

0405022/2&1 B.B.E.K.O  
May 2022  
MATHEMATICS 2&1  
Essay & Objective  
2 hours

**2 & 1**

Name.....

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Index Number.....

**BEST BRAIN EXAMINATIONS KONSORTIUM  
GHANA**

**Special Private Mock Examinations For BECE Candidates**

May 2022

**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 **ink** 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.*

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## Essay

Answer **four** questions only  
All questions carry equal marks

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

- (a) In a quiz competition, the four contestants were put into two groups. Group **AK** made of Adam and Kwakye obtained 170 points from a total of 300. Group **JP** consisting of John and Partrick also scored 130 points.
- Draw a Venn diagram to represent the above information.
  - What type of set is formed?
  - If Kwakye scored  $\frac{2}{5}$  of the total points of his group and John also scored  $\frac{4}{10}$  of the total points of his group, find the collective fraction and score of the two.
- (b) (i) The probability that Amewu arrives at school before 8:00 am is  $\frac{9}{20}$ . What is the probability that Amewu does not arrive before 8:00 am? 3.
- (ii) Find the product of  $(2x - 3)$  and  $(x - 1)$
- (c) The Value Added Tax (VAT) paid by a woman on a rice cooker was GH¢ 20.00. If VAT was charged at 4%
- What was the price of the rice cooker?
  - How much did the woman pay including the VAT.
- (d) (i) If  $r = \begin{pmatrix} -4 \\ -5 \end{pmatrix}$  and  $m = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$ , find  $p$  given that  $p = r - m$ .
- (ii) Evaluate  $\sqrt{9 + 16 + 75}$

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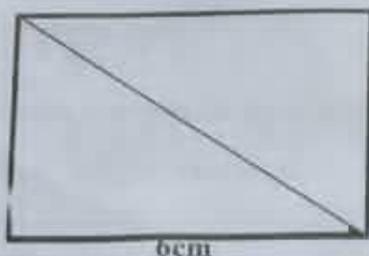
- (a) (i) Simplify  $\frac{3x-2y}{4} - \frac{x-3y}{3}$
- (ii) Evaluate  $\frac{0.0086 \times 0.0039}{0.0013}$ , leaving your answer in standard form.
- (b) Find the probability of selecting the letter H, S and O from the word "HYPOTHENUS".
- (c) Ali bought a CD for £8.50 and sold it on his market stall for £ 11. 20. What was his percentage profit?
- (d) The total perimeter of a rectangular cake below is 20cm with the length given as 6cm. The cake was divided diagonally into two equal parts. Use the figure to answer the questions below.

- (a) The smallest of 50 measurements is 20.5 and the range is 2.25. What is the largest measurement?
- (b) Solve the inequality  $\frac{2x-1}{4} - \frac{x-1}{3} > 1$  and illustrate your answer on a number line.
- (c) A mapping is defined by the rule  $x \rightarrow 3x - 1$ . If the domain is  $\{3, 4, 5\}$ , find the range.
- (d) (i) Using a ruler and a pair of compasses only, construct triangle  $XYZ$  such that  $\angle XY = 5\text{cm}$ ,  $\angle XZ = 4\text{cm}$  and  $\angle YZ = 6\text{cm}$   
 (ii) Construct the mediator of line  $YZ$ ;  
 (iii) Construct the mediator of line  $XZ$ ;  
 (iv) Locate  $O$ , the point of intersection of the mediators of lines  $YZ$  and  $XZ$ ;  
 (v) With centre  $O$  and radius  $OY$ , draw a circle.

- (a) A test was conducted in a class and the scores marked out of 25 are recorded as below.

