

1. The function f is increasing and is defined for all real numbers. The table gives values for $f(x)$ at selected values of x .

| | | | | | |
|--------|----|----|---|----|----|
| x | -2 | -1 | 0 | 1 | 2 |
| $f(x)$ | 2 | 4 | 8 | 16 | 32 |

The function g is given by $g(x) = -0.5x^2 - 4x + 1$

A.

- i. The function h is defined by $h(x) = (g \circ f)(x) = g(f(x))$. Find the value of $h(-1)$ as a decimal approximation, or indicate that it is not defined. Show the work that leads to your answer.
- ii. Find values of $f^{-1}(2)$, or indicate that it is not defined.

B.

- i. Find all values of x , as decimal approximations, for which $g(x) = 0$, or indicate there are no such values.
- ii. Determine the end behavior of g as x increases without bound. Express your answer using the mathematical notation of a limit.

C.

- i. Based on the table, which of the following function types best models function f : linear, quadratic, exponential or logarithmic?
- ii. Give a reason for your answer in part C (i) based on the relationship between the change in the output values of f and the change in the input values of f . Refer to the values in the table in your reasoning.

Answers to FRQ #1 – TABLE CA #1

| Model Solution | Scoring |
|---|--|
| A i. $h(-1) = g(f(-1))$ $h(-1) = g(4) = -23$ <hr/> ii. from the table $f(x) = 2$ when $x = -2$ $f^{-1}(2) = -2$ | Work and Answer 1 point |
| B i. $g(x) = 0 \Rightarrow -0.5x^2 - 4x + 1 = 0$ $x = -8.242$ or -8.243 $x = 0.242$ or 0.243 <hr/> ii. $\lim_{x \rightarrow \infty} g(x) = -\infty$ | Answers 1 point |
| C i. Exponential Function <hr/> ii. Successive output values over equal length input value intervals are proportional $\frac{f(-1)}{f(-2)} = \frac{f(0)}{f(-1)} = \frac{f(1)}{f(0)} = \frac{f(2)}{f(1)} = 2$ | Answer 1 point |
| | Reasoning 1 point Must reference the input and output values from the table |