# MATHEMATICS

Time: 2 hours

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1.   This question paper consists of 21 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

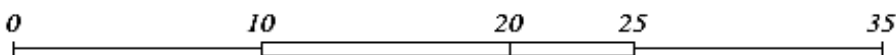The **range** of the function $f(x)$ represented in the graph is:
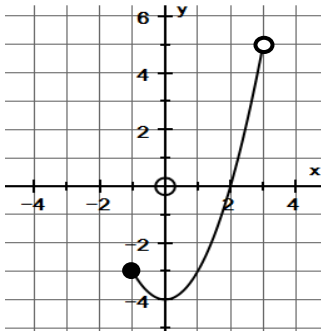
A   [–1 ; 3)

B   [–3 ; 5)
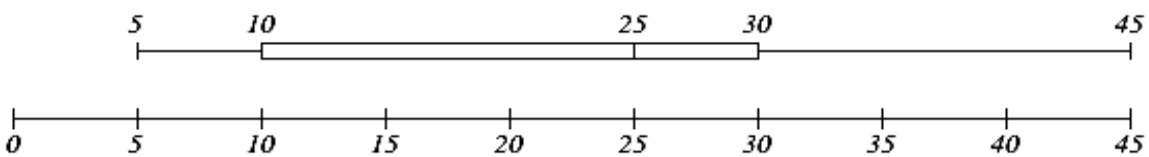
C   (–3 ; 5]

D   [–4 ; 5)

QUESTION 2

A rugby coach is comparing the last two seasons' points scored by his team. The points scored per match for the two seasons are represented in the box and whisker diagrams.
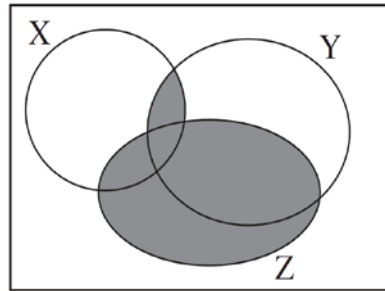

Choose the correct statement:

A   The inter-quartile range of Season 1 is greater than the inter-quartile range of Season 2.

B   In Season 1 a quarter of the scores were between 10 and 15.

C   Half of the scores in Season 2 were above 25 points.

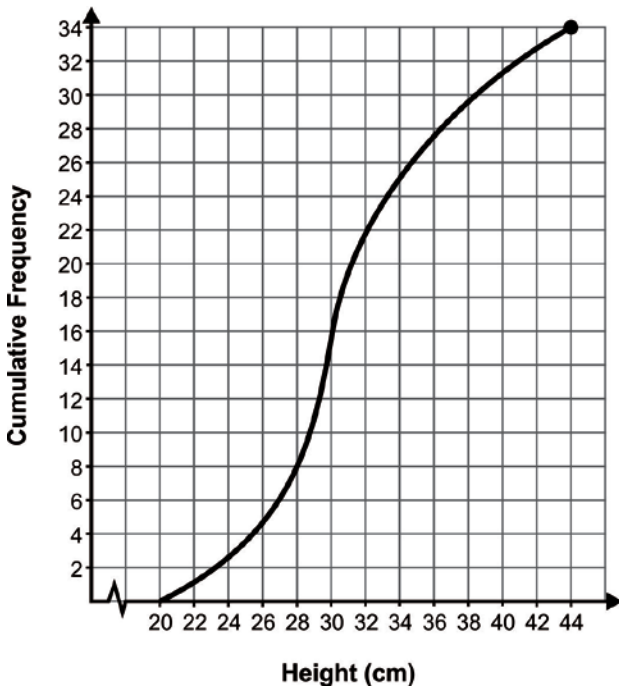D   75% of the scores in Season 1 were below 10 points.

QUESTION 3

In the figure alongside, the shaded portion represents:

A   (X ∪ Y) ∪ Z

B   (X ∪ Y) ∩ Z

C   (X ∩ Y) ∪ Z

D   (X ∩ Y) ∩ Z

QUESTION 4

The ogive below represents the height of different young plants in a garden. How many plants have a height between 28 cm and 32 cm?

A   4
B   8
C   14
D   22

QUESTION 5

After completing the square, an equivalent equation of $x^2 - 6x + 3 = 0$ is:

A $\quad (x + 3)^2 = 12$

B $\quad (x - 3)^2 = 12$

C $\quad (x - 3)^2 = 6$

D $\quad (x - 6)^2 = -3$

QUESTION 6

The length of line $AB = 5\sqrt{2}$, and the coordinates of A and B are given as:
A $(-2 ; y)$ and B $(-3 ; 4)$.

