



GRADE 11 IeBT
2012

MATHEMATICS

Time: 2 hours

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 13 pages. Please check that your paper is complete.
 2. This is a **multiple choice** assessment. Indicate your selection for each question clearly on the Answer Sheet provided. **Do not** make more than one selection per question.
 3. Read the questions carefully.
 4. Answer all the questions.
 5. No calculators may be used in this paper.
 6. All questions are equally weighted with no negative marking.
 7. Learners will require a B pencil and an eraser.
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QUESTION 1

The 101st term of the following arithmetic sequence:

$-17 ; -13 ; -9 ; \dots$ is:

- A 383 B -3017 C 366 D 417

QUESTION 2

The point $L(6 ; 2)$ is rotated around the origin through an angle of 90° clockwise to give the point:

- A $L'(-2 ; 6)$ B $L'(-6 ; -2)$ C $L'(6 ; -2)$ D $L'(2 ; -6)$

QUESTION 3

The gradient of the line $3y - 7x + 2 = 0$ is:

- A -7 B $-\frac{7}{3}$ C $2\frac{1}{3}$ D $-\frac{2}{3}$

QUESTION 4

I invest R7 325 at an interest rate of 12% p.a. compounded monthly. How much will my investment be worth in 5 years?

- A $7325(1+0,12)^5$ B $7325(1+0,01)^5$
C $7325(1+0,12)^{60}$ D $7325(1+0,01)^{60}$

QUESTION 5

A bank offered 20% per annum compounded semi-annually on an investment. What effective annual interest rate would yield the same interest over a period of one year or more?

- A 44% B 10% C 21% D 0,21%

QUESTION 6

Simplify the following expression: $\frac{\sqrt{48a} - \sqrt{3a}}{\sqrt{27a^3}}$; $a > 0$.

- A $\frac{1}{a}$ B $\sqrt{3a}$ C $\sqrt{\frac{5}{3}}$ D 1

QUESTION 7

The expression $(x+y)^{-1}(x^{-1}+y^{-1})$ is the same as:

- A $\frac{1}{xy}$ B $\frac{1}{x^2} + \frac{1}{y^2}$ C $x^2 + y^2$ D xy

QUESTION 8

The solution(s) to the equation $\sqrt{x+3} - x = 1$ is/are:

- A $x = 2$ or $x = -1$ B no real solutions
C $x = 1$ or $x = -2$ D $x = 1$

QUESTION 9

Solve for x : $2x^2 + 5x < 12$

- A $-5 < x < 0$ B $-\frac{1}{2} < x < 3$ C $-4 < x < \frac{3}{2}$ D $2 < x < 4$

QUESTION 10

The solution to an equation of the form $ax^2 + bx + c = 0$ (where a , b and c are integers with no common factor) is given as $x = \frac{4 \pm \sqrt{32}}{2}$.

The value of c is:

- (A) 1 (B) -2 (C) 3 (D) -4

QUESTION 11

Two graphs are defined by the equations

$$2x - y - 8 = 0 \quad \text{and} \quad 3x^2 + xy - y^2 = 17$$

Which of the following is a point of intersection of the graphs?

- A (4; 0) B (3; -2) C (-1; -10) D (1; -6)

QUESTION 12

$\sin A = \frac{-3}{5}$ and $\tan A > 0$ then $\cos A =$

A $\frac{2}{5}$

B $\frac{3}{5}$

C $\frac{4}{5}$

D $-\frac{4}{5}$

QUESTION 13

The solution for $2\sin\theta = -\sqrt{3}$ in the interval $\theta \in (-360^\circ; 360^\circ)$ is:

A $\theta \in \{-120^\circ; -60^\circ; 240^\circ; 300^\circ\}$

B $\theta \in \{-300^\circ; -240^\circ; 60^\circ; 120^\circ\}$

C $\theta \in \{-240^\circ; -60^\circ; 60^\circ; 240^\circ\}$

D $\theta \in \{-150^\circ; -30^\circ; 210^\circ; 330^\circ\}$

QUESTION 14

In a **quadratic** series, the first term is 1 and the second term is 10.

