

<b>KNOW</b>	<b>/ 12</b>	<b>APP</b>	<b>/ 12</b>	<b>INQ</b>	<b>/ 12</b>	<b>COMM</b>	<b>/ 6</b>
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**MHF4U1 - UNIT 5 – RATIONAL FUNCTIONS, EQUATIONS AND INEQUALITIES**  
**TEST**

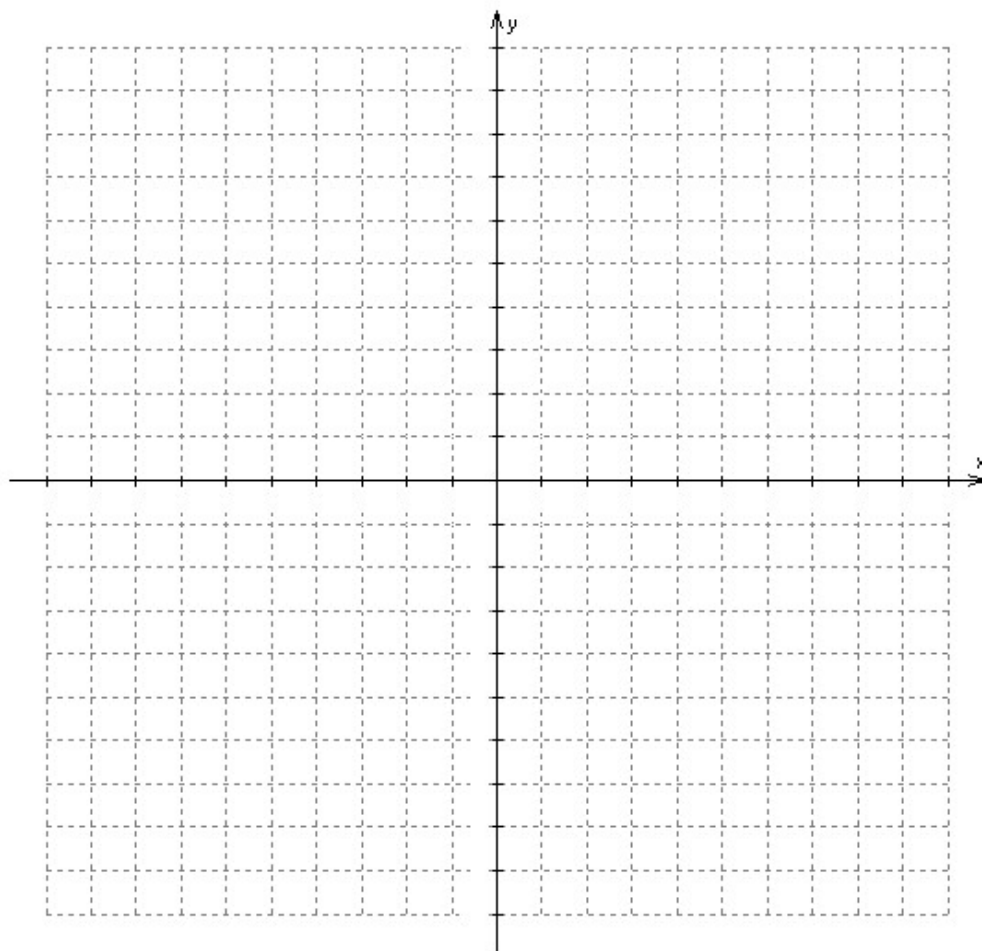
1) Complete the following table.

- ALL VALUES SHOULD BE EXACT!
- NO ROUGH WORK WILL BE MARKED FOR THIS QUESTION!
- DO NOT LEAVE ANY BOXES BLANK! WRITE “NONE” IF APPLICABLE.

