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

(A) −13
(B) −10
(C) 5
(D) 13

2. When 0.45 is written as a common fraction in its simplest form, the result is

(A) $\frac{9}{20}$
(B) $\frac{4}{5}$
(C) $\frac{9}{10}$
(D) $\frac{5}{4}$

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

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

4. If $235 \times 48.7 = 11\,444.5$, then

$23.5 \times 0.487 =$

(A) 11.4445
(B) 114.445
(C) 1 144.45
(D) 11 444.4

---

Items 5 and 6 refer to the following table which shows the amount of money an umpire earns for the number of matches he officiates during a T20 cricket tournament.

Umpires are paid a flat fee upfront for appearing in the tournament and a fixed rate for each match they officiate.

| **Number of Matches** | 3 | 4 | 5 | 6 |
|---|---|---|---|---|
| **Amount Earned ($)** | 2 250 | 2 500 | 2 750 | 3 000 |

5. Based on the information in the table, umpires are paid a flat fee of

(A) $ 250
(B) $1 200
(C) $1 500
(D) $1 750

6. Umpire *A* officiates at 10 games while Umpire *B* officiates at 6. The ratio of their earnings, *A*:*B*, is

(A) 3 : 3
(B) 4 : 3
(C) 5 : 3
(D) 11 : 6

Items 7–9 refer to the following information about the universal set, $U$, and 2 other sets, $M$ and $N$.

$U = \{p, q, r, s, t\}$
$M = \{p, q, r\}$
$N = \{p, q\}$

7. The number of possible subsets of Set $M$ is

(A) 2
(B) 4
(C) 6
(D) 8

8. The $n(M \cap N')$ is

(A) 0
(B) 1
(C) 3
(D) 5

9. Which of the following statements about Sets $M$ and $N$ is true?

(A) $M \subset N$
(B) $M \cup N = M$
(C) $M \cup N = N$
(D) $M \cap N = \{\ \}$

Item 10 refers to the following information which describes 3 sets.

$P$ = {Prime numbers}
$Q$ = {Odd numbers}
$R$ = {Even numbers}

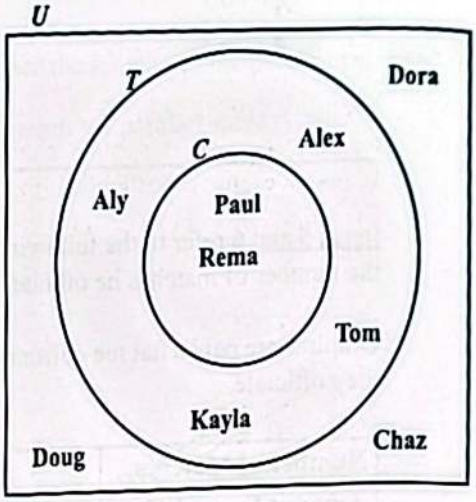
10. Which of the following sets is empty?

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

11. All students in a class play Scrabble or Checkers or both. If 36% of the students play Scrabble only and 48% of the students play Checkers only, what percentage of students play BOTH games?

(A) 12
(B) 16
(C) 84
(D) 88

Item 12 refers to the following Venn diagram which shows the universal set ($U$), and 2 sets, $T$ and $C$, that represent the students in a class who play tennis ($T$) and chess ($C$).




12. How many students play tennis but NOT chess?

(A) 2
(B) 3
(C) 4
(D) 6

13. A refrigerator costs $1 850.00. A 5% sales tax is also added to the cost of the refrigerator. What is the final cost of the refrigerator?

(A) $1 350.00
(B) $1 757.50
(C) $1 845.00
(D) $1 942.50

14. If EC$2.50 is equivalent to US$1.00, then EC$25.00, in US dollars, is

(A) $ 5.00
(B) $10.00
(C) $62.50
(D) $80.00

15. For every $100.00 in sales or a 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

16. The annual interest rate on a mortgage for a house assessed at a value of $450 000 is 5 cents on every $1. What is the interest paid on the mortgage for the first year?

