Graphs and transformations 4C
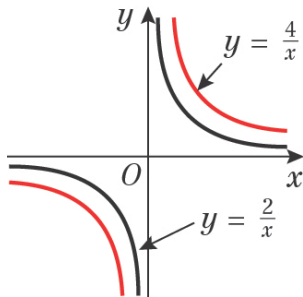
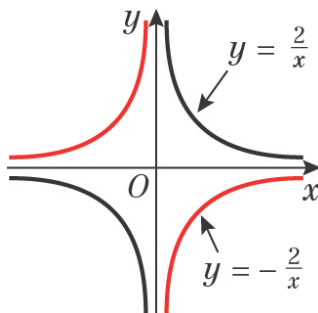**1 a** For $x > 0$, $\dfrac{4}{x} > \dfrac{2}{x}$ (since $4 > 2$)

For $x < 0$, $\dfrac{4}{x} < \dfrac{2}{x}$

So $y = \dfrac{4}{x}$ is above $y = \dfrac{2}{x}$ in first quadrant and below in third quadrant.

b For $x > 0$, $y = \dfrac{2}{x} > 0$ and $y = -\dfrac{2}{x} < 0$

For $x < 0$, $y = \dfrac{2}{x} < 0$ and $y = -\dfrac{2}{x} > 0$

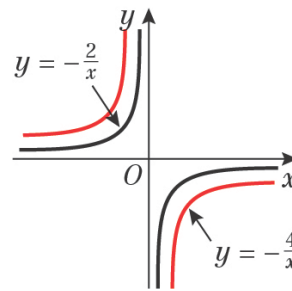**c** Graphs are like $y = -\dfrac{1}{x}$ and so exist in second and fourth quadrants.
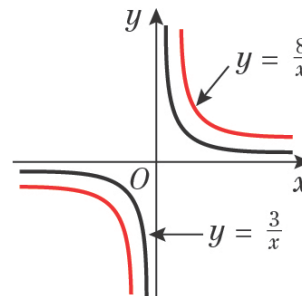
For $x > 0$, $-\dfrac{4}{x} < -\dfrac{2}{x}$

For $x < 0$, $-\dfrac{4}{x} > -\dfrac{2}{x}$

So $y = -\dfrac{4}{x}$ is above $y = -\dfrac{2}{x}$ in second quadrant and below in fourth quadrant.

c

d For $x > 0$, $\dfrac{8}{x} > \dfrac{3}{x}$
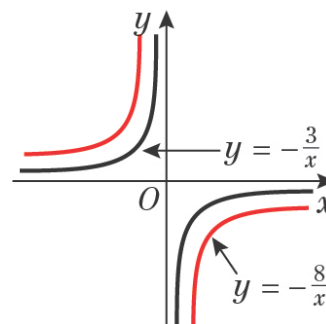
So $y = \dfrac{8}{x}$ is above $y = \dfrac{3}{x}$ in first quadrant and below in third quadrant.

e For $x > 0$, $-\dfrac{8}{x} < -\dfrac{3}{x}$

For $x < 0$, $-\dfrac{8}{x} > -\dfrac{3}{x}$

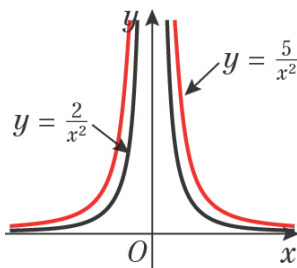So $y = -\dfrac{8}{x}$ is above $y = -\dfrac{3}{x}$ in second quadrant and below in fourth quadrant.

2 a $y = \dfrac{2}{x^2}$ and $y = \dfrac{5}{x^2}$

These are $y = \dfrac{k}{x^2}$ graphs, with $k > 0$.

x^2 is always positive and $k > 0$ so the y-values are all positive.

$\dfrac{5}{x^2} > \dfrac{2}{x^2}$ (since $5 > 2$)

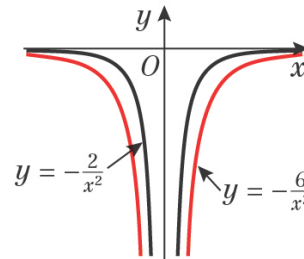So $y = \dfrac{5}{x^2}$ is above $y = \dfrac{2}{x^2}$.

c $y = -\dfrac{2}{x^2}$ and $y = -\dfrac{6}{x^2}$

These are $y = \dfrac{k}{x^2}$ graphs, with $k < 0$.

x^2 is always positive and $k < 0$ so the y-values are all negative.

$-\dfrac{6}{x^2} < -\dfrac{2}{x^2}$ (since $-6 > -2$)

So $y = -\dfrac{6}{x^2}$ is below $y = -\dfrac{2}{x^2}$.

b $y = \dfrac{3}{x^2}$ and $y = -\dfrac{3}{x^2}$

$y = \dfrac{3}{x^2}$ is a $y = \dfrac{k}{x^2}$ graph, with $k > 0$.

x^2 is always positive and $k > 0$ so the y-values are all positive.

$y = -\dfrac{3}{x^2}$ is a $y = \dfrac{k}{x^2}$ graph, with $k < 0$.

x^2 is always positive and $k < 0$ so the y-values are all negative.