

**EDUCATION-NEWS CONSULT**

**(GEN MOCK)**

**HOME MOCK FEBRUARY 2023**

**MATHEMATICS 1 & 2**



Name.....

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**PERFORMANCE BOOSTER - MOCK NUMBER 1**

**FEBRUARY 2023**

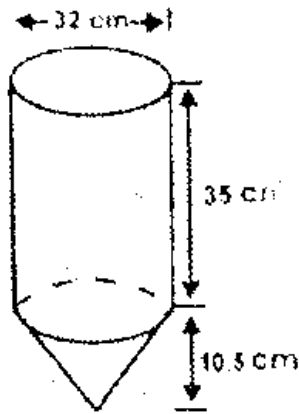
**MATHEMATICS**

**1 Hr 45 MIN**

## PAPER 2

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) If  $D(n)$  denotes the set of factors of  $n$ , list the elements of
- $D(24) \cap D(32)$
  - $D(15) \cap D(18)$
- (b) In a church of 40 women, 19 like singing, 13 like dancing and 7 like both singing and dancing.  
Using a Venn diagram, find the number of women who:
- Like singing or dancing;
  - do **not** like any of the two.
- (c) (i) The diagram below shows the fuel tank of a corn mill. The top part is a cylinder with diameter 32cm and height 35cm. The lower part is a cone of height 10.5cm.

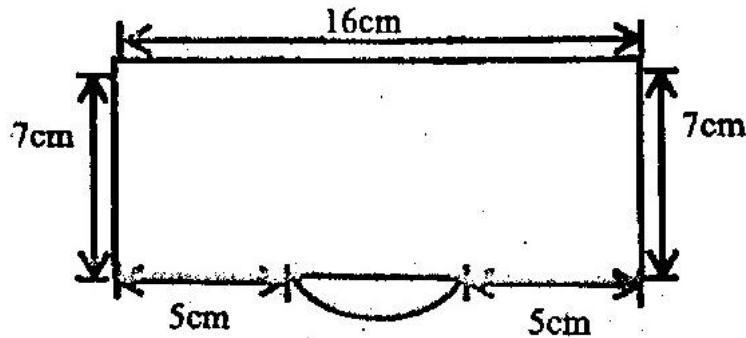


Calculate to the nearest whole number, the volume of the tank. [Take  $\pi = \frac{22}{7}$ ].

- The diameter of a cylindrical container is 22cm. If the volume of the container is  $1331\text{cm}^3$ , calculate its height.
  - (i) Using a scale of 2cm to 2units on both axes, draw on a sheet of graph paper two perpendicular axes OX and OY.  
(ii) Draw on a graph for the equation  $y = 2 - 2x$  for the values of  $x$  from -1 to 3.  
(iii) On the same graph sheet, draw a graph for the equation  $y = \frac{1}{2}(x + 1)$  for the values  $x$  from -1 to 3.  
(iv) Using the graph, find the values of  $x$  and  $y$  at the point where the two lines meet.
2. (a) The following are the masses of 25 girls in a class in kilograms.
- |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 68 | 42 | 63 | 57 | 66 | 54 | 72 | 58 | 57 | 73 | 61 | 54 | 63 |
| 45 | 38 | 40 | 57 | 58 | 56 | 48 | 63 | 63 | 63 | 68 | 39 |    |
- Arrange the marks on a stem-and-leaf plot in ascending order.
  - Find the mode and median.