(A) $ 11 750
(B) $ 22 500
(C) $107 500
(D) $117 500

17. The value of a plot of land is $18 000. Land tax is charged at the rate of $0.70 per $100 value. What is the TOTAL amount of tax payable on the land?

(A) $100.70
(B) $110.00
(C) $120.70
(D) $126.00

18. A man's basic wage for a 40-hour week is $600.00. He is paid overtime at the rate of $1\frac{1}{2}$ times the hourly rate.

If his TOTAL wage for a particular week was $802.50, how many hours overtime did he work for that week?

(A) 9
(B) 10
(C) 12
(D) 15

19. The simple interest on a sum of money invested at 5% per annum for 3 years was $90.

The sum of money invested was

(A) $ 54
(B) $ 150
(C) $ 600
(D) $1 350

20. At a sale, Jack bought a bat for $36.00. The price included a 10% discount. What was the original price of the bat?

(A) $32.40
(B) $35.00
(C) $39.60
(D) $40.00

21. $3x^2 \times 2x^3 =$

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

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

(A) $2 < x \leq 3$
(B) $2 < x \leq 6$
(C) $4 < x \leq 3$
(D) $4 < x \leq 6$

23. The distance, $L$, that an elastic string stretches when an object of mass $m$ is hung from it, varies directly as the mass of that object. If the string is stretched a distance of 31 cm by a 5-kg object, how far will a 29-kg object stretch the string?

(A) 4.68 cm
(B) 6.2 cm
(C) 135.72 cm
(D) 179.8 cm

24. John has $x$ marbles and Max has twice as many marbles as John. Max gives John 5 of his marbles. How many marbles does John now have?

(A) $x + 5$
(B) $x - 5$
(C) $2x - 5$
(D) $2x + 5$

25. Given that $3 * 6 = 12$ and $2 * 5 = 9$, then $a * b$ may be defined as

(A) $a^2 - b$
(B) $6a - b$
(C) $2a + b$
(D) $4(b - a)$

26. If $a = 3$ and $ab = 6$, then $a^2 - b^2 =$

(A) 1
(B) 2
(C) 5
(D) 13

27. Given that $A = \begin{pmatrix} 1 & 3 & -3 \\ 3 & 0 & 5 \end{pmatrix}$, then $3A$ equals

(A) $\begin{pmatrix} 3 & 9 & -9 \\ 9 & 0 & 15 \end{pmatrix}$

(B) $\begin{pmatrix} 4 & 6 & -6 \\ 6 & 3 & 8 \end{pmatrix}$

(C) $\begin{pmatrix} 3 & 9 & -6 \\ 9 & 0 & 15 \end{pmatrix}$

(D) $\begin{pmatrix} 2 & 0 & -6 \\ 0 & 3 & 2 \end{pmatrix}$

GO ON TO THE NEXT PAGE

Item 28 refers to the following matrix, $P$.

$$P = \begin{bmatrix} 8 & 6 \\ 7 & 5 \end{bmatrix}$$

**28.** The determinant of $P$ is

(A) –13
(B) –2
(C) 2
(D) 26

Item 29 refers to the following vectors, **p** and **q**.

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

**29.** The vector **p** – **q** is represented by

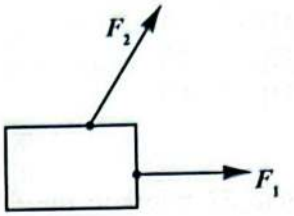
(A) $\begin{bmatrix} 1 \\ 12 \end{bmatrix}$

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

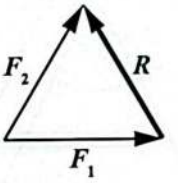
(C) $\begin{bmatrix} 5 \\ 2 \end{bmatrix}$

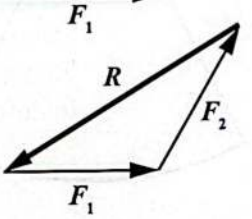
(D) $\begin{bmatrix} 1 \\ 5 \end{bmatrix}$

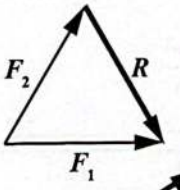
Item 30 refers to the following diagram which shows 2 forces (vectors) that act on an object.

