CANDIDATE – PLEASE NOTE!

PRINT your name on the line below and return this booklet with your answer sheet. Failure to do so may result in disqualification.

FORM TP 2023019

TEST CODE **01234010**

JANUARY 2023

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

MATHEMATICS

Paper 01 – General Proficiency

1 hour 30 minutes

27 JANUARY 2023 (a.m.)

738

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 1 hour and 30 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. **A list of formulae is provided on page 2 of this booklet.**
4. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.
5. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

Sample Item

$2a + 6a =$

(A) $8a$
(B) $8a^2$
(C) $12a$
(D) $12a^2$

Sample Answer

● (B) (C) (D)

A002

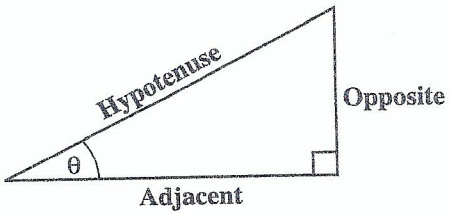
The best answer to this item is "$8a$", so (A) has been shaded.

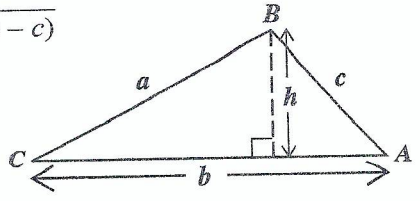
6. If you want to change your answer, erase it completely before you fill in your new choice.
7. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You may return to that item later.
8. You may do any rough work in this booklet.
9. Calculators and mathematical tables are NOT allowed for this paper.
10. **ALL diagrams in this booklet are NOT drawn to scale, unless otherwise stated.**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

LIST OF FORMULAE

Volume of a prism	$V = Ah$ where A is the area of the cross-section and h is the perpendicular length.
Volume of a cylinder	$V = \pi r^2 h$ where r is the radius of the base and h is the perpendicular height.
Volume of a right pyramid	$V = \frac{1}{3} Ah$ where A is the area of the base and h is the perpendicular height.
Circumference	$C = 2\pi r$ where r is the radius of the circle.
Arc length	$S = \frac{\theta}{360} \times 2\pi r$ where θ is the angle subtended by the arc, measured in degrees.
Area of a circle	$A = \pi r^2$ where r is the radius of the circle.
Area of a sector	$A = \frac{\theta}{360} \times \pi r^2$ where θ is the angle of the sector, measured in degrees.
Area of a trapezium	$A = \frac{1}{2}(a + b)\,h$ where a and b are the lengths of the parallel sides and h is the perpendicular distance between the parallel sides.
Roots of quadratic equations	If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Trigonometric ratios	$\sin\theta = \frac{\text{length of opposite side}}{\text{length of hypotenuse}}$ $\cos\theta = \frac{\text{length of adjacent side}}{\text{length of hypotenuse}}$ $\tan\theta = \frac{\text{length of opposite side}}{\text{length of adjacent side}}$
Area of a triangle	Area of $\Delta = \frac{1}{2} bh$ where b is the length of the base and h is the perpendicular height. Area of $\Delta ABC = \frac{1}{2} ab \sin C$ Area of $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$
Sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
Cosine rule	$a^2 = b^2 + c^2 - 2bc\cos A$





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1. What is the value of the digit 2 in the number 48.621?

(A) $\frac{2}{100}$

(B) $\frac{2}{10}$

(C) 2

(D) 200

2. What percentage of 50 is 10?

(A) 5%
(B) 20%
(C) 32%
(D) 150%

3. In standard notation, 0.02086 is written as

(A) 2.0806×10^{2}
(B) 20.806×10^{1}
(C) 2.0806×10^{-2}
(D) 0.20806×10^{3}

4. In a school, the ratio of the number of pupils to the number of teachers is 20:1. If the number of pupils is 840, how many teachers are there?