Find the values of y.

A $\quad y = 11$ or $y = -3$

B $\quad y = 9$ or $y = -1$

C $\quad y = 7$ or $y = 1$

D $\quad$ No solution

QUESTION 7

At the start of the month a Twitter account has 1 000 followers. For the first 10 days the daily increase in the number of followers is 15% of the previous day's total. For the 20 days thereafter, the daily increase slows to 5% of the previous day's total. Which graph best illustrates the change in the total number of followers over the month?

A

B

C

D
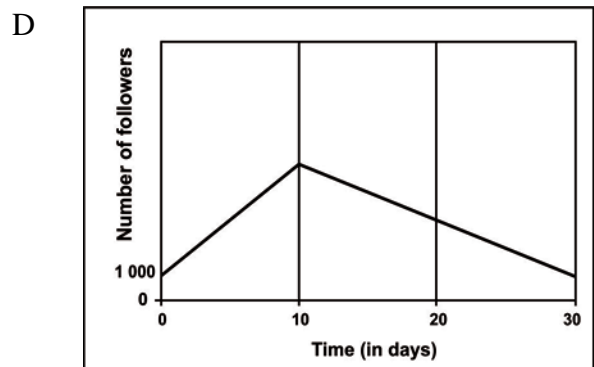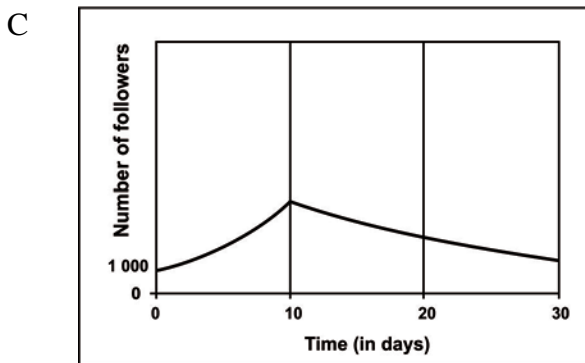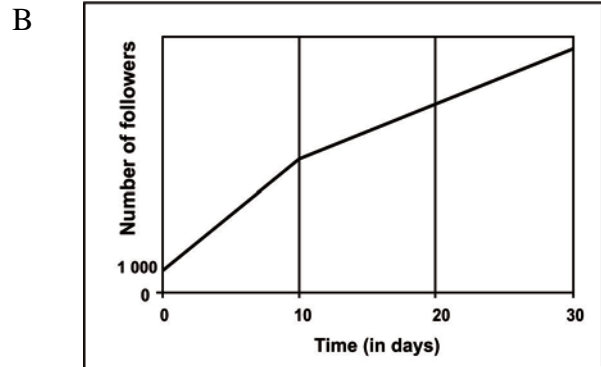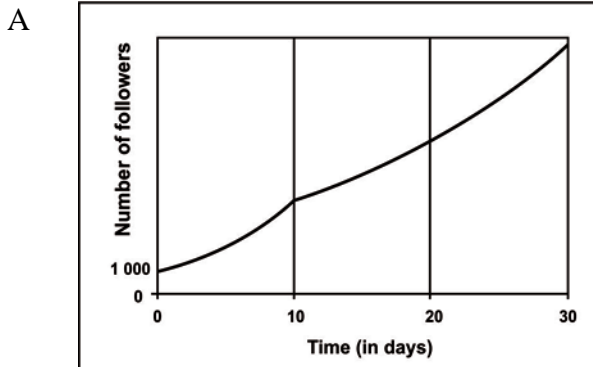
QUESTION 8

The gradient of a line AB is –3. If a line BD is perpendicular to AB and the *x*-intercept of BD is (7 ; 0), find the equation of line BD.

A $3y + x = 21$

B $3y + 7 = x$

C $3y = x + 7$

D $y + 3x = 21$

QUESTION 9

Which number is the largest?

A $27^3 \times 3^8$

B $3^7 \times 9^6$

C $\dfrac{81^7}{9^4}$

D $81^3 \times 27^2$

QUESTION 10

Simplify the following :

$$\frac{\cos(90° - x).\sin x}{\tan(180° - x).\cos^2(180° - x)}$$

A   tan*x*

B   –tan*x*

C   –1

D   1

QUESTION 11

Alex tosses a coin four times. Which of the following outcomes of heads (H) and tails (T) has the lowest theoretical probability of occurring?

