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.

[■■■] 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.*

1. Triangle ABC is an enlargement of triangle ADE with scale factor 2. If the area $ABC = 36$ cm², find the area of ADE.
   A. 4
   B. 12
   C. 9
   D. 18

2. Find the component form of the vector that translates $P(-3, 6)$ to $P'(-4, 8)$
   A. $\binom{1}{2}$
   B. $\binom{1}{2}$
   C. $\binom{-1}{2}$
   D. $\binom{-1}{1}$

3. A coin is tossed twice. What is the probability that both coins are heads?
   A. 0.5
   B. 0.25
   C. 0.4
   D. 0.2

4. What is the scale factor of the enlargement below from centre 0?
   A. 2
   B. 4
   C. 8
   D. 16

5. Find the image of the point P $(-2, -5)$ when it is reflected in the line $x = 0$.
   A. $(2, -5)$
   B. $(-2, -5)$
   C. $(5, -2)$
   D. $(-5, -2)$

6. Given the set $A = \{1, 3, 5\}$, find the cardinality of the power set of A.
   A. 2
   B. 4
   C. 6
   D. 8

7. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $A = \{odd\ numbers\}$, $P = prime\ numbers$. List the members of $A \cap P$
   A. $\{1, 3, 5, 7, 11\}$
   B. $\{1, 3, 5, 7, 9, 11\}$
   C. $\{3, 5, 7, 11\}$
   D. $\{2, 3, 5, 7, 11\}$

$P = \{composite\ number\ less\ than\ 16\}$ and $Q = \{multiples\ of\ 3\ less\ than\ 15\}$.
Use the information to answer questions 8 to 10

8. List the members of P
   A. $\{3, 4, 6, 8, 12\}$
   B. $\{4, 6, 8, 9, 10, 12, 14, 15\}$
   C. $\{4, 6, 8, 12, 14\}$
   D. $\{3, 4, 6, 8, 9, 15\}$

9. Find $P \cap Q$.
   A. $\{6, 9, 12\}$
   B. $\{6, 9, 12, 15\}$
   C. $\{3, 6, 9\}$
   D. $\{3, 9, 12, 15\}$

10. How many subsets are in set Q?
    A. 12
    B. 16
    C. 20
    D. 24

11. If a die is thrown, what is the probability that it will land with a 4 or 6 facing up?
    A. $\frac{1}{3}$
    B. $\frac{1}{2}$
    C. $\frac{2}{3}$
    D. $\frac{3}{4}$

12. If one shape is an enlargement of another, then two shapes are
    A. same
    B. congruent
    C. opposite
    D. similar

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13. Deduct $(5y + 3)$ from $(8 - 4y)$.
A. $-5 + 9y$
B. $9y - 5$
C. $5 - 9y$
D. $-5 - 9y$

14. The two rectangles below are similar. Which is a correct proportion for corresponding sides?
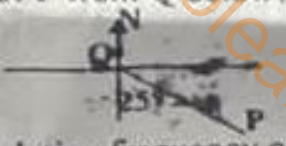
A. $\frac{12}{8} = \frac{x}{4}$
B. $\frac{12}{8} = \frac{x}{6}$
C. $\frac{12}{4} = \frac{x}{20}$
D. $\frac{4}{12} = \frac{x}{8}$

I = [ ]   II =   II = [ ]   II = [ ]   I

15 Solve $4 - (2x + 1) \geq -3$
A. $x \leq 3$
B. $x \geq 3$
C. $x \leq 3$
D. $x \geq -3$

16 If $D = \{2, 4, 6, \ldots 26\}$, then Set D is
A. a finite set.
B. an infinite set.
C. an empty set.
D. a disjoint set.

17. Find the bearing of P from Q below?
A. $335°$
B. $065°$
C. $155°$
D. $205°$

18 An event with a relative frequency of 0.1
A. is certain to occur.
B. has a good chance of occurring.
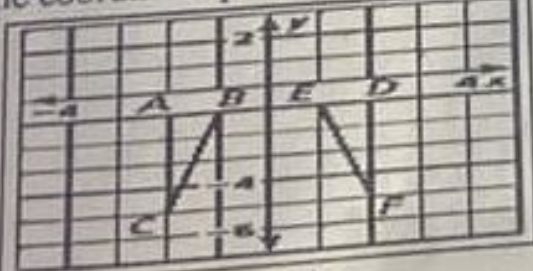C. is unlikely to occur.
D. will never occur.

