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 2019089

TEST CODE 01234010

MAY/JUNE 2019

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

MATHEMATICS

Paper 01 – General Proficiency

1 hour 30 minutes

15 MAY 2019 (p.m.)

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 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

● Ⓑ Ⓒ Ⓓ

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

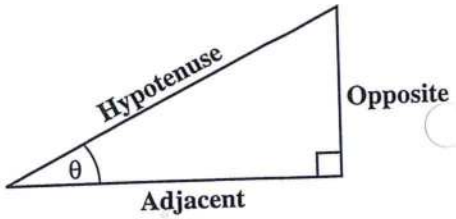
6. If you want to change your answer, erase it completely before you fill in your new choice.
7. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You may return to that item later.
8. You may do any rough work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

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

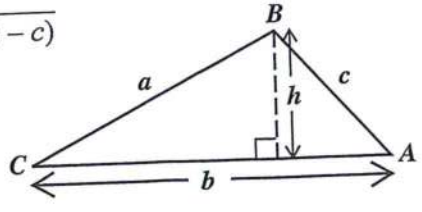
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LIST OF FORMULAE

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	$a^2 = b^2 + c^2 - 2bc\cos A$



GO ON TO THE NEXT PAGE

1. $(-3)^2 + (-2)^2$ is equal to

(A) -13
(B) -10
(C) 13
(D) 25

2. What number when added to $1\frac{1}{3}$ gives 2?

(A) $\frac{1}{3}$
(B) $\frac{2}{3}$
(C) 1
(D) 3

3. $11.1 \div 0.01$ is equal to

(A) 110
(B) 111
(C) 1 100
(D) 1 110

4. $12\frac{1}{2}\%$ of a sum of money is \$40.

What is the sum of money?

(A) \$ 45
(B) \$ 320
(C) \$ 500
(D) \$4 500

5. A test was marked out of 80. A boy scored 60% of the marks on the test. How many marks did he score?

(A) 20
(B) 48
(C) 60
(D) 75

6. The square root of 181 lies between

(A) 13 and 14
(B) 45 and 46
(C) 9 and 11
(D) 11 and 13

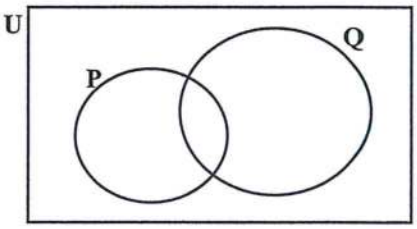
7. Which of the following sets is defined by $\{x \in Z: -2 \leq x \leq 4\}$?

(A) $\{0, 1, 2, 3, 4\}$
(B) $\{1, 2, 3, 4\}$
(C) $\{-1, 0, 1, 2, 3\}$
(D) $\{-2, -1, 0, 1, 2, 3, 4\}$

8. If $Q = \{a, b, c\}$, how many subsets can be obtained from the set Q?

(A) $2 + 3$
(B) 2×3
(C) 3^2
(D) 2^3

Item **9** refers to the following Venn diagram.



9. In the Venn diagram, $n(P) = 5$, $n(Q) = 9$ and $n(P \cup Q) = 10$. What is $n(P \cap Q)$?

(A) 4
(B) 6
(C) 14
(D) 24

GO ON TO THE NEXT PAGE

Item **10** refers to the following information.

P = {prime numbers}
Q = {odd numbers}
R = {even numbers}

10. Which of the following sets is empty?

(A) $P \cap R$
(B) $Q \cap R$
(C) $P \cap Q$
(D) $P \cup Q$

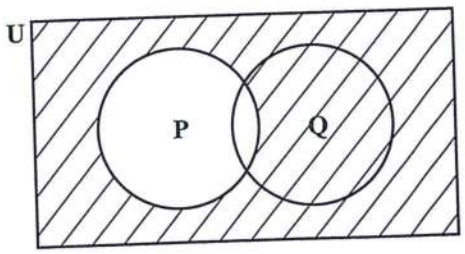
121

11. If $P = \{2, 3, 5, 7\}$,
$Q = \{2, 3, 6\}$ and
$S = \{2, 4, 5\}$

then $P \cap Q \cap S =$

(A) {2}
(B) {2, 3}
(C) {2, 3, 5}
(D) {2, 3, 4, 5, 6, 7}

Item **12** refers to the following Venn diagram.