A   H H T T

B   H T H T

C   H H H H

D   All three outcomes are equally likely

QUESTION 12

The mean mass of six boxes is 50 kg. One of the boxes with a mass of 75 kg is removed. Calculate the mean mass of the five remaining boxes.

A   25 kg

B   37,5 kg

C   40 kg

D   45 kg

QUESTION 13

The expression $\dfrac{4}{\sqrt{12}}$ is **NOT** equivalent to:

A $\quad\dfrac{\sqrt{12}}{3}$

B $\quad\dfrac{2\sqrt{3}}{3}$

C $\quad\dfrac{1}{\sqrt{3}}$

D $\quad\dfrac{2}{\sqrt{3}}$

QUESTION 14

If 4 is added to each score in a set, which one of the following statements will be true?

A   The mean and the standard deviation will remain the same.

B   The mean will increase by four and the standard deviation will decrease by four.

C   The mean will increase by four and the standard deviation will increase by two.

D   The mean will increase by four and the standard deviation will remain the same.
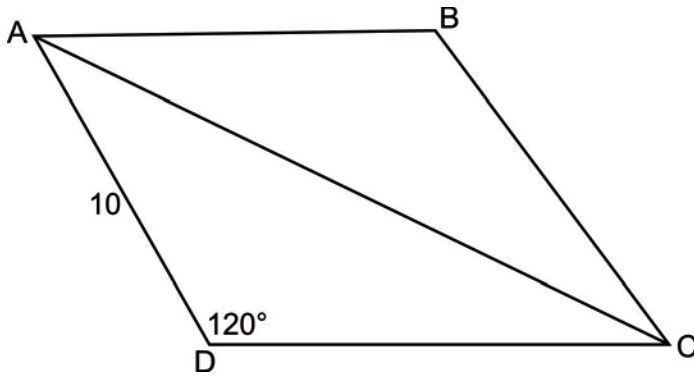
QUESTION 15

If $2^x 5^y = 8 \times 10^8$, where x and y are positive integers, then $x - y$ is equal to:

A   3

B   2

C   1

D   0

QUESTION 16

ABCD is a rhombus in which AD = 10 units and $\hat{ADC}$ = 120°.

Find the length of side AC.

A $\dfrac{10}{\sqrt{3}}$

B $10\sqrt{3}$

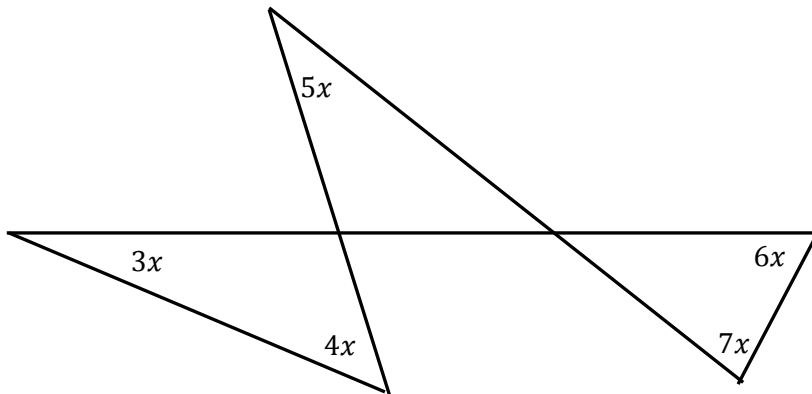C $10 + \sqrt{3}$

D $10\sqrt{2}$

QUESTION 17

The root(s) of the equation $(x + 3)(x - 3) = (x + 3)$ are :

A   3 only

B   – 4 and 3

C   –3 and 4

D   –3 and 3

QUESTION 18

Determine the value of x in the following diagram:

A $8°$
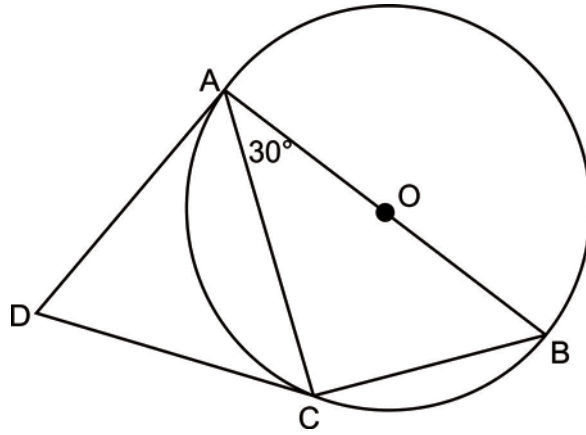
B $9°$

C $10°$

D $12°$

QUESTION 19

Which of the following is an exponential function of the form $f(x) = ab^x$ which passes through the points $(1; 12)$ and $(0; 9)$?