17	3	24	9	21	15	7	21	9	21
24	21	17	21	3	21	16	9	3	21
3	9	24	15	17	17	3	7	3	9

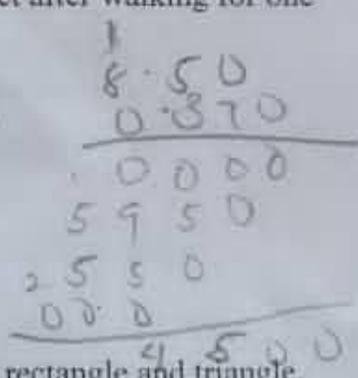
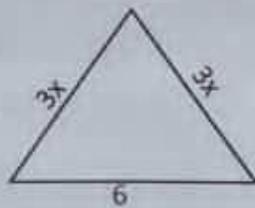
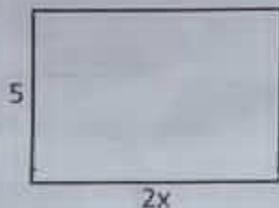
- (i) Prepare a frequency table for the above data.  
 (ii) Find the modal and median marks.  
 (iii) Use the frequency table to calculate the mean mark.  
 (iv) If a pupil is picked at random, what is the probability that he or she scored more than or equal to 21?
- (b) There are 200 books on Mr. Charles's table, 40 of them are blue and 50 grey. What is the probability of selecting a book that is neither blue nor grey?
- (c) By how much is the product of  $6\frac{1}{2}$  and  $4\frac{1}{3}$  more than the sum of  $3\frac{1}{3}$  and  $2\frac{1}{6}$ ?
- (d) (i) Evaluate  $0.7 + 1001.1 - 361.69$ .  
 (ii) If  $p = \frac{m}{r^2} + O$ , make  $r$  the subject of the relation.
- (a) (i) Using a scale of 2cm to 2units on both axes, draw two perpendicular axes  $OX$  and  $OY$  on a graph sheet.  
 (ii) On this graph sheet, mark the  $x$ -axis from  $-10$  to  $10$  and  $y$ -axis from  $-12$  to  $12$ .  
 (iii) Plot on the same graph sheet the points  $A(2, 1)$ ,  $B(3, 4)$  and  $C(4, 2)$ . Join the points to form a triangle  $ABC$ .  
 (iv) Draw the enlargement triangle  $A_1B_1C_1$  of a triangle  $ABC$  under a scale factor 2 from the origin  $(0, 0)$  such that  $A \rightarrow A_1$ ,  $B \rightarrow B_1$  and  $C \rightarrow C_1$ .  
 (v) Draw the image triangle  $A_2B_2C_2$  of triangle  $A_1B_1C_1$  under a translation by the vector  $\begin{pmatrix} -10 \\ -14 \end{pmatrix}$  where  $A_1 \rightarrow A_2$ ,  $B_1 \rightarrow B_2$  and  $C_1 \rightarrow C_2$ .
- b) Emefa thought of a number. She multiplied it by 3 and then added 6. The answer was 15. What was the number?
- c) Factorize the expression:  $3abc^2 + 6ab^2c + 12abc$ .
- d) A regular polygon has 10 sides. For this polygon, find the:  
 (i) sum of interior angles;  
 (ii) exterior angle.



- (i) Find the breadth and area of the rectangular cake.
- (ii) What is the length of the diagonal?
- (iii) If the cake is then divided into four equal parts for the guest at the party, find the size of cake each individual gets after the division.
- (iv) The cake was sold for GH 200 cedis. However, there is a reduction sale of 10% on each cake if you buy 4. If Amanda decides to buy 8 cakes, how much would she pay?

- (a) (i) Six people can harvest a field of strawberries in four days. How long would it take eight people to harvest the same field?
- (ii) A woman left home at 8:45 am. She arrived at the market after walking for one hour twenty-five minutes. At what time did he arrive?

(b) The perimeter of the rectangle and triangle below are the same.



- (i) Write down an equation relating the perimeter of the rectangle and triangle.
  - (ii) Find the value of  $x$
- (c) (i) Find the image of  $z(0, -1)$  under an enlargement from  $(3,3)$  with scale factor  $\frac{3}{4}$ .
  - (ii) The mean of ten positive numbers is 16. When another number is added, the mean becomes 18. Find the number added.
- (d) Bailey has been playing golf on the weekends. Her scores for June and July at her favorite 9-hole (per 36) golf courses are provided below.
 

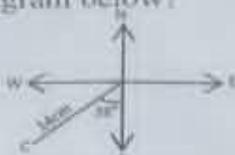
<b>Data: 25, 49, 42, 42, 56, 41, 36, 34, 30, 31</b>
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    - (i) Find the mean, median and mode from the above data.
    - (ii) Draw a stem and leaf plot for the data.

Turn over

Which of the following is represented by vector AC in the diagram below?

- A. {14cm, 038°}
- B. {14cm, 128°}
- C. {14cm, 318°}
- D. {14cm, 218°}



A truck is travelling at 40km per hour. How far does it travel in  $2\frac{1}{2}$  hours?

- A. 100km
- B. 140km
- C. 80km
- D. 60km

Ato received GH¢ 18, 000.00 at 3% charges. How much was charged?

- A. GH¢ 450.00
- B. GH¢ 360.00
- C. GH¢ 540.00
- D. GH¢ 180.00

A man was 30 years old when his son was born. Now he is three times as old as his son. Find the age of the son.