0037

12. In the Venn diagram, the shaded area represents

(A) P'
(B) $(P \cup Q)'$
(C) $Q \cup P'$
(D) $Q \cap P'$

13. If TT$6.00 is equivalent to US$1.00, then TT$15.00 in US dollars is

(A) $0.25
(B) $0.40
(C) $2.50
(D) $4.00

14. If $7 000.00 is borrowed at the rate of 5% per annum for 3 years, the simple interest is

(A) $ 105
(B) $ 210
(C) $ 370
(D) $1 050

15. A dress which costs $180.00 is being sold at a discount of 10%. The amount of the discount is

(A) $ 1.80
(B) $ 10.00
(C) $ 18.00
(D) $170.00

16. The value of a plot of land is $18 000.00. Land tax is charged at the rate of $0.70 per $100.00 value. What is the TOTAL amount of tax paid for the land?

(A) $110.00
(B) $126.00
(C) $180.70
(D) $257.15

17. At the end of any year a car is worth 5% less than what it was worth at the beginning of the year. If a car was worth \$9 500 in December 2016, then its value in January 2016 was

(A) \$ 9 995
(B) \$10 000
(C) \$10 025
(D) \$12 000

18. A loan of \$8 000 was repaid in 24 equal monthly instalments of \$400. The rate of interest on the loan was

(A) 5%

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

(C) $16\frac{1}{3}\%$

(D) 20%

19. A dinner at a restaurant was advertised at \$60.00 plus 18% tax. The total bill for this dinner was

(A) \$60.00
(B) \$70.80
(C) \$78.00
(D) \$81.60

20. At a sale, each book was marked \$3.00 off the original price. Daniel paid \$46.00 for two books that had the same sale price. What was the **original** cost of ONE of his books?

(A) \$20.00
(B) \$21.50
(C) \$24.50
(D) \$26.00

21. $\frac{1}{5x} + \frac{2}{3x}$ is equal to

(A) $\frac{3}{8x^2}$

(B) $\frac{3}{8x}$

(C) $\frac{13}{15x^2}$

(D) $\frac{13}{15x}$

22. When 5 is added to a certain number and the result is multiplied by 3, the final answer is 27. What is the **original** number?

(A) 4
(B) 12
(C) 14
(D) 19

23. What is the value of $\frac{x^2 + 3y}{xy}$, if $x = 4$ and $y = 2$?

(A) $1\frac{3}{4}$

(B) $2\frac{1}{2}$

(C) $2\frac{3}{8}$

(D) $2\frac{3}{4}$

24. If x is an integer that satisfies the inequality $4 < 2x \leq 6$, then

(A) $2 < x \leq 3$
(B) $-2 < x \leq 3$
(C) $-3 < x \leq 2$
(D) $-3 \leq x < -2$

25. The sum of 2 positive numbers (p and q) is 32. Their difference is 12. What is the SMALLER number?

(A) 10
(B) 12
(C) 20
(D) 22

26. $3x^2 \times 2x^3 =$

(A) $6x$
(B) $6x^5$
(C) $6x^6$
(D) $72x^5$

27. Two matrices, A and B, are conformable for multiplication (A × B) if

(A) the number of rows in A is equal to the number of columns in B
(B) the number of columns in A is equal to the number of rows in B
(C) both matrices are of the same order
(D) both matrices are rectangular

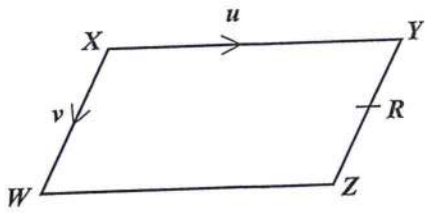
28. The determinant of the identity matrix is

(A) one
(B) zero
(C) undefined
(D) negative one

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) $\begin{bmatrix} 1 \\ 10 \end{bmatrix}$
(B) $\begin{bmatrix} 1 \\ -6 \end{bmatrix}$
(C) $\begin{bmatrix} 5 \\ 10 \end{bmatrix}$
(D) $\begin{bmatrix} 5 \\ -6 \end{bmatrix}$

Item **30** refers to the following parallelogram, $WXYZ$. In the parallelogram, $\overrightarrow{XY} = u$ and $\overrightarrow{XW} = v$. R is the midpoint of YZ.



