

$$\frac{\quad}{36} + \frac{\quad}{2} = \frac{\quad}{38}$$

Name: _____ Date: _____

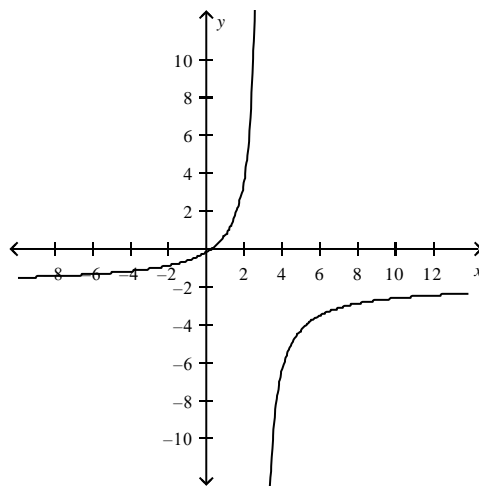
MHF4U

Test: Unit 4 –Rational Functions

Answer all questions on this paper. Be sure to show all **applicable** work and express all answers in simplest form. Marks are awarded for presentation and technical correctness

Multiple Choice – 1 mark each

1. State the equation of the rational function that this graph represents.



- a. $y = \frac{-2x+1}{x-3}$ b. $y = \frac{2x+1}{x-3}$ c. $y = \frac{-2x+1}{x+3}$ d. $y = \frac{2x+1}{x+3}$

2. State the range of $f(x) = \frac{1}{3x+4}$.

- a. $\{y \in \mathbf{R} \mid y > -\frac{4}{3}\}$ b. $\{y \in \mathbf{R} \mid y \neq -\frac{4}{3}\}$ c. $\{y \in \mathbf{R} \mid y > 0\}$ d. $\{y \in \mathbf{R} \mid y \neq 0\}$

3. The graph of which of the following rational functions has a hole?

- a. $y = \frac{2x-6}{x-6}$ b. $y = \frac{2x-3}{x-3}$ c. $y = \frac{2x-6}{2x}$ d. $y = \frac{2x-6}{x-3}$

4. Identify the vertical and horizontal asymptotes of $f(x) = \frac{x-4}{2x+1}$.

- a. vertical: $x = 4$, horizontal: $y = -\frac{1}{2}$ b. vertical: $x = 4$, horizontal: $y = \frac{1}{2}$
c. vertical: $x = -\frac{1}{2}$, horizontal: $y = \frac{1}{2}$ d. vertical: $x = \frac{1}{2}$, horizontal: $y = -\frac{1}{2}$

5. Identify the increasing and decreasing intervals for $f(x) = \frac{x+5}{x-4}$.

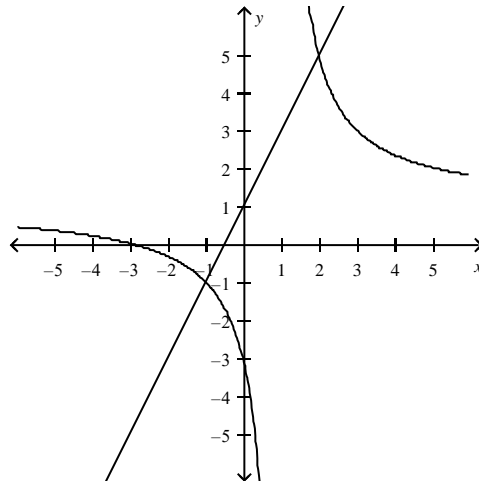
- a. Decr. $(-\infty, 4)$, Incr. $(4, \infty)$ b. Decr. $(-\infty, 4)$, Decr. $(4, \infty)$
 c. Incr. $(-\infty, 4)$, Incr. $(4, \infty)$ d. Incr. $(-\infty, 4)$, Decr. $(4, \infty)$

6. Which inequality is equivalent to $\frac{-2x}{x+5} < \frac{-18}{x+5}$?

- a. $\frac{2x-18}{x+5} < 0$ b. $\frac{18-2x}{x+5} > 0$ c. $\frac{x-9}{x+5} < 0$ d. $\frac{x-9}{x+5} > 0$

7. Use this graph to determine which of the following is a part of the solution set of

$$2x+1 > \frac{x+3}{x-1}.$$



- a. $x < -1$ b. $-1 < x < 2$ c. $x \geq 2$ d. $x > 2$

9. Determine the location of the oblique asymptote for the function $f(x) = \frac{2x^2 + 3x - 1}{x - 1}$.

Show all work. (2 marks)

