GRADE 11 IeBT
2016

MATHEMATICS

Time: 2 hours

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 15 pages and an Information Sheet. Please check that your paper is complete.

2. Read the questions carefully.

3. 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.

4. Answer all the questions.

5. The use of calculators is **NOT** allowed.

QUESTION 1

What is the formula for the n^{th} term of the sequence: 20; 16; 12; 8; ...

A $T_n = 4n - 24$

B $T_n = 4n + 16$

C $T_n = -4n + 16$

D $T_n = -4n + 24$

QUESTION 2

Helen enters the following information into her calculator when attempting to find the slope between the points (5 ; 7) and (– 4 ; 10). Which of the following statements is TRUE?

7 – 10 ÷ 5 – (–4)
= 9

A She is correct, the slope is 9

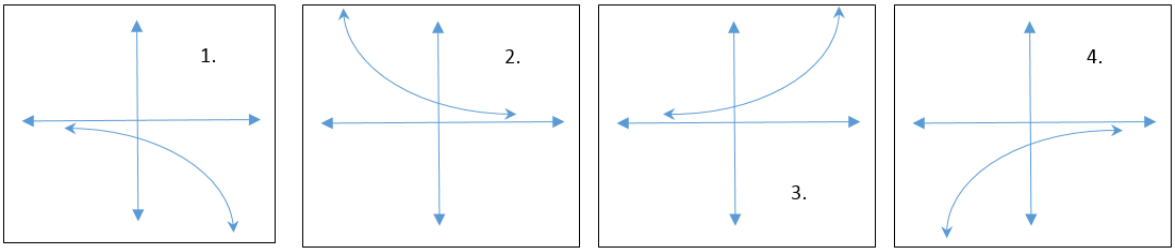
B The slope is actually -9

C The slope is actually -3

D The slope is actually $-\frac{1}{3}$

QUESTION 3

Order the equations below so that they match the order of the graphs above:



(a) $y = 3^x$

(b) $y = \left(\frac{1}{3}\right)^x$

(c) $y = -\left(\frac{1}{3}\right)^x$

(d) $y = -3^x$

A (b), (c), (a), (d)

B (d), (b), (a), (c)

C (b), (d), (a), (c)

D (c), (d), (a), (b)

QUESTION 4

Which of the following is NOT a valid reason for proving that a quadrilateral is cyclic?

A Opposite angles are supplementary

B Sum of interior angles = 360°

C Side subtends equal angles at two other points on the same side of it

D Exterior angle equals interior opposite angle

QUESTION 5

$\frac{1}{x+h}-\frac{1}{x}$ simplifies to:

A $\frac{-h}{x(x+h)}$

B $\frac{h}{2(x+h)}$

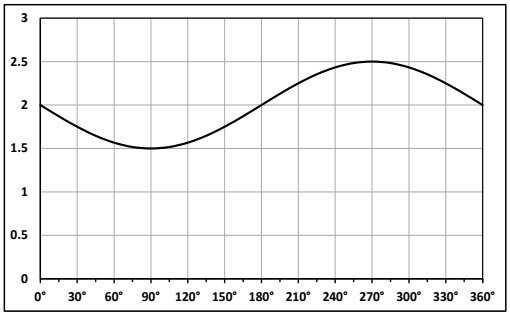
C $\frac{1}{h}$

D $\frac{1}{x}$

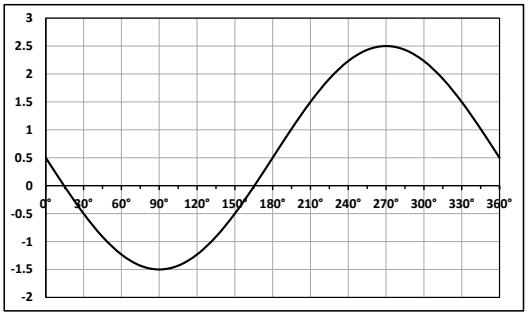
QUESTION 6

The graph of the function $f(x)=-2\sin x+\frac{1}{2}$ is:

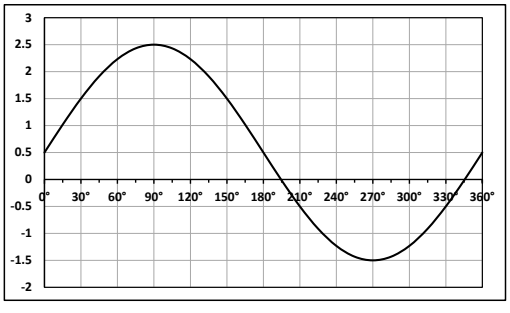
A



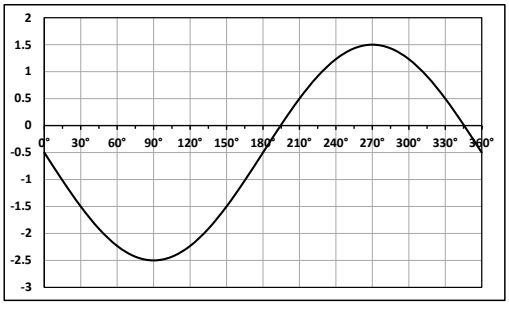
B



C

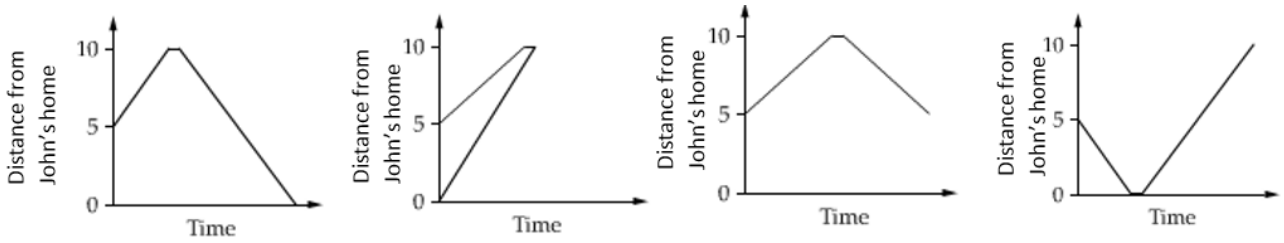


D



QUESTION 7

John starts his journey 5 km from his home and travels to Sarah's home to drop off her Mathematics textbook. Sarah's home is 10 km from John's home. John then returns to his home. Which graph best represents John's journey?



A B C D

QUESTION 8

Find the midpoint of the line segment connecting the points $(a\ ;\ b)$ and $(5a\ ;\ -7b)$.

A $(3a\ ;\ -3b)$ B $(2a\ ;\ -3b)$

C $(3a\ ;\ -4b)$ D $(-2a\ ;\ 4b)$

QUESTION 9

If $P(A) = 0{,}8$, $P(B) = 0{,}2$ and $P(A \cup B) = 0{,}9$, then $\boldsymbol{P(A \cap B)'}$ is equal to:

A 0 B 0,1

C 0,9 D 1

QUESTION 10

Chris has test scores of 50, 60 and 70. His score in his next test causes the mean to increase and the standard deviation to decrease. Which of the following scores would have caused this to happen?

A 55 B 60

C 65 D 75

QUESTION 11

Solve for x:

$2\sqrt{x+5}-\sqrt{-16x}=0$

A No real solutions

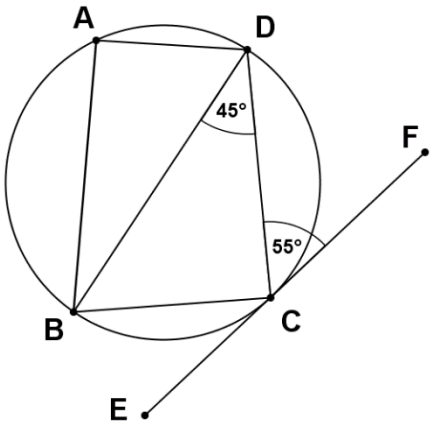
B $-\frac{5}{18}$

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

D -1

QUESTION 12

Points A, B, C and D lie on a circle.
EF is tangent to the circle at C.
$B\hat{D}C = 45°$ and $D\hat{C}F = 55°$.