30. $\overrightarrow{WR}$, expressed in terms of $\boldsymbol{u}$ and $\boldsymbol{v}$, is

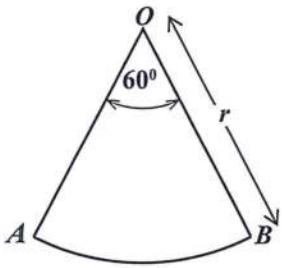
(A) $u - \frac{1}{2}v$
(B) $u + \frac{1}{2}v$
(C) $-u + \frac{1}{2}v$
(D) $-\frac{1}{2}v - u$

31. Given that 1 millimetre = $\frac{1}{1000}$ metres,

2 500 millimetres in metres is

(A) 0.25
(B) 2.5
(C) 25
(D) 250

Item **32** refers to the following diagram which shows a sector of a circle, AOB, such that $AOB = 60°$ and OB is r units long.



32. The area of AOB is

(A) $\frac{1}{6}\pi r^2$
(B) $\frac{1}{6}\pi r$
(C) $\frac{1}{3}\pi r^2$
(D) $\frac{1}{3}\pi r$

33. The volume, in cm^3, of a cube of edge 3 cm is

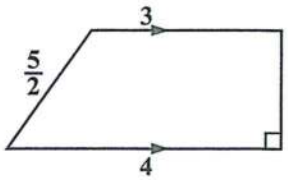
(A) 9
(B) 18
(C) 27
(D) 54

34. The perimeter of a square is 48 cm. What is the area, in cm^2?

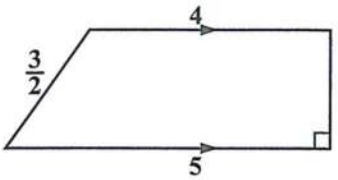
(A) 36
(B) 72
(C) 108
(D) 144

35. Which of the following figures, **not drawn to scale**, has an area equal to $\frac{1}{2}(5 + 4) \times 2$ square units?

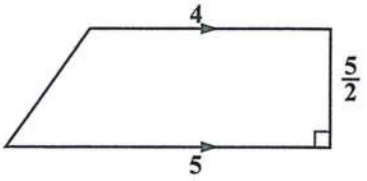
(A)



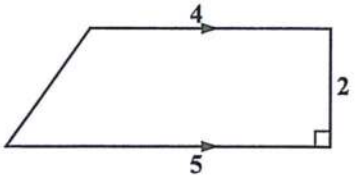
(B)



(C)



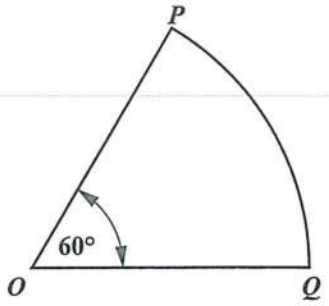
(D)



36. The area of a rectangle is 53.6 cm^2. If the length is multiplied by four and the width is halved, the area would then be

(A) 26.8 cm^2
(B) 53.6 cm^2
(C) 107.2 cm^2
(D) 214.4 cm^2

Item 37 refers to the following diagram which shows a sector of a circle, with centre O.



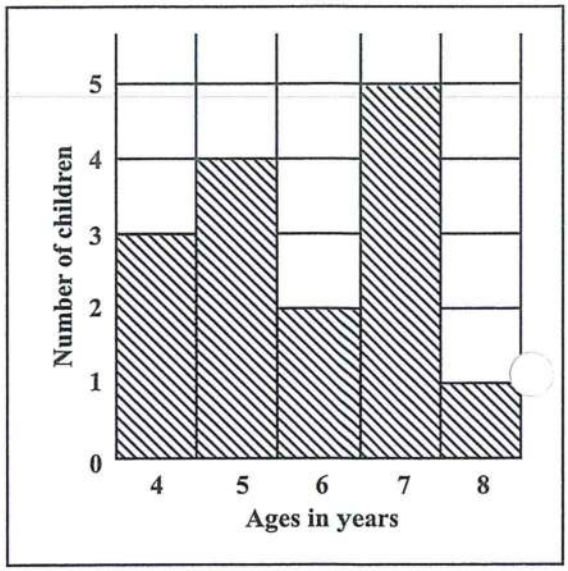
37. If the length of the minor arc PQ is 8 cm, what is the length of the circumference of the circle?

