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 $ax^2 + bx + c = 0$,

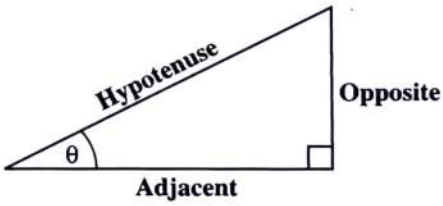
$$\text{then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Trigonometric ratios

$$\sin\theta = \frac{\text{length of opposite side}}{\text{length of hypotenuse}}$$

$$\cos\theta = \frac{\text{length of adjacent side}}{\text{length of hypotenuse}}$$

$$\tan\theta = \frac{\text{length of opposite side}}{\text{length of adjacent side}}$$

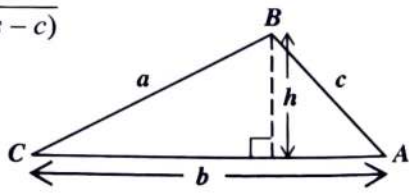


Area of a triangle — Area of $\Delta = \frac{1}{2}bh$ where b is the length of the base and h is the perpendicular height.

$$\text{Area of } \Delta ABC = \frac{1}{2}ab\sin C$$

$$\text{Area of } \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$



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) 5
(D) 13

2. What is the value of the digit 6 in the number 48.621?

(A) $\frac{6}{100}$
(B) $\frac{6}{10}$
(C) 6
(D) 600

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. The next term in the sequence

1, 6, 13, 22, 33, _____ is

(A) 44
(B) 45
(C) 46
(D) 52

5. What is the LEAST number of apples that can be shared **equally** among either 6, 10 or 15 children?

(A) 24
(B) 30
(C) 60
(D) 90

6. A certain amount of money is shared among Jay, Troy and Jordan in the ratio 2:3:9. If Troy received \$40 more than Jay, then the amount of money shared is

(A) \$280
(B) \$360
(C) \$400
(D) \$560

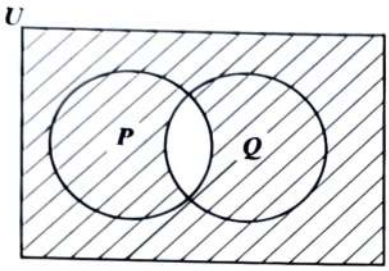
7. If $P = \{2, 3, 5, 7\}$,
$Q = \{2, 3, 6\}$ and
$S = \{2, 4, 5\}$,

then $P \cup Q \cup S =$

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

GO ON TO THE NEXT PAGE

Item **8** refers to the following Venn diagram.



8. The shaded region represents

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

9. The elements of the set
$\{x : 6 < x \leq 10$, where x is an integer$\}$ are

(A) $\{7, 8, 9\}$
(B) $\{6, 7, 8, 9\}$
(C) $\{7, 8, 9, 10\}$
(D) $\{6, 7, 8, 9, 10\}$

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

$M = \{p, q, r\}$

$N = \{p, q\}$

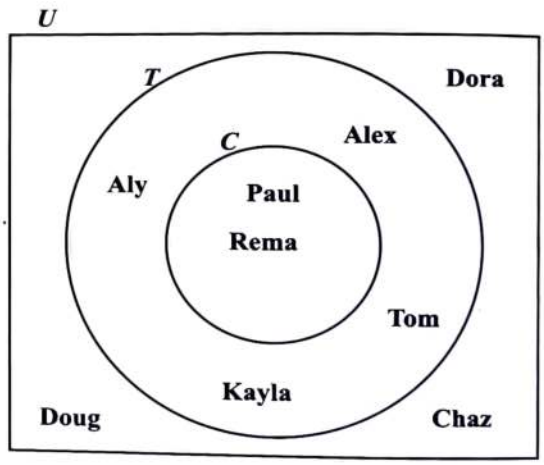
10. Which of the following statements about sets M and N is true?

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

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 two 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 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

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 sale amounting to \$1, a salesman is paid \$0.10 as commission. If his sales for a particular month was \$1 020.00, how much commission was he paid?