The value of $B\hat{A}D$ is:

A 80°

B 90°

C 100°

D 110°

QUESTION 13

If $\sqrt{a\sqrt{a\sqrt{a}}} = a^x$, find x.

A $\frac{1}{8}$

B $\frac{7}{8}$

C $\frac{17}{8}$

D $\frac{7}{2}$

QUESTION 14

The equations $4kx-2y-10=0$ and $3x+5y-7=0$ represent parallel lines.
Determine the value of k.

A $\frac{3}{4}$

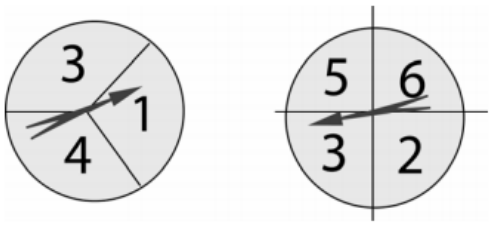
B $-\frac{3}{4}$

C $-\frac{3}{10}$

D $\frac{5}{6}$

QUESTION 15

In a game, each arrow spinner is spun once, and the results are added.



The probability that the sum of the two results is **greater than or equal to 6** is:

A $\frac{1}{4}$ B $\frac{1}{2}$

C $\frac{2}{3}$ D $\frac{3}{4}$

QUESTION 16

$\frac{\cos(180° + \theta) - \cos(-\theta)}{\cos(90° + \theta) + \sin(-\theta)}$ simplifies to:

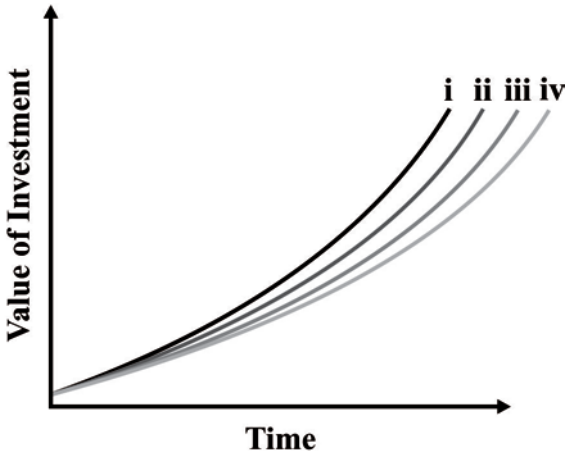
A $\frac{1}{\tan\theta}$ B $-\frac{1}{\tan\theta}$

C 0 D undefined

QUESTION 17

Scott graphed the value of an investment using the same nominal interest rate but with annual, quarterly, monthly and weekly compounding frequencies. He forgot to label them.

Which curve represents monthly compounding?

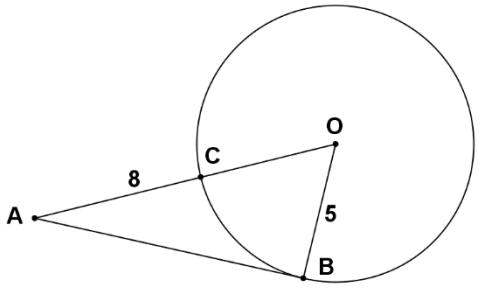


A i B ii

C iii D iv

QUESTION 18

AB is tangent to a circle with centre *O*. *OA* is a straight line passing through the circumference of the circle at C. $AC = 8$ cm and $OB = 5$ cm.



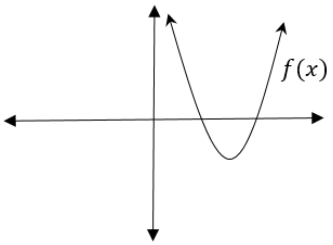
The area of ΔAOB is equal to:

A $30\ \text{cm}^2$ B $32{,}5\ \text{cm}^2$

C $35\ \text{cm}^2$ D $40\ \text{cm}^2$

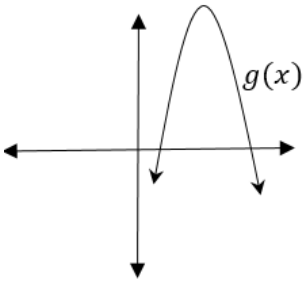
QUESTION 19

The graph of $f(x)$ is given alongside.