(A) 40
(B) 42
(C) 820
(D) 840

5. A bag of apples can be shared equally among either 6, 10 or 15 children. The MINIMUM number of apples that is likely to be in the bag is

(A) 30
(B) 31
(C) 60
(D) 90

6. If $4.3 \times 0.37 = 1.591$, then 43×0.37 is

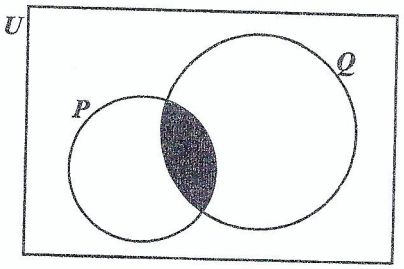
(A) 1.591
(B) 15.91
(C) 159.1
(D) 1 591.0

7. Which of the following sets is defined by

$\{x \in Z : -2 \leq x \leq 4\}$?

(A) {1, 2, 3, 4}
(B) {0, 1, 2, 3, 4}
(C) {–1, 0, 1, 2, 3}
(D) {–2, –1, 0, 1, 2, 3, 4}

Item 8 refers to the following Venn diagram which shows 2 intersecting sets, P and Q. In the Venn diagram, $n(P) = 5$, $n(Q) = 9$ and $n(P \cup Q) = 10$.



8. The number of elements in the shaded region of the Venn diagram is

(A) 1
(B) 4
(C) 5
(D) 9

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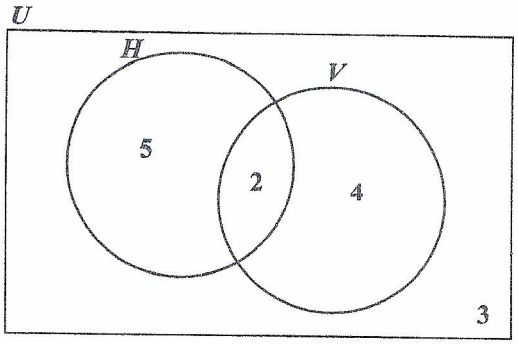
9. Which of the following pairs of sets is an example of disjoint sets?

(A) E = {even numbers} and F = {odd numbers}
(B) P = {multiples of 2} and Q = {multiples of 3}
(C) X = {whole numbers} and Y = {rational numbers}
(D) G = {multiples of five} and H = {multiples of ten}

10. All students in a class play Scrabble or Checkers or both. If 36% of the students play Scrabble only and 16% of the students play both Scrabble and Checkers, what percentage of students play Checkers but NOT Scrabble?

(A) 12
(B) 48
(C) 52
(D) 64

Item 11 refers to the following Venn diagram which shows 2 intersecting sets. The number of students in each set is indicated.



11. In the Venn diagram

U = {students who play games}
H = {students who play hockey}
V = {students who play volleyball}.

How many students play EITHER hockey OR volleyball but not both?

(A) 6
(B) 7
(C) 9
(D) 11

12. The set of two-digit positive integers that are divisible by 7 is an example of

(A) an improper set
(B) an infinite set
(C) an empty set
(D) a finite set

13. For every \$100 sales or part thereof, a salesman is paid \$10.00 as commission. If his sales for a particular month were \$1 020.00, how much commission was he paid?

(A) \$ 10.20
(B) \$ 20.20
(C) \$102.00
(D) \$110.00

14. The simple interest on \$600 for t years at 5% per annum is \$120. The value of t is

(A) $\$\frac{600 \times 5}{100 \times 120}$

(B) $\$\frac{100 \times 120}{600 \times 5}$

(C) $\$\frac{100 \times 5 \times 120}{600}$

(D) $\$\frac{600 \times 120 \times 5}{100}$

15. At a bank, EC\$2.60 is equivalent to US\$1.00. For every US\$1.00 exchanged, EC\$0.10 is deducted as an exchange tax. How many EC dollars will Leon receive if he exchanges US\$1 000.00?

(A) \$ 900.90
(B) \$2 360.34
(C) \$2 500.00
(D) \$2 600.00

16. A calculator which is marked at \$120 is sold for cash at a 30% discount. How much change would Susan receive if she pays for the calculator with a \$100 bill?