A $f(x) = 18\left(\dfrac{2}{3}\right)^x$

B $f(x) = 9(2)^x$

C $f(x) = 9\left(\dfrac{4}{3}\right)^x$

D $f(x) = 6\left(\dfrac{4}{3}\right)^x$

QUESTION 20

A circle with centre O has tangents AD and DC and diameter AB. It is also given that $\hat{CAB} = 30°$. Find $\hat{ADC}$.

A   30°

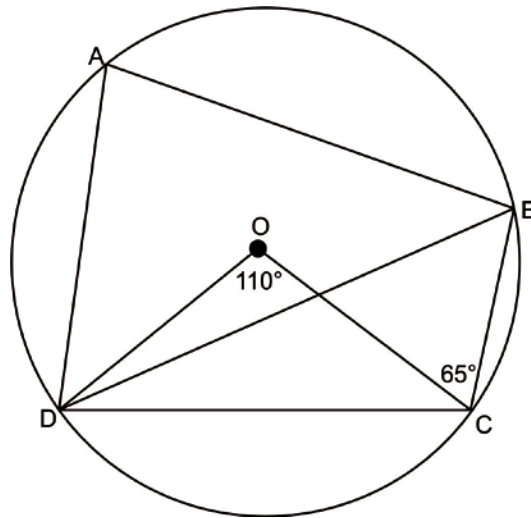B   40°

C   50°

D   60°

QUESTION 21

Simplify: $\dfrac{ab^{-1} - a^{-1}b}{a^{-1} + b^{-1}}$

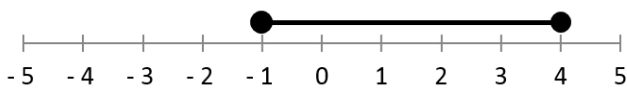A $a + b$

B $-(a + b)$

C $a - b$

D $b - a$

QUESTION 22

A circle with centre O, has $\hat{DOC} = 110°$ and $\hat{BCO} = 65°$. Find $\hat{DAB}$.

A   55°

B   65°

C   70°

D   80°

QUESTION 23

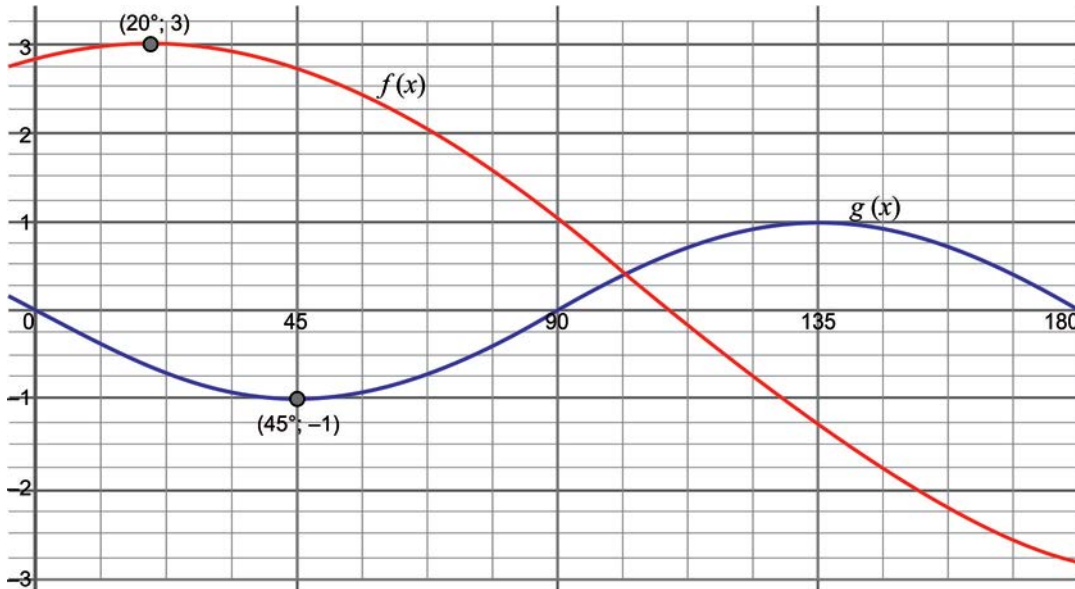

The diagram above is a graphical representation of the solution to:

A $3x + 4 \le x^2$

B $3x + 4 \ge x^2$

C $(x - 1)(x + 4) \le 0$

D $(x + 1)(x - 4) \ge 0$

QUESTION 24

The following graphs $f(x) = a\cos(x + b)$ and $g(x) = c\sin(2x)$ are given in the diagram below. Determine the values of **a, b, c**.