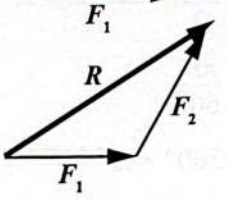



**30.** Which of the following diagrams BEST shows the resultant (sum), $R$, of the forces $F_1$ and $F_2$?

(A)



(B)



(C)


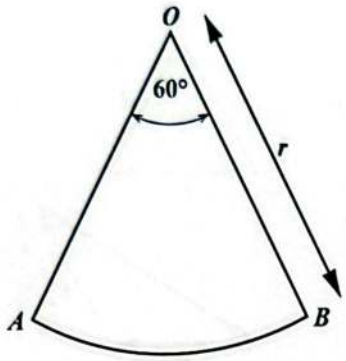

(D)


31. The length 3 800 millimetres expressed in metres is

(A) 0.38
(B) 3.8
(C) 38
(D) 380

Item 32 refers to the following diagram which shows a sector of a circle, $AOB$.

$AOB = 60°$ and the radius $OB$ is $r$ units long.



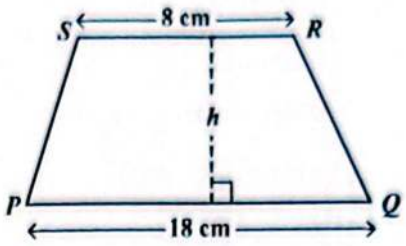

32. The area of $AOB$, in terms of $\pi$, is given by

(A) $\frac{\pi r^2}{6}$
(B) $\frac{\pi r^2}{3}$
(C) $\frac{\pi r^2}{60°}$
(D) $360° \times \pi r^2$

33. The area of a rectangle is 48 cm$^2$. What is its perimeter, in cm, if its length is 8 cm?

(A) 14
(B) 24
(C) 28
(D) 32

Item 34 refers to the following diagram of a trapezium.



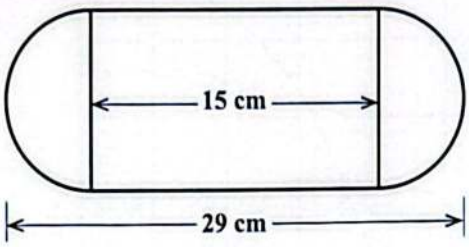

34. If the area of the trapezium, $PQRS$, is 65 cm$^2$, then its height, $h$, is

(A) 2.5 cm
(B) 3.6 cm
(C) 5.0 cm
(D) 8.0 cm

35. The scale on a map is 1:120 000. On the map, the distance between Amy's house and her school is 8.5 cm. The actual distance between Amy's house and her school, in km, is

(A) 10.2
(B) 85.2
(C) 102.0
(D) 1 020.0

Item 36 refers to the following diagram which shows a compound shape made up of a rectangle and two identical semi-circles, one on each short side.




36. Using $\pi = \frac{22}{7}$, the area of the compound shape in cm, is

(A) 198
(B) 210
(C) 316
(D) 364

37. The area of a rectangle is 40 cm$^2$. If the length is multiplied by 4 and the width is halved, the area would then be

