

0909021/2&1 B.B.E.K.O  
September 2021  
MATHEMATICS 2&1  
Essay & Objective  
2 hours

**2 & 1**

Name.....

Index Number.....

**BEST BRAIN EXAMINATIONS KONSORTIUM  
GHANA**

**Special Private Mock Examinations For BECE Candidates**

September 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 carefully. 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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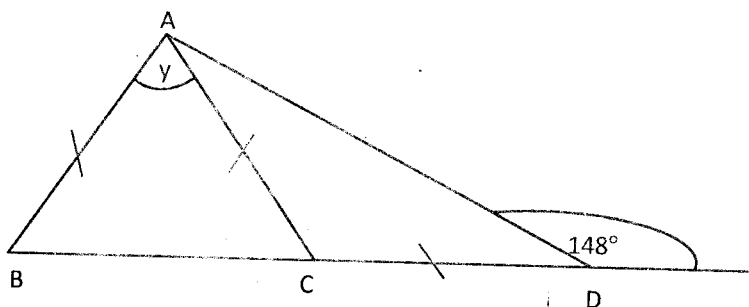
0909021 Mathematics 2&1 bbeko

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.

1. (a) (i) Solve for  $x$  in the inequality  $\frac{1}{2}(x+1) \geq \frac{1}{3}(x+2)$  and illustrate your results on the number line.
- (ii) Solve  $\frac{4x-3}{2} = \frac{8x-10}{8} + 2\frac{3}{4}$
- (b) In a school of 50 pupils, 15 study English only and 20 study French only. 5 pupils do not study any of the two subjects.
- (i) Illustration the information on a Venn diagram.
- (ii) How many students study both subjects?
- (iii) Find the number of pupils who study French.
- (c) (i) Divide  $(1\frac{1}{2} + \frac{1}{4})$  by  $(1\frac{1}{2} - \frac{1}{4})$ .
- (ii) Simplify  $12\frac{3}{4} \div (-7.8)$ .
- (d) If  $a = (\frac{1}{6})$   $b = (\frac{-7}{3})$  and  $c = (\frac{2}{-4})$ , calculate the value of  $2a + 4b - c$ .

2. (a) A man took a loan of GH¢ 1,800.00 at an interest of  $12\frac{1}{2}$  percent per annum. It was agreed that the loan and interest must be paid in one-year monthly installment. Calculate
- (i) the interest of the loan.
- (ii) the amount to be paid at the end of the year;
- (iii) the monthly installment.
- (b) In the diagram below,  $AB = AC = CD$ . Find the size of  $\angle BAC$ .



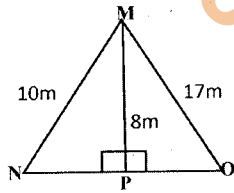
- (c) (i) Make  $y$  the subject of the relation  $py^2 = qy^2 + 4$ .
- (ii) Using your answer in 2(c) (i) above, find the value of  $y$  if  $p = 12$  and  $q = 3$ .

(d) The table below shows the marks obtained by form 3 students in a Mathematics test.

<b>Marks</b>	1	2	3	4	5	6	7	8	9	10
<b>No of Students</b>	2	3	2	1	4	10	5	4	3	1

- Prepare a frequency table for the above data.
- Find the modal mark.
- Calculate the mean mark.
- If a student is picked at random from the class, what is the probability that the mark obtained is less than 5?
- What percentage of the class failed if the pass mark is 6?

3. (a) In the figure below,  $MN = 10m$ ,  $MP = 8m$ , and  $MO = 17m$ .



Find the following:

- $NP$
  - $PO$
  - $NO$
- (b) Factorize the following expressions completely:
- $3x + 2xy - 12xz - 8yz$ ;
  - $20px + 15py - 8qx - 6qy$ .
- (c) (i) The ratio of Thompson's age to Rachael's age is 2:3. Rachael is 24 years old. How old is Thompson?
- (ii) The diameter of a cylindrical container is 22cm. If the volume of the container is  $1331\text{cm}^3$ , calculate its height.
- (d) (i) If the gradient of a line is 2 and  $(7, 2)$  is a point on the line, find its equation.
- (ii) If  $x = 3$ ,  $y = 7$  and  $z = 5$ . Find  $\frac{x^2 + xy - z^2}{xz}$ .
4. (a) A shopkeeper allows a discount of 10% on the marked price of an article. If a customer paid GH¢270.00 for an article, what was the marked price of the article?
- (b) A rectangular sheet of metal has a length of 44cm and a breadth of 42cm. It is folded to form a cylinder with the breadth becoming the height. Calculate
- the radius of the cylinder formed.
  - the volume of the cylinder [Take  $\pi = \frac{22}{7}$ ]
- (c) (i) A number is selected at a random from the set  $S = \{1, 2, 3, \dots, 15\}$ . What is the probability that the number is prime?
- (ii) A number is chosen at random from the integers 10 to 30 inclusive. Find the probability that the number is a multiple of 3.