- (b) Find the truth set of the following inequalities and illustrate your answers on number lines.
- (i)  $3 - \frac{3}{2}(x + 1) < \frac{1}{2}x$
- (ii)  $\frac{1}{5}(2 - x) + 1 < \frac{1}{2}(3x - 4)$
- (iii)  $\frac{2x-2}{4} - \frac{2x-1}{3} \leq 1$
- (c) (i) Simplify the following and leave your answer in standard form  $\frac{0.810 \times 0.00048}{0.000400 \times 0.0270}$
- (ii) Factorise completely the expression  $2xy - 8x + 5y - 20$ .
- (d) (i) A fruit seller bought some watermelons at GH¢ 5.00 each and only to realize that 12 were rotten. She then sold the rest at GH¢ 7.00 and made a profit of GH¢ 150.00. How many of the watermelons did she buy?
- (ii) John and Joan shared an amount of money in the ratio 5:7 respectively. If Joan had GH¢ 45.00 more than John, find each person's share.
3. (a) Using a ruler and a pair of compasses only, construct:
- (i) triangle **ABC** such that  $|AB|=10\text{cm}$ , length  $|BC|=8\text{cm}$  and  $\angle ABC=60^\circ$
- (ii) a perpendicular from C to meet AB at K.
- (b) (i) Measure angle BAC in (a) above,
- (ii) Measure length CK.
- (c) (i) Nineteen cards are numbered from 11 to 29. If one card is chosen at random, what is the probability that it contains the digit 2?
- (ii) A school girl bought six pens at 24Gp each, four pencils at 15Gp each, and 3 erasers at 8Gp each. How much change did she get from GH¢ 2.50?
- (d) (i) The VAT rate of a country is  $12\frac{1}{2}\%$ . A bill of GH¢ 9.70 VAT inclusive was given to a woman after eating at a restaurant. Calculate the VAT component of the bill.
- (ii) When a certain number is subtracted from 10 and the result is multiplied by 2, the final result is 4. Find the number.
4. (a) (i) Using a scale of 2cm to 2units on the x-axis and 1cm to 2units on the y-axis, draw on a sheet of graph, two perpendicular axes Ox and Oy for the intervals  $-8 \leq x \leq 12$  and  $-12 \leq y \leq 12$ .
- (ii) On the same graph sheet, draw triangle **ABC** with coordinates A(5,7), B(3,4) and C(7,3).
- (iii) Draw the image triangle  $A^1B^1C^1$  of triangle ABC under the translation by the vector  $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$ , where  $A \rightarrow A^1$ ,  $B \rightarrow B^1$  and  $C \rightarrow C^1$ .
- (iv) Draw the image triangle  $A^{11}B^{11}C^{11}$  of triangle ABC under a reflection on the line  $y = -2$  where  $A \rightarrow A^{11}$ ,  $B \rightarrow B^{11}$  and  $C \rightarrow C^{11}$ .
- (b) Find the equation of line  $B^1B^{11}$  from the graph in 4(a) above.
- (c) Arrange the following numbers in ascending order:  $110011_2$ ,  $24_5$ ,  $1000011_2$  and  $301_5$ .
- (d) If  $P = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$  and  $q = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ , find r such that  $\frac{1}{2}p - q + r = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ .

5. (a) (i) The figure below is a combination of a rectangle and a semi-circle.



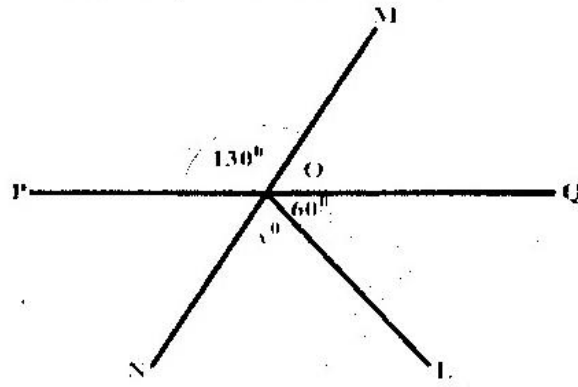
Find the perimeter of the figure [Take  $\pi = \frac{22}{7}$ ].

- (ii) The table below shows the preferred professions among 45 people interviewed.

Profession	Engineering	Tailoring	Medicine	Law	Journalism
Frequency	9	12	15	3	6

Draw a pie chart to represent the information above.

- (b) (i) The interior angles of a regular polygon is thrice its exterior angle. Find the number of sides of the polygon.
- (ii) The interior angles of a pentagon are  $100^\circ$ ,  $x^\circ$ ,  $(3x + 30)^\circ$ ,  $(2x - 10)^\circ$  and  $80^\circ$ . Find  $x$  of sides of the polygon.
- (c) (i) In the diagram below, POQ, MON and OL are straight lines  $\angle QOL = 60^\circ$  and  $\angle MOP = 130^\circ$ . Calculate the value of  $x$ .



- (ii) Copy and complete the magic square so that the sum of numbers in each row if column and diagonal is 18.

	4	
7	8	

6. (a) The sales in thousands (GH¢) of two popular drinks for the years 1997 – 2000 are given in the table below.

Year	Modna	Ranko
1997	300	450
1998	450	300
1999	500	250
2000	250	400

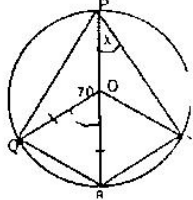
Draw a bar chart to represent the information above.

- (b) Three workers Mr. Asideu, Mr. Amoako and Mr. Atsu hold 120, 5200 and 40 shares respectively in their company. A total dividend of GH¢ 18,800.00 is paid to the three workers in the same ratio as their shares. How much does each worker receive?
- (c) Simplify:
- (i)  $(2^6 \times 3^4) \div (2^4 \times 3^2)$
- (ii)  $4x^2y + 5xy^2y - 2xy^2$
- (d) (i) Make q the subject of the relation  $w = \frac{n-q}{q}$ .
- (ii) From (d)(i) above, find the value of q when  $n = -2$ , and  $w = 10$ .