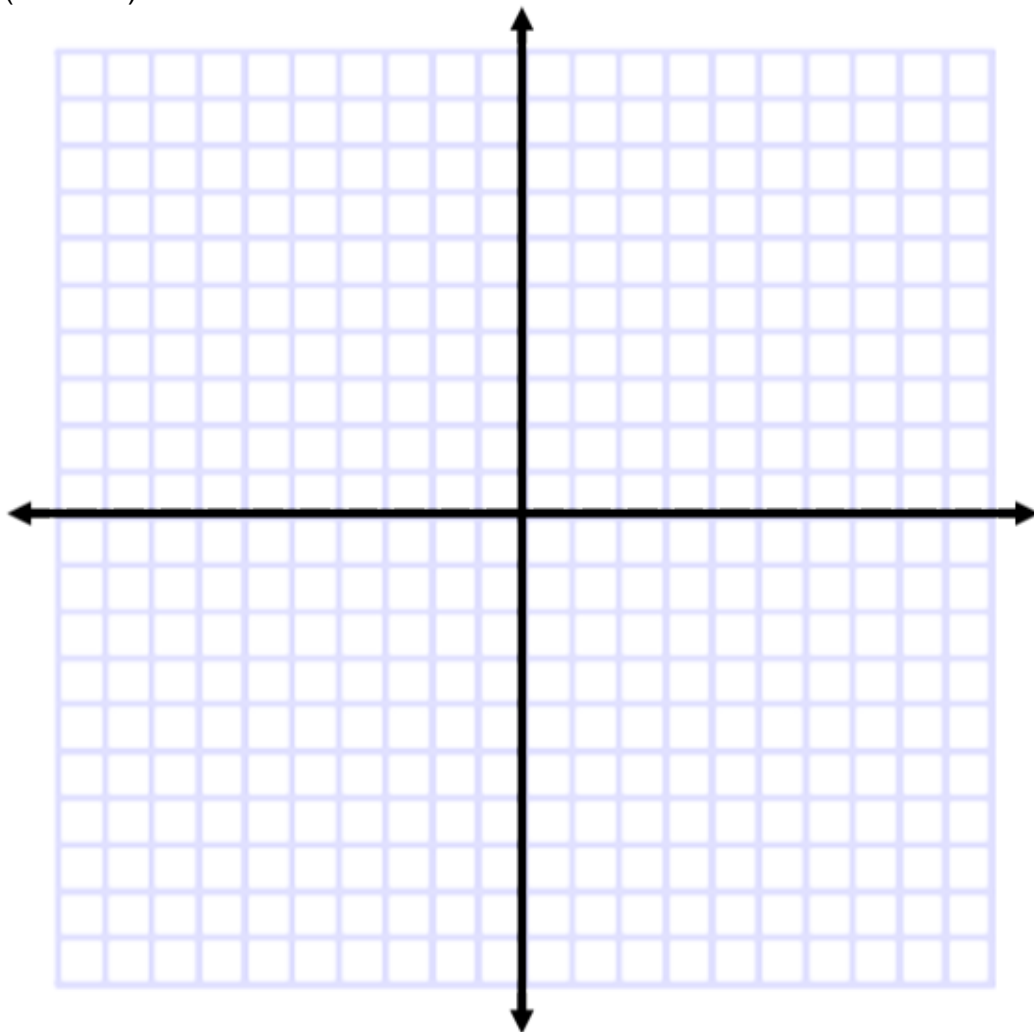
10. Solve for x in $\frac{x-2}{x} = \frac{x-4}{x-6}$. (3 marks)

11. Solve $\frac{x+3}{x+7} \leq \frac{x-1}{x-2}$ (6 marks)

12. For the function $f(x) = \frac{6x-12}{2x+4}$ determine the following values:

- a) Vertical Asymptote(s): _____
- b) Horizontal / Oblique Asymptote(s): _____
- c) x-intercept(s): _____
- d) y-intercept(s): _____
- e) Domain: _____
- f) End Behaviours: _____
- g) Give a sketch of the function $f(x)$

(7 marks)



13. The senior girls basketball team is selling pizza slices at lunch to raise money for their trip to OFSAA. They spend \$600 on boxes of pizza that have 8 slices each in them. They keep 4 pizzas to eat for themselves and sell the rest which makes them \$1232 which is a profit of \$1.50 per slice.

- a) How many slices did they sell? (5 marks)
- b) How much were they charging per slice? (1 mark)

14. Create a reciprocal function that has a vertical asymptote at $x = 2$, a horizontal asymptote at $y = -3$ and a hole at $x = -1$. (3 marks)

15. When a saw is used to cut wood, a certain percent is lost as sawdust, depending on the thickness of the saw-blade. The wood lost is called the kerf.

The percent lost, $P(t)$, can be modeled by the function $P(t) = \frac{100t}{t + W}$, where t is the thickness of the blade and W is the thickness of the wood, both in millimeters. Consider a saw cutting a 30mm thick piece of wood.

Explain the significance of the horizontal asymptote. (2 marks)