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

16. A man's basic wage for a 40-hour week is \$160.00. He is paid overtime at the rate of $1\frac{1}{4}$ times the hourly rate. If he works $6\frac{1}{2}$ hours overtime in a certain week, his wage for that week is

(A) \$165.00
(B) \$166.50
(C) \$171.50
(D) \$192.50

17. A television set costs \$350 cash. When bought on hire purchase, a deposit of \$35 is required, followed by 12 monthly payments of \$30 each. How much money is saved by paying cash?

(A) \$10
(B) \$25
(C) \$40
(D) \$45

18. 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 2021, then its value in **January 2021** was

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

19. A loan of \$15 000 was repaid in 24 equal monthly instalments of \$750. The total interest paid as a percentage of the principal was

(A) 5%

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

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

(D) 20%

20. At a sale, a discount of \$3.00 off the original price was offered for each book. Daniel paid \$46.00 for 2 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

GO ON TO THE NEXT PAGE

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

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

22. If $5(y - 2) = 3(y + 4)$, then y is

(A) -1
(B) 3
(C) 7
(D) 11

23. Seven times the product of two numbers, a and b, may be written as

(A) $\frac{ab}{7}$
(B) $7ab$
(C) $7a + b$
(D) $7(a + b)$

24. Given that $3 * 6 = 3$ and $2 * 4 = 0$, then $a * b$ may be defined as

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

25. If $x = -2$, $y = 3$, $t = 3$, then $\left[\frac{x}{y}\right]^t =$

(A) $-\frac{6}{9}$
(B) $-\frac{8}{27}$
(C) $\frac{8}{27}$
(D) $\frac{9}{6}$

26. If $\frac{1}{3^{2x}} = 9$, then the value of x is

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

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

(A) $\begin{bmatrix} 3 & 9 & -9 \\ 9 & 0 & 15 \end{bmatrix}$
(B) $\begin{bmatrix} 4 & 6 & -6 \\ 6 & 3 & 8 \end{bmatrix}$
(C) $\begin{bmatrix} 3 & 9 & -6 \\ 9 & 0 & 15 \end{bmatrix}$
(D) $\begin{bmatrix} 2 & 0 & -6 \\ 0 & 3 & 2 \end{bmatrix}$

28. The determinant of the 2×2 identity matrix is

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

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

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

29. The vector $\mathbf{p} - \mathbf{q}$ is represented by

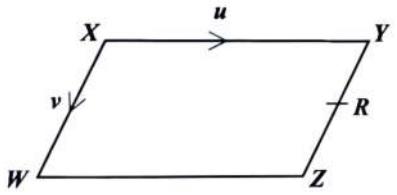
(A) $\begin{pmatrix} 1 \\ 12 \end{pmatrix}$

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

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

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

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. $\overrightarrow{RW}$, expressed in terms of u and v, is

(A) $\frac{1}{2}v - u$

(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, then 2 500 millimetres, in metres, is

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

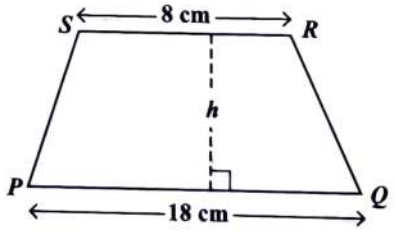
32. The length of the edge of a cube that has a volume of 27 cm^3 is

(A) 3 cm
(B) 4.5 cm
(C) 6 cm
(D) 9 cm

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

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

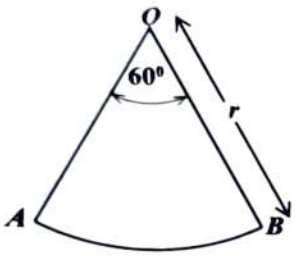
Item **34** refers to the following diagram of a trapezium, $PQRS$, which has an area of 65 cm^2.



34. The height, h, of $PQRS$ is

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

Item 35 refers to the following diagram which shows a sector of a circle, AOB. Angle $AOB = 60°$ and the radius OB is r units long.



