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 2020018

TEST CODE 01234010

JANUARY 2020

# CARIBBEAN EXAMINATIONS COUNCIL

## CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

## MATHEMATICS

**Paper 01 – General Proficiency**

*1 hour 30 minutes*

**06 JANUARY 2020 (p.m.)**

329

**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

(A) (B) (C) (D)

A001

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. Figures are not necessarily drawn to scale.
10. Calculators and mathematical tables are NOT allowed for this paper.

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

1. What percentage of 40 is 8?

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

2. $\left[\frac{2}{3}\right]^{-2}$ is equal to

(A) $\frac{4}{9}$
(B) $\frac{4}{6}$
(C) $\frac{6}{4}$
(D) $\frac{9}{4}$

3. $\sqrt{17^2 - 15^2} =$

(A) 1
(B) 2
(C) 8
(D) 16

4. The square root of 191 lies between

(A) 11 and 13
(B) 12 and 13
(C) 13 and 14
(D) 45 and 46

5. $99 \times 101$ has the same value as

(A) $(99 \times 100) + 1$
(B) $(99 \times 100)(99 \times 1)$
(C) $(99 \times 100) - (99 \times 1)$
(D) $(99 \times 100) + (99 \times 1)$

6. There are 40 students in a class. Girls make up 60% of the class. 25% of the girls wear glasses. How many girls in the class wear glasses?

(A) 6
(B) 8
(C) 10
(D) 15

7. If $n(A) = m$, then the number of subsets of $A$ can be expressed as

(A) $2^m$
(B) $m^2$
(C) $2^{2m}$
(D) $2m^2$

8. Which of the following statements describes the set of integers greater than $-3$ but less than 6?

(A) $\{x : -3 > x > 6, x \in Z\}$
(B) $\{x : -3 \geq x \geq 6, x \in Z\}$
(C) $\{x : -3 \leq x \leq 6, x \in Z\}$
(D) $\{x : -3 < x < 6, x \in Z\}$

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

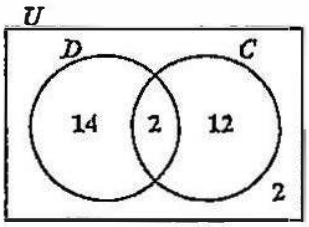
(A) $E$ = {even numbers} and $F$ = {odd numbers}
(B) $P$ = {multiples of 2} and $Q$ = {multiples of 3}
(C) $G$ = {multiples of five} and $H$ = {factors of 20}
(D) $X$ = {whole numbers} and $Y$ = {rational numbers}

10. Given $A$ = {1, 3, 6, 8, 9, 12, 15} and $B$ = {6, 9, 12}, which of the following statements is true?

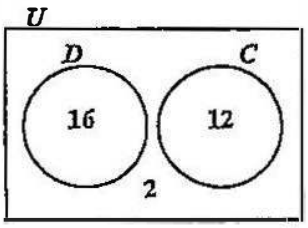
(A) $B \subset A$
(B) $A \cap B = \varnothing$
(C) $A$ and $B$ are disjoint sets
(D) $B$ is the complement of $A$

11. The 30 students in Teacher May's class have either a dog ($D$) or a cat ($C$), or none of the two. ALL the students who have a cat also have a dog. If $n(C) = 12$ and $n(D) = 16$, which of the following Venn diagrams below correctly represents this information?

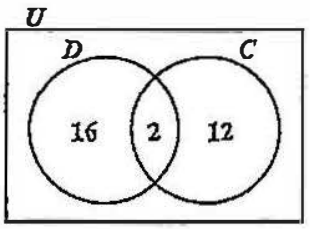
(A)



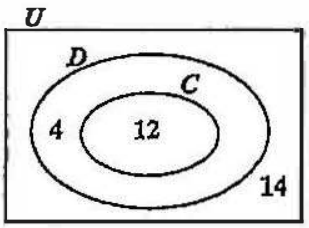

(B)




(C)

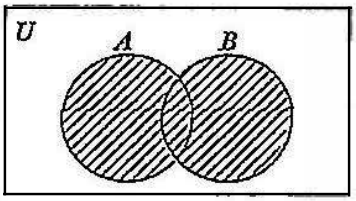



(D)