A $a = 3 \; ; b = 20° \; ; c = -1$

B $a = 3 \; ; b = -20° \; ; c = -1$

C $a = 3 \; ; b = -20° \; ; c = 1$

D $a = -3 \; ; b = -20° \; ; c = -1$

QUESTION 25

If x is a root of $x^2 - 9x + 8 = 0$, then the value of $(x - 4)(x - 5)$ is:

A   5

B   12

C   9

D   20

QUESTION 26

Find the general solution of the following trig equation: $2\cos^2 x + \cos x = 1$

A $x = 120° + \text{K}.360°$ or
       $x = 240° + \text{K}.360°$ or
       $x = \text{K}.360°$ and $\text{K} \in Z$

B $x = \text{K}.360°$ and $\text{K} \in Z$

C $x = 90° + \text{K}.360°$ or
       $x = 270° + \text{K}.360°$ or
       $x = \text{K}.360°$ and $\text{K} \in Z$

D $x = 60° + \text{K}.360°$ or
       $x = 300° + \text{K}.360°$ or
       $x = \text{K}.180° + \text{K}.360°$ and $\text{K} \in Z$
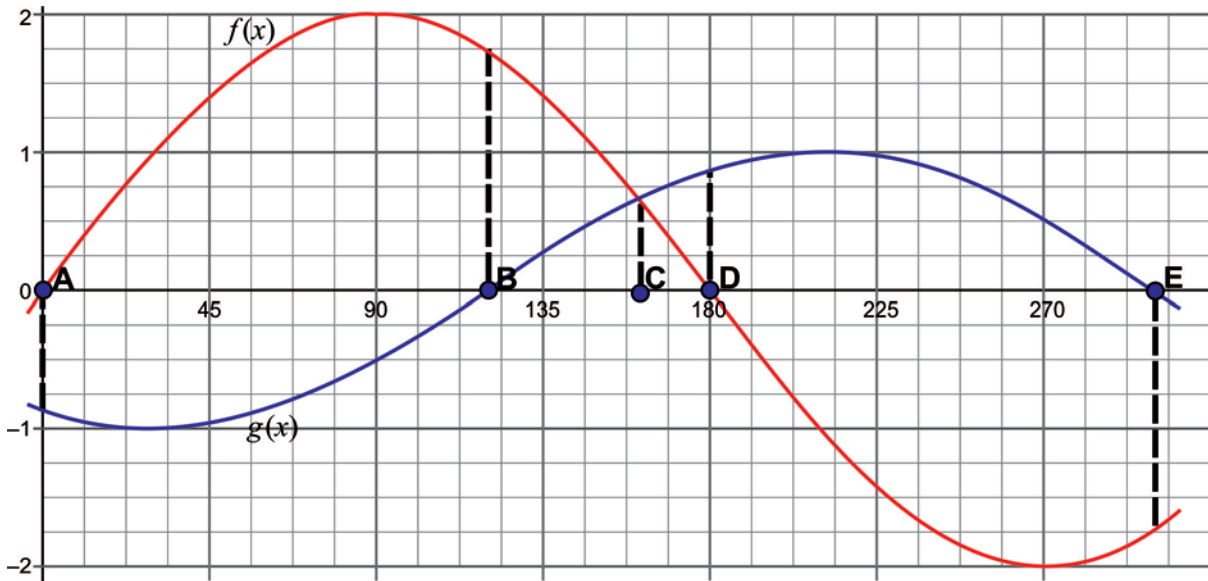
QUESTION 27

If $f(x) = 2x$, then $\dfrac{f(x+1)}{f(x) + 2}$ simplifies to:

A 1

B $\dfrac{1}{2}$

C $\dfrac{x + 1}{x + 2}$

D $\dfrac{2x + 1}{2x + 2}$

QUESTION 28

Choose the region for the values of x where: $f(x) \le g(x)$ and $f(x).g(x) \le 0$.