**Turn over**

- (d) (i) If the sum of the interior angles of a regular polygon is 30 right angles, how many sides has the polygon?
- (ii) The exterior angles of a polygon are  $25^\circ$ ,  $43^\circ$ ,  $142^\circ$ ,  $4x^\circ$  and  $x^\circ$ . Find the value of  $2x$ .
5. (a) Using a ruler and a pair of compasses only,
- Draw  $|PQ| = 9\text{cm}$ .
  - Construct a perpendicular to  $PQ$  at  $Q$ .
  - Construct triangle  $QPS = 60^\circ$  at the point  $P$  on  $PQ$  such that  $PS = 6.5\text{cm}$ .
  - Construct a line parallel to  $PQ$  through  $S$ . Let the perpendicular through  $Q$  and the parallel through  $S$  meet at  $R$ .
  - Measure  $|PR|$ .
- (b) The area of a square is  $8\text{km}^2$ . Find the perimeter.
- (c) Solve  $\frac{x-1}{2} + 3x = 10$ .
- (d) Given that  $f = \frac{vu}{v+u}$
- make  $v$  the subject of the relation.
  - find the value of  $v$  when  $f = 20$  and  $u = 5$ .
6. (a) (i) Using a scale of 2cm to 2 units on both axis, draw on a graph sheet two perpendicular axes,  $Ox$  and  $Oy$  for the intervals  $-10 \leq x \leq 10$  and  $-10 \leq y \leq 10$ .
- (ii) Draw on this graph indicating the coordinates,  $\Delta PQR$  with vertices  $P(4, 1)$ ,  $Q(2, 5)$ , and  $R(-2, 0)$ .
- (iii) Draw the image  $\Delta ABC$  of  $\Delta PQR$  under the mapping  $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} 2y \\ x-y \end{pmatrix}$  where  $P \rightarrow A$ ,  $Q \rightarrow B$  and  $R \rightarrow C$ .
- (iv) Draw the image  $\Delta DEF$  of  $\Delta PQR$  under an enlargement from the origin with scale factor  $-2$  where  $P \rightarrow D$ ,  $Q \rightarrow E$ , and  $R \rightarrow F$ .
- (b) From 6(a) above, find
- $|BE|$
  - $|CF|$
- (c) Simplify the expression  $(4a + 5b)(a-b) + (4a - 5b)(a + b)$ .
- (d) A rectangle is 12cm long and 9cm wide. Calculate the length of a diagonal.

**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 candidate whose name is winner Seyram BABANAWO. 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 4510.

**BEST BRAIN EXAMINATION KONSORTIUM  
SPECIAL PRIVATE MOCK FOR BECE CANDIDATES  
OBJECTIVE ANSWER SHEET.**

CANDIDATE NAME: <b>BABANAWOSEYRAMWNNER</b>		SUBJECT: <b>MATHEMATICS</b>
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1. Use HB 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, rul out your
4. First mark completely  
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			CENTRE NUMBER				PAPER CODE		
7	3	1	7	7	3	4	4	5	0
[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]
[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]
[6]	[6]	[6]	[6]	[6]	[6]	[6]	[6]	[6]	[6]
[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]
[8]	[8]	[8]	[8]	[8]	[8]	[8]	[8]	[8]	[8]
[9]	[9]	[9]	[9]	[9]	[9]	[9]	[9]	[9]	[9]

For Supervisors Only.

If candidate is absent shade this space

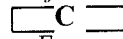
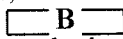
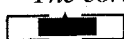
Answer all questions

Each question is followed by four options A to D. Find out 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.

What is the smallest number which is divisible by 16 and 20?

- 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.



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.

1. Which of the following dimensions form the sides of a right-angled triangle?

- A. 3cm, 4cm, 6cm  
B. 3cm, 5cm, 7cm  
C. 5cm, 13cm, 27cm  
D. 5cm, 12cm, 13cm

2. A polygon has 10 sides. The sum of its interior angles is

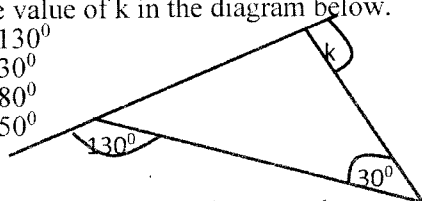
- A.  $2 \times 180^\circ$   
B.  $4 \times 180^\circ$   
C.  $6 \times 180^\circ$   
D.  $8 \times 180^\circ$

3. If  $1:x$  is equivalent to  $6\frac{1}{4}:25$ , find  $x$ .

- A. 4  
B. 6.25  
C. 24  
D. 100

4. Find the value of  $k$  in the diagram below.

- A.  $130^\circ$   
B.  $30^\circ$   
C.  $80^\circ$   
D.  $50^\circ$



5. The sum of an integer and 7 more than the next one is 66. Find the integer.

- A. 73  
B. 29  
C. 59  
D. 33

6. Which of the following is in order of decreasing magnitude?

- A. 9, -5, -23, -21  
B. -5, -2, 1, 13  
C. -18, -15, -6, 1  
D. 4, -15, -37, -49

7. Find the integers within  $5 < x < 9$ .

- A. {5 6 7}  
B. {5 6 7 8}  
C. {5 6 7 8 9}  
D. {6 7 8}

8. The median of 17,  $x$ , 24,  $x + 7$ , 35, 36, and 46 arranged in ascending order is 25. What is the value of  $x$ ?

- A. 25  
B. 18  
C. 32  
D. 10

9. Find the value of  $V$  in the diagram below.

- A.  $30^\circ$   
B.  $40^\circ$   
C.  $50^\circ$   
D.  $60^\circ$



10. Find  $m$  in terms of  $r$  and  $c$  if  $r = \frac{2m^2 - 4}{4c}$

- A.  $m = \frac{4rc + 4}{2}$   
B.  $m = \sqrt{2(rc + 1)}$   
C.  $m = \frac{\sqrt{4rc + 4}}{2}$   
D.  $m = \frac{4rc + 4}{2}$

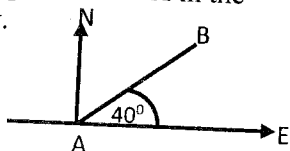
11. A set of furniture was sold for GH 30 at a profit of 20%. Find the cost price.