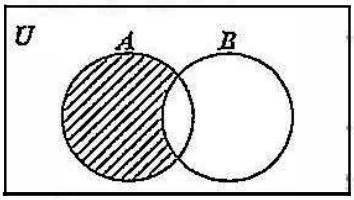


12. In which of the following Venn diagrams is the region $A \cap B'$ shaded?

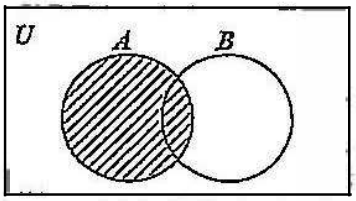
(A)



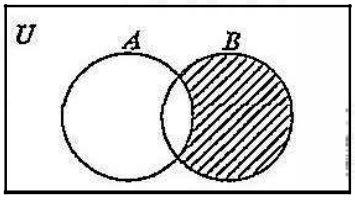

(B)




(C)




(D)




13. If EC \$2.50 is equivalent to US \$1.00, then EC \$20.00 in US dollars is

(A) \$ 5.00
(B) \$ 8.00
(C) \$50.00
(D) \$80.00

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

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

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

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

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

15. Given that $y$ varies directly as $x$, and $y = 19$ when $x = 152$, which of the following equations represents the relationship between $x$ and $y$?

(A) $y = 8x$

(B) $y = \dfrac{1}{133}x$

(C) $y = \dfrac{1}{8}x$

(D) $y = x - 133$

16. A man's annual salary is \$45 000. His tax free allowances total \$13 000. He has to pay a tax of 20% on his taxable income.

The tax payable is

(A) \$ 2 600
(B) \$ 6 400
(C) \$ 9 000
(D) \$11 600

17. A man pays 60 cents for every 200 $m^3$ of gas used, plus a fixed charge of \$13.75. How much does he pay when he uses 55 000 $m^3$ of gas?

(A) \$178.75
(B) \$175.25
(C) \$165.00
(D) \$151.25

18. A car presently valued at \$12 000 depreciates at the rate of 10% per annum. What will be the value of the car one year later?

(A) \$10 800
(B) \$11 800
(C) \$11 880
(D) \$13 200

19. A dinner at a restaurant was advertised at \$60 plus 18% tax. The TOTAL bill for this dinner was

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

20. A store offers a discount of 10% to customers who spend more than \$20. If a customer's total bill is \$80, what will he actually pay?

(A) \$60
(B) \$70
(C) \$72
(D) \$74

21. $\frac{4}{5x} + \frac{2}{5x} =$

(A) $\frac{6}{5x}$

(B) $\frac{6}{10x}$

(C) $\frac{8}{25x}$

(D) $\frac{6}{25x}$

22. If $m * n = \sqrt{m^3 - n^2}$, then $5 * 2 =$

(A) 2

(B) $\sqrt{11}$

(C) $\sqrt{34}$

(D) 11

23. Given that $3(x-1)-2(x-1)=7$, the value of $x$ is

(A) 6
(B) 7
(C) 8
(D) 9

24. $-(-2q)-3q =$

(A) $-6q$
(B) $-5q$
(C) $-q$
(D) $5q$

25. If $x = 4$ and $y = 2$, then the value of $\frac{x^2 + 3y}{xy}$ is

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

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

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

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

26. If $\frac{p}{5} = 20$, then $p =$

(A) $20 - 5$
(B) $20 + 5$
(C) $20 \div 5$
(D) $20 \times 5$

Item 27 refers to the following vectors, p and q.

$$p = \begin{bmatrix} 3 \\ 7 \end{bmatrix} \quad q = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$$

27. The vector $p - q$ is represented by

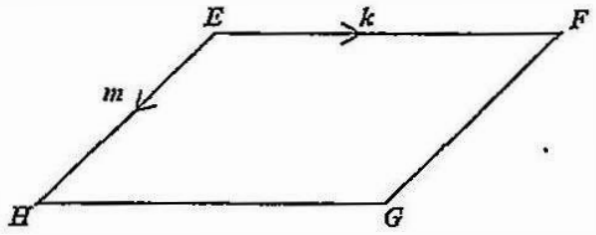
(A) $\begin{bmatrix} 1 \\ 12 \end{bmatrix}$

(B) $\begin{bmatrix} 5 \\ 12 \end{bmatrix}$

(C) $\begin{bmatrix} 5 \\ 2 \end{bmatrix}$

(D) $\begin{bmatrix} 1 \\ 5 \end{bmatrix}$

Item 28 refers to the following diagram of a parallelogram, in which EF is parallel to $HG$, $EH$ is parallel to $FG$, $\overrightarrow{EF} = k$ and $\overrightarrow{EH} = m$.




