

MARCH TEST PACKAGE OUT OF 100

QUESTION	TOPICS	MARKS
1	Algebra <ul style="list-style-type: none"> • Factorise • Quadratic formula • Surd equations • Exponential equations • Inequality • Simultaneous equations 	20

QUESTION 1

1.1 Solve for x :

1.1.1 $(2x-4)(x-1) = 0$ (2)

1.1.2 $2x^2 - 3(x+2) = 4$ (correct to TWO decimal places) (4)

1.1.3 $x^2 + 4x - 21 \leq 0$ (3)

1.1.4 $-\sqrt{x-1} = 3-2x$ (4)

1.2 Solve simultaneously for x and y :

$2x = 1-y$ and $xy - x^2 + y^2 = 5$ (6)

QUESTION 1

1.1 Solve for x :

1.1.1 $5x(2x+7)(8-x) = 0$ (3)

1.1.2 $x^2 + 13x + 12 = 0$ (3)

1.1.3 $5x^2 - 7x + 8 = 0$ (2)

1.1.4 $\sqrt{x-2} + 2 = x$ (5)

1.1.5 $x(x-1) < 20$ (4)

1.1.6 $2^{1-2x} + 7 \cdot 2^{-x} - 4 = 0$ (5)

1.2 The roots of a quadratic equation are $x = \frac{5 \pm \sqrt{22-3m}}{2}$.
If m is an integer, determine the largest value of m for which these roots will be rational. (3)

1.3 Evaluate: $\frac{\sqrt{9^{2024}}}{\sqrt{9^{2023}} - \sqrt{9^{2025}}}$ (3)

1.4 Solve simultaneously for x and y :
 $3 + y - 2x = 0$ and $4x^2 + y^2 - 2xy - 7 = 0$ (6)

2	Number Pattern <ul style="list-style-type: none"> Quadratic pattern Sequence and Series <ul style="list-style-type: none"> Arithmetic and Geometric sequences and series Convergence Infinite series Sigma notation 	28
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QUADRATIC NUMBER PATTERN

QUESTION 4

- 4.1 Given the quadratic number pattern: 94 ; 90 ; 82 ; 70 ; ...
- 4.1.1 Determine the next two terms of the number pattern. (2)
- 4.1.2 Determine T_n , the general term of the number pattern. (4)
- 4.1.3 Calculate two consecutive terms whose first difference is -136 . (4)
- 4.2 A quadratic number pattern has a general term $T_n = an^2 + bn - 15$.
 $T_2 - T_1 = 3$ and $T_3 - T_2 = 7$. Determine the values of a and b . (5)
- [15]

ARITHMETIC SERIES AND SEQUENCE & SUM TO INFINITY

QUESTION 3

3.1 Consider the arithmetic sequence: $-\frac{7}{2}; -3; -\frac{5}{2}; \dots$

3.1.1 Determine the general term of the sequence. (2)

3.1.2 The sum of the first n terms of this sequence is 675. Calculate the value of n . (4)

3.1.3 A new sequence is formed by squaring each term of the given arithmetic sequence. Determine which term of the new sequence will have the smallest value. (3)

3.2 The first 3 terms of an infinite geometric series are given:

$$(x+1) + 2(x+1)^2 + 4(x+1)^3 + \dots$$

3.2.1 For which values of x will the series converge? (3)

3.2.2 If $x = -\frac{3}{4}$, determine the numerical value of the first term. (1)

3.2.3 Write the series in sigma notation. (3)

3.2.4 Calculate the sum to infinity of the series. (2)

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GEOMETRIC SEQUENCE AND SUM TO INFINITY