(A) \$16
(B) \$20
(C) \$28
(D) \$36

17. A man pays 60 cents for every 200 m^3 of gas used, plus a fixed charge. If he pays \$178.75 when he uses 55 000 m^3 of gas, how much is the fixed charge?

(A) \$ 13.75
(B) \$ 14.35
(C) \$151.25
(D) \$165.00

18. A plot of land presently valued at \$12 000 appreciates in value at the rate of 2.5% per annum. What will be the value of the plot of land one year later?

(A) \$10 700
(B) \$11 700
(C) \$11 970
(D) \$12 300

19. A loan of \$8 000 was paid back in 2 years in monthly payments of \$400. The interest on the loan, as a percentage, was

(A) 5%

(B) $8\frac{1}{3}\%$

(C) $16\frac{2}{3}\%$

(D) 20%

20. An article bought for \$125 was sold for \$175. The profit as a percentage of the cost price was

(A) 28.6%
(B) 40%
(C) 50%
(D) 71.4%

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21. The product of a number, $\frac{2p}{3}$ and its reciprocal may be written as

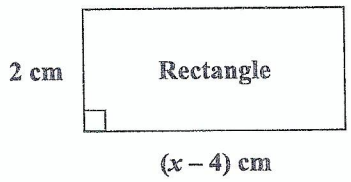
(A) $\frac{2p}{3} \times \frac{3}{p}$

(B) $\frac{2p}{3} \times -\frac{3p}{2}$

(C) $\frac{2p}{3} \times \frac{3}{2p}$

(D) $\frac{2p}{3} \times -\frac{3}{2p}$

Item 22 refers to the following diagram of a rectangle.



22. The area of the rectangle, in cm^2, is x^2. The equation that may be used to find the value of x is

(A) $x^2 = 2(x - 4)$
(B) $x^2 = (x - 2)(x - 4)$
(C) $x^2 = (x - 4)(x + 2)$
(D) $x^2 = 2(x - 4)(x - 2)$

23. Althea normally saves \$$x$ each month, but in June, she saved \$4 more than twice her usual amount. In June she saved

(A) \$ $4x$
(B) \$ $6x$
(C) \$ $2(x + 4)$
(D) \$ $(2x + 4)$

24. If $3 + \frac{x}{2} = 1$, the value of x is

(A) -11
(B) -4
(C) $\frac{1}{4}$
(D) $\frac{1}{2}$

25. $5^{n+1} \times 5^{n+2}$ is the same as

(A) 5^{2n}
(B) 5^{2n+3}
(C) $5^{3(2n)}$
(D) 2×5^{2n}

26. If $a * b = a^2 + b^2$, then the value of $(3 * 4) * 2$ is

(A) $25^2 + 2^2$
(B) $12^2 + 2^2$
(C) $(3 + 4 + 2)^2$
(D) $(3^2 + 4^2) + 2^2$

27. If $|A| = 0$, then A is

(A) an inverse matrix
(B) a singular matrix
(C) an identity matrix
(D) a non-singular matrix

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28. If $A = \begin{pmatrix} 1 & 2 & 5 & 4 \\ 6 & 1 & 3 & 7 \\ -2 & 3 & 2 & 9 \end{pmatrix}$, then the order of A is

(A) 2×3
(B) 3×2
(C) 3×4
(D) 4×3

29. If the vectors $\mathbf{p}$ and $\mathbf{q}$ are $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$ and $\begin{bmatrix} -1 \\ 4 \end{bmatrix}$ respectively, then $-\mathbf{p} - 2\mathbf{q}$ is