35. The length of the arc AB of the circle is

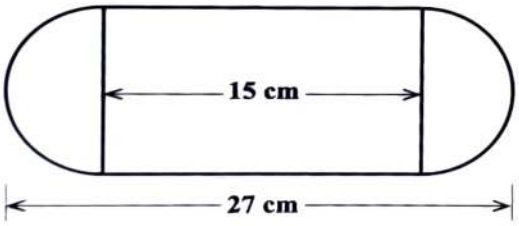
(A) $\frac{1}{3}\pi r$

(B) $\frac{1}{6}\pi r$

(C) $\frac{1}{3}\pi r^2$

(D) $\frac{1}{6}\pi r^2$

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



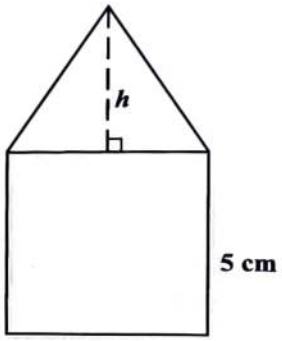
36. The area of the compound shape above, in terms of π, is

(A) $6(9 + \pi)$
(B) $36(5 + \pi)$
(C) $6(5 + 2\pi)$
(D) $18(5 + 2\pi)$

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

Item 38 refers to the following diagram which shows a compound shape that comprises a triangle resting on a square of side 5 cm.



38. If the TOTAL area of the compound shape is 35 cm^2, then the height of the triangle is

(A) 2 cm
(B) 4 cm
(C) 5 cm
(D) 10 cm

Items **39** and **40** refer to the following frequency distribution which shows the average mass, in kg, of a group of children in a school.

Mass (kg)	21–30	31–40	41–50	51–60	61–70
Frequency	28	34	12	38	20

39. The number of children who have a mass of at least 41 kg is

(A) 12
(B) 62
(C) 70
(D) 104

40. The lower limit of the modal class is

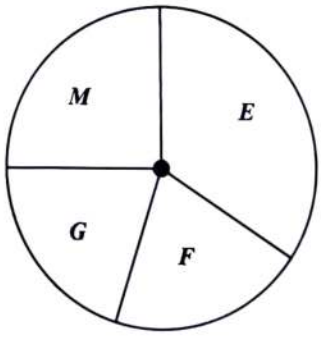
(A) 30.5
(B) 41.0
(C) 50.5
(D) 51.0

---

41. Ms Clarke arranged the 15 test scores of her students in order of size and selected the 8th score for reporting purposes. Which of the following statistical measures did Ms Clarke obtain?

(A) Mean
(B) Mode
(C) Range
(D) Median

42. The pie chart below, **drawn to scale**, shows how a student used 12 hours in studying English (*E*), Mathematics (*M*), French (*F*) and Geography (*G*).



The amount of time spent studying Mathematics is APPROXIMATELY

(A) 1 hour
(B) 2 hours
(C) 3 hours
(D) 4 hours

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

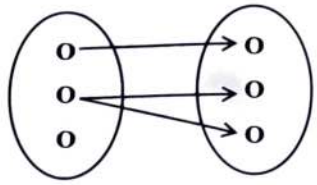
Item **44** refers to the following table which shows the responses of 100 persons from two ethnic groups, P and R, to a survey about their attitude towards Mathematics.

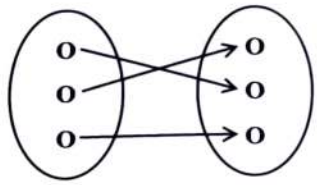
Attitude Towards Mathematics	Ethnicity		Total
	P	***R***	
Positive	25	12	37
Neutral	11	9	20
Negative	24	19	43
Total	60	40	100

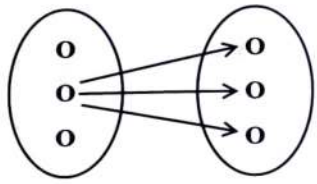
44. A respondent is selected at random. What is the probability that the selected respondent is of ethnicity P and has a positive attitude towards Mathematics?

