Test - Indices, surds and quadratic functions

Year: Year 12 · Duration: 60 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	5	4	4	3	4	**20**
Mark						

Show your working.

Question 1 (5 marks)

Question 1 – Indices and surds

Do not use a calculator.

a. Write $\dfrac{(3x^2)^3}{9x^{-1}}$ in the form ax^n. (3 marks)

b. Show that $\dfrac{10}{\sqrt{5}-1}$ can be written as $\dfrac{5(\sqrt{5}+1)}{2}$. (2 marks)

Question 2 (4 marks)

Question 2 – Completing the square

$f(x) = x^2 + 10x + 7$.

a. Write $f(x)$ in the form $(x+a)^2 + b$. (2 marks)

b. Write down the coordinates of the minimum point and solve $f(x) = 0$ exactly. (2 marks)

Question 3 (4 marks)

Question 3 – Discriminant

The equation $x^2 + (k-1)x + 4 = 0$ has equal roots.

a. Find the possible values of k. (3 marks)

b. For one of these values, solve the equation. (1 mark)

Question 4 (3 marks)

Question 4 – Quadratic in disguise

Solve $x^4 - 10x^2 + 9 = 0$.

Question 5 (4 marks)

Question 5 – Problem: designing a poster

A rectangular poster has perimeter 100 cm. Its width is w cm.

a. Show that its area is $A = 50w - w^2$. (1 mark)
b. By completing the square find the maximum area and the width that gives it. (2 marks)
c. The printer needs the area to be at least 600 cm^2. Find the range of possible widths. (1 mark)