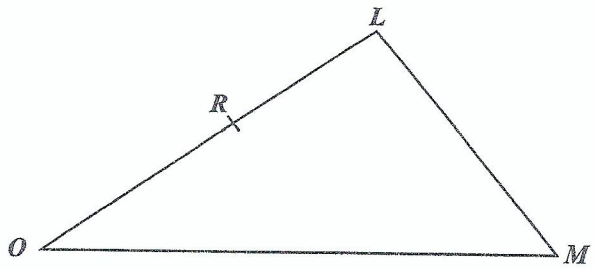
(A) $\begin{bmatrix} -5 \\ 10 \end{bmatrix}$

(B) $\begin{bmatrix} 5 \\ -6 \end{bmatrix}$

(C) $\begin{bmatrix} 2 \\ -6 \end{bmatrix}$

(D) $\begin{bmatrix} -1 \\ -10 \end{bmatrix}$

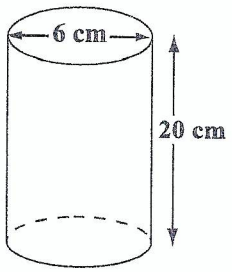
Item 30 refers to the following diagram of triangle OLM, in which R is the midpoint of $\overrightarrow{OL}$. Further, $\overrightarrow{OR} = 3\mathbf{a} - 2\mathbf{b}$ and $\overrightarrow{OM} = 2\mathbf{a} + 3\mathbf{b}$.



30. $\overrightarrow{LM}$ expressed in terms of $\mathbf{a}$ and $\mathbf{b}$ is

(A) $5\mathbf{b} - \mathbf{a}$
(B) $7\mathbf{b} - 4\mathbf{a}$
(C) $4\mathbf{a} + 7\mathbf{b}$
(D) $2(2\mathbf{a} + 3\mathbf{b})$

Item 31 refers to the following diagram which shows a cylinder with diameter 6 cm and height 20 cm.



31. The volume of the cylinder, in cm^3, and in terms of π, is

(A) 60
(B) 120
(C) 180
(D) 720

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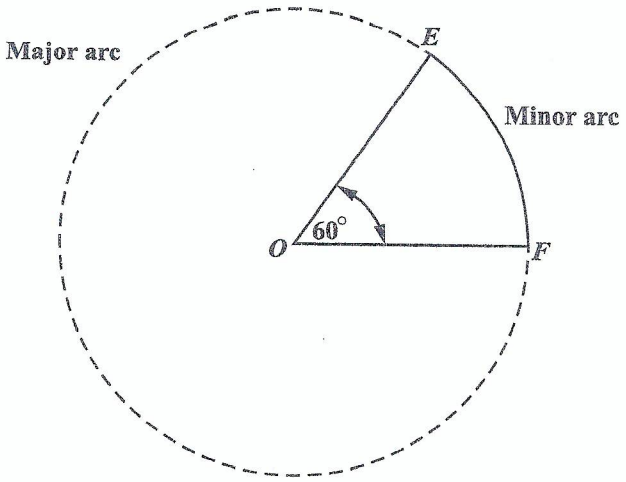
Item 32 refers to the following diagram which shows a circle, centred at O, and with a sector and the major and minor arcs indicated.



32. If the area of the minor sector, EOF, is 103 cm^2, then the area of the circle, in cm^2, is

(A) 206
(B) 412
(C) 515
(D) 618

33. If it took a speedboat 9 hours to travel a distance of 1 080 km, what was its average speed, in kmh^{-1}?

(A) 12
(B) 102
(C) 120
(D) 1 200

34. The lengths of the sides of a triangle are x, $2x$ and $2x$ centimetres. If the perimeter is 20 centimetres, what is the value of x?

(A) 4
(B) 5
(C) 8
(D) 10

35. Fifty guests had 2 glasses of champagne each. Each glass held 150 millilitres. How many litres of champagne were used?

(A) 0.15
(B) 1.5
(C) 15
(D) 150

36. A square has the same perimeter as a rectangle with length 15 centimetres and width 11 centimetres. What is the area of the square, in cm^2?