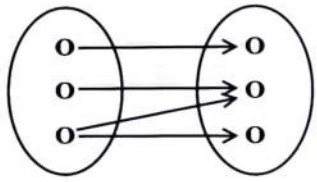
(A) 0.25
(B) 0.37
(C) 0.42
(D) 0.60

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

(A)


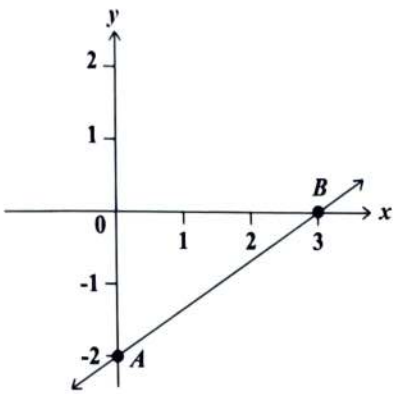
(B)


(C)


(D)


GO ON TO THE NEXT PAGE

Items **46** and **47** refer to the following graph of the straight line AB.



46. The point where the straight line AB crosses the horizontal axis is

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

47. The equation of the straight line AB is

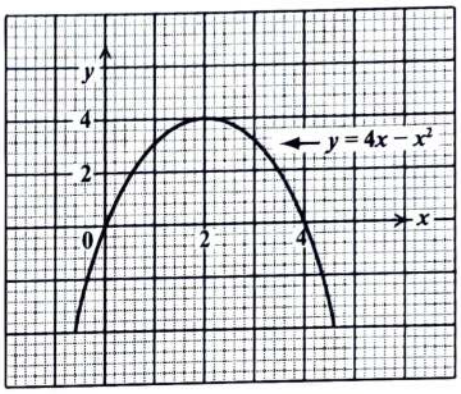
(A) $y = x - 2$

(B) $y = 2x - 2$

(C) $y = \frac{2}{3}x - 2$

(D) $y = -\frac{3}{2}x - 2$

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



48. 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)

49. The equation of the axis of symmetry of the quadratic function is

(A) $x = 2$
(B) $y = 2$
(C) $y = x$
(D) $y = 2x$

50. If $g(x) = \frac{7x - 3}{5}$, then $g^{-1}(-2) =$

(A) $-\frac{17}{5}$

(B) -1

(C) 1

(D) $\frac{13}{7}$

51. A parking lot charges \$1.00 plus \$0.25 for every hour or part thereof (h) in which a vehicle is parked. A function, $C(h)$, that represents the parking cost is

(A) $C(h) = 0.25h$

(B) $C(h) = 1.00h + 0.25$

(C) $C(h) = 0.25h + 1.00$

(D) $C(h) = \frac{h}{0.25} + 1.00$

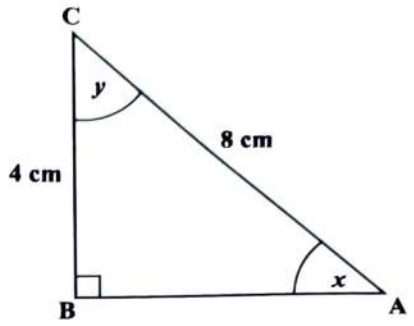
52. The range of f: $x \rightarrow x^3$ for the domain $\{-2, -1, 0, 1, 2\}$ is

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

53. If the sum of the interior angles of a polygon is 4 right angles, then the polygon is a

(A) triangle
(B) hexagon
(C) pentagon
(D) quadrilateral

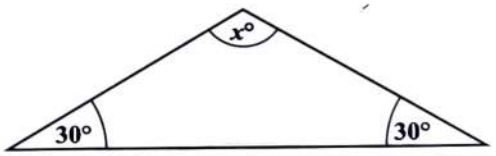
Item **54** refers to the following diagram of a right-angled triangle.