28. $\overrightarrow{EG}$ expressed in terms of $k$ and $m$ is

(A) $k + m$
(B) $k - m$
(C) $m - k$
(D) $-m - k$

29. If $5\begin{bmatrix} x \\ y \end{bmatrix} = 4\begin{bmatrix} 10 \\ 20 \end{bmatrix}$, then the values of $x$ and $y$ are

(A) $x = 4,\ y = 5$
(B) $x = 8,\ y = 16$
(C) $x = 2.5,\ y = 4$
(D) $x = 10,\ y = 20$

Item 30 refers to the following matrices, $A$ and $B$.

$$A = \begin{bmatrix} 1 & 3 & -3 \\ 3 & 0 & 5 \end{bmatrix}, \quad B = \begin{bmatrix} 3 & 0 \\ 2 & 1 \\ 0 & 5 \end{bmatrix}$$

30. The matrix product $AB$ is

(A) $\begin{bmatrix} 9 & -12 \\ 9 & 25 \end{bmatrix}$

(B) $\begin{bmatrix} -6 & -12 \\ 9 & 25 \end{bmatrix}$

(C) $\begin{bmatrix} 9 & -18 \\ 9 & 25 \end{bmatrix}$

(D) $\begin{bmatrix} -12 & -6 \\ 25 & 9 \end{bmatrix}$

31. The volume of a cube whose edge is 6 cm long is

(A) 18 $cm^3$
(B) 36 $cm^3$
(C) 72 $cm^3$
(D) 216 $cm^3$

32. 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

33. 2 500 millimetres expressed in metres is

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

34. An aircraft leaves $A$ at 16:00 hours and arrives at $B$ at 19:30 hours, travelling at an average speed of 550 kilometres per hour. $A$ and $B$ are in the same time zone. The distance from $A$ to $B$, in kilometres, is

(A) 907.5
(B) 962.5
(C) 1 815
(D) 1 925

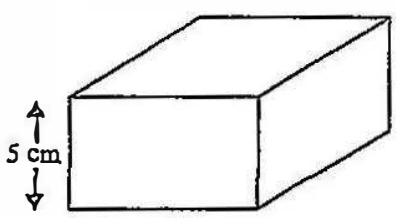
35. In a rectangular garden plot, 15 m long and 12 m wide, an area of 80 $m^2$ is used for a vegetable garden. What area of the plot is NOT used for vegetable gardening?

(A) 26 $m^2$
(B) 100 $m^2$
(C) 134 $m^2$
(D) 260 $m^2$

36. 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

Item 37 refers to the follwoing diagram, not drawn to scale, which shows a cuboid.




37. The volume of the cuboid is 320 $cm^3$ and the height is 5 cm. If the cuboid has a square base, what is the length of one side of the base?

(A) 8 cm
(B) 16 cm
(C) 32 cm
(D) 64 cm

38. A square has the same area as a rectangle with sides of length 9 cm and 16 cm. What is the length of the side of the square?

(A) 9 cm
(B) 12 cm
(C) 12.5 cm
(D) 75 cm

39. The median of the numbers

1, 1, 5, 5, 6, 7, 7, 7, 7, 8 is

(A) 5.4
(B) 6
(C) 6.5
(D) 7

Item 40 refers to the following frequency table which shows the time taken by 20 students to solve a maths problem.

| Time, $x$ (minutes) | Frequency |
|---|---|
| 0–2 | 5 |
| 3–5 | 9 |
| 6–8 | 2 |
| 9–11 | 4 |

