## Lesson 8

## GCSE Mathematics Iteration

## 8.1 Homework (Revision)

Non-Calculator

Marks Available : 60

## **Question 1**

A number sequence, U, is described by the following flowchart,



Complete this table to show the first six terms in sequence U

| $U_1$ | ${U}_2$ | $U_3$ | ${U}_4$ | $U_5$ | $U_{6}$ |
|-------|---------|-------|---------|-------|---------|
| 124   |         |       |         |       |         |

[ 7 marks ]

# **Question 2**

Simplify,

(i) 
$$4 \times \left(\frac{3}{4} + 1\right)$$
 (ii)  $\left(5 + \frac{3}{7}\right) \times 7$ 

A number sequence, K, is described by the following flowchart,



The flowchart generates a loop of numbers.

On the following diagram write out the numbers that are in the loop.



[8 marks]

#### **Question 4**

First expand the brackets, then simplify,

(i)  $\left(4 + \frac{1}{6}\right) \times 6$  [2 marks] (ii)  $\frac{\left(3 + \frac{2}{7}\right)}{4} \times \frac{7}{7}$ 

[ 2 marks ]

A sequence of numbers has the iterative rule

$$A_1 = \frac{1}{16} \qquad A_{n+1} = \frac{4}{3} A_n$$

Use the space below to work out the first six terms of this iterative sequence.

Simplify fractions where possible.

Put your answers in the table.

| <sup>11</sup> <sub>1</sub> <sup>11</sup> <sub>2</sub> <sup>11</sup> <sub>3</sub> <sup>11</sup> <sub>4</sub> | $A_5$ | $A_6$ |
|---|-------|-------|
|   |       |       |
|   |       |       |

[ 7 marks ]

# Question 6

Simplify,

(i) 
$$\frac{\left(\frac{3}{8}+2\right)}{5} \times \frac{8}{8}$$

[ 2 marks ]

(iii) 
$$\frac{\left(4+\frac{2}{3}\right)}{5}$$

(ii)  $\frac{\left(5+\frac{7}{4}\right)}{11}$ 

[ 2 marks ]

The following sum has an answer that is a rational number. (i)

> That is, a number in the form  $\frac{p}{q}$  for integer p and q with  $q \neq 0$ Determine what that rational number is.

$$\frac{\left(1 - \frac{1}{2}\right)}{3}$$
 [2 marks]

Consider the iteration,  $B_1 = \frac{1}{2}$ ,  $B_{n+1} = \frac{1 - B_n}{3}$ (ii)

> Use the space below to work out the first six terms of this iterative sequence and put your answers in the table towards the bottom of the page.

| $B_1$ | $B_2$ | <i>B</i> <sub>3</sub> | $B_4$ | $B_5$ | <i>B</i> <sub>6</sub> |
|-------|-------|-----------------------|-------|-------|-----------------------|
|       |       |                       |       |       |                       |
|       |       |                       |       |       |                       |
|       |       |                       |       |       |                       |

[7 marks]

**Question 8** Simplify,

(i) 
$$\frac{1}{\left(\frac{5}{3}+4\right)} \times \frac{3}{3}$$

[ 2 marks ]

$$(\mathbf{ii}) \quad \frac{5}{\left(\frac{7}{8}+2\right)}$$

[ 2 marks ]

[ 2 marks ]

(ii) 
$$\frac{5}{\left(\frac{7}{8}+2\right)}$$

(iii)  $\frac{9}{(\frac{7}{5}-1)}$ 

(i) The following sum has an answer that is a rational number.

That is, a number in the form  $\frac{p}{q}$  for integer p and q with  $q \neq 0$ Determine what that rational number is.

$$\frac{2}{\left(3+\frac{2}{3}\right)}$$

[ 2 marks ]

(ii) Consider the iteration, 
$$Z_1 = 0$$
,  $Z_{n+1} = \frac{2}{3 + Z_n}$ 

Use the space below to work out the first six terms of this iterative sequence and put your answers in the table towards the bottom of the page.

| $Z_1$ | $Z_2$ | $Z_3$ | $Z_4$ | $Z_5$ | $Z_6$ |
|-------|-------|-------|-------|-------|-------|
|       |       |       |       |       |       |
|       |       |       |       |       |       |

<sup>[7</sup> marks]

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Teachers may obtain detailed worked solutions to the exercises by email from mhh@shrewsbury.org.uk