19 Find the truth set of the equation
$39x + 3 = 83 - x$
A. $\{2\}$
B. $\{1\}$
C. $\{1/2\}$
D. $\{0\}$

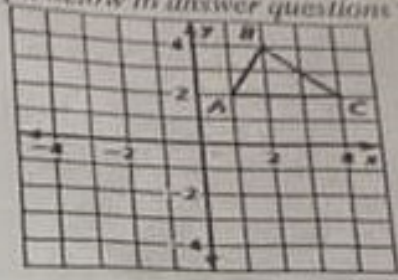**20.** The area of a circle is $100\,\pi\text{cm}^2$. Find its circumference.
A. $5\,\pi\text{cm}$
B. $10\,\pi\text{cm}$
C. $15\,\pi\text{cm}$
D. $20\,\pi\text{cm}$

21. The coordinate plane below shows a

A. rotation about $90°$ clockwise
B. rotation about $90°$ anticlockwise
C. reflection in the x-axis
D. reflection in the y-axis

Use the graph below to answer questions 22 to 24

22. What are the coordinates of triangle ABC?
A. $A(2, 2), B(4, 2), C(2, 2)$
B. $A(2, 1), B(4, 2), C(2, 4)$
C. $A(1, 2), B(2, 4), C(4, 2)$
D. $A(1, 1), B(2, 2), C(3, 4)$

23. What is the coordinate of the the vertices of $A_1 B_1 C_1$ after the triangle ABC is translated by the vector $\binom{-1}{3}$
A. $A_1(0, 5), B_1(1, 7), C_1(3, 5)$
B. $A_1(2, -1), B_1(3, 1), C_1(4, -1)$
C. $A_1(5, 1), B_1(3, -2), C_1(6, 5)$
D. $A_1(-1, 6), B_1(-2, 12), C_1(-4, 6)$

24. What are the coordinates of the vertices of $A_2 B_2 C_2$ of triangle ABC after a $270°$ clockwise rotation about the origin?
A. $A_2(2, -1), B_2(4, -2), C_2(2, -4)$
B. $A_2(-1, -2), B_2(-2, -4), C_2(-4, -2)$
C. $A_2(-1, 2), B_2(-2, 4), C_2(-4, 2)$
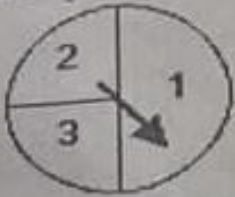D. $A_2(-2, 1), B_2(-4, 2), C_2(-2, 4)$

25. If $A = \{x, y, z\}$, then the number of subsets in the powerset of A is
A. 4
B. 8
C. 16
D. 20

26. A ball is drawn from a bag containing 7 red, 3 white, and 6 blue balls. The probability that it is a red ball is
A. $\frac{3}{16}$
B. $\frac{7}{16}$
C. $\frac{9}{16}$
D. $\frac{10}{16}$

Turn ov

27. A={0, 1, 2} and B={1, 2, 3}. A and B are
    A.   equal sets.
    B.   super sets.
    C.   subsets.
    D.   equivalent sets.

28. A line AB is 7 cm long. Under an enlargement with a scale factor of 3, the length of the image of AB is
    A.   10cm
    B.   21cm
    C.   4 cm
    D.   49 cm

29. The probability that the pointer below stops on an odd number when spinned is
    A. $\frac{1}{3}$
    B. $\frac{1}{2}$
    C. $\frac{3}{2}$
    D. $\frac{3}{4}$

30. A mapping is defined by $n \rightarrow 2n - 3$. The image of −2 under the mapping is
    A.   −1
    B.   −5
    C.   −7
    D.   7

31. Find the sum of all the even numbers between 70 and 80.
    A.   200
    B.   223
    C.   280
    D.   300

32. At what price will a shopper buy a 12kg sugar that sells Ghȼ 20/kg when a 10% VAT is added?
    A.   Ghȼ 240
    B.   Ghȼ 264
    C.   Ghȼ 180
    D.   Ghȼ 200

33. What is the largest prime factor of 225?
    A.   3
    B.   5
    C.   15
    D.   17

34. Find the product of 0.042 and 0.09.
    A.   0.00378
    B.   0.378
    C.   0.378
    D.   3.78

35. Determine the number of lines of symmetry for the figure below.
    A.   1
    B.   2
    C.   3
    D.   4

36. The scale factor for an enlargement is 0.5. Compared to the object, the image is
    A.   smaller.
    B.   larger.
    C.   the same size.
    D.   far different.