- A. 10 years
- B. 15 years
- C. 12 years
- D. 18 years

Baa's scores in a test are as follows: 88, 86, 89, 92, 90, 86. What was his median score?

- A. 89
- B. 90
- C. 92
- D. 95

Make h the subject if the relation  $V = \pi r^2 h$

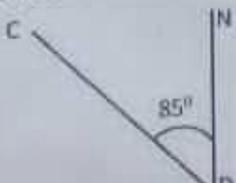
- A.  $h = \frac{v}{\pi r^2}$
- B.  $h = \sqrt{\pi r^2}$
- C.  $h = \frac{\pi r^2}{v}$
- D.  $h = (\pi r^2)^2$

The image of Q (10, -3) when translated by the vector V is  $Q^1(4, 5)$ . Find V

- A.  $\begin{pmatrix} 14 \\ 2 \end{pmatrix}$
- B.  $\begin{pmatrix} 6 \\ -8 \end{pmatrix}$
- C.  $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$
- D.  $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$

what is the bearing of town C from D in the diagram below?

- A. 05°
- B. 085°
- C. 095°
- D. 055°



16. Towns P and Q are 15.5cm apart on a map. If the scale of the map is 1cm: 4km find the actual distance between P and Q

- A. 15.5km
- B. 31km
- C. 46km
- D. 62km

17. Factorise  $a^2 + 5a + 6$

- A.  $(a + 3)(a - 2)$
- B.  $(a - 2)(a - 3)$
- C.  $(a + 2)(a + 3)$
- D.  $(a - 1)(a + 3)$

18. The average of six numbers 2, 8, 9, x, 7 and 12 is 7. Find the value of x.

- A. 3
- B. 5
- C. 6
- D. 4

19. Correct 0.079 to one significant figure

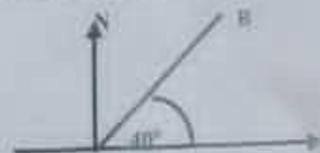
- A. 0.09
- B. 0.07
- C. 0.08
- D. 0.008

20. At eight o'clock, the angle between the hour and the minute hands of the clock is

- A. 150°
- B. 240°
- C. 90°
- D. 60°

21. Find the bearing of B from A below.

- A. 130°
- B. 040°
- C. 060°
- D. 050°



22. If  $2^{3x} = 8$ , what is the value of x?

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

23. Ama had 50 oranges and 35 of them went bad. What is the percentage of oranges left?

- A. 25%
- B. 15%
- C. 30%
- D. 60%

- A. 80
- B. 40
- C. 120
- D. 160

The correct answer is 80, which is lettered A and therefore answer space A would be shaded.

**A**  **B**  **C**  **D**

Think carefully before you shade the answer spaces. Erase completely an answer you wish to change. Do all rough work on this question paper. Now answer the following questions

Express the first fifteen days in the month of April in hours.

- A. 360 hours
- B. 240 hours
- C. 150 hours
- D. 120 hours

- A. 12.3m
- B. 13.3m
- C. 14.3m
- D. 24m

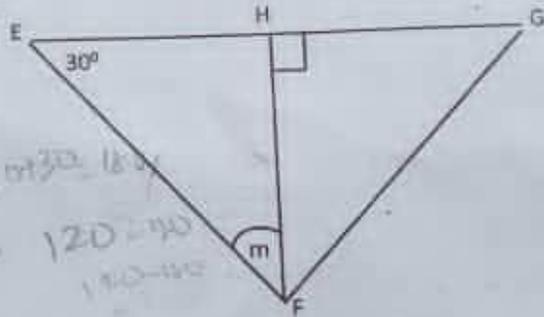
If  $x = 3$ ,  $y = 2$  and  $z = -1$ , find the value of  $\frac{x^2 - y^2}{y^2 + z^2}$ .

- A.  $\frac{9}{4}$
- B.  $\frac{5}{2}$
- C. 1
- D. 5

$$\frac{3^2 - 2^2}{2^2 + (-1)^2} = \frac{9 - 4}{4 + 1} = \frac{5}{5} = 1$$

Find the value of  $m$  in the diagram below

- A.  $50^\circ$
- B.  $70^\circ$
- C.  $60^\circ$
- D.  $40^\circ$



$3 \text{ or } 30^\circ$   
 $m + 120 = 180$   
 $120 - 180$

A train is travelling at 100km per hour. How far does the train travel in  $5\frac{1}{2}$  hours?

- A. 500km
- B. 550km
- C. 50km
- D. 436km

An acid solution is 75% water. How many litres of pure acid are in 20 litres of this solution?