(A) 16 cm
(B) 24 cm
(C) 48 cm
(D) 64 cm

38. The area of a triangle is 30 cm² and its base is 10 cm. What is the height, in cm, of the triangle?

(A) 6
(B) 12
(C) 13
(D) 17

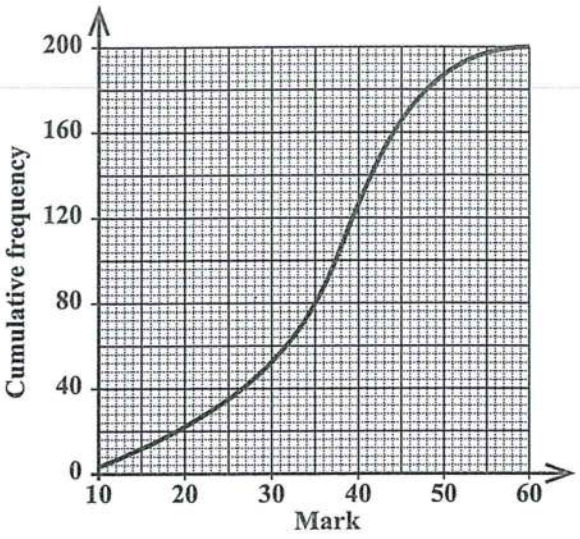
Item 39 refers to the following histogram which shows the number of children aged 4, 5, 6, 7 and 8 who took part in a survey.



39. What was the modal age?

(A) 5
(B) 6
(C) 7
(D) 8

Items 40–42 refer to the following diagram which shows the cumulative frequency curve based on the marks of 200 students who took a driving test.



40. The median mark scored by the 200 students is

(A) 30.0
(B) 37.5
(C) 40.0
(D) 100.0

41. What is the interquartile range of the marks scored by the 200 students?

(A) 12.5
(B) 30.0
(C) 42.5
(D) 100.0

42. If 38% of the students passed the test, what was the pass mark?

(A) 20
(B) 40
(C) 76
(D) 124

43. The following table shows the frequency of scores obtained by students in a test.

121

Scores	2	3	5	6	8	10
No. of Students	8	4	6	3	9	2

The range of the scores is

(A) 2
(B) 7
(C) 8
(D) 10

Item 44 refers to the following two-way table, which shows the mode of transportation to school on a particular day, for a group of 200 students.

	Bus	Taxi	Walk	Total
Male	30	50	28	108
Female	44	16	32	92
Total	74	66	60	200

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44. A male student is picked at random from the group. What is the probability that he does NOT walk to school on that day?

(A) $\frac{2}{5}$

(B) $\frac{13}{18}$

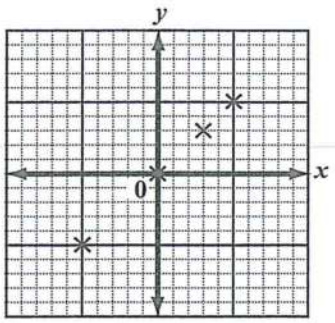
(C) $\frac{20}{27}$

(D) $\frac{7}{10}$

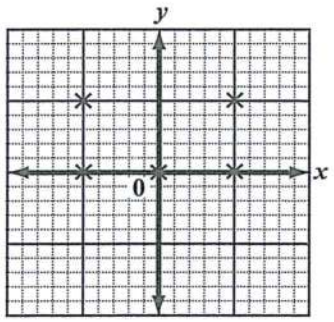


45. Which of the following represents the graph of a function?

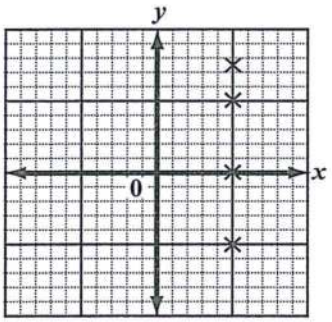
(A)