QUESTION 3

3.1 Consider $\sum_{k=0}^p (3^{5-k}) = \frac{1093}{3}$

3.1.1 Write down the first three terms of the series. (1)

3.1.2 Does the series converge? Motivate your answer. (2)

3.1.3 Calculate the value of p . (4)

3.1.4 Calculate: $\sum_{k=1}^{\infty} (3^{5-k})$ (2)

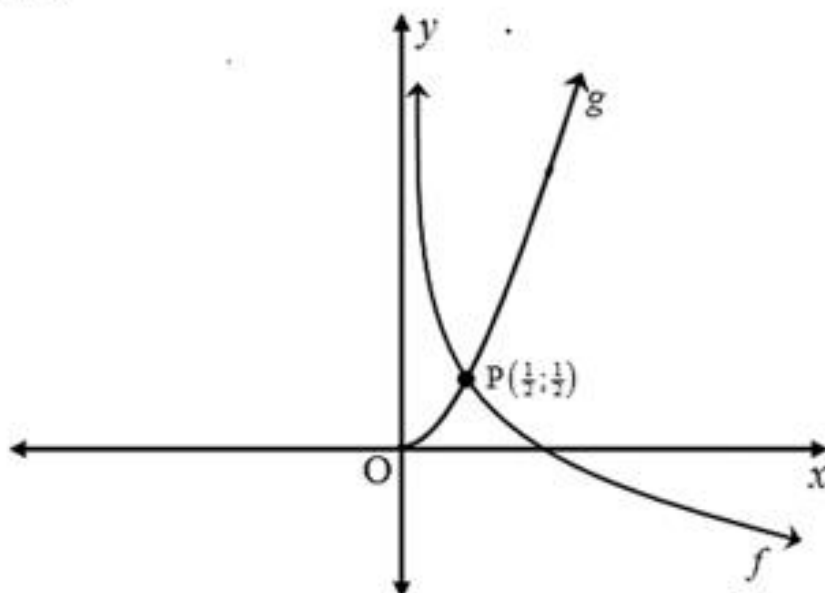
3	Inverse Functions <ul style="list-style-type: none"> • Parabola • Use a point to find the equation of the graph • Restricting the domain • Sketching the graph and its Inverse 	11
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4	Inverse Functions <ul style="list-style-type: none"> • Exponential graph 	13
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QUESTION 6

The diagram below shows the graphs of $f(x) = -\log_c x$ and $g(x) = d x^2$; $x \geq 0$.

The point $P\left(\frac{1}{2}; \frac{1}{2}\right)$ is the point of intersection of the graphs f and g .



6.1 Calculate the values of c and d . (3)

6.2 Determine:

6.2.1 The equation of $g^{-1}(x)$ in the form $y = \dots$ (2)

6.2.2 The equation of $h^{-1}(x)$ in the form $y = \dots$, if h is a reflection of f in the x -axis (2)

6.2.3 The x -values for which $h^{-1}(x) > 0$ (1)

[8]

5	Trigonometry <ul style="list-style-type: none"> • Identities • Double and compound angles • Reduction formula • Solving triangle – right-angled • Solving General equations 	28
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QUESTION 3

- 3.1 Given : $\sin \beta = \frac{1}{3}$ where $\beta \in (90^\circ; 270^\circ)$, determine the following by using a sketch and without the use of a calculator:

3.1.1 $\tan \beta$ (3)

3.1.2 $\cos 2\beta$ (2)

3.1.3 $\cos(-\beta - 450^\circ)$ (2)

- 3.2 Simplify the following to a single trigonometric ratio:

$$\frac{4 \cos(-x) \cdot \cos(90^\circ + x)}{\sin(30^\circ - x) \cdot \cos x + \cos(30^\circ - x) \cdot \sin x} \quad (6)$$

- 3.3 If $\cos 23^\circ = a$, express the following in terms of a:

3.3.1 $\tan 203^\circ$ (3)

3.3.2 $\sin 46^\circ$ (3)

- 3.4 Determine the values of the following, without using a calculator:

3.4.1 $\sin 105^\circ$ (4)

3.4.2 $\cos 69^\circ \cdot \cos 9^\circ + \cos 81^\circ \cdot \cos 21^\circ$ (3)

5.2 Given: $\frac{\cos^4 x + \sin^2 x \cdot \cos^2 x}{1 + \sin x}$

5.2.1 Prove that $\frac{\cos^4 x + \sin^2 x \cdot \cos^2 x}{1 + \sin x} = 1 - \sin x$ (4)

5.2.2 For what value(s) of x in the interval $x \in [0^\circ ; 360^\circ]$ is $\frac{\cos^4 x + \sin^2 x \cdot \cos^2 x}{1 + \sin x}$ undefined? (2)

5.2.3 Write down the minimum value of the function defined by $y = \frac{\cos^4 x + \sin^2 x \cdot \cos^2 x}{1 + \sin x}$ (2)

6.3 Determine the general solution of the following equation:

$$6\sin^2 x + 7\cos x - 3 = 0 \quad (6)$$