

---

**Unit 3: Rational Expression & Rational Functions Review**


---

Topics:

- Simplifying Rational Expressions  
(This includes simplifying, multiplying, dividing, adding and subtracting and stating restrictions!)
- Graphs of Rational Functions (holes and asymptotes)
- Applications of Rational Expressions

Questions to work on from the text:

Pg.87 # 21 – 27, pg. 248 #11, 12

*Supplementary problems*

(These are sample questions for each topic; look at the textbook questions as well!):

1) State the restrictions for

$$\text{a) } \frac{6a(a+1)}{5a(2a-3)} \quad \text{b) } \frac{x-1}{x+2} \div \frac{x+3}{x-4}$$

2) Simplify each of the following. Don't forget to state your restrictions.

$$\text{a) } \frac{2x-4y}{2x-2y} \quad \text{b) } \frac{1-x}{x-1} \quad \text{c) } \frac{x^2-y^2}{(x+y)^2} \quad \text{d) } \frac{3a^3}{2b} \cdot \frac{10b^3}{9a^2}$$

$$\text{e) } \frac{x^2-x-20}{x^2-6x} \div \frac{x^2+9x+20}{x-6} \quad \text{f) } 3 - \frac{5x-5}{5} \quad \text{g) } \frac{x}{4x-2} + \frac{5}{6x-3}$$

$$\text{h) } \frac{a-4}{4} - \frac{4}{a-4} + \frac{1}{4a-16} \quad \text{i) } \frac{x^2+4x-3}{x^2-16} + \frac{4-3x}{3x-12}$$

3) Sketch the graph of the function  $y = \frac{2x-2}{x^2+2x-3}$ . Clearly label any asymptote(s) and/or hole(s).4) Sketch the graph of the function  $y = \frac{x^2+7x+6}{2x+12}$ . Clearly label any asymptote(s) and/or hole(s).5) The perimeter of a triangle is  $\frac{9x+1}{4}$ . If two of the side lengths are  $\frac{x+1}{2}$  and  $\frac{2x-1}{2}$ , what is the third side length?6) Find the simplified expression for the area of a rectangle with sides  $\frac{5}{x+3} + \frac{2}{x-1}$  and  $\frac{x-2}{x^2+x-6}$ .

7) Alice and Megan left Ottawa for Toronto in their new bug to see the musical Mama Mia. On the way to Toronto they drove 10 km/h faster than on the way back. The total travelling time for the round trip was 7 hours and 18 minutes. If the distance from Ottawa to Toronto is 400 km, determine how fast the girls were travelling and how long the ride to Toronto was.

8) Two planes, A and B, are 2500 km from an airport. Plane A is flying 50 km/h faster than plane B. Hence plane A arrives at the airport 1 h 40 min before plane B. Find the speeds of the two planes and the time it took them to reach the airport.

9) Rewrite  $\frac{3}{x^2 - x - 2}$  as a sum or difference of two rational expressions.

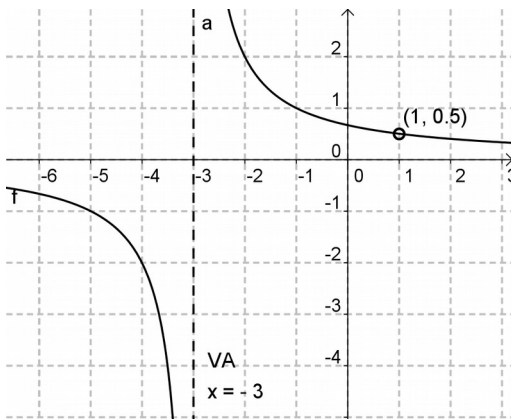
**Answers:**

1. a)  $a \neq 0, \frac{3}{2}$  b)  $x \neq -3, -2, 4$  2. a)  $\frac{x-2y}{x-y}, x \neq y$  b)  $-1, x \neq 1$  c)  $\frac{x-y}{x+y}, x \neq -y$  d)  $\frac{5ab^2}{3}, a \neq 0, b \neq 0$  e)

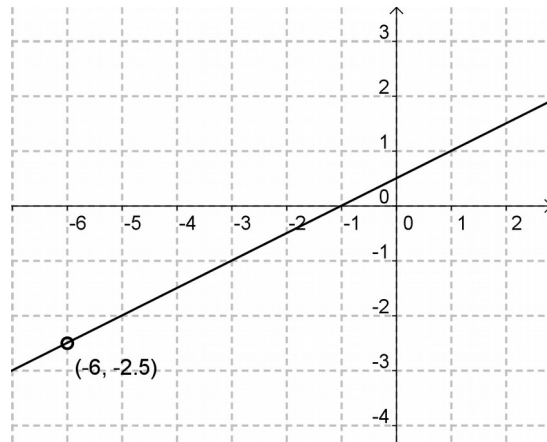
$\frac{x-5}{x(x+5)}, x \neq -5, -4, 0, 6$  f)  $4-x$  g)  $\frac{3x+10}{6(2x-1)}, x \neq \frac{1}{2}$  h)  $\frac{a^2-8a+1}{4(a-4)}, a \neq 4$  i)  $\frac{4x+7}{3(x+4)(x-4)}, x \neq \pm 4$

3.  $y = \frac{2}{x+3}, x \neq -3, 1$ , hole at  $(1, \frac{1}{2})$ ,

VA at  $x = -3$



4.  $y = \frac{1}{2}x + \frac{1}{2}, x \neq -6$ , hole at  $(-6, -\frac{5}{2})$



5. The 3<sup>rd</sup> side length is  $\frac{3x+1}{4}$ .

6. Area =  $\frac{7x+1}{(x+3)^2(x-1)}, x \neq -3, 1, 2$

7. The girls travelled to Toronto at 114.82 km/h in 3h29min, and travelled back at 104.82 km/h

8. Plane A travels at a speed of 300 km/h and arrives at the airport after 8h20min. Plane B travels at 250 km/h and it takes 10 hours to reach the airport.

9. Answers may vary.  $\frac{3}{x^2-x-2} = \frac{1}{x-2} - \frac{1}{x+1}$