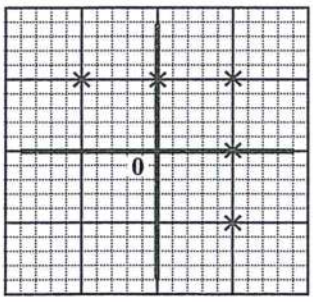
(B)



(C)



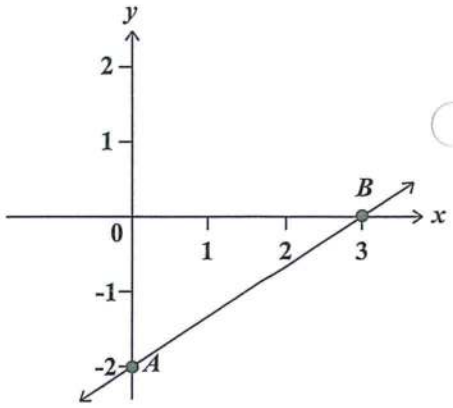
(D)



46. If $f(x) = 2x^2 - 1$, then $f(-3) =$

(A) –32
(B) –19
(C) 17
(D) 35

Item 47 refers to the following graph of a straight line.



47. The straight line AB cuts the y axis at

(A) (0, 3)
(B) (0, 2)
(C) (3, –2)
(D) (0, –2)

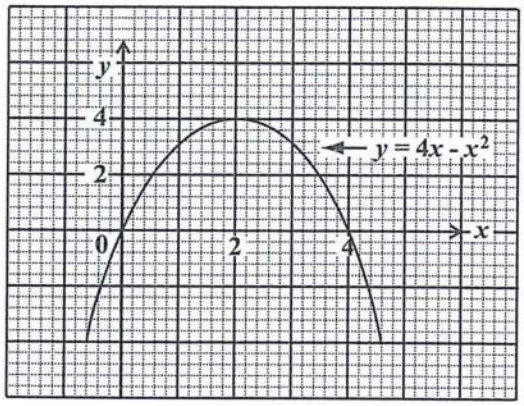
48. The equation of the line which passes through the point (0, 5) and has a gradient of 4 is

(A) $y = 4x$
(B) $y = 5x$
(C) $y = 4x + 5$
(D) $y = 5x + 4$

49. The range of $f: x \rightarrow x^3$ for the domain $\{-2, -1, 0, 1, 2\}$ is

(A) $\{8, 1, 0, 1, 8\}$
(B) $\{6, 3, 0, 3, 6\}$
(C) $\{-6, -3, 0, 3, 6\}$
(D) $\{-8, -1, 0, 1, 8\}$

Items **50–51** refer to the following graph of a function.



50. The values of x for which $y = 4x - x^2$ intersects $y = 0$ are

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

51. The coordinates of the turning point of $y = 4x - x^2$ are

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

52. Which of the following pairs of lines is perpendicular?

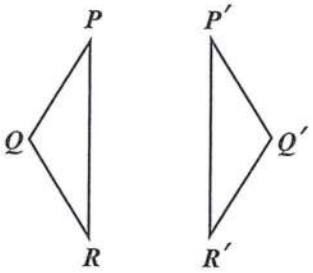
(A) $2y = -3x - 8$
$3x - 2y = -8$

(B) $y = 2x + 1$
$y = 2x - 6$

(C) $y = -4x + 10$
$4y = x + 1$

(D) $x - 2y = -1$
$3x + 5y = 8$

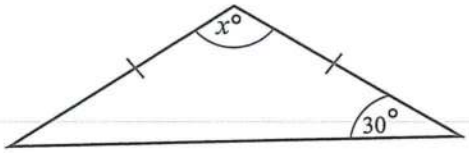
Item **53** refers to the following diagram of a transformation.