A $A \le x \le B$

B $B \le x \le C$

C $C \le x \le D$

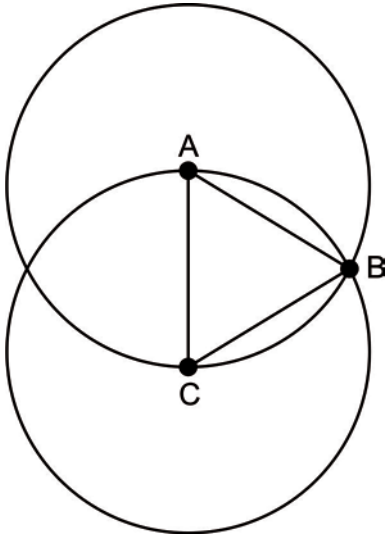D $D \le x \le E$

QUESTION 29

If $g(x)$ is a reflection of $f(x) = \dfrac{-3}{x+2} - 5$ about the y-axis then $g(x)$ is:

A $g(x) = \dfrac{3}{x-2} - 5$

B $g(x) = \dfrac{-3}{x-2} - 5$

C $g(x) = \dfrac{-3}{x+2} + 5$

D $g(x) = \dfrac{3}{x+2} - 5$

QUESTION 30

Two circles, with centres at A and C, each have a radius of 8 and intersect at B.

What is the area of △ABC?

A   16

B $12 + 4\sqrt{3}$

C   24

D $16\sqrt{3}$

QUESTION 31

Nic deposits R10 000 into a bank account. He earns interest of 10% per annum compounded monthly for the first five years and 8% per annum compounded monthly for the next five years. The balance in his account after 10 years is calculated.
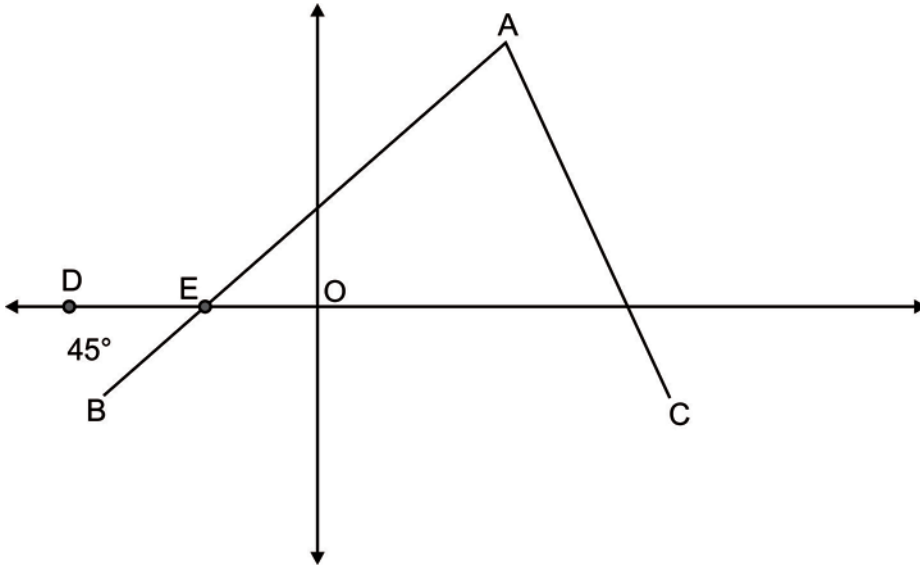
Which of the following is a correct representation of Nic's investment?

A $10\,000 \left(1 + \dfrac{10\%}{12}\right)^{60} \left(1 + \dfrac{8\%}{12}\right)^{60}$

B $10\,000 \left(1 + \dfrac{10\%}{12}\right)^{60} + \left(1 + \dfrac{8\%}{12}\right)^{60}$

C $10\,000 \left(1 + \dfrac{10\%}{12}\right)^{60} + 10\,000 \left(1 + \dfrac{10\%}{12}\right)^{60}$

D $10\,000 \left(1 + \dfrac{10\%}{12}\right)^{60} \times 10\,000 \left(1 + \dfrac{8\%}{12}\right)^{60}$

QUESTION 32

In the following diagram the gradient of AC is equal to $\dfrac{-1}{\sqrt{3}}$ and $D\hat{E}B = 45°$.