The constant 2nd difference is 5. The fourth term will be equal to:

A 24

B 19

C 38

D 43

QUESTION 15

If the points $L(x; y)$; $M(3; -5)$ and $N(4; -4)$ are collinear then y in terms of x could be expressed as:

A $y = 9x - 32$

B $y = x - 8$

C $y = x + 2$

D $y = x$

QUESTION 16

The table below provides information on the temperature of a cup of hot chocolate in room temperature 12 °C in the given time interval (in minutes).

Time t (minutes)	1	2	3	4	5
Temperature T (°C)	80	72	66	62	60

The relationship between time t (in minutes) and Temperature T (in °C) is of the form:

A $T = \frac{a}{t}$

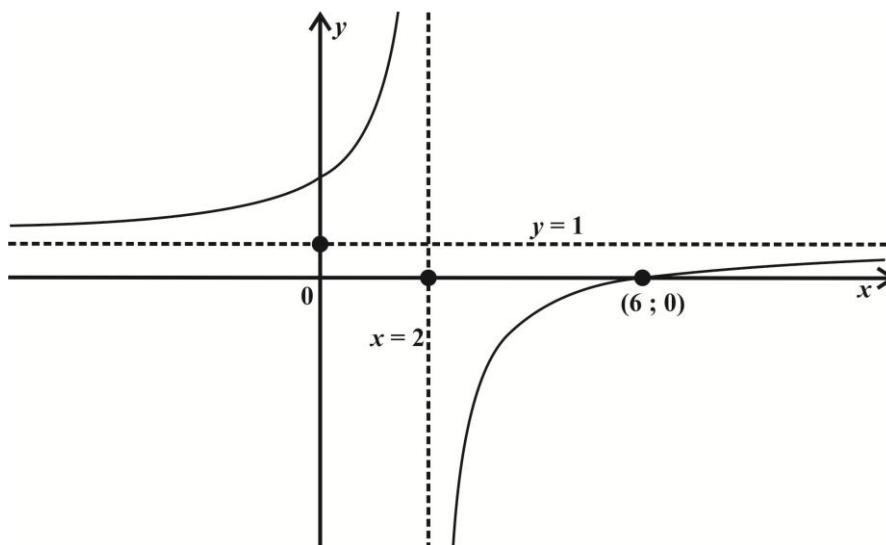
B $T = -at^2 + bt + c$

C $T = b - at$

D $T = a^{-t} + b$

QUESTION 17

The hyperbola shown below is in the form $y = \frac{a}{x-p} + q$



Use the information given on the graph to select the correct equation for this hyperbola from the options below:

A $y = \frac{-8}{x+2} + 1$

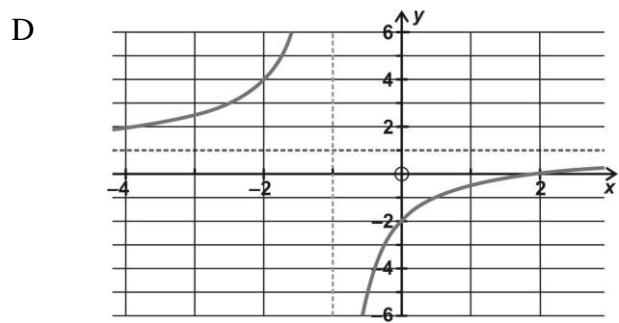
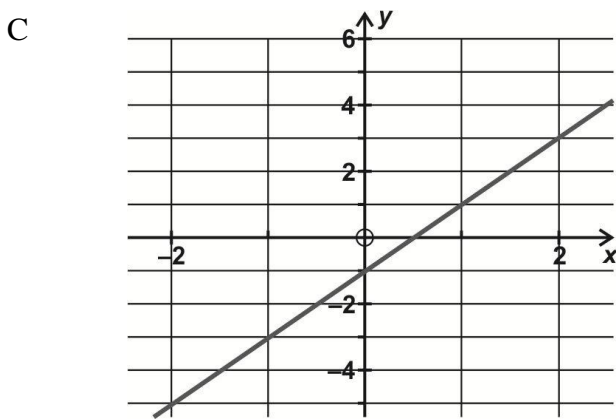
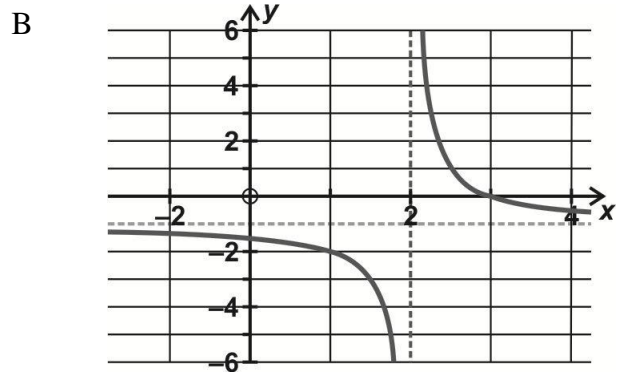
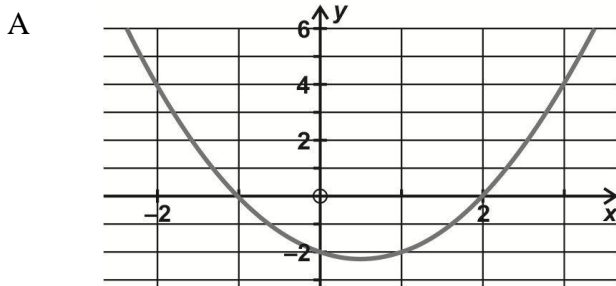
B $y = \frac{6}{x}$

C $y = \frac{-12}{x-2} + 1$

D $y = \frac{-4}{x-2} + 1$

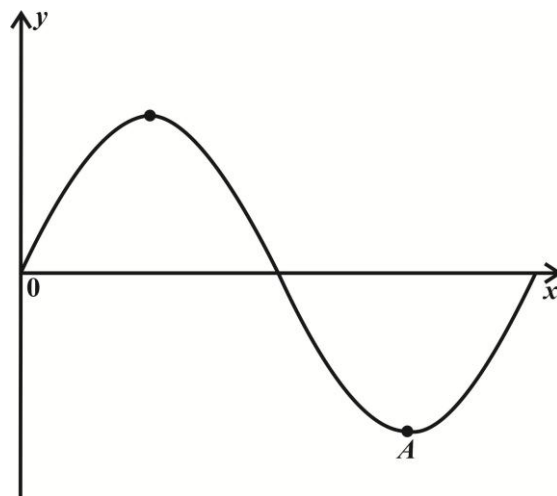
QUESTION 18

Which of the following graphs best describes the equation: $\frac{y}{x-2} - 1 = x$?



QUESTION 19

The graph shown below is defined by the equation $f(x) = 3\sin 2x$ on the interval $[0; 180^\circ]$.



The coordinate of point A is:

- A (135°; 3) B (135°; -3) C (270°; -3) D (540°; -3)

QUESTION 20

The line $y = a(x+b) + c$ is reflected in the y-axis. What is the new equation?

- A $y = c - ab - ax$ B $y = ab - c + ax$ C $y = ab + c - ax$ D $y = ax - ab - c$

QUESTION 21

The simplified form of $\frac{\cos x \cdot \sin(180^\circ - x) \cdot \sin 150^\circ}{\tan 45^\circ \cdot \cos(180^\circ - x) \cdot \cos(90^\circ + x) \cdot \cos 300^\circ}$ is:

- A 1 B -1 C $\tan x$ D $\frac{1}{\sqrt{3}}$

QUESTION 22

If a point $(x; y)$ is in the 2nd quadrant, which of the following must be true?