37. In the diagram below, write the rule for the translation of $\triangle LMN$ to $\triangle L^{I}M^{I}N^{I}$
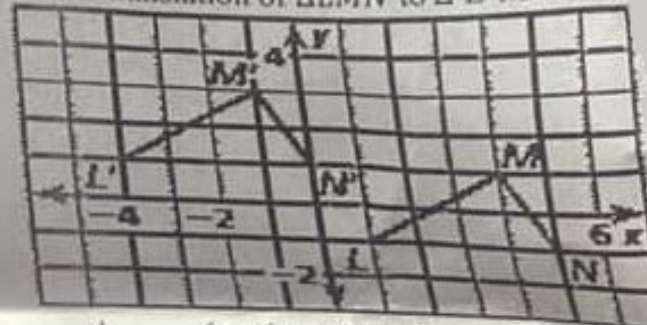
    A. $(x,y) \rightarrow (x + 5, y - 2)$
    B. $(x,y) \rightarrow (x + 7, y + 2)$
    C. $(x,y) \rightarrow (x + 2, y + 5)$
    D. $(x,y) \rightarrow (x - 5, y + 2)$

38. Point $D(-5, -6)$ was transformed into Point $D_1(-8, 4)$. Which transformation took place?
    A.   Translation of 3 left and 2 down
    B.   Translation of 3 right and 2 up
    C.   Translation of 3 left and 10 up
    D.   Reflection over the x-axis

39. If the image of x under the mapping $x \longrightarrow 2x + 3$ is 3, find x
    A.   9
    B.   3
    C.   0
    D.   -3

40. If a square has sides 3.5 m long and image under an enlargement has side long, what is the scale factor for the enlargement?
    A.   4
    B.   16
    C.   49
    D.   3

END OF PAPER

PAPER 2
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.

1. (a) In a survey of 120 people, Etornam found that 70 people liked Product A, 80 liked Product B and 50 liked both Product A and product B.
   - (i) Draw a Venn diagram to represent the information.
   - (ii) How many liked product A or B?
   - (iii) How many liked product A but not B?
   - (iv) How many didn't like either?

   (b) Timothy has 12 cards, each with a letter on it.

c	o	r	b	e	t	t	m	a	t	h	s

   He picks a card at random. Calculate the probability that the chosen card is
   - (i) the letter t
   - (ii) not the letter 'e'

   (c) U = {even numbers}, A = {factors of 8} and B = {factors of 20}
   - (i) List the members of the set $A \cup B$
   - (ii) A number is chosen at random from set B. Find the probability that the number is in set $A \cap B$.

   (d) Value Added Tax of 15% was charged on an item that costs Gh¢200.
   - (i) Calculate the VAT amount.
   - (ii) Calculate the VAT inclusive price.

2. (a)
   - (i) Using a scale of 2cm to 2 units on both axes, draw on the same graph sheet two perpendicular axes OX and OY.
   - (ii) Plot the points A(4, -2), B(8, -2), C(10,-4) and D(4, -4). Join the points to form the quadrilateral ABCD.
   - (iii) Give the name of the quadrilateral formed.
   - (iv) Draw the image $A_1B_1C_1D_1$ of the quadrilateral ABCD under a rotation of **180** degrees about the origin where A→ A₁, B→B₁, C→ C₁ and D→D₁. Write down the coordinates of A₁, B₁, C₁, and D₁
   - (v) Translate the quadrilateral **ABCD** by the vector $\binom{-2}{-6}$ where A→ A₂, B→B₂, C→ C₂ and D→D₂. Write down the coordinates of A₂, B₂, C₂, D₂.

   (b) Martha is a waiter at a restaurant and is paid Gh¢19.00 per hour. If she works from 5pm to 10pm on a certain day, calculate Martha's total pay for that day.

   (c) A triangular spinner has sections coloured white (W), green (G) or blue (B). It is spun 20 times and the color it lands on each time was recorded as shown below

   W W B G G W B G G W

   G B G B G W G B G B

   Draw a relative frequency table for the experiment.

   (d) Find the coordinates of the image of;
   - (i) Q(1, 4) when it is rotated through 180° about the origin.
   - (ii) R (4,5) when it is rotated through 90° anticlockwise about the origin

(3.) **(a)** A man had three (3) GH¢ 50.00, seven GH¢ 20.00 and five GH¢ 10.00 notes in his pocket. If he bought a shirt for GH¢ 150.00 and two different pairs of shoes at GH¢ 80.00 each. How many GH¢ 20.00 and GH¢ 10.00 notes did he have left?

(b) The figure below is a combination of a rectangle and a semi – circle.
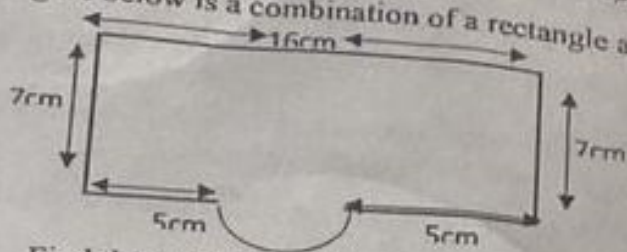

(i) Find the perimeter of the figure.

(ii) Find the area of the figure [Take $\pi = \frac{22}{7}$]

(c) A and B are two sets. $n(U) = 37, n(A) = 22, n(A \cap B) = 12$ and $n(A \cup B) = 30$.

(i) Draw a Venn diagram below to show the number of elements in each region.

