Exploring Rational Functions

ExploringRationalFunctions.tns

Name _____

Class _____

Problem 1 – Graphing $y = \dfrac{1}{x-a}$ **for various values of** *a*

On page 1.4, Grab point *a* and drag it left and right. Notice that as the value of *a* changes, the equation and graph are updated.

1. **a.** For what value of *x* is $y = \dfrac{1}{x-2}$ undefined?

   b. For what value of *x* is $y = \dfrac{1}{x+1}$ undefined?

   c. For what value of *x* is $y = \dfrac{1}{x-a}$ undefined?

2. As you move point a along the *x*-axis, the place where the graph of $y = \dfrac{1}{x-a}$ has a "break" follows along. Explain why this happens.

3. At what value of *x* does the graph of $y = \dfrac{1}{x-a}$ have a vertical asymptote?

Problem 2 – Exploring Another Triangle

4. For each value of *x* below, what is the *y*-coordinate of point *P* for the graph on page 2.2.

   (5,   ) (4,   ) (3.5,   ) (3.2,   ) (1,   )

5. Enter 3.01 for the *x*-coordinate. Where did the point go? Click and grab the coordinate plane. Pull down on the plane repeatedly until you bring point *P* into view. Be persistent, point *P* is way up there!

6. Now enter 2.99 for the *x*-coordinate of *P*. What is the value of *y*? Pull the plane up until you can see point *P*.

7. **a.** Could you make the *y*-coordinate of point *P* be equal to 1,000? If so, what is the value of *x*?

   b. Could you make the *y*-coordinate of point *P* be equal to −1,000? If so, what is the value of *x*?

8. Could you make the *y*-coordinate of point *P* as big as anyone asked? How?

Problem 3 – Horizontal Asymptote

9. For each value of *x* below, what is the y-coordinate of point *P* for the graph on page 3.2.

(5,   )   (13,   )   (23,   )   (103,   )   (1,   )

10. Enter 503 for *x*. Where did the point go? Click and grab the coordinate plane. Pull the plane to the left repeatedly until you bring point *P* into view.

11. Enter –497 for the *x*-coordinate of point *P*. What is the value of *y*? Pull the plane to the right until you can see *P*.