- A. GH¢ 25.00  
B. GH¢ 24.00  
C. GH¢ 20.00  
D. GH¢ 18.00

12.  $J = \frac{1}{2}mv^2$ , if  $v = 4$  and  $J = 12$ , find  $m$

- A. 1.5  
B. 3.0  
C. 3.6  
D. 6.3

13. The interior angle of a regular polygon is  $135^\circ$ . How many sides has the polygon?  
 A. 6  
 B. 8  
 C. 9  
 D. 12
14. A van uses 10 litres of petrol in 80km. How far will it go on half a litre?  
 A. 40km  
 B. 0.4km  
 C. 0.04km  
 D. 4.0km
15. A boy throws a dice once. What is the probability of getting the number 4?  
 A.  $\frac{1}{6}$   
 B.  $\frac{1}{3}$   
 C.  $\frac{1}{2}$   
 D.  $\frac{5}{6}$
16. If  $2(kx+6) = 6+8x$ , find the value of k, when  $x=3$   
 A. 4  
 B. 3  
 C. -3  
 D. -4
17. A line cutting across two or more lines is called  
 A. diagonal.  
 B. symmetrical.  
 C. rotational.  
 D. transversal.
18. A basket contains 450 oranges. If each orange costs GH¢ 0.15, find the total cost of the oranges.  
 A. GH¢ 3.30  
 B. GH¢ 4.35  
 C. GH¢ 4.65  
 D. GH¢ 67.50
19. Find the bearing of B from A in the diagram below.

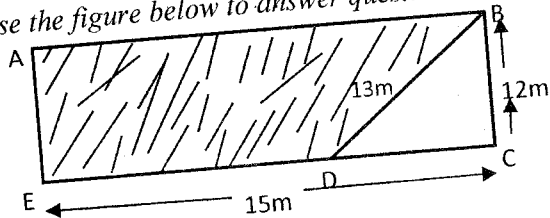


- A.  $130^\circ$   
 B.  $040^\circ$   
 C.  $060^\circ$   
 D.  $050^\circ$

20. Three children shared an amount of GH¢ 9,108.00 in the ratio 2: 3: 4. What is the highest share?  
 A. GH¢ 2,024.00  
 B. GH¢ 3,036.00  
 C. GH¢ 4, 048.00  
 D. GH¢ 4, 554.00
21. 200 bottles of equal capacity hold 350 liters of water. How much water does each bottle hold?  
 A. 1, 750 liters  
 B. 175 liters  
 C. 17.5 liters  
 D. 1.75 liters
22. Arrange the following in the descending order of magnitude:  $0.32, \frac{2}{5}, 27\%, \frac{1}{3}$   
 A.  $0.32, \frac{2}{5}, 27\%, \frac{1}{3}$   
 B.  $0.32, \frac{1}{3}, \frac{2}{5}, 27\%$   
 C.  $27\%, 0.32, \frac{1}{3}, \frac{2}{5}$   
 D.  $\frac{2}{5}, \frac{1}{3}, 0.32, 27\%$
23. In an enlargement  $AB \rightarrow A^1B^1$ ,  $/AB/ = 4\text{cm}$  and  $/A^1B^1/ = 24\text{cm}$ . Find the scale factor of the enlargement.  
 A. 6  
 B.  $\frac{1}{3}$   
 C. 4  
 D. 20
24. If the diameter of a circular tray is 14cm, find the circumference. [Take  $\pi = \frac{22}{7}$ ]  
 A. 88cm  
 B. 154cm  
 C. 44cm  
 D.  $44\text{cm}^2$
25. If  $c = \frac{b^2+4r}{2ar}$ , find C when  $b=3, r=4$  and  $a=5$   
 A.  $\frac{19}{40}$   
 B.  $\frac{11}{20}$   
 C.  $\frac{3}{8}$   
 D.  $\frac{5}{8}$

26. If  $x = \{1, 2, 3, 4, 5\}$ , find the truth set of  $2x + 1 < 7$ .
- $\{1, 2\}$
  - $\{2, 3\}$
  - $\{1, 2, 3\}$
  - $\{3\}$
27. Solve the equation  $13x - 2(3x + 4) = 22$ .
- 5
  - 4
  - $\frac{30}{7}$
  - $\frac{26}{7}$
28. Calculate the gradient of the line passing through M(9,0) and N(-2,-9).
- 0.82
  - 0.818
  - 9
  - 1.22
29. If a number is added to  $\frac{1}{5}$  of the same number, the result 12. Find the number.
- 3
  - 5
  - 15
  - 10

Use the figure below to answer questions 30 and 31.



