Name: \_\_\_\_\_

GCSE (1 - 9)

## Iteration

## Instructions

- Use black ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
- there may be more space than you need.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must show all your working out.

## Information

- The marks for each question are shown in brackets
- use this as a guide as to how much time to spend on each question.

## **Advice**

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- · Check your answers if you have time at the end

1. The equation  $x^3 + 7x - 2 = 55$  has a solution between 3 and 4.

Use trial and improvement to find this solution. Give your answer to 1 decimal place.

2. Use trial and improvement to solve  $x^3 - x^2 = 85$ Give your answer to 1 decimal place. 3. Use trial and improvement to solve  $x^3 + 5x = 70$ Give your answer to 1 decimal place.

4.	An approximate solution to an equation is found using this		
iterative process:			

$$x_{n+1} = \sqrt{(x_n) + 10}$$
 and  $x_1 = 3$ 

a) Work out the values of  $x_2$  and  $x_3$ 

b) Work out the solution to 3 decimal places

5.	An approximate solution to an equation is found using the	his	
iterative process:			

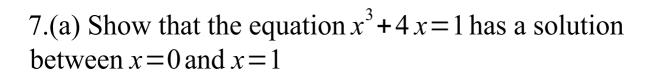
$$x_{n+1} = \frac{(x_n)^3 - 3}{8}$$
 and  $x_1 = -1$ 

a) Work out the values of  $x_2$  and  $x_3$ 

b) Work out the solution to 6 decimal places

6. A sequence is defined by the term-to-term rule: $U_{n+1} = U_n^2 - 8U_n + 17$	
a) Given that $U_1 = 4$ , find $U_2$ and $U_3$	
	( - )
••••••••••••	(2)
b) Given instead that $U_1$ =2, find $U_2$ , $U_3$ and $U_{100}$	

..... (3)



.....(2)

(b) Show that the equation  $x^3 + 4x = 1$  can be rearranged to give  $x = \frac{1}{4} - \frac{x^3}{4}$ 

.....(1)

(c) Starting with  $x_0 = 0$ , use the iteration formula  $x_{n+1} = \frac{1}{4} - \frac{x_n^3}{4}$  twice, to find an estimate to the solution of  $x^3 + 4x = 1$ 

.....(3)