(A) 26
(B) 52
(C) 165
(D) 169

37. The circumference of a circle is 154 cm.

Given that $\pi = \frac{22}{7}$, the radius of the circle, in centimetres, is

(A) 7
(B) 24.5
(C) 49
(D) 54

38. The distance around a lake is 8 km. On a map, this distance around the lake is represented by a length of 2 cm. The scale on the map is

(A) 1 : 40
(B) 1 : 2 000
(C) 1 : 200 000
(D) 1 : 400 000

Items 39 and 40 refer to the following table which shows the number of books that 58 students bought at a sale.

No. of Books Bought	3	4	5	6	7	8
No. of Students	9	9	13	11	9	7

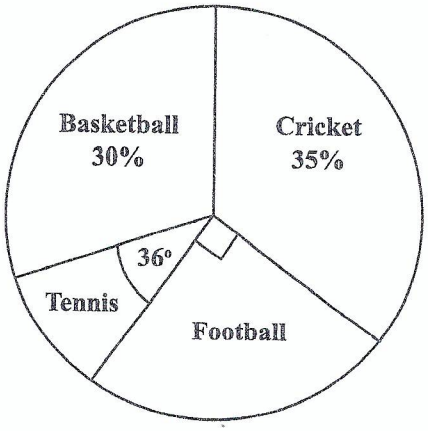
39. The mode of the number of books bought is

(A) 5
(B) 7
(C) 9
(D) 13

40. The median number of books the students bought at the sale is

(A) 4
(B) 5
(C) 6
(D) 13

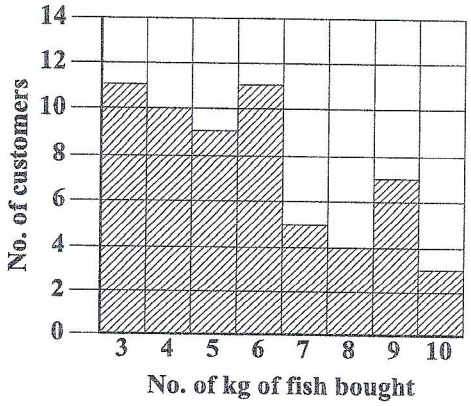
Item 41 refers to the following pie chart which shows the popular games played by a group of students.



41. If 180 students played football, how many students are in the group?

(A) 300
(B) 360
(C) 720
(D) 900

Item 42 refers to the following chart which shows the amount of fish bought, in kg, by the first 60 customers at a fish market.



42. How many customers bought at LEAST 6 kg of fish?

(A) 18
(B) 19
(C) 30
(D) 34

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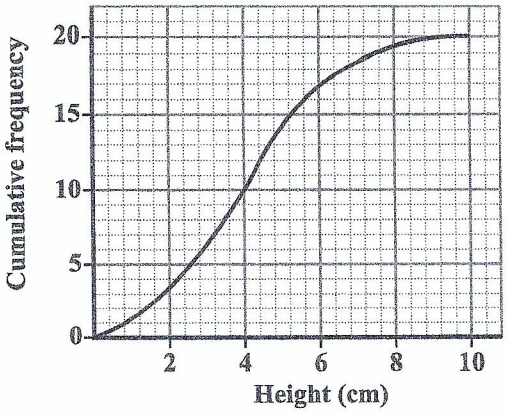
Item 43 refers to the following diagram which shows the cumulative frequency curve of the heights of 20 plants.



43. The interquartile range of the set of measurements is

(A) 2.2 cm
(B) 2.6 cm
(C) 5.0 cm
(D) 5.2 cm

Item 44 refers to the following table which shows the results of a survey of 100 persons from 2 major ethnic groups, *P* and *R*. Respondents were interviewed about their attitude towards Mathematics.

Attitude Towards Mathematics	Ethnicity		Total
	P	*R*	
Positive	25	12	37
Neutral	11	9	20
Negative	24	19	43
Total	60	40	100

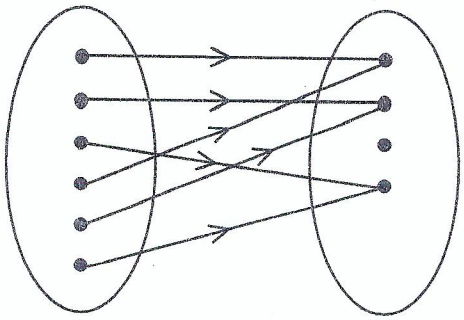
44. A respondent from ethnic group *P* is selected at random. What is the probability that he has a negative attitude towards Mathematics?