30. Find  $|DC|$
- 5m
  - 20m
  - 15m
  - 14m
31. Calculate the area of the shaded region.
- $210\text{m}^2$
  - $207.5\text{m}^2$
  - $230\text{m}^2$
  - $150\text{m}^2$
32. The diagonals of a kite are 6cm and 10cm long. Find the area of the kite.
- $25\text{cm}^2$
  - $18\text{cm}^2$
  - $42\text{cm}^2$
  - $30\text{cm}^2$

8

33. Express 962 in standard form.
- $9.62 \times 10$
  - $9.62 \times 10^2$
  - $0.962 \times 10^3$
  - $0.09672 \times 10^2$
34. Convert 0.03858 to 3 significant figures.
- 0.00385
  - 0.0386
  - 0.0039
  - 386
35. Find the sum of 124.3, 0.275 and 74.06 correct to one decimal place.
- 198.6
  - 198.7
  - 892.0
  - 892.4
36. Round 8921465 to the nearest hundred.
- 8921000
  - 8921400
  - 8921460
  - 8921500
37. Find the total cost of 25 pens and 75 books if each pen costs GH¢ 0.20 and each book cost GH¢ 0.30.
- GH¢ 22.50
  - GH¢ 23.50
  - GH¢ 27.50
  - GH¢ 50.00
38. If  $a = 64$  and  $b = 22$ , find  $\frac{a}{b}$
- 2.90
  - 2.91
  - 8
  - 9
39. Which of the following is a factor of the expression  $ac - 2bc + ad - 2bd$ ?
- $c - d$
  - $a - 2b$
  - $a + b$
  - $a + 2b$
40. Evaluate  $\frac{2^3 \times 3^4 \times 3^3}{2^3 \times 2 \times 3^5}$
- 6
  - 9
  - 12
  - 18

END OF PAPER



**BEST BRAIN EXAMINATIONS KONSORTIUM**

SPECIAL MOCK EXAMINATIONS FOR BECE CANDIDATES – September 2021  
 MARKING SCHEME – MATHEMATICS

**GENERAL NOTES ON PAPER II**

1. Marks are subdivided into marks for method (M), for accuracy (A) and for accuracy not preceded by M mark (B).
2. The M marks should be given for a particular stage if the method is correct, that is, it would yield the right answer, if correctly carried out without numerical errors. Marks are not generally subdivided and unless the M mark for a preceding stage has been awarded, no A marks can be gained for that stage. (No deduction should be made from M marks).
3. Deduct 1 mark for omission of units or for wrong units not more than once in one whole question.
4. Give '0' (zero) for results obtained for work that is indecipherable or wholly suppressed.
5. If more questions are attempted than the rubric allows, delete the marks given for these extra questions which have the lowest marks. This rule implies that for candidates attempting more than four questions, consider only their best four and ignore the remaining questions by writing "MQA". (MQA denotes More Questions Answered than allowed by rubrics)
6. Do not mark beyond the first appearance of a correct answer, i.e. ignore any further work beyond the correct answer

**QUESTION ONE**

(a) (i)  $\frac{1}{2}(x+1) \geq \frac{1}{3}(x+2) = 6 \times \frac{1}{2}(x+1) \geq \frac{1}{3}(x+2) \times 6$   
 $3(x+1) \geq 2(x+2)$   
 $3x+3 \geq 2x+4$   
 $3x-2x \geq 4-3$   
 $x \geq 1$

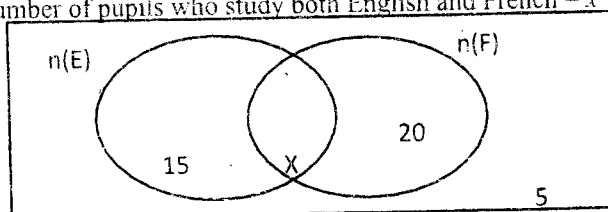


M½  
 A½  
 B1

(ii)  $\frac{4x-3}{2} = \frac{8x-10}{8} + 2\frac{3}{4}$   
 $8 \times \frac{4x-3}{2} = 8 \times \frac{8x-10}{8} + 8 \times \frac{11}{4}$   
 $4(4x-3) = (8x-10) + 22$   
 $16x-12 = 8x-10+22$   
 $16x-8x = -10+22+12$   
 $8x = 24 \quad x = 3$

M½  
 A½  
 B1

- (b) (i) Let Number of pupils in the school = n(U)  
 Number of pupils who study English = n(E)  
 Number of pupils who study French = n(F)  
 Number of pupils who study both English and French = x



$n(U) = 50$

B2  
 (-½ec)

(ii)  $15 + x + 20 + 5 = 50$   
 $x + 40 = 50$   
 $x = 10 \quad \therefore 10 \text{ pupils study both subjects}$

M½  
 A½

(iii)  $n(F) = 20 + x$   
 $= 20 + 10$   
 $= 30 \quad \text{Hence 30 pupils study French}$

