Gr 11 Paper 1 - Algebra - 2020

Equations:

1. Solve for x:

a. $-2(x + 2)(3x - 2) = 0$

b. $2(x + 3)^2 - 8 = 0$

2. Solve for x in terms of p in simplest form:

c. $(x - p + 3)^2 = 9$

d. $x^2 - 2px + p = 0$

Surd Equations

3. Solve for x:

a. $(\sqrt{x - 1} - 3)(\sqrt{x - 1} + 2) = 0$

b. $x = 2 - \sqrt{2x - 5}$

c. $\sqrt{x^2 + x + 10} + 2 = x(x + 1)$

Completing the Square

4. Solving for x by completing the square, leaving your answers in terms of a:

   $2x^2 - 2x = a$.

5. Solve for x in terms of m by completing the square: $x^2 - 4mx = m^2$

Simultaneous Equations

6. Solve the following equations simultaneously:

   $y + 7 = 2x$ and $x^2 - xy + 3y^2 = 15$

Inequalities:

Solve for x:

1. $(x - 3)(2x + 3) \leq 0$

2. $x^2 \geq 2x$

3. $(x + 2)^2 < 1$

4. $x^2 \geq 16$

Exponential Equations: x **is in the exponent position**

Solve for x:

1. $4^{x-2} - 16^{3x+4} = 0$

2. $2^{4x} - 8 . 2^x = 0$

3. $2^{2x} - 4^{x-1} = 6$

4. $5^{x+2} = 24 + 5^x$

5. $4^x + 4.2^x - 5 = 0$ 6. $9^x - 2.3^{x+2} + 81 = 0$

Exponential Equations: x is in the base position

Solve for x:

1. $2x^{\frac{2}{3}} - 32 = 0$ 2. $2 - 16x^{\frac{-3}{2}} = 0$

3. $162 - 2\sqrt[3]{x^4} = 0$

Nature of Roots

1.   Given: $9x^2 - 12px = -4p^2$

For which value(s) of p will the equation have equal roots?

2. a.   Show that the roots of $2x^2 - 5x = 3$ are real and rational.

   b.   Determine the value that must be added to the negative root so that the roots are equal.

3.   The equations $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$ both have real and equal roots. Solve for a and b, where $a > 0$ and $b > 0$.

4. Determine the value(s) of k if $x^2 + 2kx + 5k + 6$ is a perfect square.

Root questions

1.   If 2 and-4 are the roots of the equation $x^2 + bx + c = 0$, determine the values of b and c.

2.   The roots of a quadratic equation are given as $5 - \sqrt{2}$ and $5 + \sqrt{2}$. Determine the equation in the form $ax^2 + bx + c = 0$.

Number Patterns

1.   Find the nth term in each of the following:

a. $-1; -5; -11; -19 \ldots \ldots \ldots$ b. $2; 1; 2; 5; 10 \ldots \ldots \ldots$

c. $-3; -7; -11; -15 \ldots \ldots \ldots.$ d. $\frac{1}{2}; 1; \frac{3}{2}; 2 \ldots \ldots \ldots \ldots$

2. Consider the following arithmetic sequence:

$(x + 5)$; $(37 - x)$; $(x + 13)$ … … ..

a. Determine the value of x.   b. Determine the general term.

3. The share price of a certain company formed a quadratic pattern over a specific time interval. The share price at the end of each day for the first 5 days was:

Day 1 : R32 699

Day 2 : R32 896

Day 3 : R33 091

Day 4 : R33 284

Day 5 : R33 475

a. Determine a formula for the nth term of the pattern.

b. At the end of which day, will the share price be at its maximum?

4. If f is a quadratic function such that: $f(0) = 2f(1) = 4 \; and \; f(2) = 16,$ find the value of $f(3)$.

5. The sequence $4; 9; x; 37; …$ is a quadratic sequence

a. Calculate x

b. Hence, or otherwise, determine the nth term of the sequence