Find the size of $B\hat{A}C$.
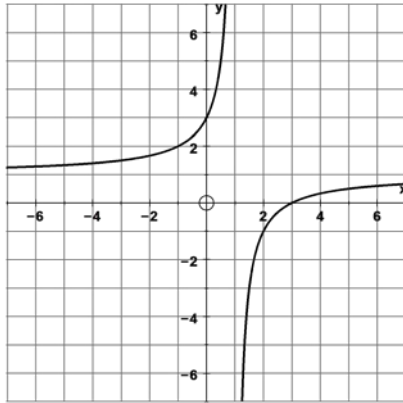

A   60°

B   90°

C   75°

D   105°

QUESTION 33

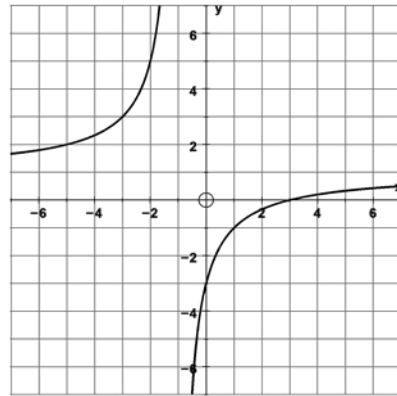Which of the graphs below represents the function:

$$f(x) = \frac{x + 3}{x + 1}?$$
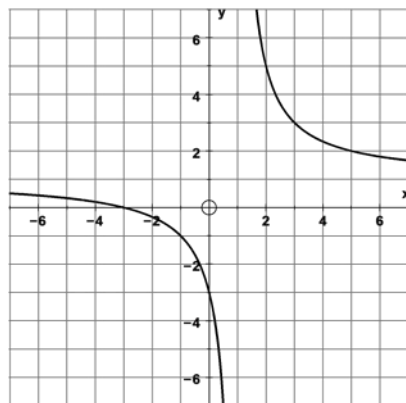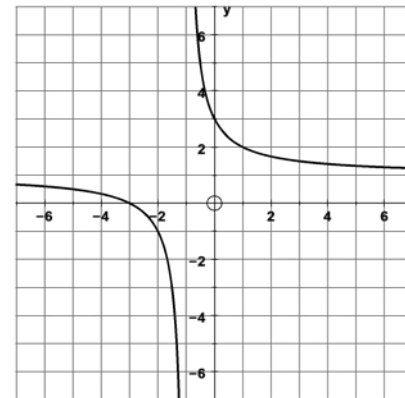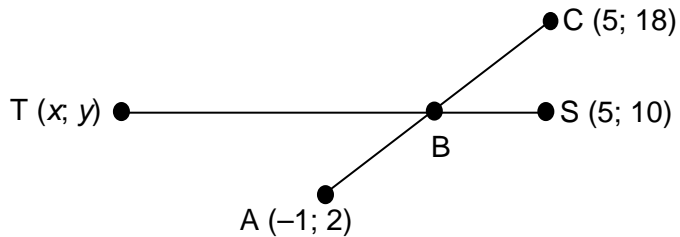
A

B

C

D

QUESTION 34

B is the midpoint of AC and it is given that: $\dfrac{TB}{BS} = \dfrac{3}{2}$.

Determine the length of TB.

A   3

B   2

C $\dfrac{9}{2}$

D $\dfrac{27}{2}$

QUESTION 35

The probability of Holly getting this question correct is 0,4 and the probability of Hutch getting it correct is 0,25. If these two probabilities are independent of each other then which one of the following statements is true?

A   The probability that they both get it correct is 0,65.

B   The probability that they both get it correct is 0,15.

C   The probability that only one of them gets it correct is 0,45.

D   The probability that they both get it wrong is 0,35.

QUESTION 36

ABCD is a square. P and D are points on the y-axis. A is a point on the x-axis. PAB is a straight line. The coordinates of D are $(0 ; \sqrt{3})$ and $D\hat{A}O = 60°$.

Find the length of **PD**.
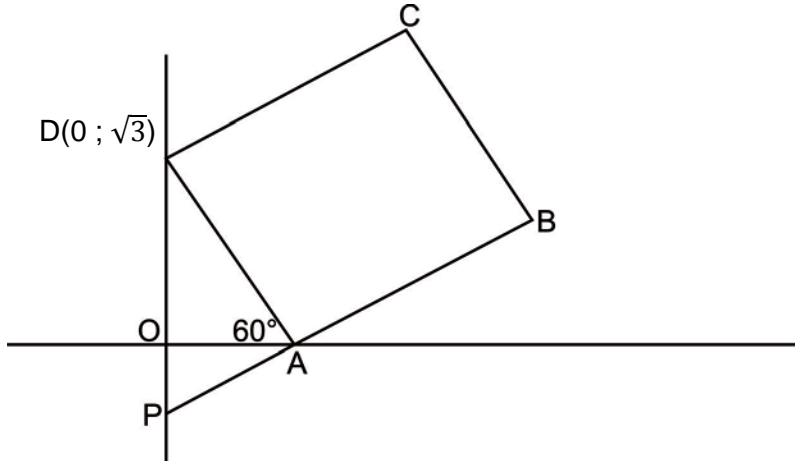
A $\dfrac{4}{\sqrt{3}}$