M½  
 A½  
 M½

(c) (i)	<p>Divide <math>(1\frac{1}{2} + \frac{1}{4})</math> by <math>(1\frac{1}{2} - \frac{1}{4})</math>  <math>(\frac{3}{2} + \frac{1}{4})</math> by <math>(\frac{3}{2} - \frac{1}{4})</math>  gives: <math>(\frac{7}{4})</math> by <math>(\frac{5}{4})</math>  <math>12\frac{3}{4} \div (-7.8) = \frac{51}{4} \div -\frac{78}{10} = \frac{51}{4} \times -\frac{10}{78} = -\frac{510}{312} = -\frac{85}{52}</math> or <math>-1\frac{33}{52}</math></p>	M1 A1
(ii)	<p>Finding the L.C.M of both sides  <math>\frac{7}{4} \div \frac{5}{4} = \frac{7}{4} \times \frac{4}{5} = \frac{7}{5}</math></p>	M1 A1
(d)	<p><math>2(\frac{1}{6}) + 4(\frac{-7}{3}) - (\frac{2}{-4}) = (\frac{2-28-2}{12+12+4}) = (\frac{-28}{28})</math></p>	M1 A1
<b>TOTAL = 15 MARKS</b>		
(a) (i)	<p><b>QUESTION TWO</b>  Principal = GHs 1800.00  Time = 1 year  Rate = <math>\frac{25}{2}</math>  Simple interest = ?  Simple interest = <math>\frac{1800 \times 1 \times \frac{25}{2}}{100}</math>  = GHs 225.00</p>	B½ M½ M½ A½
(ii)	<p>Amount paid = GHs 1800.00 + GHs 225.00  = GHs 2025.00</p>	M½ A½
(iii)	<p>If 12 months = GHs 2025.00  1 month = ?  = <math>\frac{1}{12} \times</math>GHs 2025.00  Therefore, monthly instalment = GHs 168.75</p>	M½ A½
(b)	<p><math>\angle ADC + 148^\circ = 180^\circ</math>  <math>\angle ADC = 180^\circ - 148^\circ</math>  <math>\angle ADC = 32^\circ</math>  Hence <math>\angle CAD = 32^\circ</math>  <math>\triangle ACD = 180^\circ</math>  <math>\angle CAD + \angle ADC + \angle ACD = 180^\circ</math>  <math>32^\circ + 32^\circ + \angle ACD = 180^\circ</math>  <math>64^\circ + \angle ACD = 180^\circ</math>  <math>\angle ACD = 180^\circ - 64^\circ</math>  <math>\angle ACD = 116^\circ</math>  <math>\angle ACB + 116^\circ = 180^\circ</math>  <math>\angle ACB = 180^\circ - 116^\circ</math>  <math>\angle ACB = 64^\circ</math>  <math>\angle ABC = 64^\circ</math>  <math>\triangle ABC = 180^\circ</math>  <math>\angle ACB + \angle ABC + \angle BAC = 180^\circ</math>  <math>\angle BAC = 180^\circ - 128^\circ</math>  <math>\angle BAC = 52^\circ</math></p>	B½         B½ B½ A½

(c) (i)  $py^2 = qy^2 + 4$   
 $py^2 - qy^2 = 4$   
 $y^2(p - q) = 4$   
 $y^2 = \frac{4}{p - q}$

$$y = \sqrt{\frac{4}{p - q}}$$

$$y = \sqrt{\frac{4}{p - q}}$$

$$y = \sqrt{\frac{4}{12 - 3}}$$

$$y = \sqrt{\frac{4}{9}} \quad y = \frac{2}{3} \text{ or } 0.67$$

(d) (i)

Marks (x)	Frequency (f)	fx
1	2	2
2	3	6
3	2	6
4	1	4
5	4	20
6	10	60
7	5	35
8	4	32
9	3	27
10	1	10
	$\Sigma f = 35$	$\Sigma fx = 202$

(ii) The modal mark is 6 (because it is the mark with the highest frequency of 10)

(iii) Mean  $\frac{\Sigma fx}{\Sigma f} = \frac{202}{35}$   
 $= 5.77$

(iv) Mark less than 5 =  $\frac{2+3+2+1}{35}$   
 $= \frac{8}{35}$

(v) If the pass mark is 6 the number of student who failed are

$$4 + 1 + 2 + 3 + 2 = 12$$

$$\frac{12}{35} \times 100\%$$

$$= \frac{1200}{35} \%$$

$$= 34.28\%$$

**TOTAL = 15 MARKS**

(a) (i)

**QUESTION THREE**

$$/MN/ = 10\text{m}; /PM/ = 8\text{m}; /OM/ = 17\text{m}$$

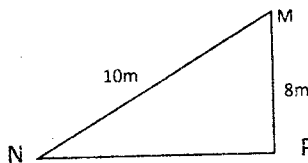
$$/MP/^2 + /NP/^2 = /MN/^2$$

$$10^2 = 8^2 + /NP/^2$$

$$/NP/^2 = 100 - 64$$

$$/NP/ = \sqrt{36}$$

$$/NP/ = 6\text{m}$$



M½  
M½  
A1

M½

M1

B3

B1

M½

A½

M½

A½

M½

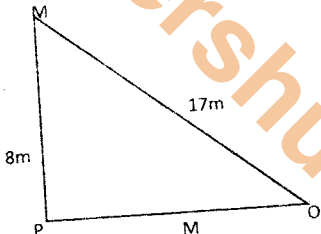
A½

M½

M½

A½

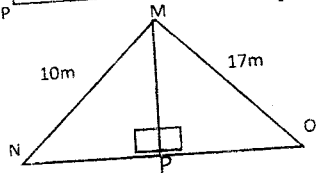
(ii)



$$\begin{aligned} /MO/^2 &= /MP/^2 + /PO/^2 \\ /PO/^2 &= /MO/^2 - /MP/^2 \\ &= 17^2 - 8^2 \\ &= 289 - 64 \\ /PO/ &= \sqrt{225} \\ &= 15m \end{aligned}$$

M $\frac{1}{2}$ M $\frac{1}{2}$ A $\frac{1}{2}$ 

(iii)



$$\begin{aligned} /NO/ &= /NP/ + /PO/ \\ &= 6m + 15m \\ /NO/ &= 21m \end{aligned}$$

M $\frac{1}{2}$ M $\frac{1}{2}$ A $\frac{1}{2}$ 

(b) (i)

$$\begin{aligned} &= 3x^2 + 2xy - 12xz - 8yz \\ &= x(3x + 2y) - 4z(3x + 2y) \\ &= (x - 4z)(3x + 2y) \end{aligned}$$

M $\frac{1}{2}$ A $\frac{1}{2}$ M $\frac{1}{2}$ 

(ii)

$$\begin{aligned} &20px + 15py - 8qx - 6qy \\ &5p(4x + 3y) - 2q(4x + 3y) \\ &(5p - 2q)(4x + 3y) \end{aligned}$$

