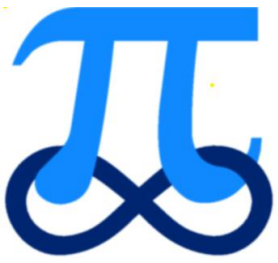
KumarMaths

Pearson Edexcel GCSE Maths (9 – 1)

Past Exam Questions by Topics:

Solving Equations using Iteration methods.



1. (*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 $x^3 + x = 7$

.....

(3)

(6 marks)

2. (*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 $x^3 + 7x - 5 =$

.....

(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)

(9 marks)

3. 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 $x^3 + 2x^2 + 4 = 0$

.....

.....

.....

.....

(2)

(5 marks)

4. (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 arranged 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 for the solution of $x^3 + 4x = 1$

.....

(3)

(6 marks)

5. (a) Show that the equation $x^3 + 5x - 4 = 0$ has a solution between $x = 0$ and $x = 1$

(2)

(b) Show that the equation $x^3 + 5x - 4 = 0$ can be arranged to give $x = \dfrac{4}{x^2 + 5}$

(2)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \dfrac{4}{x_n^{\,2} + 5}$ twice, to find an estimate for the solution of $x^3 + 5x - 4 = 0$

.....

(3)

(7 marks)

6. (a) Show that the equation $2x^3 + 4x = 3$ has a solution between 0 and 1.

(2)

(b) Show that $2x^3 + 4x = 3$ can be arranged to give $x = \frac{3}{4} - \frac{x^3}{2}$

(1)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{3}{4} - \frac{x_n^3}{2}$ three times to find an estimate for the solution to $2x^3 + 4x = 3$

.....

(3)

(6 marks)

7. (*a*) Show that the equation $x^3 - 3x^2 + 3 = 0$ has a solution between $x = 2$ and $x = 3$

(2)

(*b*) Show that the equation $x^3 - 3x^2 + 3 = 0$ can be rearranged to give $x = \sqrt[3]{3x^2 - 3}$

(1)

(*c*) Starting with $x_0 = 2$, use the iteration formula $x_{n+1} = \sqrt[3]{3x^2 - 3}$ to find the value of x_2.
Give your answer correct to 3 decimal places.

.....

(3)

(6 marks)

8. $f(x) = 3x^3 - 2x - 6.$

(*a*) Show that f (*x*) = 0 has a root, α, between $x = 1.4$ and $x = 1.45$.

(2)

(*b*) Show that the equation f (*x*) = 0 can be written as

$$x = \sqrt{\left(\frac{2}{x} + \frac{2}{3}\right)}, \quad x \neq 0.$$

(3)

(*c*) Starting with $x_0 = 1.43$, use the iteration

$$x_{n+1} = \sqrt{\left(\frac{2}{x_n} + \frac{2}{3}\right)}$$

to calculate the values of x_1, x_2 and x_3, giving your answers to 4 decimal places.

(3)

(8 marks)

9.

$$f(x) = 2x^3 - x - 4.$$

(a) Show that f $(x) = 0$ has a root, α, between 1.35 and 1.4.

(2)

(*b*) Show that the equation $f(x) = 0$ can be written as

$$x = \sqrt{\left(\frac{2}{x} + \frac{1}{2}\right)}.$$

(3)

(*c*) Use the iteration formula

$$x_{n+1} = \sqrt{\left(\frac{2}{x_n} + \frac{1}{2}\right)},$$

with $x_0 = 1.35$, to find, to 2 decimal places, the value of x_1, x_2 and x_3.

(3)

(8 marks)