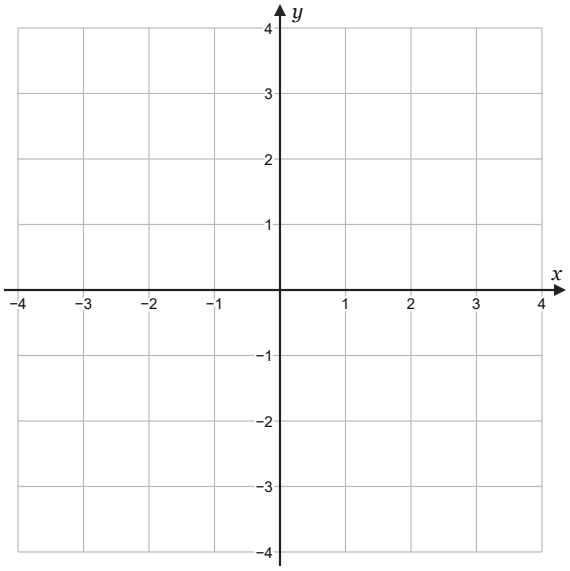
Algebra 2 Unit 1 worksheet: The square root and reciprocal functions

Name _____ Date _____ Period _____

1. On graph paper, with x and y each running from −4 to 4, sketch the graph of $y = \dfrac{1}{x}$. Plot the exact points at $x = \pm\dfrac{1}{4}, \pm\dfrac{1}{2}, \pm 1, \pm 2$ and ± 4, draw both asymptotes as dashed lines, and name the quadrants the graph lies in.



2. Find the range of $y = \dfrac{1}{x}$ when the inputs are limited as shown.

(a) $1 \le x \le 4$ (b) $-5 \le x \le -2$ (c) $x > 8$ (d) $0 < x < 0.2$

(e) $-1 \le x \le 2, x \ne 0$

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3. The point $(1.6,\ 0.625)$ is on the graph of $y = \dfrac{1}{x}$.

(a) Without dividing, use the two symmetries of the graph to name three more points on it.

(b) Check each of your points by multiplying its coordinates.

(c) Jin says the graph is also its own mirror image in the y-axis. Use the point $(1.6,\ 0.625)$ to show that he is wrong.

4. Find every point where the line $y = 16x$ meets the graph of $y = \dfrac{1}{x}$. Then explain why the line $y = -16x$ never meets that graph.

5. Compare $y = \sqrt{x}$ with the line $y = \dfrac{x}{4}$ for $x \geq 0$.

(a) Which graph is higher at $x = 1$? At $x = 100$?

(b) Find every x at which the two graphs meet.

(c) Find every x at which the square root graph is above the line, and explain your answer.

6. For a number $a > 0$, the point $P = \left(a,\ \dfrac{1}{a}\right)$ is on the graph of $y = \dfrac{1}{x}$. A rectangle has corners at the origin, at $(a, 0)$, at P and at $\left(0,\ \dfrac{1}{a}\right)$.

(a) Show that the area of the rectangle is the same for every $a > 0$.

(b) Find the perimeter of the rectangle when $a = 4$.

(c) Find every a that makes the perimeter 5, and name the point P in each case.

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