Timester Challenge
Iteration

$$X_{n+1} = 3X_n + 5$$

Given $X_1 = -2$,
Calculate X_2 and X_3.

Bronze

$$X_{n+1} = 2 - \frac{1}{2X_n}$$

Given $X_1 = 1$,
Calculate X_2 and X_3.

Bronze

An approximate solution to an equation is found using the iterative process

$x_{n+1} = 4 + \dfrac{7}{x_n}$ and $x_1 = 4$.

Work out the solution to 1 decimal place.

Silver

a) Show that the equation $x^3 + 5x = 3$ can be rearranged to give

$$x = \frac{3}{5} - \frac{x^3}{5}.$$

b) Starting with $x_0 = 1$, use the iterative formula $x_{n+1} = \dfrac{3}{5} - \dfrac{x_n^3}{5}$, to find an estimate solution to 1 decimal place of $x^3 + 5x = 3$.

Gold

Timester Challenge

Iteration

Answers

$$X_{n+1} = 3X_n + 5$$

Given $X_1 = -2$,
Calculate X_2 and X_3.

$X_2 = 3(-2) + 5$
$X_2 = -1$

$X_3 = 3(-1) + 5$
$X_3 = 2$

Bronze

$$X_{n+1} = 2 - \frac{1}{2X_n}$$

Given $X_1 = 1$,
Calculate X_2 and X_3.

$X_2 = 2 - \dfrac{1}{2(1)}$
$X_2 = 1.5$

$X_3 = 2 - \dfrac{1}{2(1.5)}$
$X_3 = 1.\dot{6}$

Bronze

An approximate solution to an equation is found using the iterative process
$x_{n+1} = 4 + \frac{7}{x_n}$ and $x_1 = 4$.
Work out the solution to 1 decimal places.

$X_2 = 4 + \dfrac{7}{(4)}$
$X_2 = 5.75$
$X_3 = 5.217391 \ldots$
$X_4 = 5.341666 \ldots$
$X_5 = 5.310452 \ldots$
$X_6 = 5.318155 \ldots$

So $x = 5.3$ to 1 d.p.

Silver

a) Show that the equation $x^3 + 5x = 3$ can be rearranged to give $x = \frac{3}{5} - \frac{x^3}{5}$.

$5x = 3 - x^3$
$x = \dfrac{(3 - x^3)}{5}$

So, $x = \frac{3}{5} - \frac{x^3}{5}$

b) Starting with $x_0 = 1$, use the iterative formula $x_{n+1} = \frac{3}{5} - \frac{x_n^3}{5}$, to find an estimate solution to 1 decimal place of $x^3 + 5x = 3$.

So, $x_1 = \frac{3}{5} - \frac{1^3}{5}$
$x_1 = 0.4$
$x_2 = 0.5872$
$x_3 = 0.5595 \ldots$
$x_4 = 0.5649 \ldots$
$x_5 = 0.5639 \ldots$

So $x = 0.6$ to 1 d.p.

Gold