PAPER 1 –

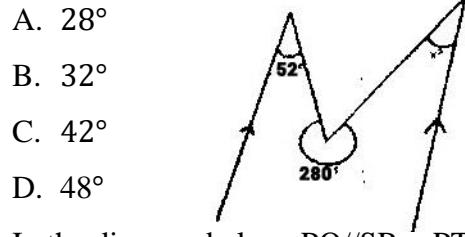
OBJECTIVE TEST

- Factorize completely, the expression  $(h^2 - k^2 - p(h + k))$   
 A.  $(h - k)^2$   
 B.  $(h + k)$   
 C.  $h^2 - k^2 - h - kp$   
 D.  $(h + k)(h - k - p)$
- In the diagram, PQRS is a circle with centre O,  $|OQ| = |OR|$  and angle QOR =  $70^\circ$ . Find the value of x.

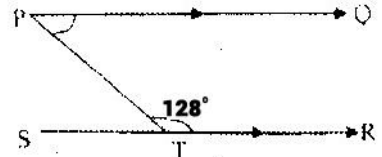


- Find the truth set of the inequality  $2t + 5 < 4t - 5$ .  
 A.  $\{t : t > 0\}$   
 B.  $\{t : t > 1\}$   
 C.  $\{t : t < 5\}$   
 D.  $\{t : t > 5\}$
- If  $P = \{2, 4, 6, 8, 10\}$ , which of the following adequately defines P?  
 A. The set of even numbers  
 B. The set of even numbers less than 12  
 C. The set of all positive integers divisible by 2  
 D. The set of all positive integers less than 12.
- Find the coordinates of the points Q(-3, 7) under a rotation through  $180^\circ$ .  
 A. (3, -7)  
 B. (-7, 3)  
 C. (7, 3)  
 D. (-3, 7)
- $\vec{OA} = \begin{pmatrix} 0 \\ 5 \end{pmatrix}$  and  $\vec{AB} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ . If O is the origin, find  $\vec{OB}$ .  
 A.  $\begin{pmatrix} 4 \\ 9 \end{pmatrix}$   
 B.  $\begin{pmatrix} -2 \\ -1 \end{pmatrix}$   
 C.  $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$   
 D.  $\begin{pmatrix} -4 \\ -9 \end{pmatrix}$

- Find the value of x in the diagram below.



- In the diagram below,  $PQ \parallel SR$ ,  $\angle PTR = 120^\circ$   
 A.  $38^\circ$   
 B.  $52^\circ$   
 C.  $76^\circ$   
 D.  $128^\circ$



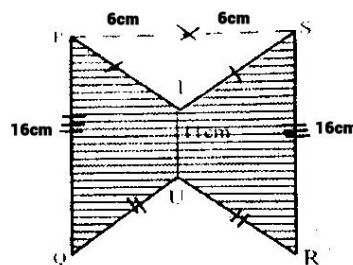
Use the table below for questions 9 – 11.

Age (years)	16	17	18	19	20
No. of students	2	8	4	4	2

- Calculate the mean of the students  
 A. 15.3 years  
 B. 16.8 years  
 C. 17.0 years  
 D. 19.8 years
- What is the modal age?  
 A. 20 years  
 B. 18 years  
 C. 17 years  
 D. 16 years
- If a student is selected at random, find the probability that he is at least 18 years.  
 A.  $\frac{7}{10}$   
 B.  $\frac{1}{2}$   
 C.  $\frac{3}{10}$   
 D.  $\frac{1}{5}$
- Which of the following is not true about a square?  
 A. Two pairs of opposite sides are parallel  
 B. The diagonals are equal  
 C. Each of the inside angles is  $90^\circ$   
 D. The diagonals cut at  $45^\circ$
- Express 9800 in standard form.  
 A.  $9.8 \times 10^{-4}$   
 B.  $9.8 \times 10^3$   
 C.  $9.8 \times 10^4$   
 D.  $9.8 \times 10^5$

