

GR 12 MATHS - EXAM QUESTION PAPERS

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NATIONAL NOV 2014 PAPER 1

You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

If necessary, round off answers to **TWO** decimal places, unless stated otherwise.

► ALGEBRA AND EQUATIONS AND INEQUALITIES [21]

QUESTION 1

- 1.1 Solve for x :
- 1.1.1 $(x + 2)(4 - x) = 0$ (2)
- 1.1.2 $3x^2 - 2x + 14$ (correct to TWO decimal places.) (4)
- 1.1.3 $2^{x+2} + 2^x = 20$ (3)

- 1.2 Solve the following equations simultaneously:
- $$x = 2y + 3$$
- $$3x^2 - 5xy = 24 + 16y$$
- (6)

- 1.3 Solve for x : $(x - 1)(x - 2) = 6$ (4)

- 1.4 The roots of a quadratic equation are: $x = \frac{2 \pm \sqrt{6-4}}{2}$
For which values of k are the roots real? (2) [21]

► PATTERNS AND SEQUENCES [31]

QUESTION 2

Given the arithmetic series: $2 + 8 + 14 + \dots$ (to 251 terms)

- 2.1 Write down the fourth term of the series. (1)
- 2.2 Calculate the 251st term of the series. (3)
- 2.3 Express the series in sigma notation. (2)
- 2.4 Calculate the sum of the series. (2)
- 2.5 How many terms in the series are divisible by 4? (4) [12]

QUESTION 3

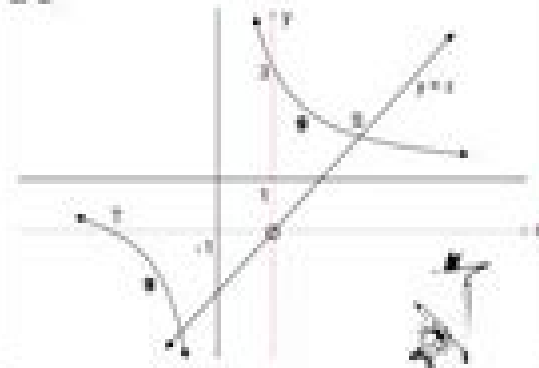
- 3.1 Given the quadratic sequence: $-1; -7; -11; p; \dots$
- 3.1.1 Write down the value of p . (2)
- 3.1.2 Determine the n^{th} term of the sequence. (6)
- 3.1.3 The first difference between two consecutive terms of the sequence is 16. Calculate the values of these two terms. (4)
- 3.2 The first three terms of a geometric sequence are: $16; 4; 1$
- 3.2.1 Calculate the value of the 12th term. (Leave your answer in simplified exponential form.) (3)
- 3.2.2 Calculate the sum of the first 10 terms of the sequence. (2)
- 3.3 Determine the value of:
 $\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{3}\right)\left(1 + \frac{1}{4}\right)\left(1 + \frac{1}{5}\right) \dots$
 up to 98 factors. (4) [16]

► FUNCTIONS AND GRAPHS [33]

QUESTION 4

The diagram below shows the hyperbola g defined by $g(x) = \frac{2}{x+2} + 4$ with asymptotes $y = 1$ and $x = -1$.

The graph of g intersects the x -axis at T and the y -axis at $(0, 2)$. The line $y = x$ intersects the hyperbola in the first quadrant at S .



Q1

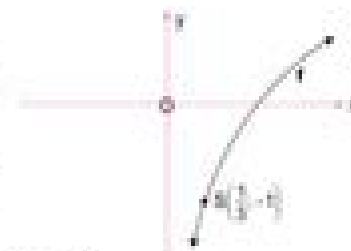
- 4.1 Write down the values of p and q . (2)
- 4.2 Calculate the x -coordinate of T . (2)
- 4.3 Write down the equation of the vertical asymptote of the graph of h , if $h(x) = g(x + 5)$. (1)
- 4.4 Calculate the length of OS . (5)
- 4.5 For which values of k will the equation $g(x) = x + k$ have two real roots that are of opposite signs? (1) [11]

QUESTION 5

Given:

$f(x) = \log_{a+1} x$ where $a > 0$.

$S\left(\frac{1}{3}, -1\right)$ is a point on the graph of f .



- 5.1 Prove that $a = 2$. (2)
- 5.2 Write down the equation of h , the inverse of f , in the form $y = \dots$ (2)
- 5.3 If $g(x) = -f(x)$, determine the equation of g . (1)
- 5.4 Write down the domain of g . (1)
- 5.5 Determine the values of x for which $f(x) > -3$. (2) [6]



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