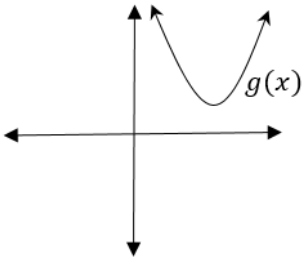


Which of the following best represents the graph of $g(x) = f(-x) + 4$?

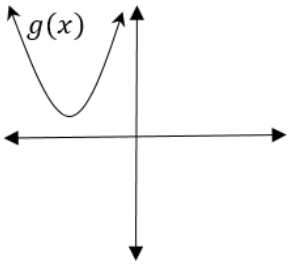
A



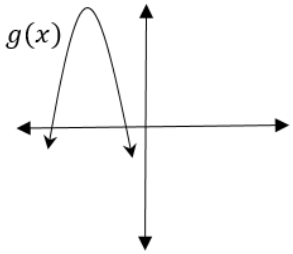
B



C

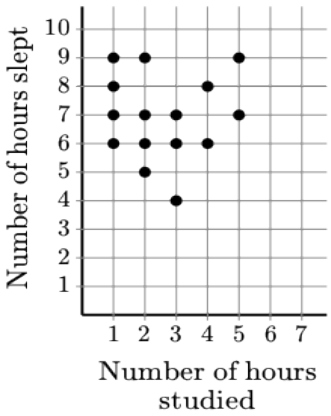


D



QUESTION 20

In a survey, 15 students were each asked to give the number of hours they studied one day and the number of hours they slept that night. The results are plotted in the diagram, where each dot represents one of the students.



The median number of hours studied is how much less than the median number of hours slept?

A 5

B 4

C 3

D 2

QUESTION 21

If $ax + x^2 = y^2 - ay$ and $x + y \neq 0$, what is a in terms of x and y?

A $x - y$

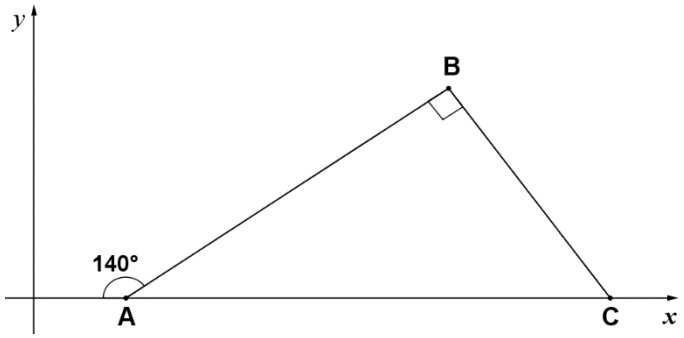
B $\dfrac{x^2 + y^2}{x + y}$

C $y - x$

D $x + y$

QUESTION 22

The gradient of AB is:



A $\tan 140°$

B $-\tan 40°$

C $\dfrac{1}{\tan 40°}$

D $\dfrac{1}{\tan 50°}$

QUESTION 23

The following are three consecutive terms of a linear sequence: $2x$; $4x + 2$; 12

Determine the value of x.

A $\dfrac{8}{3}$

B $\dfrac{4}{3}$

C 6

D 2

QUESTION 24

$\cos 0° + \cos 30° + \cos 60° + \cos 90° + \cos 120° + \cos 150° =$

A $\cos 450°$

B $\sqrt{3}\tan 30°$

C $\sqrt{3}\sin 30°$

D $\sqrt{3}\cos 30°$

QUESTION 25

If the function $f(x) = x^2 - 6x + 2$ is translated 5 units up and 2 units to the right, then the resulting function $g(x)$ is:

A $g(x) = (x-8)^2 + 4$

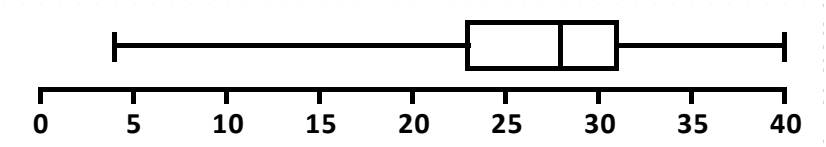
B $g(x) = (x-2)^2 + 5$

C $g(x) = (x-5)^2 - 2$

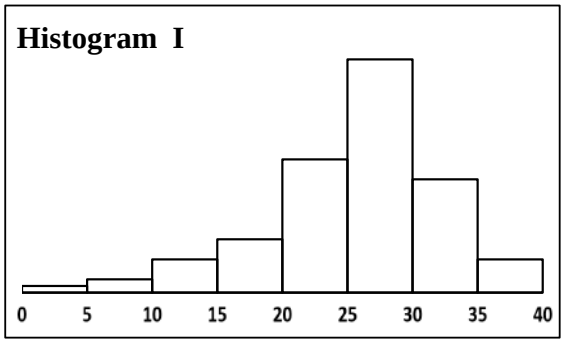
D $g(x) = (x-8)^2 - 5$

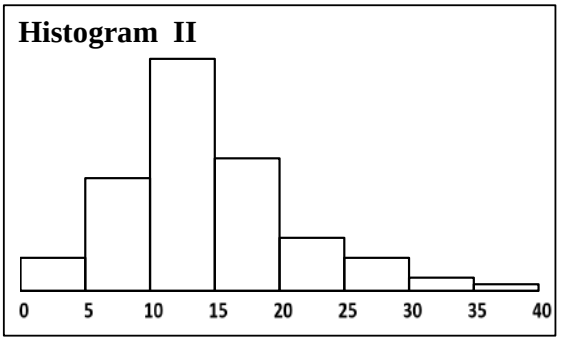
QUESTION 26

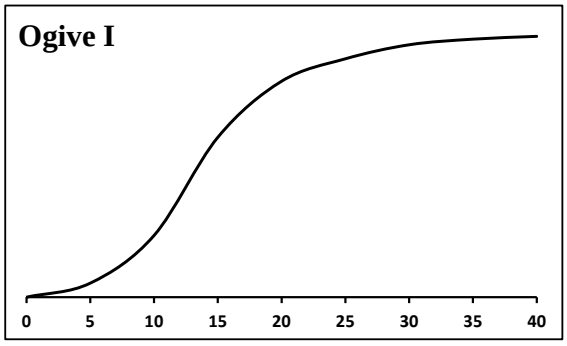
The IeBT results (out of 40) for Pythagoras College are represented by the following box-and-whisker plot.

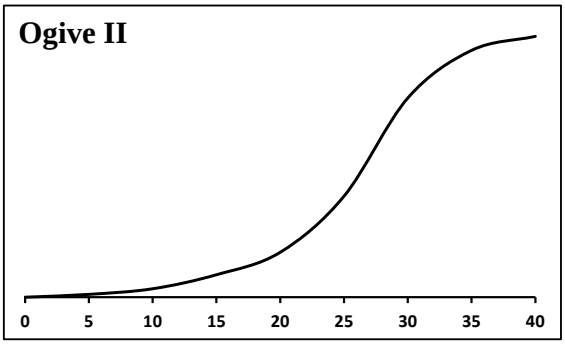


Which of the following are the histogram and ogive curve of the same data?









A Histogram I and Ogive I

B Histogram I and Ogive II

C Histogram II and Ogive I

D Histogram II and Ogive II

QUESTION 27

Thapelo invests R3 500 in a savings account. The interest rate for the first 5 years is 8% p.a. compounded monthly. At the end of the 5th year he withdraws R1 000. The interest rate then changes to 9% p.a. compounded semi-annually for the next 5 years.