- A. 25
- B. 5
- C. 150
- D. 20

Find the value of  $a^2 + 3a - 6$  when  $a = -4$ .

- A. -2
- B. 2
- C. -10
- D. 1

$$-16 + (-12) - 6 = -34$$

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24. Simplify  $3y - \frac{(2y-3)}{4}$   
 A.  $10y + 3$   
 B.  $10y - 3$   
 C.  $\frac{10y-3}{4}$   
 D.  $\frac{10y+3}{4}$
25. Find the circumference of a circular tray with diameter of 28cm. [Take  $\pi = \frac{22}{7}$ ]  
 A. 88cm  
 B. 154cm  
 C. 44cm  
 D.  $44\text{cm}^2$
26. If  $\vec{PQ} = \begin{pmatrix} 4 \\ 1 \\ 0 \end{pmatrix}$  and  $\vec{PR} = \begin{pmatrix} 3 \\ -1 \\ -1 \end{pmatrix}$ , what is  $\vec{QR}$ ?  
 A.  $\begin{pmatrix} -1 \\ 7 \\ -1 \end{pmatrix}$   
 B.  $\begin{pmatrix} 1 \\ 7 \\ -1 \end{pmatrix}$   
 C.  $\begin{pmatrix} 7 \\ 5 \\ 7 \end{pmatrix}$   
 D.  $\begin{pmatrix} 7 \\ 7 \\ 7 \end{pmatrix}$
27. Evaluate  $\frac{2}{5}(37-22) - 3$   
 A. 3  
 B. 4  
 C. 5  
 D. 6
28. Factorise completely  $b^2 + fb - mb - fm$ .  
 A.  $(b-1)(b-m)$   
 B.  $(b+1)(b-m)$   
 C.  $(b+1)(m-b)$   
 D.  $(b+1)(m+b)$
29. Find the area of a rectangle with length of 3cm and breadth  $\frac{24}{3}\text{cm}$   
 A.  $5.14\text{ cm}^2$   
 B.  $24\text{ cm}^2$   
 C.  $12\text{ cm}^2$   
 D.  $4.28\text{ cm}^2$
30. Simplify  $40x^4y^2 \div 8x^2y^2$ .  
 A.  $5y^2$   
 B.  $5x^2y$   
 C.  $5x^2$   
 D.  $8x^2$
31. Simplify  $(8x^2y^3) \left(\frac{3}{8}xy^4\right)$   
 A.  $3x^3y^7$   
 B.  $3x^2y^7$   
 C.  $3x^3y^4$   
 D.  $3xy$
32. Convert  $1.05 \times 10^{-1}$  to a decimal fraction.  
 A. 105  
 B. 1.05  
 C. 10.5  
 D. 0.105
33. If  $M = \{\text{Egg, Pear}\}$  and  $N = \{\text{orange, egg, pear}\}$ . Which of the following is true?  
 A.  $M = N$   
 B.  $M \subset N$   
 C.  $N \subset M$   
 D.  $N \in M$
34. Find the H.C.F of 35 and 70.  
 A. 5  
 B. 10  
 C. 7  
 D. 35
35. Factorize  $22ab - 11ac + 6rb - 3rc$ .  
 A.  $(2b-c)(11a+3r)$   
 B.  $(2+c)(11a-3r)$   
 C.  $(2b-c)(11a-3r)$   
 D.  $(2b+c)(11a+3r)$
36. The statement; "one number is 12 less than the other" can be expressed as  
 A.  $x$  and  $x - 12$   
 B.  $x$  and  $0.12x - x$   
 C.  $x$  and  $x + 0.12x$   
 D.  $x$  and  $x - 12x$
37. Of two complementary angles, one is 4 times bigger than the. Find the angles.  
 A.  $50^\circ$  and  $40^\circ$   
 B.  $62^\circ$  and  $28^\circ$   
 C.  $60^\circ$  and  $30^\circ$   
 D.  $72^\circ$  and  $18^\circ$
38. Find the set of integers within the interval  $-3 < x < 0$   
 A.  $\{-3, -2, -1\}$   
 B.  $\{-2, -1, 0\}$   
 C.  $\{-3, -2, -1, 0\}$   
 D.  $\{-2, -1\}$
39. Find the gradient of the line that passes through A (5, 10) and B (6, 15).  
 A. -1  
 B. 1  
 C. 5  
 D. -5
40. Which of the following angles can be trisected?  
 A.  $30^\circ$   
 B.  $60^\circ$   
 C.  $80^\circ$   
 D.  $90^\circ$