education

Department of Education
FREE STATE PROVINCE

GRADE 11

MATHEMATICS

MARCH TEST
2022

MARKS: 50

TIME: 1 hour

This question paper consists of 6 pages

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of THREE questions.
2. Clearly show ALL calculations, diagrams, graphs, etc. that you have used to determine your answers.
3. Answers only will NOT necessarily be awarded full marks.
4. If necessary, round off answers to TWO decimal places, unless stated otherwise.
5. Diagrams are NOT necessarily drawn to scale.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1

1.1 Solve for x.

1.1.1 $(x-2)(x+7)=0$ (2)

1.1.2 $x(5x-3)=1$ (Correct to TWO decimal places) (4)

1.1.3 $x^2-x-6<0$ (3)

1.1.4 $2^x+2^{x+1}=48$ (4)

1.1.5 $\sqrt{2x-1}+2=x$ (4)

1.2 Solve for x and y simultaneously

$x+6=2y$

$x^2+2xy=3y^2$ (6)

[23]

QUESTION 2

2.1 Simplify the following without using a calculator:

2.1.1 $\dfrac{9^{x+1}-6.3^{2x}}{\left(\sqrt{3}\right)^{4x+1}}$ (4)

2.1.2 $\dfrac{\sqrt{4x^9}-\sqrt{16x^9}}{\sqrt{x}}$ (4)

2.2 Determine the value(s) of k for which the equation $\dfrac{1}{k}=x^2-x+1$ where $k\neq 0$ has real roots. (5)

[13]

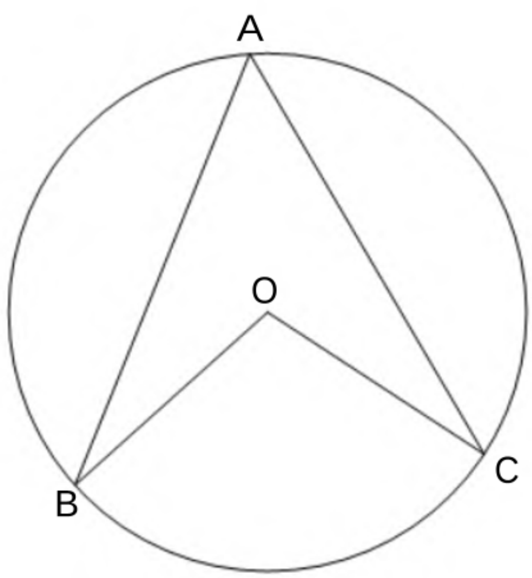
QUESTION 3

Give reasons for your statements and calculations in Question 3

3.1 Complete the following statement

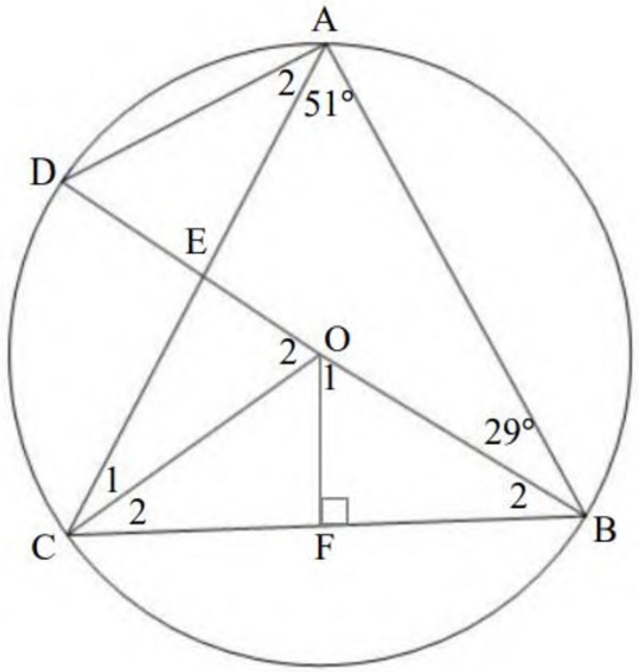
3.1.1 Opposite angles of a cyclic quadrilateral are ……………………………. (1)

3.2 In the diagram below, O is the centre of the circle. A, B and C are points on the circumference of the circle. AB, AC and OC are drawn.



Prove the theorem which states that $B\hat{O}C = 2 \times B\hat{A}C$ (5)

3.3 In the diagram, O is centre of the circle. Points A, B, C and D lie on the circumference of the circle. BOD is a diameter. $\hat{A}_1 = 51^\circ$ and $\hat{B}_1 = 29^\circ$. A line is drawn from O to F such that the length of BC = 24m and radius of the circle centred O is 13m.



3.3.1	Determine the size of $C\hat{O}B$	(2)
3.3.2	Determine the size of $\hat{A}_2$.	(2)
3.3.3	Determine the size of $\hat{D}$.	(1)
3.3.4	Determine the length of OF.	(3)
		[14]

TOTAL [50]

INFORMATION SHEET

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

$A = P(1+ni)$ $\quad A = P(1-ni)$ $\quad A = P(1-i)^n$ $\quad A = P(1+i)^n$

$T_n = a + (n-1)d$ $\quad S_n = \frac{n}{2}[2a + (n-1)d]$

$T_n = ar^{n-1}$ $\quad S_n = \frac{a(r^n - 1)}{r-1}\ ; r \neq 1$ $\quad S_\infty = \frac{a}{1-r}\ ;\ -1 < r < 1$

$F = \frac{x[(1+i)^n - 1]}{i}$ $\quad P = \frac{x[1-(1+i)^{-n}]}{i}$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\quad M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $\quad y - y_1 = m(x - x_1)$ $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad m = \tan\theta$

$(x-a)^2 + (y-b)^2 = r^2$

In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc.\cos A$

$\text{area } \Delta ABC = \frac{1}{2}ab.\sin C$

$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$ $\quad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$ $\quad \cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases}$$

$\sin 2\alpha = 2\sin\alpha.\cos\alpha$

$\bar{x} = \frac{\sum x}{n}$ $\quad \sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$

$P(A) = \frac{n(A)}{n(S)}$ $\quad$ P(A or B) = P(A) + P(B) – P(A and B)

$\hat{y} = a + bx$ $\quad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$