B $2\sqrt{3}$

C $\dfrac{9}{2\sqrt{3}}$
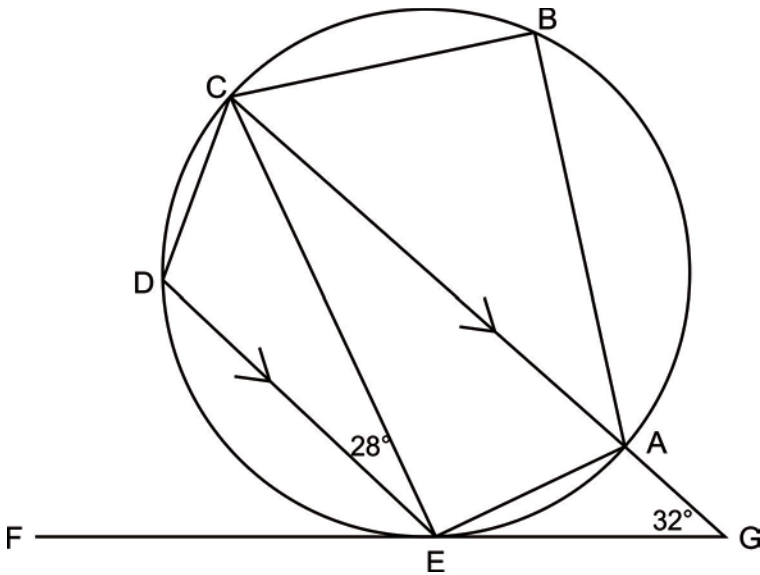
D $\dfrac{3}{\sqrt{3}}$

QUESTION 37

If $f(x) = a(x - 2)^2 + c$ and $g(x) = (2x - 5)(x - b)$ are functions representing the same parabola, then the value of b is:

A $-\dfrac{13}{2}$

B $\dfrac{3}{2}$

C $\dfrac{8}{5}$

D $-\dfrac{1}{2}$

QUESTION 38

It is given in the following diagram that FG is a tangent, $\hat{DEC} = 28°$ and $\hat{CGF} = 32°$.

CG is parallel to DE. Find $\hat{CBA}$.

A   88°
B   90°
C   92°
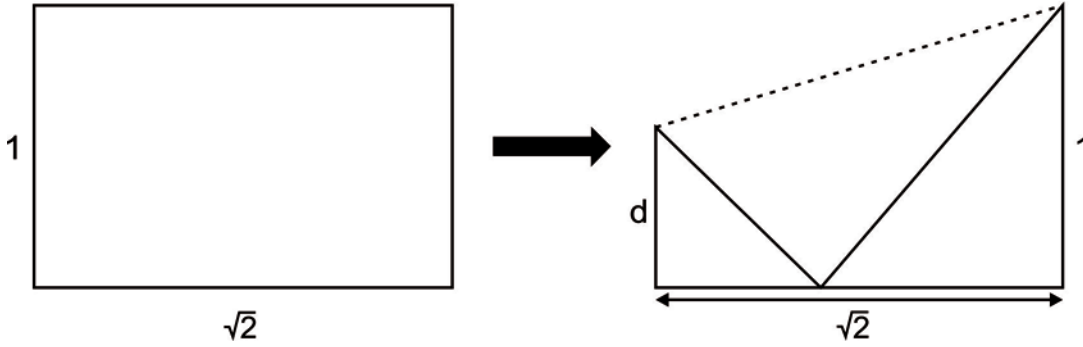D   102°

QUESTION 39

Given the quadratic sequence:

$$1 \; ; \; 3 \; ; \; x \; ; \; 1 \; ; \; y \; ; \; . \; . \; .$$

Determine $x + y$.

A   –1
B   0
C   1
D   2

QUESTION 40

A rectangular sheet of paper with sides 1 and $\sqrt{2}$ has been folded once as shown, so that one corner just meets the opposite edge. What is the value of the length d?

A $\dfrac{1}{2}$

B $\sqrt{2} - 1$

C $\dfrac{7}{16}$

D $\sqrt{3} - \sqrt{2}$