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

(A) Sin x
(B) Tan y
(C) Sin y
(D) Tan x

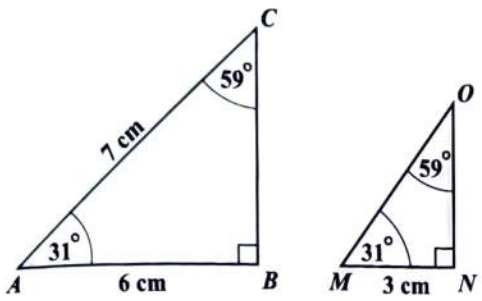
Item **55** refers to the following diagram of an isosceles triangle.



55. In the triangle, the value of x is

(A) 30°
(B) 60°
(C) 120°
(D) 150°

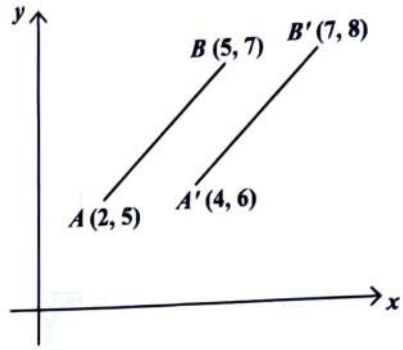
Item **56** refers to the following pair of similar triangles.



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

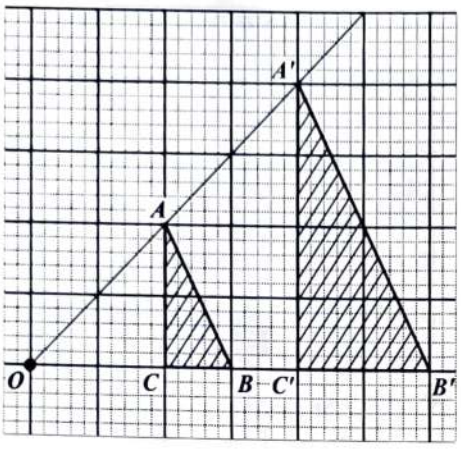
(A) $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$

(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 a transformation.



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

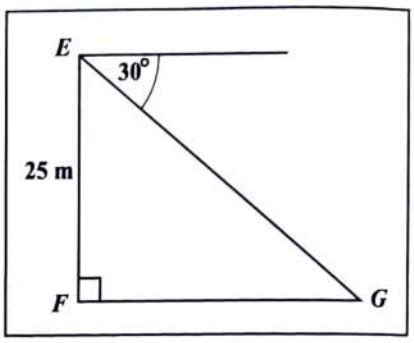
(A) -2

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

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

(D) 2

Item **59** refers to the following diagram which shows that the angle of depression of a point G from E is $30°$.



59. If F is 25 metres from E, then the distance FG, in metres, is

(A) $\frac{25}{\tan 30°}$

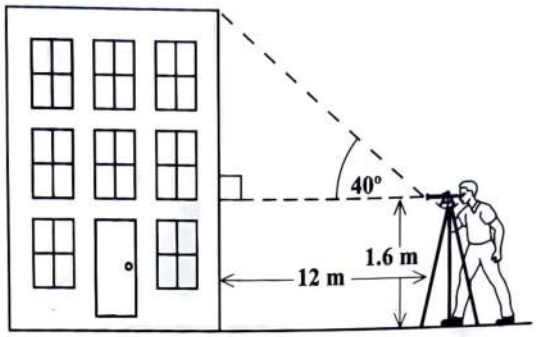
(B) $\frac{25}{\tan 60°}$

(C) $25 \cos 30°$

(D) $25 \sin 30°$

Item **60** refers to the following diagram of a building.

A surveyor sets up his instruments 12 metres from the foot of the building and records the angle of elevation of the top of the building.



60. An estimate of the height of the building can be obtained by calculating

(A) $1.6 + 12 \tan 40^\circ$
(B) $1.6 + 12 \cos 40^\circ$
(C) $(12 \tan 40^\circ) - 1.6$
(D) $(12 \sin 40^\circ) - 1.6$

END OF TEST

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