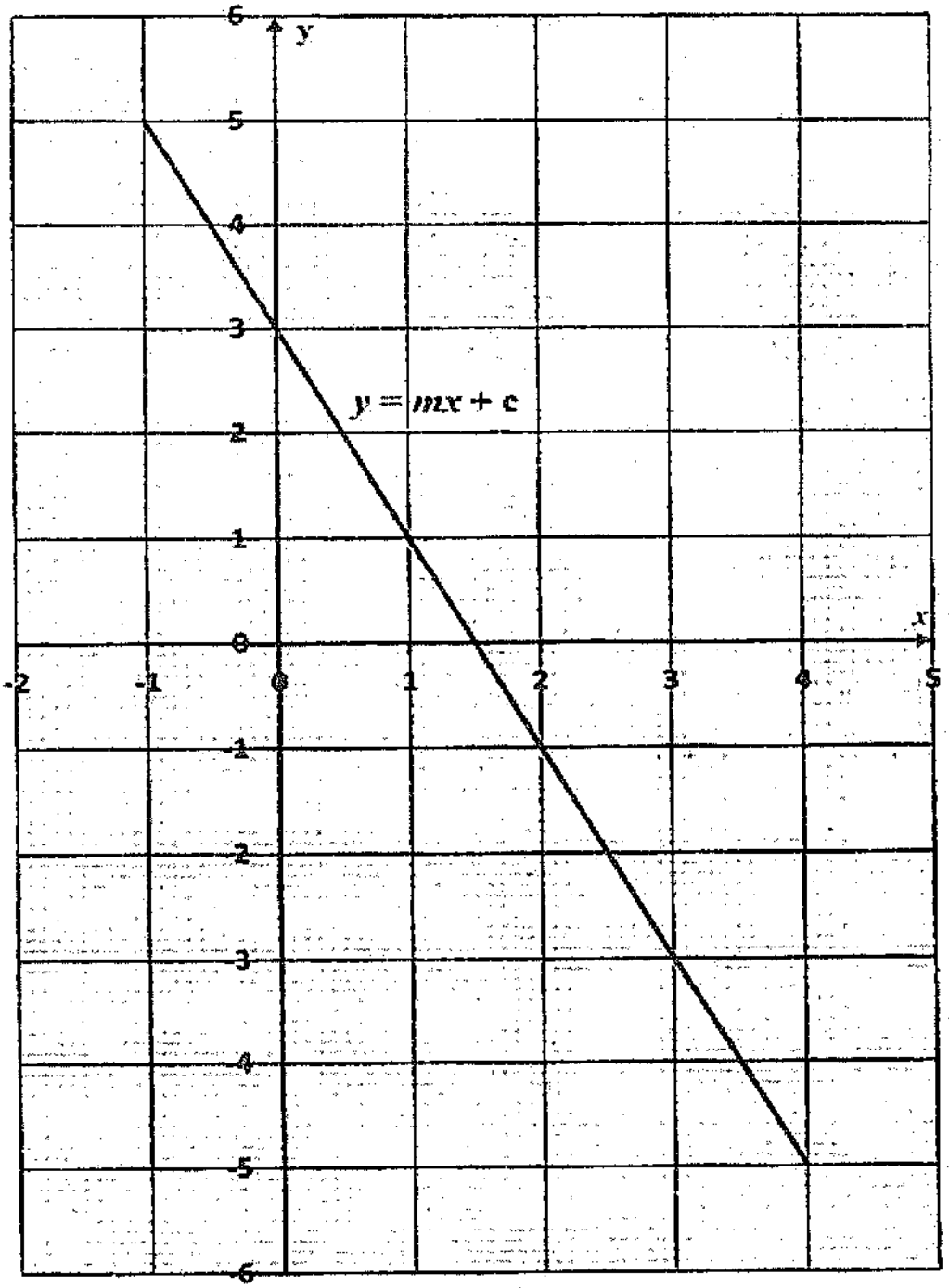
9. The area of a rectangle is 18 cm^2. If the width is 2 cm, find its perimeter.
   A. 20 cm
   B. 18 cm
   C. 22 cm
   D. 36 cm