40. The lower class boundary of the interval "3–5" is

(A) 2.0
(B) 2.5
(C) 3.0
(D) 5.5

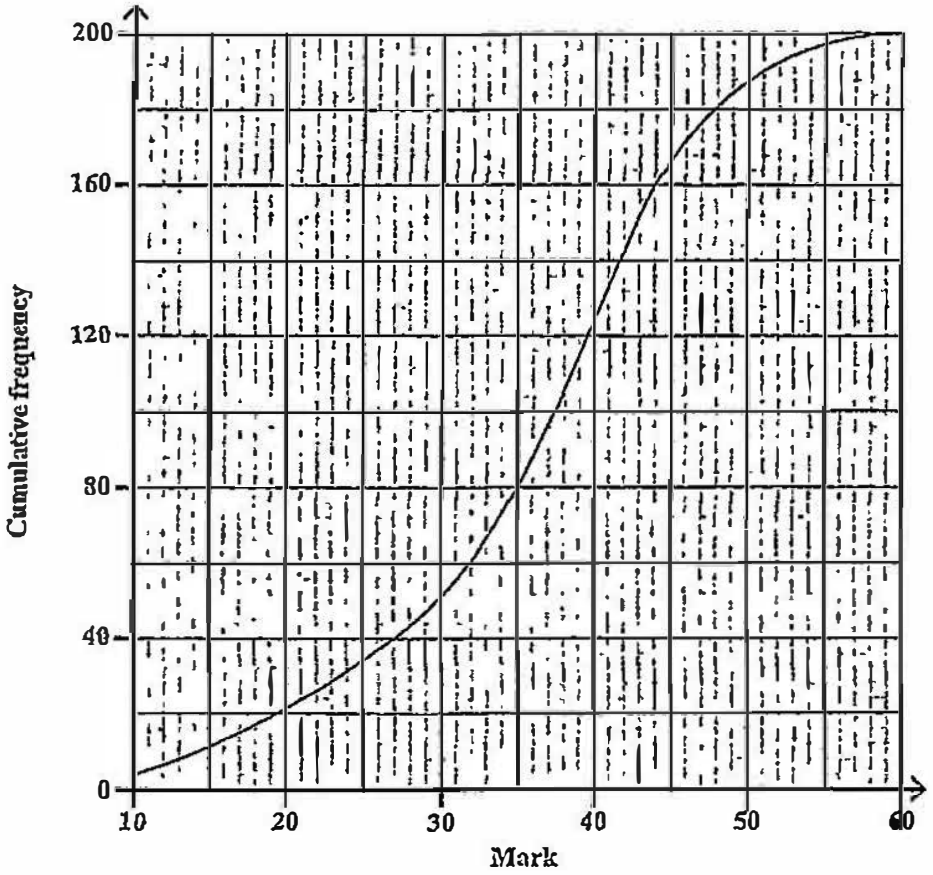
Item 41 refers to the following table which shows the frequency of scores obtained by students in a test.

| Scores | 2 | 3 | 5 | 6 | 8 | 11 |
|---|---|---|---|---|---|---|
| Students | 8 | 4 | 6 | 3 | 12 | 2 |

41. The modal score is

(A) 8
(B) 9
(C) 10
(D) 12

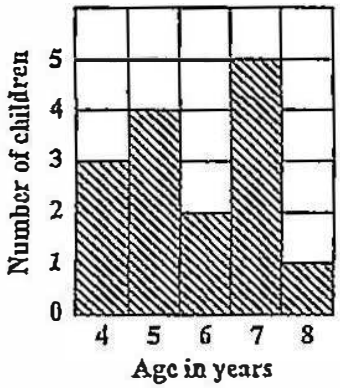
Item 42 refers to the following diagram of a cumulative frequency curve which shows the mark obtained by 200 students on a test.




42. The median of the marks scored by the 200 students is

(A) 30.0
(B) 35.0
(C) 37.5
(D) 100.0

Item 43 refers to the following bar chart which shows the ages of children who took part in a survey.




43. How many children took part in the survey?

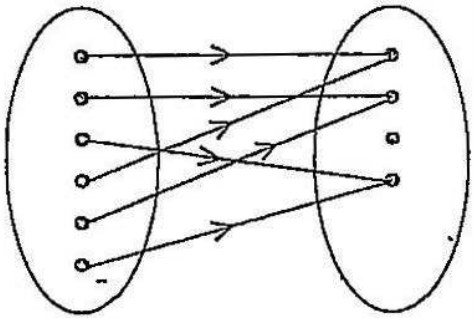
(A) 5
(B) 15
(C) 75
(D) 87

44. Six hundred students write an examination. The probability of a randomly selected student failing the examination is $\frac{1}{5}$.

How many students are expected to pass?

(A) 100
(B) 120
(C) 480
(D) 500

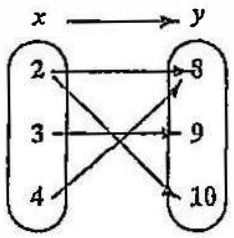
Item 45 refers to the following mapping diagram.



45. 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

Item 46 refers to the following arrow diagram.




46. The arrow diagram above BEST describes the relation

(A) $y$ is less than $x$
(B) $y$ is a factor of $x$
(C) $x$ is a multiple of $y$
(D) $x$ is a factor of $y$

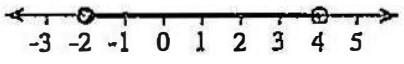
47. Which of the following line graphs represents $\{x: -2 < x \leq 4\}$?