A $\frac{1}{2}$ 

(c) (i)

Thompson age : Rachael's age = 2:3

Given

Rachael's age = 24

Let

Thompson's age = x

=&gt;

$$x: 24 = 2: 3$$

$$\frac{x}{24} = \frac{2}{3}$$

$$3x = 48$$

$$x = \frac{48}{3}$$

$$x = 16$$

∴ Thompson is 16 years old

M $\frac{1}{2}$ M $\frac{1}{2}$ M $\frac{1}{2}$ A $\frac{1}{2}$ 

(ii)

Let

h = height of cylinder

v = volume of the cylinder

Given

Diameter of container, d = 22cm

Radius, r =  $\frac{22}{2}$ 

Volume of the cylinder, v = 1331

$$\Rightarrow V = \pi r^2 h$$

$$1331 = \frac{22}{7} \times 11^2 \times h$$

$$1331 \times 7 = 22 \times 11^2 \times h$$

$$h = \frac{1331 \times 7}{22 \times 121}$$

M1

M1

A $\frac{1}{2}$ 

M1

A $\frac{1}{2}$ 

M1

golearnershub.com

$$\frac{11 \times 7}{22}$$

$$= \frac{7}{2}$$

$$= 3.5$$

∴ Height of the cylinder is 3.5 cm

(d) (i)

Equation of line give gradient  $m$  and point  $(x_1, y_1)$  is given as:

$$y - y_1 = m(x - x_1)$$

Given

$$(x_1, y_1) = (7, 2)$$

$$m = 2$$

=>

Equation of the line

$$y - 2 = 2(x - 7)$$

$$y - 2 = 2x - 14$$

$$y = 2x - 14 + 2$$

$$y = 2x - 12$$

(ii)

Given

$$x = 3; y = 7; z = 5$$

$$\frac{x^2 + xy - z^2}{xz} = \frac{(3)^2 + (3 \times 7) - (5)^2}{3(5)}$$

$$\frac{9 + 21 - 25}{15} = \frac{5}{15} = \frac{1}{3}$$

**TOTAL = 15 MARKS**

(a)

**QUESTION FOUR**

Discount = 10%

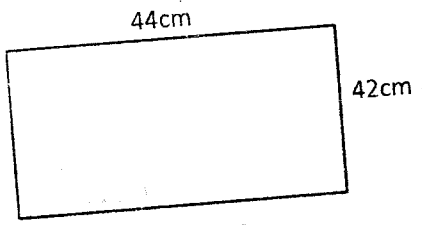
New price = GH¢270.00

$$\text{Marked price} = \frac{100}{100 - 10} \times \text{GH¢}270$$

$$= \frac{100}{90} \times \text{GH¢}270$$

$$= \text{GH¢}300.00$$

(b) (i)



$$\begin{aligned} \text{Area of a rectangle} &= L \times B \\ &= 44\text{cm} \times 42\text{cm} \\ &= 1848\text{cm}^2 \end{aligned}$$

$$\text{Area of a cylinder} = 2\pi rh$$

$$r = \frac{A}{2\pi h} = \frac{1848\text{cm}^2}{2 \times \frac{22}{7} \times 42}$$