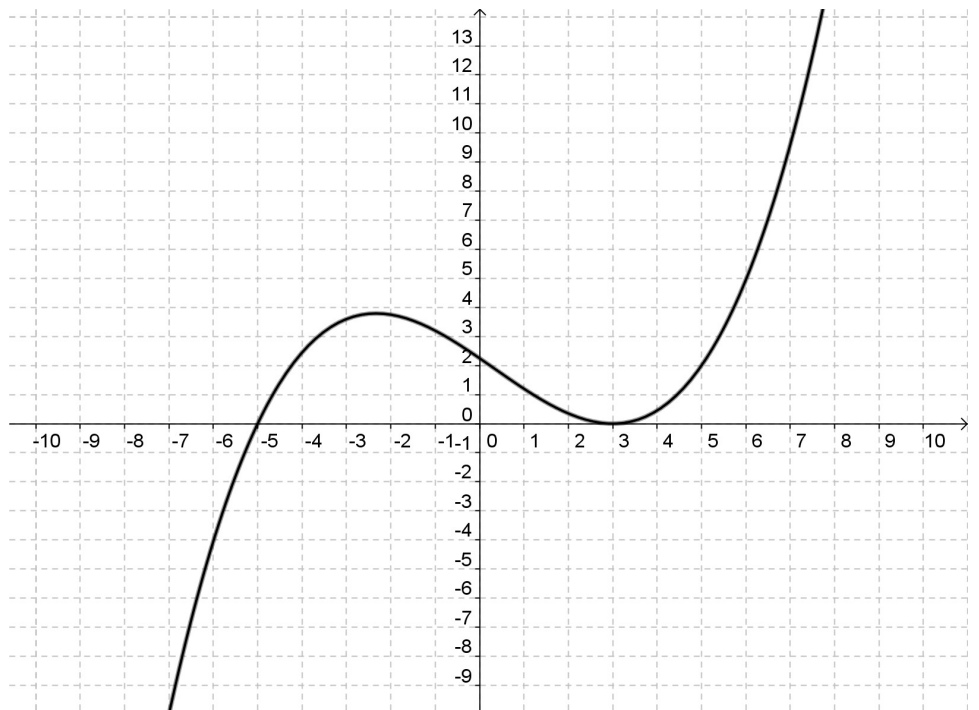
*(K – 12 marks)*

Function	$y = \frac{x^2 + 3x - 10}{x^2 - 4}$	$y = \frac{(x+5)(2x-3)}{(x-5)(3x+1)(x+3)}$	$y = \frac{6x^2 + 5x - 4}{x+2}$	$y = \frac{6x^2 + 18x}{2x^2 + 9}$
Domain			$\{x \in \mathbb{R} \mid x \neq -2\}$	
Zeros				
y – intercept	$\frac{5}{2}$			
Vertical Asymptotes				
Horizontal Asymptote				
Linear Oblique Asymptote				NONE
Holes		NONE		

- 2) Sketch the graph of the function  $f(x) = \frac{x^2 - x - 2}{x^2 - x - 12}$  on the axes below. Be sure to show all work leading to your sketch and clearly show all intercepts and asymptotes on your graph. Don't forget to indicate your scales on the axes! (4 - 6 marks)



- 3) The graph of a function  $y = f(x)$  is shown on the right. Sketch the graph of  $y = \frac{1}{f(x)}$  on the same axes.  
(A – 3 marks)



- 4) If he works alone, Bertino needs 3 hours to clean his house. If he works together with his daughter, Vanessa, they can clean the house in 2 hours. How long would it take Vanessa to clean the house by herself? (A – 3 marks)

- 5) Solve  $\frac{4-x}{x+1} - 1 = \frac{x-6}{3x-2}$ . Round your final answer to the nearest tenth. (I – 4 marks)

6) Solve  $\frac{x}{x+6} \geq \frac{3}{x-4}$ . (*I – 4 marks*)

7) The function  $f(x) = \frac{2x^4 + 13x^3 - 3x^2 - 82x + 40}{x^3 + 2x^2 - 11x - 12}$  can be written  $f(x) = \frac{(2x-1)(x-2)(x+4)(x+5)}{(x-3)(x+1)(x+4)}$ .