10. There are 15 white and 25 black identical balls in a box. If a ball is selected at random from the box, find the probability that it is white.
   A. $\frac{1}{15}$
   B. $\frac{1}{25}$
   C. $\frac{5}{8}$
   D. $\frac{3}{8}$

11. Simplify: $\frac{27^{m+1}}{3^{m+2}}$.
   A. 3^{2m-1}
   B. 3^{2m}
   C. 3^{2m+1}
   D. 3^{2m+2}

12. A bus departed from Elmina at 9:15 pm and arrived in Accra at 2:45 am the next day. How long did the journey take?
   A. 4 hours 30 minutes
   B. 4 hours 20 minutes
   C. 5 hours 20 minutes
   D. 5 hours 30 minutes

13. A fair coin and a fair die are rolled together **once**. Find the probability of obtaining a tail and an odd number.
   A. $\frac{1}{3}$
   B. $\frac{1}{4}$
   C. $\frac{1}{2}$
   D. $\frac{2}{3}$



The diagram shows the graph of a linear relation of the form $y = mx + c$.
Use the graph to answer questions **14** *and* **15**.

14. Find the slope of the relation.

A. -1
B. -2
C. 1
D. 2

15. Find the equation of the relation.

A. $y = -2x + 2$
B. $y = -2x + 3$
C. $y = 2x - 3$
D. $y = 2x + 3$

16. A number of oranges are shared among 50 students and **each** got 15 oranges. If the same number of oranges are shared equally among 30 students, how many will **each** student get?

A. 15
B. 13
C. 20
D. 25

17. Andrews drew three lines such that the length of the first one is 10 cm, the second is 15 cm longer than the first one and the third is 9 cm less than the second. Find the length of the third line.

A. 14 cm
B. 4 cm
C. 16 cm
D. 34 cm

18. A story book contains 50 pages. If a student reads 10 pages per hour, find the relationship between the number of **unread** pages (N) and time (t).

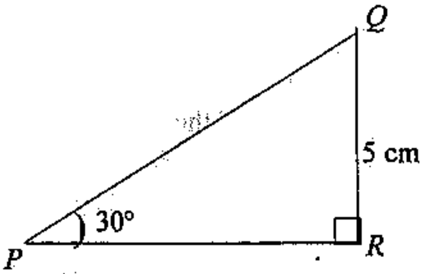
A. $N = -10t + 50$

B. $N = 10t + 50$

C. $N = 10t - 50$

D. $N = -\frac{1}{10}t + 50$

19.



NOT DRAWN TO SCALE

In the diagram, $\angle QPR = 30°$ and $|\overline{QR}| = 5$ cm.
[Take $\sin 30° = \frac{1}{2}$].

Find the length of PQ.

A. 5.0 cm
B. 2.5 cm
C. 10.0 cm
D. 12.0 cm

20. Find the truth set of $2x - 4 < 6 + 3x$.

A. $\{x : x > -2\}$
B. $\{x : x < 2\}$
C. $\{x : x < 10\}$
D. $\{x : x > -10\}$

21. Evaluate: $\sqrt{75} + \sqrt{18} - \sqrt{27}$

A. $2\sqrt{3} + 3\sqrt{2}$

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

C. $5\sqrt{6}$

D. $\sqrt{6}$

22. One of the factors of the expression $4m^2 + 12m - 8m - 24$ is $(4m - 8)$. Find the other factor.

A. $m + 3$

B. $m - 3$

C. $2m - 3$

D. $2m + 3$

23. Given the vectors $\mathbf{m} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$ and $\mathbf{n} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$, find $2\mathbf{m} + \mathbf{n}$.

A. $\begin{pmatrix} -6 \\ 0 \end{pmatrix}$

B. $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$

C. $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$

D. $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$

24. An article which cost GH¢ 600.00 was sold at a discount of 10 %. Find the selling price.

A. GH¢ 504.00

B. GH¢ 60.00

C. GH¢ 540.00

D. GH¢ 560.00

25. Mansah packed 1,800 apples into a number of boxes. If each box contained 120 apples, how many boxes were fully packed?

