

f r q

$x$	1	2	3	4	5
$f(x)$	-10	-5	4	17	34

Let  $f$  be an increasing function defined for  $x \geq 0$ . The table gives values of  $f(x)$  at selected values of  $x$ . The function  $g$  is given by  $g(x) = \frac{x^3 - 14x - 27}{x+2}$ .

4.  Part A

- (i) The function  $h$  is defined by  $h(x) = (g \circ f)(x) = g(f(x))$ . Find the value of  $h(5)$  as a decimal approximation, or indicate that it is not defined.
- (ii) Find the value of  $f^{-1}(4)$ , or indicate that it is not defined.

Part A

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



0

1

2

The student response includes both of these criteria.

- Value of  $h(5)$
- Value of  $f^{-1}(4)$

Model Solution

(i)  $h(5) = g(f(5)) = g(34) = \frac{(34)^3 - 14(34) - 27}{34+2} = 1077.806$

(ii) Because  $f$  is increasing on its domain,  $f^{-1}$  exists. From the table,  $f^{-1}(4) = 3$ .

5.  Part B

- (i) Find all values of  $x$ , as decimal approximations, for which  $g(x) = 3$ , or indicate there are no such values.
- (ii) Determine the end behavior of  $g$  as  $x$  decreases without bound. Express your answer using the mathematical notation of a limit.

Part B