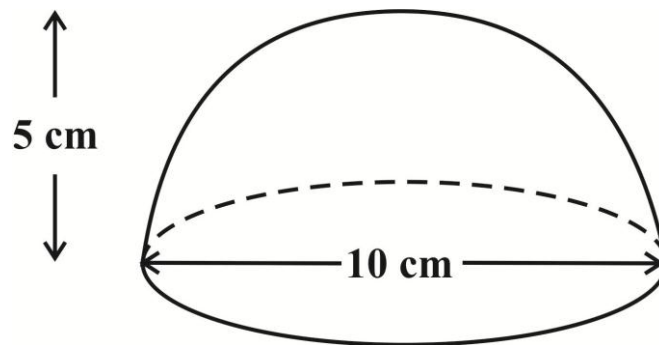
1. $x < y$
2. $x + y > 0$
3. $\frac{x}{y} < 0$

- A only 1 B only 3 C only 1 and 2 D only 1 and 3

QUESTION 23

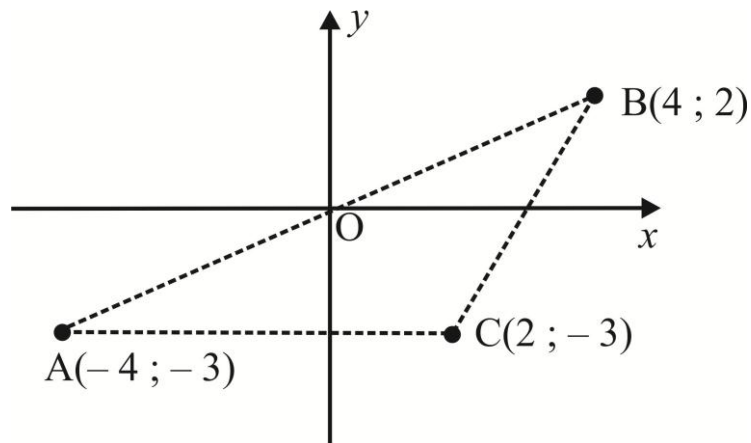
It is given that the surface area of a sphere of radius 5 cm is $100\pi \text{ cm}^2$.

Determine the total surface area of the given solid hemisphere.



- A $50\pi \text{ cm}^2$ B 55 cm^2 C $60\pi \text{ cm}^2$ D $75\pi \text{ cm}^2$

QUESTION 24

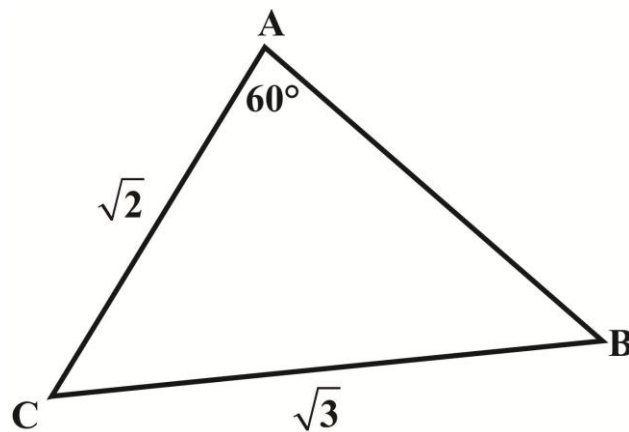


$A(-4; -3)$, $B(4; 2)$ and $C(2; -3)$ are the coordinates of a triangle. $\triangle ABC$ is ENLARGED through the origin by a factor of k . The enlarged triangle has an area of 60 square units.

The value of k is:

- A $\sqrt{3}$ B 2 C $\sqrt{2}$ D 4

QUESTION 25



In $\triangle ABC$ (which is NOT drawn to scale) $\hat{A} = 60^\circ$ $AC = \sqrt{2}$ $BC = \sqrt{3}$ then $\hat{B} =$

- A 75° B 60° C 45° D 30°

QUESTION 26

Given the points $A(-2; 4)$, $B(0; 8)$ and $C(x; 6)$ in the Cartesian plane. If B is equidistant from A and C determine the value(s) of x .