A. 16

B. 15

C. 17

D. 18

26. Find the interest on GH¢ 400.00 for 2 years at 10 % simple interest per annum.

A. GH¢ 40.00

B. GH¢ 8.00

C. GH¢ 60.00

D. GH¢ 80.00

27. Zalia and Amina shared an amount of money in the ratio 2 : 5. If Amina had GH¢ 150.00 **more than** Zalia, how much did they share?
A. GH¢ 250.00
B. GH¢ 100.00
C. GH¢ 350.00
D. GH¢ 450.00

28. Find the image of the point (–3, 5) when it is rotated through 360° about the origin.
A. (–3, 5)
B. (5, –3)
C. (–3, –5)
D. (–5, 3)

29. A bag of rice weighs 2 kg. If the empty bag weighs 150 g, find the weight of the rice.
[1 kg = 1,000 g]
A. 0.185 kg
B. 0.175 kg
C. 1.750 kg
D. 1.850 kg

30. Make m the subject of the relation $\frac{1}{m} = \frac{1}{p} + \frac{1}{r}$.
A. $m = \frac{pr}{r-p}$
B. $m = \frac{pr}{r+p}$
C. $m = \frac{r+p}{pr}$
D. $m = \frac{r-p}{pr}$

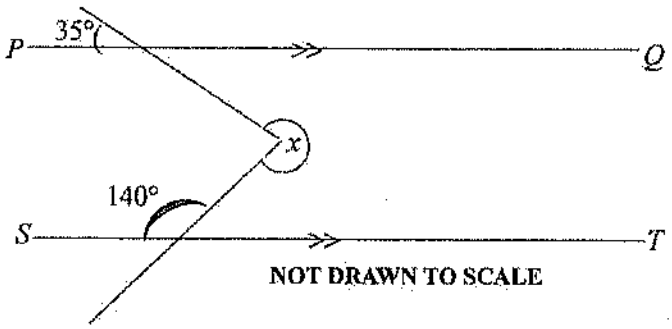
31. Two brands of airconditioners S and T cost GH¢ 3,000.00 and GH¢ 4,000.00 respectively. A company budgeted GH¢ 20,000.00 to buy airconditioners. If the company bought 5 units of brand S instead of brand T, how much did it save?
A. GH¢ 5,000.00
B. GH¢ 1,000.00
C. GH¢ 15,000.00
D. GH¢ 20,000.00

32. A frog leaps in such a way that its distance, in metres, from its starting position after **each** leap is given by 4, 7, 10, . . .
Find its distance from the starting position after the 10th leap.
A. 31
B. 28
C. 34
D. 37

33. If the gradient of a straight line is zero, then the line
A. is horizontal.
B. is vertical.
C. rises to the right.
D. falls to the right.

34. The point $P(-2, 3)$ is translated by a vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$ to a point R. Find the coordinates of R.
A. $(-3, 6)$
B. $(6, -2)$
C. $(-1, 0)$
D. $(-3, -6)$

35.



In the diagram, line PQ is parallel to line ST. Find the value of the angle marked x.
A. 220°
B. 140°
C. 285°
D. 290°

36. If the bearing of Q from P is 120°, find the bearing of P from Q.
A. 210°
B. 060°
C. 240°
D. 300°

Number on die	1	2	3	4	5	6
Frequency	4	3	3	2	3	5

The table shows the results when a student tossed a die many times.
Use the information to answer questions **37** *and* **38.**

37. Find the mode.
A. 5
B. 6
C. 4
D. 3

38. How many times did the student throw the die?
A. 18
B. 6
C. 20
D. 21

39. Simplify: $3x - 2(3 + 2x) + x(2x + 4)$.

A. $2x^2 + 3x - 6$

B. $2x^2 + 11x - 6$

C. $2x^2 + 4x - 6$

D. $2x^2 - 4x - 6$

40. Araba is 3 years younger than her sister. If the sum of their ages is 17 years, find Araba's age.

A. 8 years

B. 7 years

C. 9 years

D. 10 years

END OF PAPER