(A) 20 cm$^2$
(B) 40 cm$^2$
(C) 80 cm$^2$
(D) 160 cm$^2$

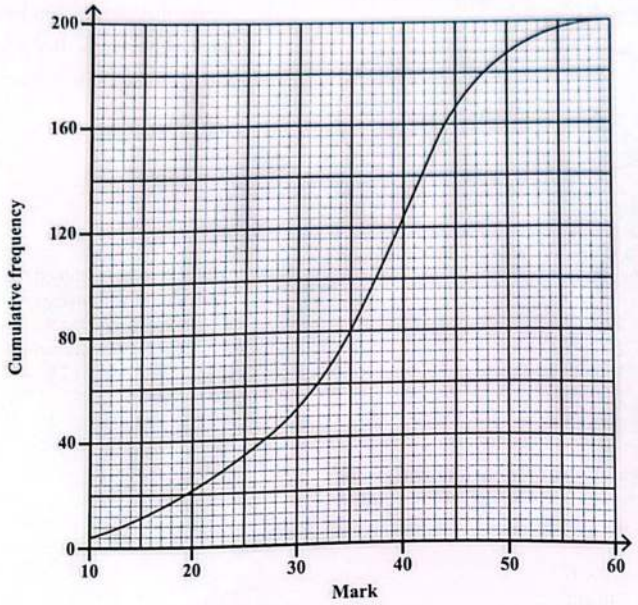
38. Dina drove her car at 58 km/h for 6 hours then increased her speed by 17 km/h, to ensure that she reached her destination in another $1\frac{1}{2}$ hours. Her average speed, in km/h, for the entire journey was

(A) 48.0
(B) 49.8
(C) 60.0
(D) 61.4

39. Thirty students recorded the colours of their eyes, choosing from the colours brown, blue, green, hazel, and black. The measurement scale used in this scenario is classified as

(A) ratio
(B) ordinal
(C) interval
(D) nominal

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




**40.** How many students scored at MOST 45 marks?

(A) 34
(B) 40
(C) 166
(D) 170

**41.** The median mark scored by the 200 students is

(A) 30.5
(B) 37.5
(C) 52.0
(D) 100.0

**42.** If EXACTLY 28 students passed the test, then the 'pass mark' is **most** likely

(A) 23
(B) 37
(C) 46
(D) 52





**43.** If the mean of the FOUR numbers 4, 8, $x$ and 12 is 10, then $x$ is 45

(A) 4
(B) 10
(C) 12
(D) 16

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) $\frac{6}{25}$
(B) $\frac{1}{4}$
(C) $\frac{2}{5}$
(D) $\frac{43}{100}$

**43.** If the mean of the FOUR numbers 4, 8, $x$ and 12 is 10, then $x$ is

(A) 4
(B) 10
(C) 12
(D) 16

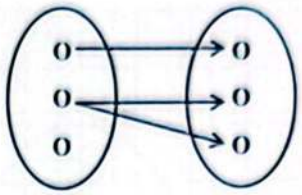
Item **44** refers to the following table which shows the results of a survey of 100 persons from 2 major ethnic groups, $P$ and $R$. Respondents were interviewed about their attitude towards Mathematics.

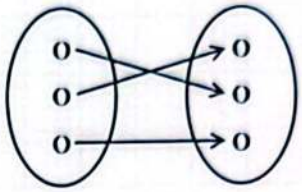
| Attitude Towards Mathematics | Ethnicity | | Total |
|---|---|---|---|
| | *P* | *R* | |
| Positive | 25 | 12 | 37 |
| Neutral | 11 | 9 | 20 |
| Negative | 24 | 19 | 43 |
| Total | 60 | 40 | 100 |

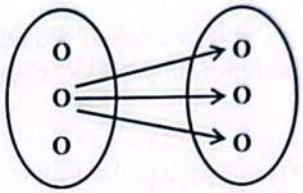
**44.** A respondent from ethnic group $P$ is selected at random. What is the probability that he has a negative attitude towards Mathematics?

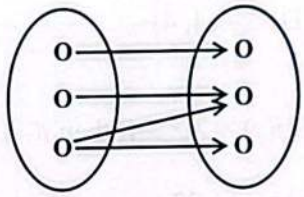
(A) $\frac{6}{25}$
(B) $\frac{1}{4}$
(C) $\frac{2}{5}$
(D) $\frac{43}{100}$

**45.** Which of the following diagrams BEST illustrates a function?

(A) 

(B) 