The amount of money that Thapelo has in his savings account at the end of the 10 year period is:

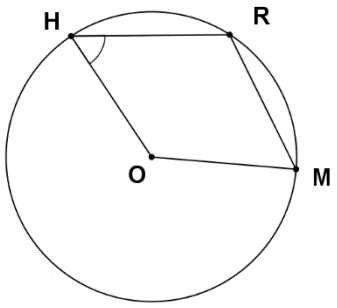
A $3\,500\left(1+\frac{0,08}{12}\right)^{12\times5}\left(1+\frac{0.09}{2}\right)^{2\times5}-1\,000$

B $3\,500\left(1+\frac{0,08}{12}\right)^{12\times5}-1\,000\left(1+\frac{0.09}{2}\right)^{2\times5}$

C $3\,500\left(1+\frac{0,08}{12}\right)^{12\times5}\left(1+\frac{0.09}{2}\right)^{2\times5}-1\,000\left(1+\frac{0.09}{2}\right)^{2\times5}$

D $3\,500\left(1+\frac{0,08}{12}\right)^{12\times5}+\left(1+\frac{0.09}{2}\right)^{2\times5}-1\,000$

QUESTION 28



$RHOM$ is a rhombus with points R, H and M on the circle with centre O.

The diagram is not drawn to scale.

$R\hat{H}O$ is:

A 30° B 45°

C 60° D impossible to determine

QUESTION 29

It is given that $f(3) = 4$ and $f(n) = f(n-1) + 3n$ for $n > 3$.

Determine $f(5)$.

A 16 B 31

C 108 D 180

QUESTION 30

Point *A* has co-ordinates (4 ; 1). Point B lies on the line $y = 2x + 1$ and has co-ordinates (a ; b).

The distance between the two points is $\sqrt{20}$. A possible value of *a* is:

A 4 B 3

C 2 D 1

QUESTION 31

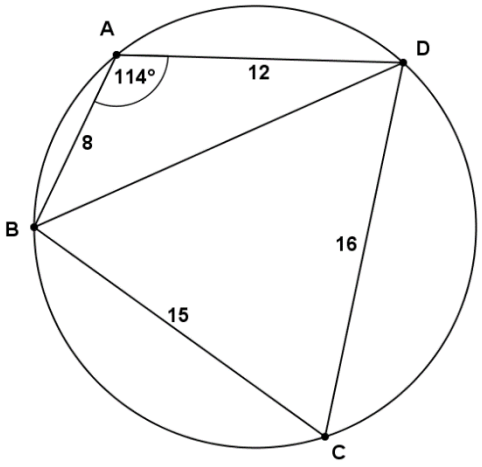
If $5^{10x} = 1\,600$ and $2^{\sqrt{y}} = 25$ what is the value of: $\dfrac{\left(5^{(x-1)}\right)^5}{4^{-\sqrt{y}}}$?

A 5 B 8

C 40 D 200

QUESTION 32

$ABCD$ is a cyclic quadrilateral with $AB = 8$, $AD = 12$, $BC = 15$, $CD = 16$ and $B\hat{A}D = 114^0$.



The ratio of the areas of ΔABD and ΔBCD is:

A 1 : 2

B 2 : 5

C 3 : 8

D 4 : 9

QUESTION 33

A bag contains 3 red marbles and x blue marbles.

Two marbles are pulled from the bag **without replacement**.

An expression that represents the probability that one marble is red and the other is blue, in any order, is:

A $\left(\frac{3}{x+3}\right)\left(\frac{x}{x+3}\right)+\left(\frac{x}{x+3}\right)\left(\frac{3}{x+3}\right)$

B $\left(\frac{3}{x+3}\right)+\left(\frac{x}{x+2}\right)+\left(\frac{x}{x+3}\right)+\left(\frac{3}{x+2}\right)$

C $\left(\frac{3}{x+3}\right)\left(\frac{x}{x+2}\right)+\left(\frac{x}{x+3}\right)\left(\frac{3}{x+2}\right)$

D $\left(\frac{3}{x+3}\right)\left(\frac{2}{x+3}\right)+\left(\frac{x}{x+3}\right)\left(\frac{x-1}{x+3}\right)$

QUESTION 34

The general solution to the equation $\sin x \tan x = \sqrt{3} \sin x$ is:

A $x = 30° + k.180° \quad k \in \mathbb{Z}$

B $x = 60° + k.180° \quad k \in \mathbb{Z}$

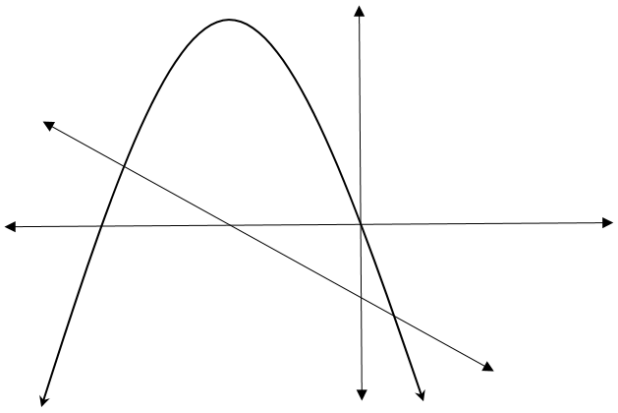
C $x = 30° + k.180°$, or $x = k.180° \quad k \in \mathbb{Z}$

D $x = 60° + k.180°$, or $x = k.180° \quad k \in \mathbb{Z}$

QUESTION 35

Given the graphs $f(x) = -2x - 8$ and $g(x) = -x^2 - 8x$,

what is the maximum value of $g(x) - f(x)$?



A 3

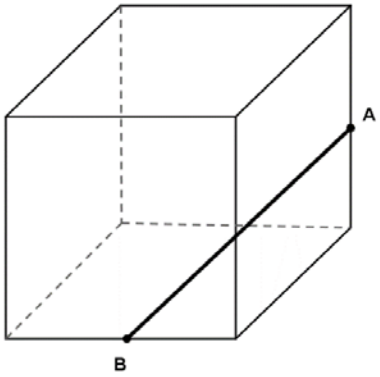
B 4

C 16

D 17

QUESTION 36

A cube has sides of length 2. Points *A* and *B* are the midpoints of two of the edges as shown. The length of line segment *AB* is:



A $\sqrt{3}$

B $\sqrt{5}$

C $\sqrt{6}$

D 3

QUESTION 37

Solve for *x* if it is given that: $9^x - (3^{x+1})(4) + 27 = 0.$

A $x = -1$ or $x = -2$

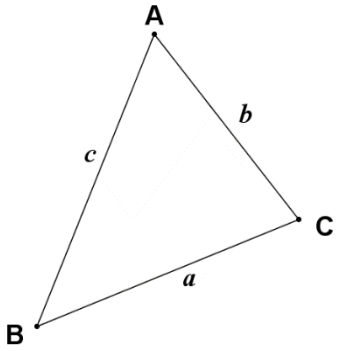
B $x = 3$ or $x = 9$

C $x = 1$ or $x = 2$

D $x = -3$ or $x = -9$

QUESTION 38

If ΔABC is scalene, then $\frac{2\sin B}{\tan A}$ is equal to:



A $\frac{a^2 + b^2 - c^2}{bc}$

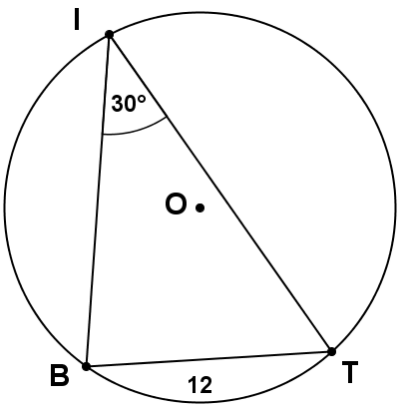
B $\frac{b^2 + c^2 - a^2}{ac}$

C $\frac{a^2 + c^2 - b^2}{ab}$

D $\frac{b^2 + c^2 - a^2}{ab}$

QUESTION 39

Points *B*, *I* and *T* lie on a circle with centre *O*. $B\hat{I}T = 30°$ and chord $BT = 12.$



The diameter of the circle is:

A 12

B 16

C 20

D 24

QUESTION 40

The following sequence of symbols is given:

$$\alpha\beta\beta\epsilon\epsilon\epsilon\theta\alpha\alpha\beta\beta\beta\beta\epsilon\epsilon\epsilon\epsilon\epsilon\theta\alpha\alpha\alpha\beta\beta\beta\beta\beta\beta\beta\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\theta \ldots$$

If this sequence is repeated which symbol will appear in the 195^{th} position?

A α B β

C ϵ D θ

END OF PAPER