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

..... (1)

5. An approximate solution to an equation is found using this 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

..... (2)

b) Work out the solution to 6 decimal places

..... (1)

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}

7.(a) Show that the equation $x^3 + 4x = 1$ has a solution between x=0 and x=1

..... (2)

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

(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 $x^3 + 4x = 1$