(A) $\frac{11}{100}$
(B) $\frac{6}{25}$
(C) $\frac{1}{4}$
(D) $\frac{2}{5}$

45. The point where a linear function crosses the horizontal axis is

(A) the y-intercept
(B) the x-intercept
(C) always positive
(D) always negative

Item 46 refers to the following mapping diagram.



46. The relationship that BEST describes the mapping in the diagram is

(A) one-to-one
(B) one-to-many
(C) many-to-one
(D) many-to-many

47. If $h(x) = \frac{3x-2}{5}$, then $h(-6) =$

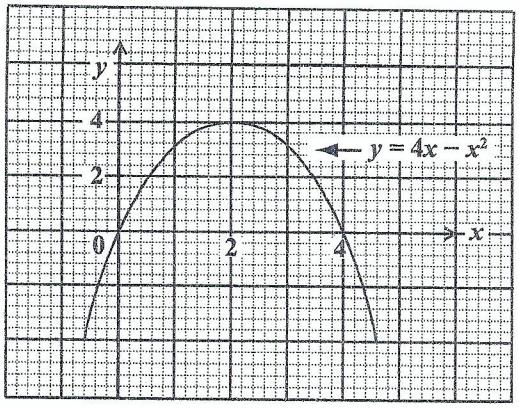
(A) -4

(B) $\frac{-16}{5}$

(C) $\frac{16}{5}$

(D) 4

Items 48 and 49 refer to the following graph of a quadratic function.



48. The maximum point of $y = 4x - x^2$ is

(A) (0, 0)
(B) (0, 4)
(C) (4, 2)
(D) (2, 4)

49. The values of x at the points where $y = 4x - x^2$ intersects $y = 0$ are

(A) $x = 0$ and $x = 4$
(B) $x = 0$ and $x = 2$
(C) $x = 2$ and $x = 4$
(D) $x = 0$ and $x = -4$

50. Which of the following equations represents a straight line?

(A) $xy = 4$
(B) $y + 4 = x^2$
(C) $y + 3 = 2x$
(D) $y = x^2 + 2x - 5$

51. Which of the following sets is represented by the function $f: x \rightarrow x^2 + 3$ where $x \in \{0, 1, 2, 3\}$?

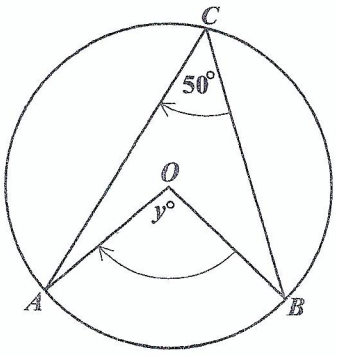
(A) $\{(0, 3), (1, 1), (2, 4), (3, 9)\}$
(B) $\{(0, 3), (1, 4), (2, 5), (3, 6)\}$
(C) $\{(0, 3), (1, 5), (2, 7), (3, 9)\}$
(D) $\{(0, 3), (1, 4), (2, 7), (3, 12)\}$

52. A line L is parallel to the line $2x - 5y - 8 = 0$.

What is the gradient of the line L?

(A) $-\frac{5}{2}$
(B) $\frac{-2}{5}$
(C) $\frac{2}{5}$
(D) 2

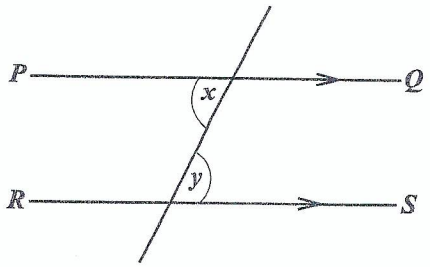
Item **53** refers to the following diagram of a circle.