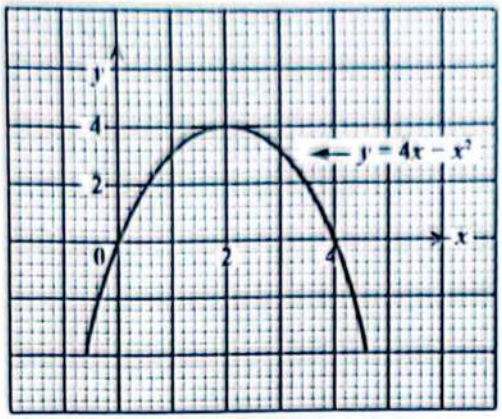
(C) 

(D) 

**46.** The equation of the line that crosses the vertical axis at the point (0, 5) and that has a gradient of 4 is

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

Item 47 refers to the following graph of a quadratic function.



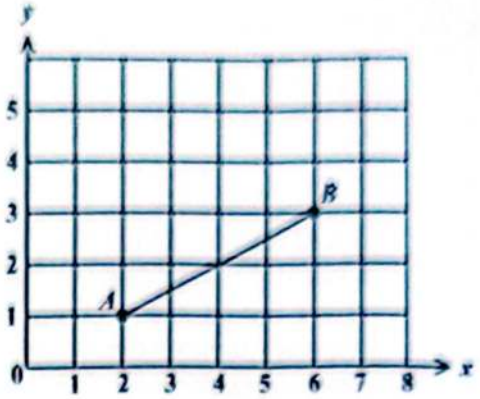

47. The coordinates of the maximum point of the function $y = 4x - x^2$ are

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

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

(A) −32
(B) −19
(C) 17
(D) 35

Items 49 and 50 refer to the following graph of a line segment, $AB$.




49. If the line segment $AB$ is extended, at what point is the line segment expected to intercept the vertical axis?

(A) (0, 0)
(B) $\left(0, \frac{1}{2}\right)$
(C) (0, −1)
(D) $\left(0, -\frac{1}{2}\right)$

50. The equation of the perpendicular bisector of $AB$ is

(A) $y = \frac{1}{2}x$
(B) $y = 2x - 6$
(C) $y = -\frac{1}{2}x + 4$
(D) $y = -2x + 10$

Item 51 refers to the following set of ordered pairs which represents a function, $f$.

(2, 5), (5, 8), (8, 11), (11, 14)

51. Which of the following equations BEST describes the function?

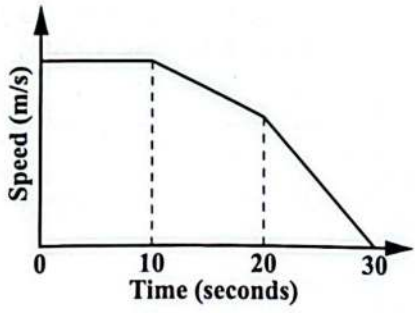
(A) $y = x + 3$
(B) $x + y = 3$
(C) $x = y + 3$
(D) $y = 2x + 1$

Item 52 refers to the following information regarding the way in which John moves along a straight line for 30 seconds.

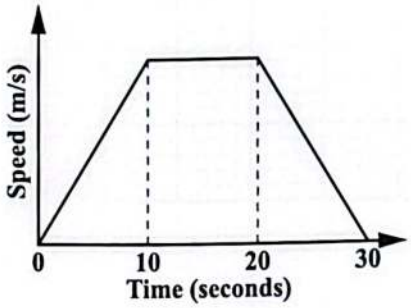
For the first 10 seconds, John starts from rest and runs with uniform acceleration. He then runs with constant speed for the next 10 seconds then slowly decreases his speed to arrive at his destination within the final 10 seconds.