(A)



(B)

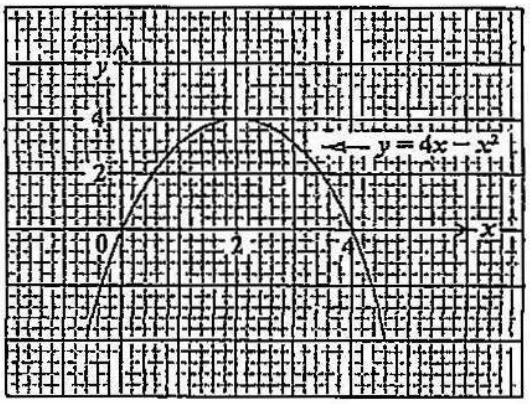


(C)



(D)



Items 48–49 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) (2, 4)
(D) (4, 2)

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 represents the equation of a straight line?

(A) $y = \frac{4}{x}$

(B) $y = 2x + 3$

(C) $y = x^2 - 4$

(D) $y = x^2 + 2x - 5$

51. Which of the following sets is represented by the function $f: x \to x^2 + 3$ 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 $L$?

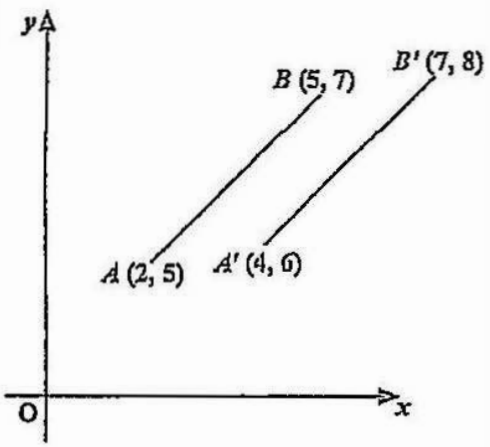
(A) $-\frac{5}{2}$

(B) $-\frac{2}{5}$

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

(D) 2

Item 53 refers to the following diagram which shows a translation.




53. In the diagram, the translation by which $AB$ is mapped onto $A'B'$ is represented by

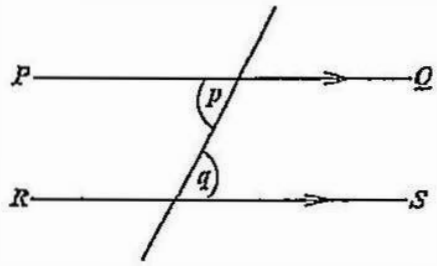
(A) $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

(B) $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$

(C) $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$

(D) $\begin{bmatrix} 5 \\ 3 \end{bmatrix}$

Item 54 refers to the following diagram.

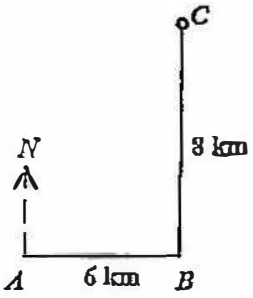



54. In the diagram $PQ$ and $RS$ are parallel. Which of the following BEST describes the relation between $p$ and $q$?

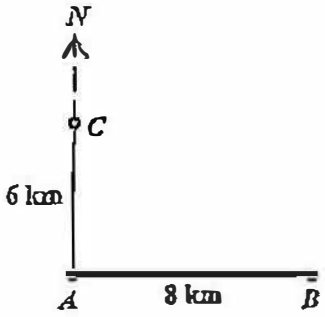
(A) $p = q$
(B) $p < q$
(C) $p - q = 180°$
(D) $p + q = 180°$

55. A ship sailed 8 km due east from $A$ to $B$. It then sailed 6 km due north to $C$. Which of the following diagrams BEST represents the path of the ship?