53. If O is the centre of the circle, then $y°$ is

(A) 25°
(B) 80°
(C) 90°
(D) 100°

Item **54** refers to the following diagram.



54. In the diagram, PQ and RS are parallel. Which of the following BEST describes the relation between x and y?

(A) $x = y$
(B) $x < y$
(C) $x + y = 90°$
(D) $x + y = 180°$

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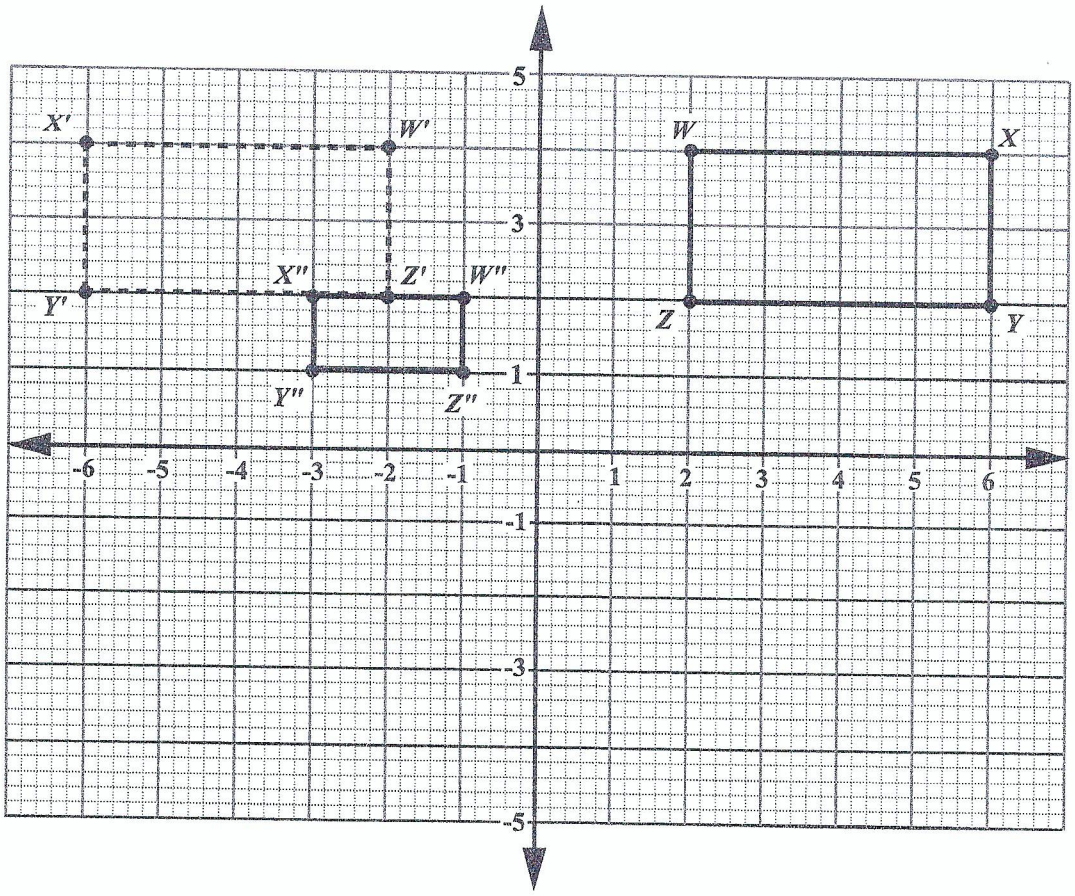
Item 55 refers to the following diagram which shows rectangle $WXYZ$ and its image $W'X'Y'Z'$ and $W''X''Y''Z''$ after it undergoes a composite/double transformation.