- A $x = -1$ B $x = \pm 1$ C $x = 4$ D $x = \pm 4$

QUESTION 27

The speed at which a sample of cars were travelling on a certain road is recorded in the table below.

Interval (km/h)	Frequency
$0 < x \leq 20$	5
$20 < x \leq 40$	10
$40 < x \leq 60$	20
$60 < x \leq 80$	15

The best estimate of the average speed of the vehicles is:

- A 44 km/h B 48 km/h C 54 km/h D 64 km/h

QUESTION 28

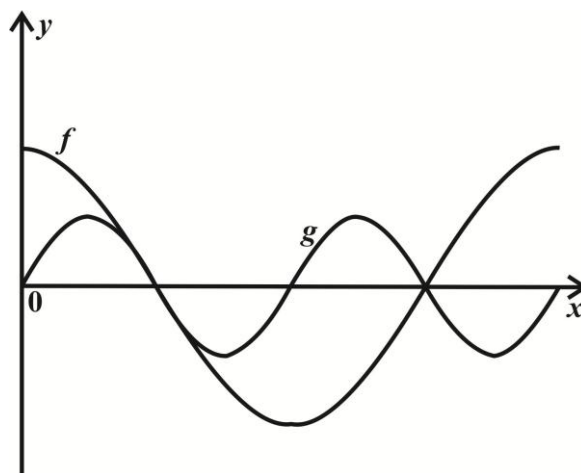
At 08h00, water is poured onto a concrete surface. Due to extreme heat, the patch decreases in size each hour by 50%. At 14h00 the surface area of the water covers only $0,1 \text{ m}^2$.

What area was covered at 08h00?

- A $0,6 \text{ m}^2$ B 5 m^2 C $3,2 \text{ m}^2$ D $6,4 \text{ m}^2$

QUESTION 29

The graphs of $f(x) = 2 \cos x$ and $g(x) = \sin 2x$ for $[0^\circ; 360^\circ]$ are shown below.



The values of x for which $f(x).g(x) \geq 0$ is:

- A $[0^\circ; 180^\circ]$ B $[180^\circ; 360^\circ]$ C $[0^\circ; 90^\circ]$ OR $[270^\circ; 360^\circ]$ D $[90^\circ; 270^\circ]$

QUESTION 30

The function $y = -2x^2 - 9x + 20$ can be written in which of the following ways?

A $y = -2\left(x + \frac{9}{4}\right)^2 - \frac{241}{16}$

B $y = -2\left(x + \frac{9}{2}\right)^2 + \frac{121}{2}$

C $y = \left(-2x - \frac{9}{2}\right)^2 - \frac{1}{4}$

D $y = -2\left(x + \frac{9}{4}\right)^2 + \frac{241}{8}$

QUESTION 31

An internet sales company imported a container of wireless keyboards for a certain brand of computer for R3 000. Unfortunately, 10 were faulty. By selling each of the working keyboards at R40 more than the purchase price, the sales company was able to make a profit of R1 000.

If x represents the number of keyboards imported, then this question can be modelled according to the following equation:

A $\frac{4000}{x} - \frac{3000}{x} = 40$

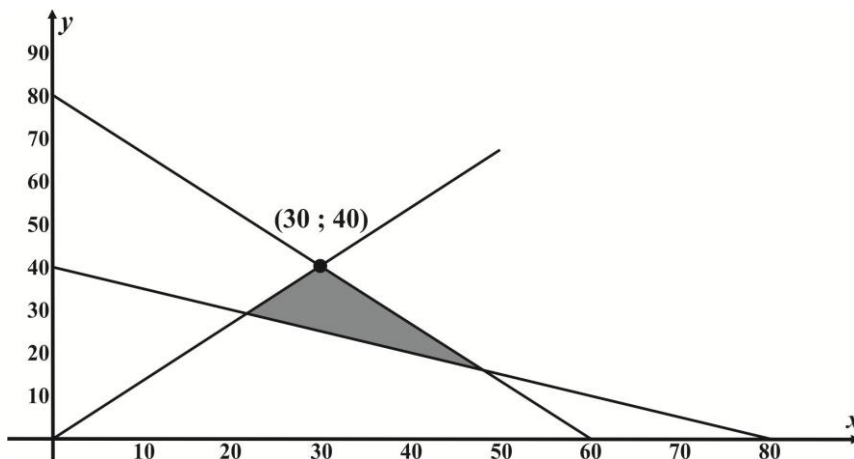
B $\frac{4000}{x-10} - \frac{3000}{x} = 40$

C $\frac{4000}{x-10} + \frac{3000}{x} = 1000$

D $40(x-10) = 1000$

QUESTION 32

The feasible region for a linear programming problem is shaded in the diagram below.



Which of the following sets of constraints best describes the feasible region?

A $2y + x \leq 80$
 $3y + 4x \leq 240$
 $4y \geq 3x$

B $2y + x \geq 80$
 $3y + 4x \leq 240$
 $3y \leq 4x$

C $2y + x \geq 80$
 $3y + 4x \leq 240$
 $4y \leq 3x$

D $2y + x \leq 80$
 $3y + 4x \leq 40$
 $3y \leq 4x$

QUESTION 33

N.B. The volume of any pyramid is given by: $V = \frac{1}{3} \times \text{base area} \times \text{perpendicular height}$

An inverted cone with base radius r and height H has been filled to the top with water. A rectangular based pyramid with base dimensions $l \times b$ and height h is then completely submerged inside the cone such that some water pours out of the top of the cone.

The volume of water left inside the cone is given by:

- A $\frac{\left(lb - \frac{r^2}{2}\right)H}{3}$ B $\frac{(\pi r^2 - lb)H}{3}$ C $\frac{\pi r^2 H - 3lbh}{3}$ D $\frac{\pi r^2 H - lbh}{3}$

QUESTION 34

If $\tan(\theta + 15^\circ) = \sqrt{3}$ and $195^\circ < \theta + 15^\circ < 285^\circ$, then: $\sin \theta \cdot \cos \theta + \tan \theta \cdot \cos(\theta + 75^\circ) =$

- A 0 B 1 C -1 D $\sqrt{3}$

QUESTION 35

If $k > 4$, how would you translate the graph of $y = x^2$ to get the graph of $y = x^2 + 4x + k$?

- A left 2 units and up k units B right 2 units and up $(k - 4)$ units
 C left 2 units and up $(k - 4)$ units D right 2 units and down $(k - 4)$ units

QUESTION 36

7 data values are to be placed in the table below in **ascending order**.

				x		
--	--	--	--	-----------------------	--	--

The following information to the data applies:

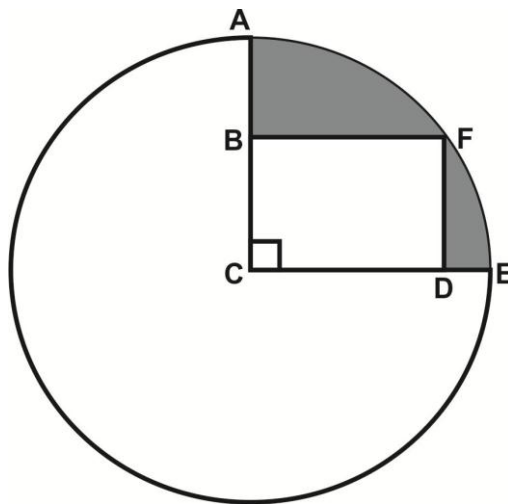
- range = 30 interquartile range = 15 maximum = 70
 mode = 45 median = 50 mean = 52

The value of x is

- A 50 B 52 C 54 D 55

QUESTION 37

In the figure shown, C is the centre of the circle. BCDF is a rectangle with CD extended to E and CB extended to A. A, E and F are points on the circumference of the circle.