52. Which of the following velocity–time graphs represents John's motion along the straight line?

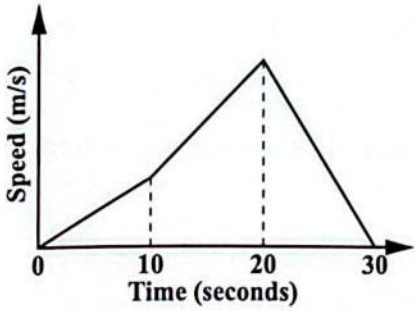
(A)



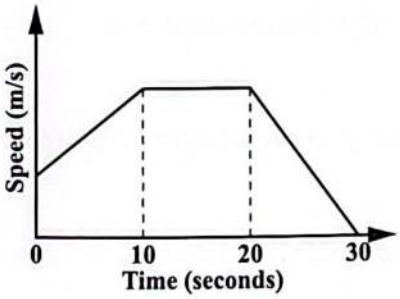

(B)




(C)




(D)



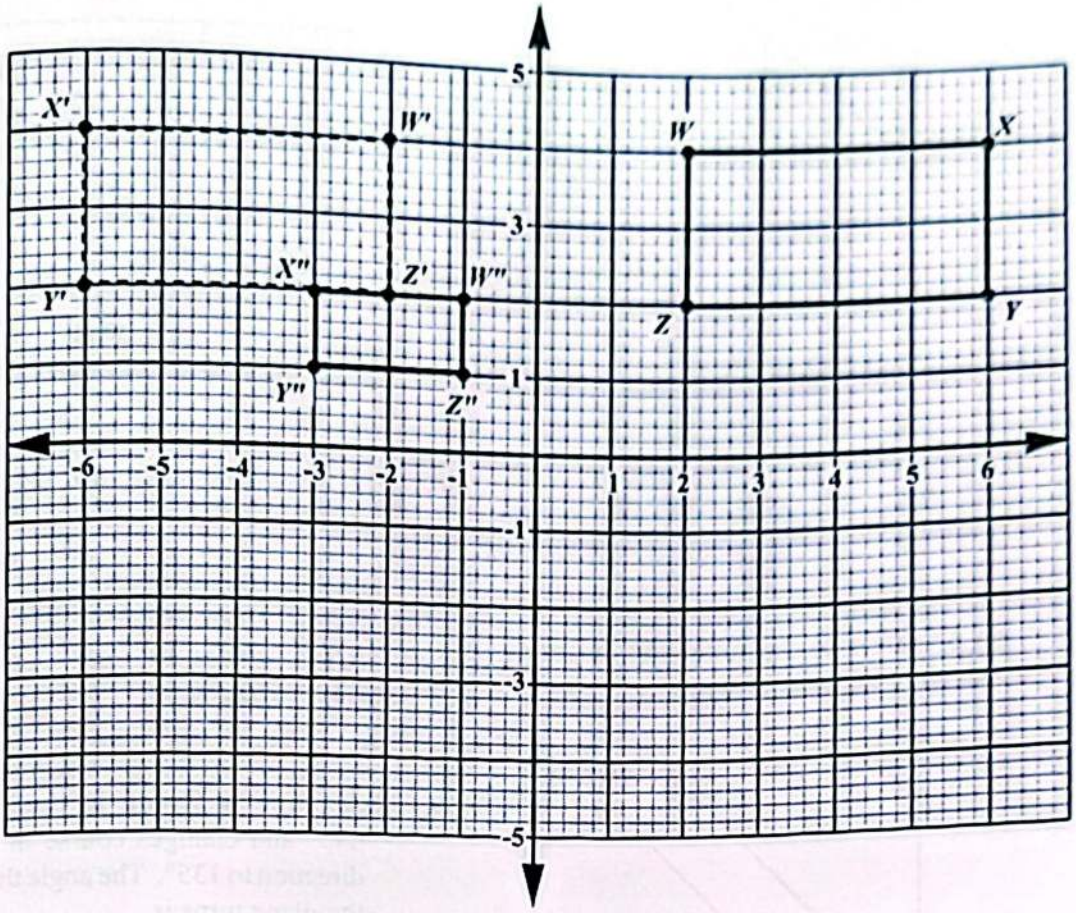
**53.** If $\cos A = \frac{b}{c}$, which of the following ratios also has the same value as $\cos A$?

(A) $\sin(90° - A)$
(B) $\cos(90° - A)$
(C) $\sin(180° - A)$
(D) $\cos(180° - A)$

**54.** In which of the following polygons does the sum of the measures of the interior angles equal the sum of the measures of the exterior angles?

