

frq

$x$	1	2	4	8	16	32
$f(x)$	0	5	10	15	20	25

Let  $f$  be an increasing function defined for  $x > 0$ . The table gives values for  $f(x)$  at selected values of  $x$ . The function  $g$  is given by  $g(x) = 0.25x^3 - 9.5x^2 + 110x - 399$ .

### 3. Part A

(i) The function  $h$  is defined by  $h(x) = (g \circ f)(x) = g(f(x))$ . Find the value of  $h(8)$  as a decimal approximation, or indicate that it is not defined.

(ii) Find the value of  $f^{-1}(20)$ , or indicate that it is not defined.

### Part B

(i) Find all values of  $x$ , as decimal approximations, for which  $g(x) = -45$ , 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.

### Part C

(i) Use the table of values of  $f(x)$  to determine if  $f$  is best modeled by a linear, quadratic, exponential, or logarithmic function.

(ii) Give a reason for your answer based on the relationship between the change in the output values of  $f$  and the change in the input values of  $f$ .

### Part A

Select a point value to view scoring criteria, solutions, and/or examples to score the response.



0	1	2
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The student response includes both of these criteria.

- Value of  $h(8)$
- Value of  $f^{-1}(20)$

### Model Solution

(i)  $h(8) = g(f(8)) = g(15) = -42.75$