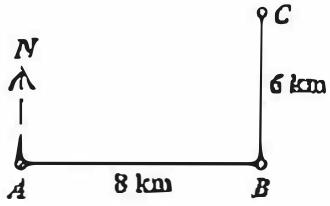
(A)



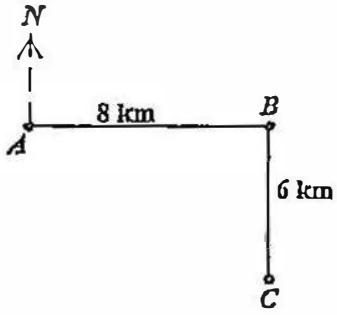

(B)




(C)

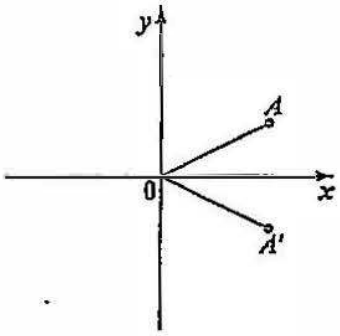



(D)

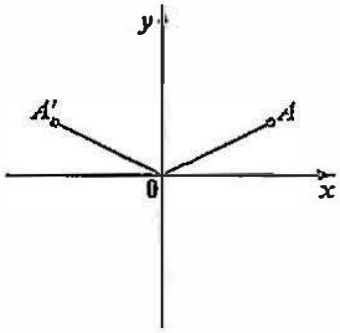



56. In each of the following diagrams, $OA'$ is the image of $OA$. Which of the diagrams shows a reflection in the $y$-axis?

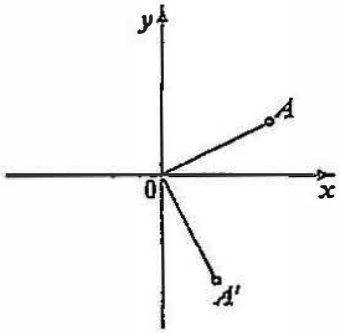
(A)



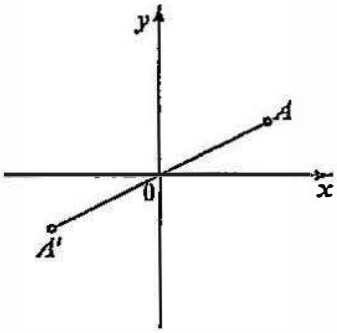

(B)




(C)




(D)



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

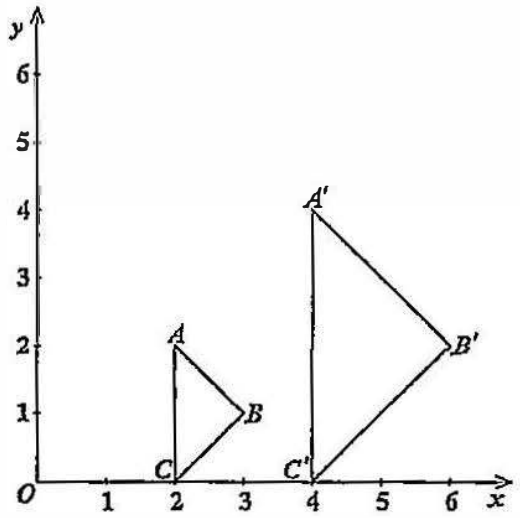
(A) $30°$

(B) $60°$

(C) $\left[\frac{180}{3x}\right]°$

(D) $(180 - 3x)°$

Item 58 refers to the following diagram which shows an enlargement.




58. In the diagram, triangle $ABC$ is mapped onto triangle $A'B'C'$ where $O$ is the centre of enlargement. What is the scale factor of the enlargement?

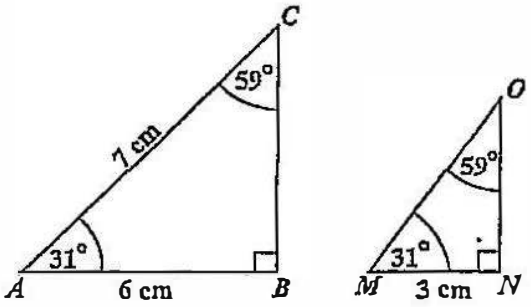
(A) $\frac{1}{2}$

(B) $-2$

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

(D) $2$

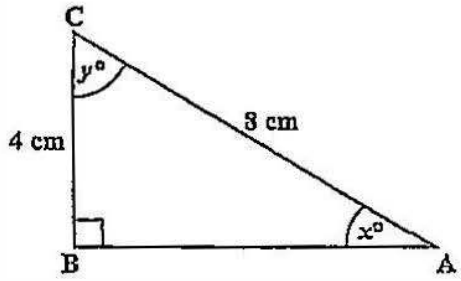
Item 59 refers to the following pair of similar triangles.




59. The length of $MO$, in centimetres, is

(A) 3
(B) 3.5
(C) 6
(D) 7

Item 60 refers to the following right-angled triangle.




60. Which trigonometric ratio is equal to $\frac{4}{8}$?

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

END OF TEST

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