Reciprocal graphs

Starter

1. **(Review of last lesson)** State what happens to the coordinates of the points on the curve $y = f(x)$ when it undergoes these transformations:

    (a) $y = f(4x)$ (b) $y = -f(x)$ (c) $y = f(x) + 3$

    (d) $y = f(-x)$ (e) $y = f(x + 5)$ (f) $y = 7f(x)$

    Working: (a) $y = f(4x)$ is a horizontal stretch, factor $\dfrac{1}{4}$.

    Multiply the $x-$coordinates by $\dfrac{1}{4}$.

    (b) $y = -f(x)$ is a reflection in the $x-$axis.
    Change the sign of the $y-$coordinates.

    (c) $y = f(x) + 3$ is a vertical translation, 3 units up.
    Add 3 to the $y-$coordinates.

    (d) $y = f(-x)$ is a reflection in the $y-$axis.
    Change the sign of the $x-$coordinates.

    (e) $y = f(x + 5)$ is a horizontal translation, 5 units left.
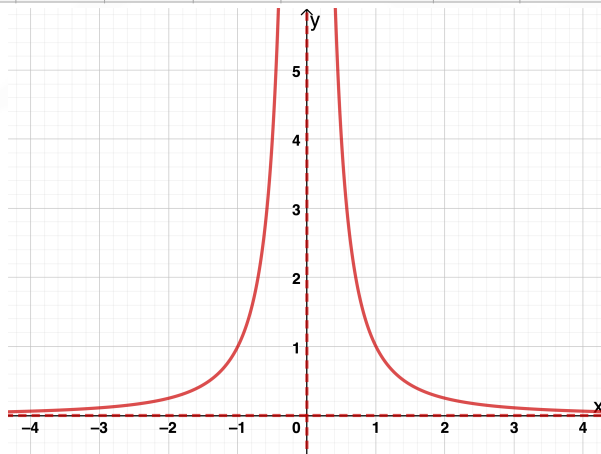   Subtract 5 from the $x-$coordinates.

    (f) $y = 7f(x)$ is a vertical stretch, factor 7.
    Multiply the $y-$coordinates by 7.

2. Complete the table of values for the curve $y = \dfrac{1}{x^2}$ and hence sketch the curve:

x	-4	-3	-2	-1	0	1	2	3	4
y									

Working:

x	-4	-3	-2	-1	0	1	2	3	4
y	0.0625	$0.\dot{1}$	0.25	1	undefined	1	0.25	$0.\dot{1}$	0.0625

E.g. 1 State the equations of the asymptotes of these curves.

(a) $\quad y = \dfrac{1}{x} + 4$ (b) $\quad y = \dfrac{1}{(x-2)^2}$ (c) $\quad y = \dfrac{1}{3x^2}$ (d) $\quad y = \dfrac{7}{x}$

Working: (a) $\quad y = \dfrac{1}{x} + 4$ is a vertical translation, 4 units up

The equations of the asymptotes are $x = 0$ and $y = 4$.

(b) $\quad y = \dfrac{1}{(x-2)^2}$ is a horizontal translation, 2 units right

The equations of the asymptotes are $x = 2$ and $y = 0$.

(c) $\quad y = \dfrac{1}{3x^2}$ is a stretch, which does not affect the asymptotes

The equations of the asymptotes remain $x = 0$ and $y = 0$.

(d) $\quad y = \dfrac{7}{x}$ is a stretch, which does not affect the asymptotes

The equations of the asymptotes remain $x = 0$ and $y = 0$.

Video: **Sketching reciprocal curves**

Solutions to Starter and E.g.s

Exercise
p78 5D Qu 1-4, (5 red)