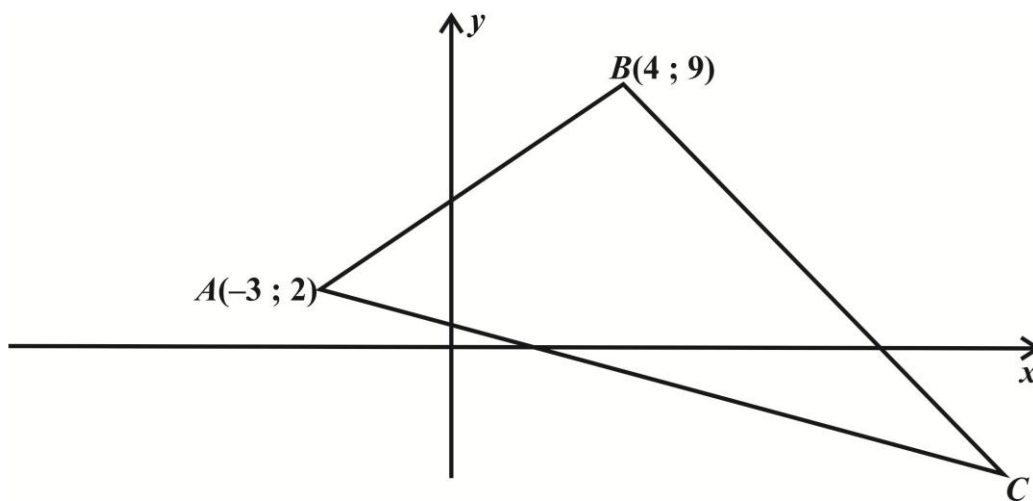


If $BC = (x - 1) \text{ cm}$ and $CD = (x + 1) \text{ cm}$, then the area of the shaded region may be given as:

- | | | | |
|---|------------------------------------|---|---|
| A | $2\pi x^2 + 2\pi - x^2 + 1$ | B | $\frac{1}{2}(\pi x^2 + \pi - 2x^2 - 2)$ |
| C | $\pi x^2 + 2\pi x + \pi - x^2 + 1$ | D | $\frac{1}{2}(\pi x^2 + \pi - 2x^2 + 2)$ |

QUESTION 38

In the figure shown (*not to scale*), the gradient $m_{BC} = -\sqrt{3}$.
Point A(-3; 2) and point B(4; 9) are given.

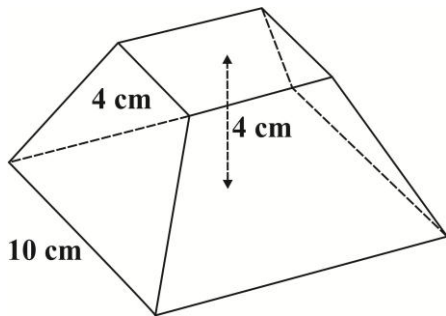


$\hat{A}BC =$

- | | | | | | | | |
|---|------------|---|------------|---|-------------|---|-------------|
| A | 75° | B | 90° | C | 105° | D | 120° |
|---|------------|---|------------|---|-------------|---|-------------|

QUESTION 39

A piece of wood is in the shape of a square-based pyramid with top cut off . This kind of shape is called a *frustum*.



The height of the shape measured from the centre of the square base to the centre of the square top is 4 cm.

The square base has side of 10 cm and the square top has side of 4 cm.

The total surface area of the **6 faces** equals

- A 256 cm² B 228 cm² C 396 cm² D 340 cm²

QUESTION 40

A set of 10 data values has mean, $\bar{x} = 20$, and standard deviation, $\sigma = 2$.

Each data value is multiplied by 3 **and then** 5 is added to each value.

The new set of data has a mean and standard deviation (respectively) of:

- A 65 and 6 B 65 and 11 C 75 and 6 D 75 and 11