$$r = \frac{1848\text{cm}^2}{264}$$

$$r = \frac{1848\text{cm}^2}{264} \quad r = 7 \text{ cm}$$

A1

M1

M1

A1

M½

A1

M½

M½

M½

M½

A1

M1

A1

M½

A½

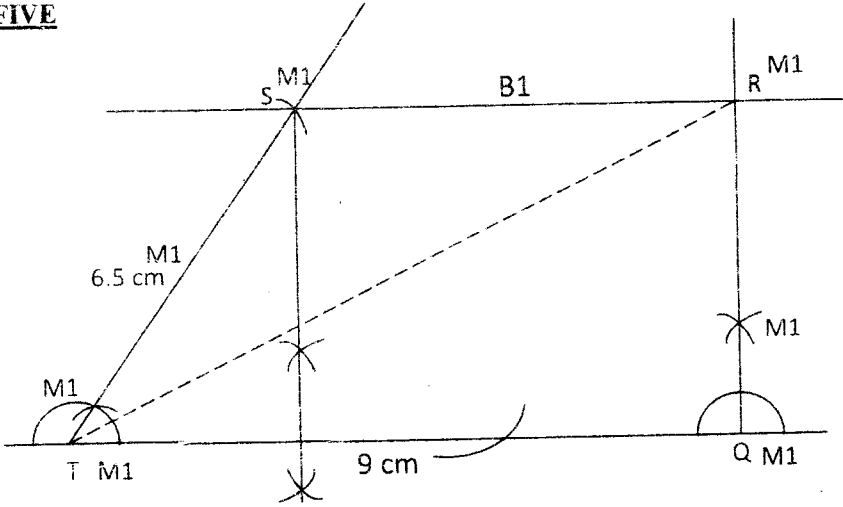
M½

M½

M½

M½

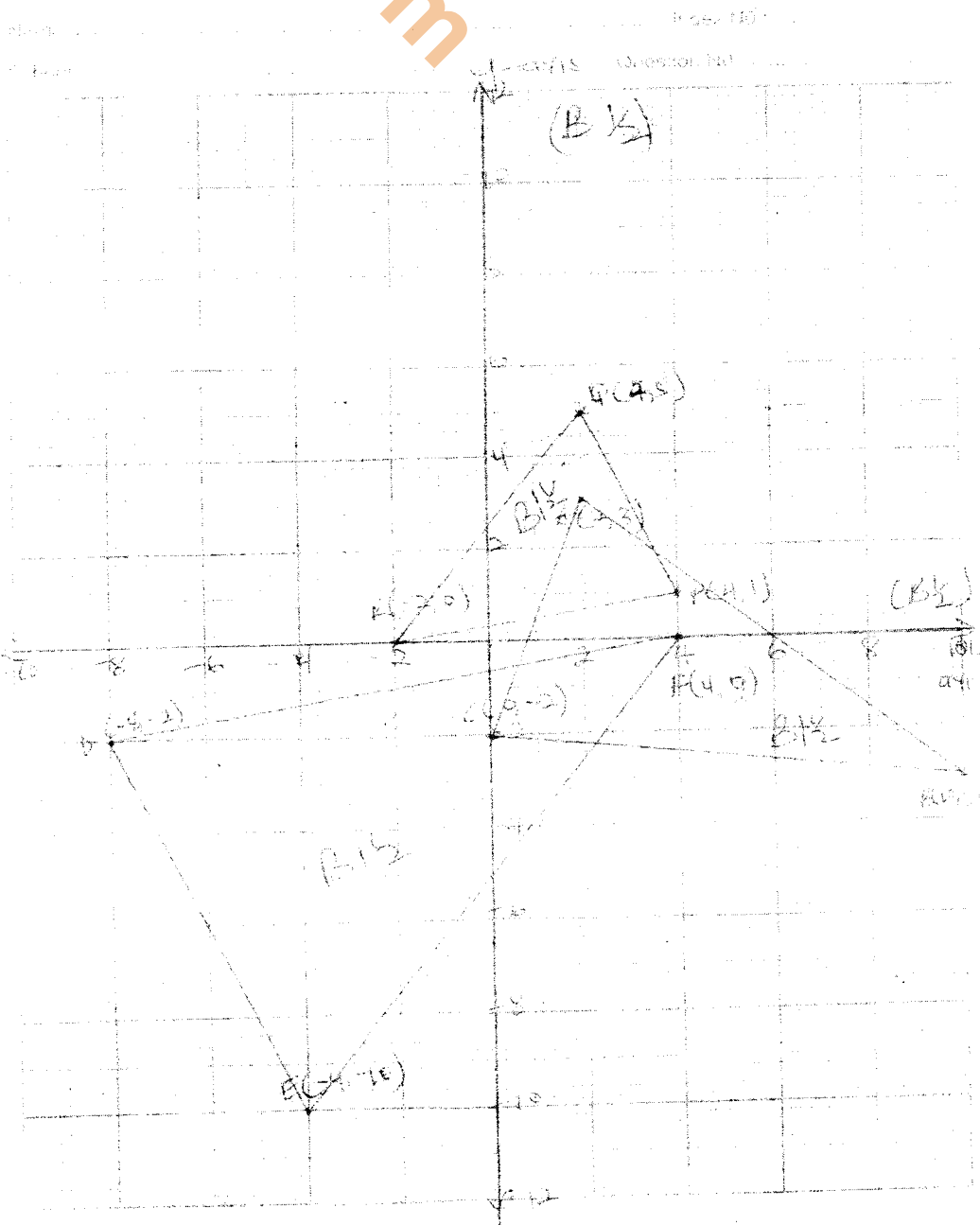
A1

(ii)	Volume of a cylinder = $\pi r^2 h = \frac{22}{7} \times (7 \times 7) \times 42$ $= 6468 \text{ cm}^3$	M1 A1
(c) (i)	$S = \{1, 2, 3, \dots, 15\}$ $n(\text{Probability that the number is prime}) = \frac{n(\text{Prime number})}{\text{Total number}}$ $= \frac{6}{15}$ $= \frac{2}{5}$	M½ M½ M½ A½
(ii)	$n(\text{multiples of 3}) = \{12, 15, 18, 21, 24, 27, 30\} = 7$ $p(\text{multiple of 3}) = \frac{7}{21} = \frac{1}{3}$	
(d) (i)	The sum of the interior angles = $30 \times 90^\circ = 2700^\circ$ The formula of the sum of interior angles of a polygon = $(n - 2) \times 180^\circ$ $2700^\circ = (n - 2) \times 180^\circ$ $2700^\circ = 180n - 360^\circ$ $180n = 3060^\circ$ $n = \frac{3060^\circ}{180} = 17$	M1 M1 A1
(ii)	Total exterior of angle of a polygon = $360^\circ$ $25^\circ + 43^\circ + 142^\circ + 4x + x = 360^\circ$ $210^\circ + 5x = 360^\circ$ $5x = 360^\circ - 210^\circ$ $5x = 150^\circ$ $\frac{5x}{5} = \frac{150}{5}$ $x = 30^\circ$ $2x = 2(30^\circ) = 60^\circ$	M1 M1 A1
<b>TOTAL = 15 MARKS</b>		
<b>QUESTION FIVE</b>		
(a) (i)-(iv)		M1 B1 M1 M1 M1 B1
(v)	- Correct Construction of $90^\circ$ - Correct Construction of $60^\circ$ - Parallel to PQ - $PR = 10.5 \pm 1$	

