



Name: \_\_\_\_\_ Date: \_\_\_\_\_

IBSL Year 1

Rational Quiz - Paper 1

Score:            /37

CAC%:

IB:

### INSTRUCTIONS TO CANDIDATE

- Write your name in the boxes above.
- Do not open this examination paper until instructed to do so.
- You are not permitted access to any calculator for this paper.
- Section A: answer all questions in the boxes provided.
- Section B: answer all questions in the answer booklet provided. Write your name on the front of the answer booklet turn it in with your examination paper.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the **Mathematics SL formula booklet** is required for this paper
- The maximum mark for this examination paper is [37 marks].



Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

### Section A

Answer **all** questions in the space provided. Working may be continued in the answer booklet.

1. Let  $f(x) = \frac{1}{x}$ ,  $x \neq 0$ .

(a) Sketch the graph of  $f$ .

(2)

The graph of  $f$  is transformed to the graph of  $g$  by a translation of  $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ .

(b) Find an expression for  $g(x)$ .

(2)

(c) (i) Find the intercepts of  $g$ .

(ii) Write down the equations of the asymptotes of  $g$ .

(iii) Sketch the graph of  $g$ .

(10)  
(Total 14 marks)

2. The function  $f(x)$  is defined as  $f(x) = 3 + \frac{1}{2x - 5}$ .

(a) Sketch the curve of  $f$  for  $-5 \leq x \leq 5$ , showing the asymptotes.

(3)

(b) Using your sketch, write down

(i) the equation of each asymptote;

(ii) the value of the  $x$ -intercept;

(iii) the value of the  $y$ -intercept.

(iv) the domain

(v) the range

(6)

(Total 9 marks)

Do **not** write solutions on this page.

## Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

1. Let  $f(x) = 3x - 2$  and  $g(x) = \frac{5}{3x}$ , for  $x \neq 0$ .

a. [2 marks]

Find  $f^{-1}(x)$ .

b. [2 marks]

Show that  $(g \circ f^{-1})(x) = \frac{5}{x+2}$ .

c. [2 marks]

Let  $h(x) = \frac{5}{x+2}$ , for  $x \geq 0$ . The graph of  $h$  has a horizontal asymptote at  $y = 0$ .

Find the  $y$ -intercept of the graph of  $h$ .

d. [3 marks]

Hence, sketch the graph of  $h$ .

e. [1 mark]

For the graph of  $h^{-1}$ , write down the  $x$ -intercept;

f. [1 mark]

For the graph of  $h^{-1}$ , write down the equation of the vertical asymptote.

g. [3 marks]

Given that  $h^{-1}(a) = 3$ , find the value of  $a$ .

(Total 14 marks)