14. Find the mean of 306, 308, 304 and 314.
- 306
  - 308
  - 307
  - 308
15. A man spent 58% of his income and the amount left was GH¢ 21,000.00. Find his income.
- GH¢ 27, 619.05
  - GH¢ 36,206.90
  - GH¢ 50,000.00
  - GH¢ 40, 384.62
16. Which of the following is the image of  $(-2, 5)$  under the mapping  $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} 2y \\ y - 2x \end{pmatrix}$ ?
- (5, 1)
  - (5, 9)
  - (10, 1)
  - (10, 9)
17. The square root of a number is  $3k$ . Find half of the number.
- $\sqrt{-\frac{k}{2}}$
  - $\sqrt{k}$
  - $\frac{1}{2}k$
  - $\frac{9}{2}k^2$
18. Make  $m$  the subject of the relation  $\frac{km^2}{g^2} = h$
- $\sqrt{\frac{k}{g^2h}}$
  - $\sqrt{\frac{g^2h}{k}}$
  - $\frac{gh}{k}$
  - $\frac{kh}{g}$
19. Find the truth set of the equation  $39x + 3 = 83 - x$ .
- { 2 }
  - { 1 }
  - {  $\frac{1}{2}$  }
  - { 0 }
20. The area of a circle is  $100\pi\text{cm}^2$ . Find its circumference.
- $5\pi\text{cm}$
  - $10\pi\text{cm}$
  - $15\pi\text{cm}$
  - $20\pi\text{cm}$
21. If  $2(kx + 6) = 6 + 8x$ , find the value of  $k$  when  $x = 3$ .
- 4
  - 3

- 3
  - 4
22. Two ball bearing have volumes of  $1.6\text{ cm}^3$  and  $5.4\text{ cm}^3$ . Find the ratio of their surface areas.
- 2 : 3
  - 3 : 8
  - 8 : 27
  - 5 : 12
23. Write  $0.000316 \times 10^{-7}$  in standard form.
- $3.16 \times 10^{11}$
  - $3.16 \times 10^3$
  - $3.16 \times 10^{-3}$
  - $3.16 \times 10^{-11}$
24. Find the range of values of  $x$  for which  $\frac{5-x}{3} + 2 < \frac{x-2}{2}$ .
- $x < \frac{12}{5}$
  - $x < \frac{9}{2}$
  - $x > \frac{28}{5}$
  - $x < 8$



25. In the diagram above,  $|PT| = |ST|$ ,  $|QU| = |RU|$ ,  $|PQ| = |RS| = 16\text{cm}$  and  $|TU| = 11\text{cm}$ . Calculate the area of the shaded region.
- $80\text{ cm}^2$
  - $86\text{ cm}^2$
  - $160\text{ cm}^2$
  - $162\text{ cm}^2$
26. What is the value of 8 in the numeral 682, 111?
- 800
  - 8000
  - 80, 000
  - 800, 000
27. Find the greatest common factor of 35 and 70.
- 5
  - 7
  - 10
  - 35
28. Mansah obtained 150 marks out of 240 marks in an English test. What was her percentage score?
- 33.3%

- B. 36.5%  
 C. 41.67%  
 D. 62.5%
29. Find the integers within the intervals  
 $5 < x < 9$ .  
 A. {5, 6, 7}  
 B. {5, 6, 7, 8}  
 C. {5, 6, 7, 8, 9}  
 D. {6, 7, 8}
30. A square of side 6cm has the same area as a rectangle of length 9cm. Find the breadth of the rectangle.  
 A. 3 cm  
 B. 4 cm  
 C. 6 cm  
 D. 24 cm
31. If  $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2}$ , find k when  $k_1 = 1$  and  $k_2 = 2$ .  
 A.  $\frac{1}{4}$   
 B.  $\frac{2}{3}$   
 C.  $\frac{3}{5}$   
 D.  $\frac{4}{5}$
32. What is the largest prime factor of 225?  
 A. 3  
 B. 5  
 C. 15  
 D. 17
33. Find the sum of all the even numbers between 70 and 80.  
 A. 200  
 B. 223  
 C. 280  
 D. 300
34. A mapping is defined by  $n \rightarrow 2n - 3$ . What is the image of  $-2$  under the mapping?  
 A.  $-1$   
 B.  $-5$   
 C.  $-7$   
 D. 7

35. If  $b^2 + 2 = 51$ , find b.  
 A. 49  
 B. 7  
 C. 17  
 D. -17

36. Simplify  $1\frac{1}{2} + 2\frac{1}{4} - 3\frac{5}{8}$ .  
 A.  $\frac{1}{8}$   
 B.  $\frac{3}{8}$   
 C.  $\frac{3}{16}$   
 D.  $\frac{5}{16}$

37. Find the next two numbers in the sequence, 2, 5, 14, 20, ..... , .....  
 A. 26, 34  
 B. 26, 35  
 C. 27, 34  
 D. 27, 35

40% of students in a class speak Ga and 75% speak Twi. Use this information to answer questions 38 and 39.

38. What percentage of them speak both Ga and Twi?  
 A. 5%  
 B. 10%  
 C. 15%  
 D. 30%
39. If there are 40 students, how many speak only Twi?  
 A. 10  
 B. 16  
 C. 24  
 D. 30
40. How many faces has a triangular pyramid?  
 A. 3  
 B. 4  
 C. 5  
 D. 6