(A) Triangle
(B) Hexagon
(C) Pentagon
(D) Quadrilateral

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




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

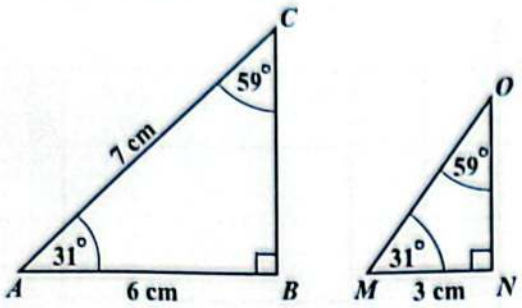
(A) A translation of 8 units to the left, followed by an enlargement, centred at the origin with a scale factor of $\frac{1}{2}$

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

(C) A counterclockwise rotation of 90° about the origin, followed by an enlargement, centred at the origin with a 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

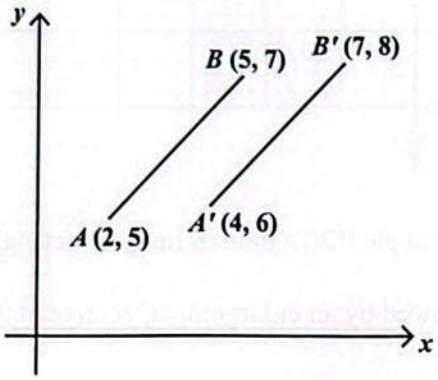
Item 56 refers to the following pair of similar triangles.




**56.** The length of $MO$, in cm, is

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

Item 57 refers to the following diagram which shows a transformation.




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

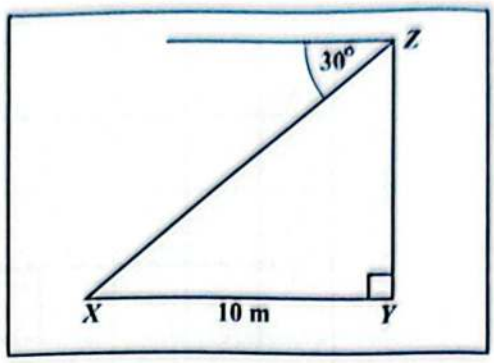
(A) $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$

(B) $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

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

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

Item 58 refers to the following diagram which shows the angle of depression of a point, $X$, relative to another point, $Z$.



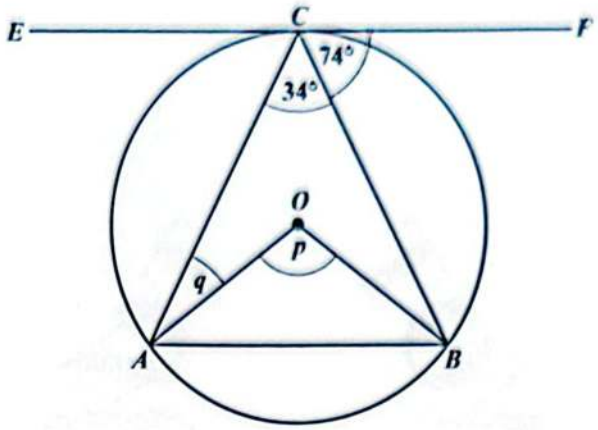

**58.** If $X$ is 10 metres from $Y$, the height of $YZ$, in metres, is

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

**59.** A plane is flying in the 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 which shows a circle with centre, $O$, and the points $A$, $B$ and $C$ on its circumference. The line $ECF$ is a tangent to the circle at $C$ and $\angle ACB$ and $\angle FCB$ are 34° and 74° respectively.




**60.** Which of the following options shows the correct values of $p$ and $q$?

| | $p$ | $q$ |
|---|---|---|
| (A) | 68° | 16° |
| (B) | 68° | 18° |
| (C) | 73° | 39° |
| (D) | 74° | 34° |

**END OF TEST**

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