(ii) Find

(α) $n(A \cap B^1)$

(β) $n(A^1 \cup B^1)$

(d) Given that $p = \begin{pmatrix} 2-3x \\ 5-2y \end{pmatrix}$, $q = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$ and $p - q = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$, find the value of $(x + y)$.

(4) **(a)** A group of high school students were asked whether they were in the Drama club or Music club. The results are summarized in the following Venn diagram.
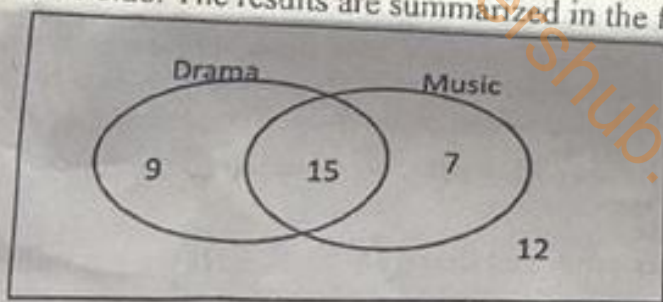
(i) Describe what each region in the Venn diagram represents.

(ii) How many students were in only one of the two clubs?

(iii) How many students were in the drama club or the music club?

(iv) How many students were surveyed?

(b) In the diagram below, ABC and EDC are straight lines. EA is parallel to DB. $EC = 8\ cm, DC = 5\ cm$ and $DB = 2\ cm$. Calculate the length of AE.
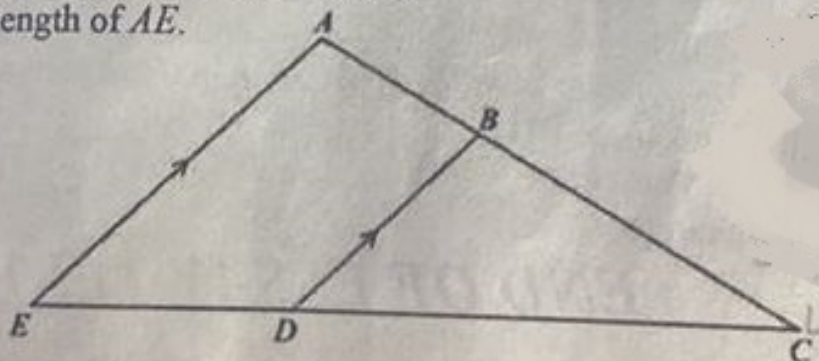
(c) Lordina carries out a survey about the number of times students go to a bookshop. She asks at random 100 customers how many times they went to the shop last month. The table below shows Lordina's results.

Number of times	0	1	2	3	4	5	6	More than 6
Frequency	4	12	13	17	25	13	11	5

(i) Using a scale of 2 cm: 2 units on the y-axis, draw a bar chart to represent the information.

(ii) If one of the 100 customers is chosen at random, what is the probability that this customer went to the shop 5 times or more?

(d) A stove costs Ghȼ2500. VAT of 15% is to be added to the cost price. Calculate
(i) the VAT amount;
(ii) the selling price of the stove.

5. (a) The income tax in a certain region of the world depends on how much is earned that year as follows: 0% on the first Ghȼ14500 earned and 10% on the remaining income earned. If Elsie's salary is Ghȼ 52,000 calculate how much income tax she will pay.

(b) A, B and C are three sets. $A \cap B = \emptyset$ and $C \subset A$
(i) Draw a Venn diagram to show the sets A, B and C.
(ii) On the Venn diagram, shade the region that represents $A \cap C'$

(c) The vertices of triangle OAB have coordinates O(0,0), A(0, 2), B(4, 2). Find the coordinates of the triangle O'A'B' after an enlargement with scale factor 2, center O(0,0)

(d) Sena has a box of pens. The box contains 6 blue pens, 8 black pens and 3 red pens.
(i) If Sena picks a pen at random, what is the probability that he picks a blue pen?
(ii) Some more blue pens are added to the box. The probability of selecting a blue pen is now $\frac{1}{2}$. How many blue pens were added to the box?

6. (a) Ankomah's age is twice as young as that of his father. If the sum of their ages is 90, find the product of their ages.

(b) Adotevi deposited GHȼ 400.00 at GCB bank for 2 years. The bank gives a rate of 5%. Find the total amount she would be able to withdraw after the period.

(c) John and Joana shared an amount of money in the ratio 5:7 respectively. If Joana had GHȼ 45.00 more than John. Find each person's share.

(d) Using ruler and a pair of compasses only, construct;
(i) triangle ABC with |AB|= 8.5cm, angle ABC = 75° and angle BAC = 45°
(ii) perpendicular bisector of |BC| and |AC| and label them L_1 and L_2. Label the L_1 and L_2 as P.
(iii) with P as centre, construct a circle with radius AP and measure the radius of the circle

END OF ESSAY TEST