53. What transformation maps PQR onto $P'Q'R'$?

(A) Enlargement
(B) Rotation
(C) Translation
(D) Reflection

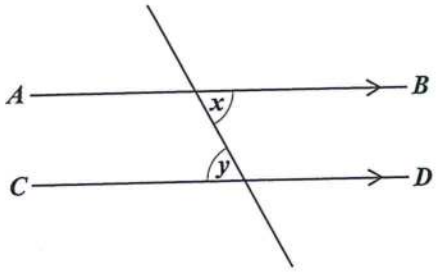
Item **54** refers to the following diagram of an isosceles triangle.



54. In the triangle, the value of x is

(A) 30°
(B) 60°
(C) 120°
(D) 150°

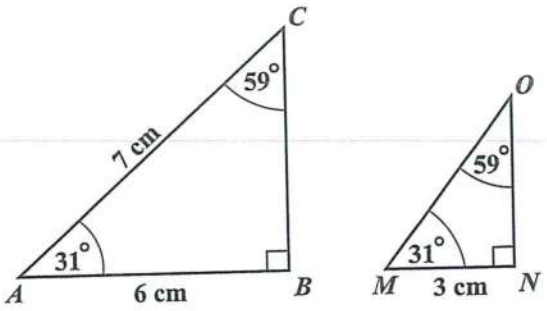
Item **55** refers to the following transversal diagram, in which the lines AB and CD are parallel.



55. Which of the following BEST describes the relation between x and y?

(A) $x > y$
(B) $x = y$
(C) $x + y > 2x$
(D) $x + y < 2x$

Item **56** refers to the following pair of similar triangles.



56. The length on MO, in cm, is

(A) 2.5
(B) 3.0
(C) 3.5
(D) 7.0

57. The image of a point $P(1, 2)$ under a translation is $P'(-5, -4)$. What is the translation vector?

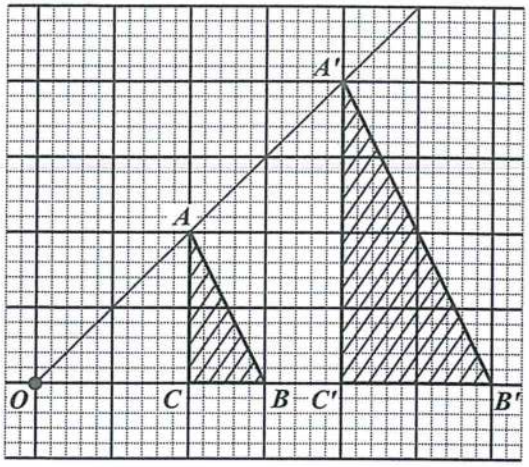
(A) $\begin{bmatrix} -6 \\ -6 \end{bmatrix}$

(B) $\begin{bmatrix} -4 \\ -2 \end{bmatrix}$

(C) $\begin{bmatrix} 4 \\ 2 \end{bmatrix}$

(D) $\begin{bmatrix} 6 \\ 6 \end{bmatrix}$

Item **58** refers to the following diagram.



58. OAA', OBB' and OCC' are straight lines. $\Delta\ ABC$ is mapped onto $\Delta\ A'B'C'$ by an enlargement with centre O. What is the scale factor of the enlargement?

(A) $\frac{1}{2}$

(B) $-\frac{1}{2}$

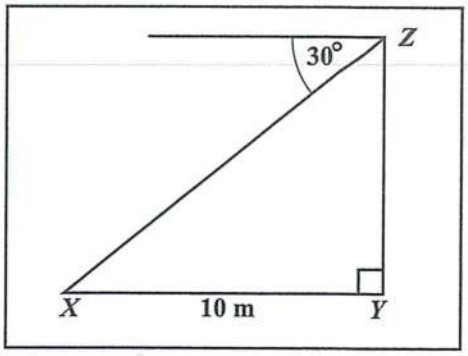
(C) 2

(D) –2

59. A plane is flying in a direction of 045° and changes course in a clockwise direction to 135°. The angle through which the plane turns is

(A) 45°
(B) 90°
(C) 135°
(D) 270°

Item **60** refers to the following diagram, **not drawn to scale**, which shows that the angle of depression of a point X from Z is 30°.



60. If X is 10 metres from Y, the height of YZ, in metres, is

(A) 10 tan 30°
(B) 10 sin 30°
(C) 10 cos 30°
(D) 10 cos 60°

END OF TEST

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