55. What sequence of transformations will map rectangle $WXYZ$ onto its image, rectangle $W''X''Y''Z''$?

(A) A translation of 8 units to the left, followed by an enlargement, centred at the origin with scale factor of $\frac{1}{2}$

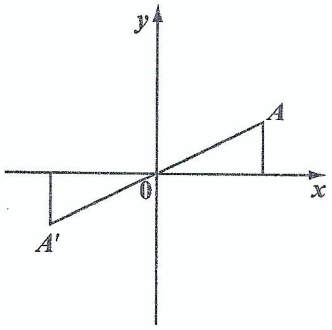
(B) A reflection in the y-axis, followed by an enlargement, centred at the origin with scale factor of $\frac{1}{2}$

(C) A counterclockwise rotation of 90° about the origin, followed by an enlargement, centred at the origin with scale factor of $\frac{1}{2}$

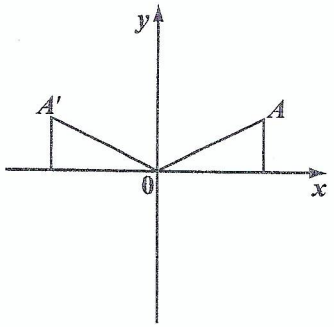
(D) An enlargement, centred at the origin with scale factor of $\frac{1}{2}$, followed by a counterclockwise rotation of 90° about the origin

56. In each of the following diagrams, A' is the image of A. Which of the diagrams shows a reflection in the x-axis?

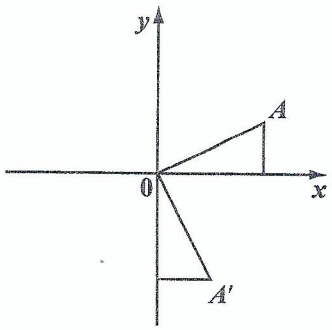
(A)



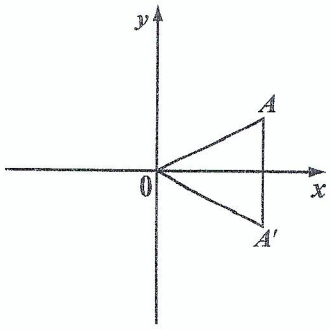
(B)



(C)



(D)



57. In triangle ABC, angle $A = x°$ and angle $B = 2x°$. What is the size of angle C?

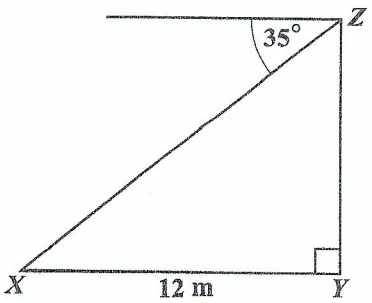
(A) $(180 - 3x)°$

(B) $60°$

(C) $30°$

(D) $\left[\frac{180}{3x}\right]°$

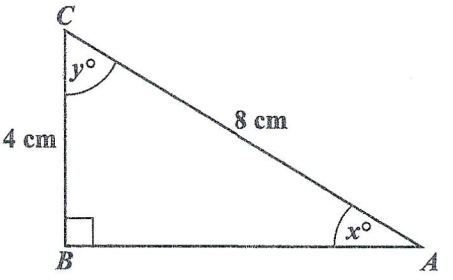
Item **58** refers to the following diagram which shows the angle of depression of a point, X, from Z.



58. The angle of depression of the point X from Z is 35°. If X is 12 metres from Y, then the height YZ, in metres, is

(A) 12 cos 35°
(B) 12 cos 55°
(C) 12 sin 55°
(D) 12 tan 35°

Item **59** refers to the following diagram of a right-angled triangle, *ABC*.



59. In the right-angled triangle above, which trigonometric ratio is equal to $\frac{4}{8}$?

(A) $\sin x$
(B) $\tan y$
(C) $\cos x$
(D) $\tan x$

60. Under the translation $\begin{bmatrix} -2 \\ 3 \end{bmatrix}$, the image of (–5, 3) is

(A) (0, –3)
(B) (1, –2)
(C) (–7, 6)
(D) (3, 6)

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.