a) Determine the equation of the function's linear oblique asymptote. (*I – 2 marks*)

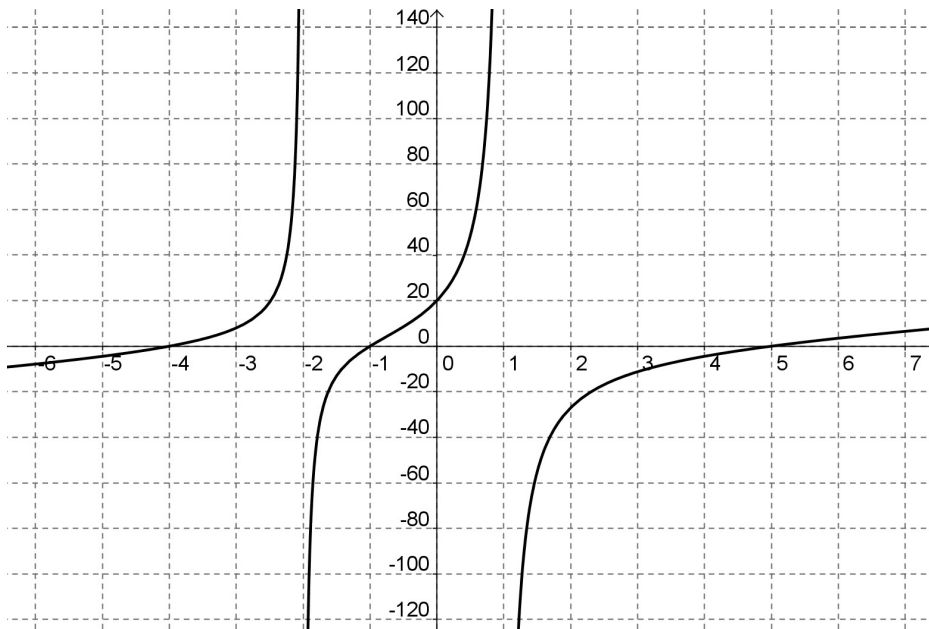
b) The graph of  $f(x)$  contains a hole. State the coordinates,  $(x, y)$ , of the point where the hole would be plotted. Express all values in **exact** form (do not round). (*I – 2 marks*)

- 8) The graph shown on the right has the equation

$$g(x) = \frac{a(x-b)(x+c)(x+d)}{(x-e)(x+f)}.$$

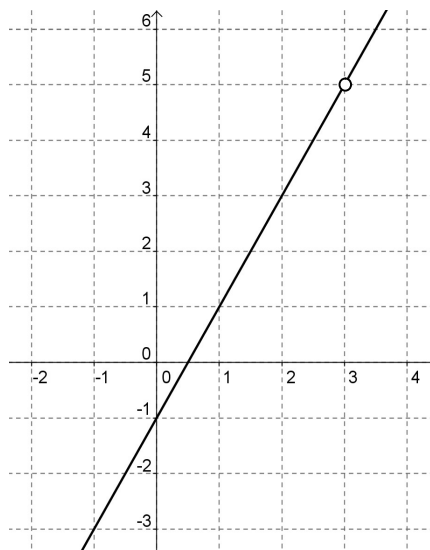
If  $a, b, c, d, e$  and  $f$  are all positive numbers, state their possible values below.

(C – 2 marks)



$a =$  \_\_\_\_\_  $b =$  \_\_\_\_\_  $c =$  \_\_\_\_\_  $d =$  \_\_\_\_\_  $e =$  \_\_\_\_\_  $f =$  \_\_\_\_\_

- 9) Frank and Maria were discussing functions of the form  $y = \frac{f(x)}{g(x)}$ , where  $f(x)$  and  $g(x)$  are polynomials. Frank claimed that he could create a function of this form whose graph has a horizontal asymptote and a linear oblique asymptote. Is Frank correct? Explain. (C – 2 marks)



- 10) The graph on the left contains a hole where  $x = 3$ . Determine a possible equation for the graph. (C – 2 marks)