Name:_____

GCSE (1 - 9) Iteration	Solutions:

These questions represent all of the times that this topic has appeared in unlocked Pearson Edexcel GCSE maths papers.

Question	Where the question appeared
1	Edexcel, GCSE, Summer 2017, Paper 3H, Q07
2	Edexcel, GCSE, Autumn 2017, Paper 2H, Q18
3	Edexcel, GCSE, Autumn 2017, Paper 3H, Q15
4	Edexcel, GCSE, Summer 2018, Paper 3H, Q18
5	Edexcel, GCSE, Autumn 2018, Paper 3H, Q13
6	Edexcel, GCSE, Autumn 2019, Paper 2H, Q22
7	Edexcel, GCSE, Autumn 2020, Paper 2H, Q19

1

Using $x_{n+1} = -2 - \frac{4}{x_n^2}$

with $x_0 = -2.5$

(a) find the values of x_1, x_2 and x_3

$x_1 =$ .....

$x_2 =$ .....

$x_3 =$ .....

(3)

(b) Explain the relationship between the values of x_1, x_2 and x_3 and the equation $x^3 + 2x^2 + 4 = 0$

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(2)

(Total for Question 16 is 5 marks)

[Edexcel, GCSE, Summer 2017, Paper 3H, Q07]

2

At time $t = 0$ hours a tank is full of water.

Water leaks from the tank.
At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

$$V_0 = 2000$$
$$V_{t+1} = kV_t$$

write down the value of k.

$k =$ .....

(Total for Question 18 is 1 mark)

[Edexcel, GCSE, Autumn 2017, Paper 2H, Q18]

3

(a) Show that the equation $x^3 + 7x - 5 = 0$ has a solution between $x = 0$ and $x = 1$

(2)

(b) Show that the equation $x^3 + 7x - 5 = 0$ can be arranged to give $x = \dfrac{5}{x^2 + 7}$

(2)

(c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \dfrac{5}{x_n^2 + 7}$ three times to find an estimate for the solution of $x^3 + 7x - 5 = 0$

(3)

(d) By substituting your answer to part (c) into $x^3 + 7x - 5$, comment on the accuracy of your estimate for the solution to $x^3 + 7x - 5 = 0$

(2)

(Total for Question 15 is 9 marks)

[Edexcel, GCSE, Autumn 2017, Paper 3H, Q15]

4

(a) Show that the equation $x^3 + x = 7$ has a solution between 1 and 2

(2)

(b) Show that the equation $x^3 + x = 7$ can be rearranged to give $x = \sqrt[3]{7 - x}$

(1)

(c) Starting with $x_0 = 2$,
use the iteration formula $x_{n+1} = \sqrt[3]{7 - x_n}$ three times to find an estimate for a solution of $x^3 + x = 7$

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(3)

(Total for Question 18 is 6 marks)

[Edexcel, GCSE, Summer 2018, Paper 3H, Q18]

5

The number of animals in a population at the start of year t is P_t
The number of animals at the start of year 1 is 400

Given that

$$P_{t+1} = 1.01P_t$$

work out the number of animals at the start of year 3

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(Total for Question 13 is 2 marks)

[Edexcel, GCSE, Autumn 2018, Paper 3H, Q13]

6

The number of rabbits on a farm at the end of month n is P_n
The number of rabbits at the end of the next month is given by $P_{n+1} = 1.2P_n - 50$

At the end of March there are 200 rabbits on the farm.

(a) Work out how many rabbits there will be on the farm at the end of June.

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(3)

(b) Considering your results in part (a), suggest what will happen to the number of rabbits on the farm after a long time.

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(1)

(Total for Question 22 is 4 marks)

[Edexcel, GCSE, Autumn 2019, Paper 2H, Q22]

7

A hot air balloon is descending.
The height of the balloon n minutes after it starts to descend is h_n metres.

The height of the balloon $(n+1)$ minutes after it starts to descend, h_{n+1} metres, is given by

$$h_{n+1} = K \times h_n + 20 \quad \text{where } K \text{ is a constant.}$$

The balloon starts to descend from a height of 1200 metres at 09 15
At 09 16 the height of the balloon is 1040 metres.

Work out the height of the balloon at 09 18

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(Total for Question 19 is 4 marks)

[Edexcel, GCSE, Autumn 2020, Paper 2H, Q19]