(b)	Area of a square = $L^2$ $81 = L^2$ $\sqrt{81} = L$ $L = 9\text{cm}$ Perimeter = $4L = 4(9)$ $= 36\text{cm}$	B $\frac{1}{2}$ M $\frac{1}{2}$ A $\frac{1}{2}$
(c)	$\frac{(x-1) \times 2}{2} + \frac{(3x) \times 2}{1} = 10 \times 2$ $x - 1 + 6x = 20$ $7x = 20 + 1$ $7x = 21$ $x = 3$	M $\frac{1}{2}$ M $\frac{1}{2}$ A $\frac{1}{2}$
(d) (i)	$f = \frac{vu}{v+u}$ $fv + fu = vu$ $fv - vu = fu$ $v = \frac{fu}{f-u}$	M $\frac{1}{2}$ M $\frac{1}{2}$ A $\frac{1}{2}$
(ii)	When $f = 20, u = 5$ then $v = ?$ $= \frac{20 \times 5}{20 + 5}$ $= \frac{100}{25}$ $= \frac{15}{3}$ $= \frac{20}{3}$ $= 6\frac{2}{3}$	M1 M1 A1
<b>TOTAL = 15 MARKS</b>		
<b>QUESTION SIX</b>		
(a)	P(4, 1), Q(2, 5), R(-2, 0) $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} 2y \\ x-y \end{pmatrix}$ $\Rightarrow P \begin{pmatrix} 4 \\ 1 \end{pmatrix} \rightarrow A \begin{pmatrix} 2(1) \\ 4-1 \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $Q \begin{pmatrix} 2 \\ 5 \end{pmatrix} \rightarrow B \begin{pmatrix} 2(5) \\ 2-5 \end{pmatrix} = \begin{pmatrix} 10 \\ -3 \end{pmatrix}$ $R \begin{pmatrix} -2 \\ 0 \end{pmatrix} \rightarrow C \begin{pmatrix} 2(0) \\ -2-0 \end{pmatrix} = \begin{pmatrix} 0 \\ -2 \end{pmatrix}$  Enlargement from the origin with a scale factor of -2 $P \begin{pmatrix} 4 \\ 1 \end{pmatrix} \rightarrow D [-2 \begin{pmatrix} 4 \\ 1 \end{pmatrix} = \begin{pmatrix} -8 \\ -2 \end{pmatrix}$ $Q \begin{pmatrix} 2 \\ 5 \end{pmatrix} \rightarrow E [-2 \begin{pmatrix} 2 \\ 5 \end{pmatrix} = \begin{pmatrix} -4 \\ -10 \end{pmatrix}$ $R \begin{pmatrix} -2 \\ 0 \end{pmatrix} \rightarrow F [-2 \begin{pmatrix} -2 \\ 0 \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$	M $\frac{1}{2}$ M $\frac{1}{2}$ M $\frac{1}{2}$

### BEST BRAIN EXAMINATIONS CONSORTIUM

QUESTION PAPER





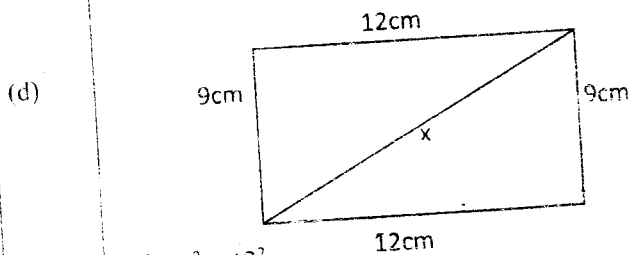
$$\begin{aligned} \text{(b) (i)} \quad |\overrightarrow{BE}| &= \overrightarrow{OE} - \overrightarrow{OB} \\ &= \begin{pmatrix} -4 \\ -10 \\ -14 \\ -7 \end{pmatrix} - \begin{pmatrix} 10 \\ -3 \end{pmatrix} \\ &= \begin{pmatrix} -14 \\ -7 \end{pmatrix} \end{aligned}$$

$$\begin{aligned} \text{Magnitude of vector BE} &= \sqrt{(-14)^2 + (-7)^2} \\ &= \sqrt{196 + 49} \\ &= \sqrt{245} = 7\sqrt{5} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad |\overrightarrow{CF}| &= \overrightarrow{OF} - \overrightarrow{OC} \\ &= \begin{pmatrix} -4 \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ -2 \end{pmatrix} \\ &= \begin{pmatrix} -4 \\ 2 \end{pmatrix} \end{aligned}$$

$$\begin{aligned} \text{Magnitude of vector CF} &= \sqrt{(-4)^2 + (2)^2} \\ &= \sqrt{16 + 4} \\ &= \sqrt{20} = 2\sqrt{5} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 4a + 5a(a-b) + (4a-5b)(a+b) &= 4a(a-b) + 5b(a-b) + 4a(a+b) - 5b(a+b) \\ \{4a^2 - 4ab + 5ab - 5b^2\} + \{4a^2 + 4ab - 5ab - 5b^2\} & \\ = 8a^2 - 10b^2 & \end{aligned}$$



$$\begin{aligned} X^2 &= 9^2 + 12^2 \\ X^2 &= 81 + 144 \\ X &= \sqrt{225} \\ X &= 15\text{cm} \end{aligned}$$

Hence the diagonal of the rectangle is 15cm

### PAPER 1

1. D
2. D
3. A
4. C
5. C
6. D
7. D
8. B
9. C
10. C

11. A
12. A
13. B
14. D
15. A
16. B
17. D
18. D
19. D
20. C

21. D
22. D
23. A
24. C
25. D
26. A
27. C
28. B
29. D
30. A

31. D
32. D
33. B
34. B
35. A
36. D
37. C
38. A
39. B
40. B

M½  
A½

M½  
A½

M½  
M½  
M½  
A½

M½  
M½  
A1

B1

M½  
A½