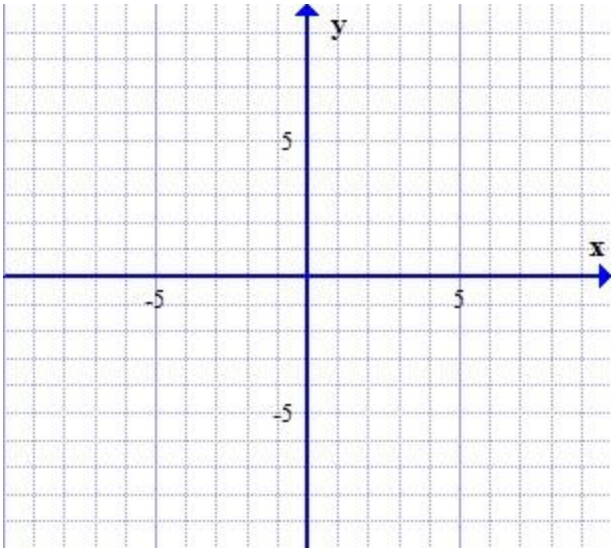
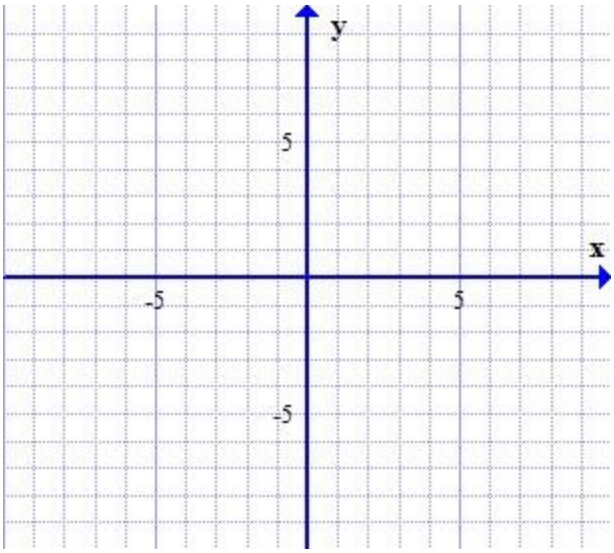
Transformations of Graphs. Part 3:Horizontal and Vertical Stretches

Graph: $y = x^2$, $y = 2x^2$ and $y = \frac{1}{2}x^2$ on the same grid



Graph: $y = x^2$, $y = (2x)^2$ and $y = (0.5x)^2$ on the same grid



Rule:

1) Write the replacement for x or y and write the equation of the image $y = f(x)$ after each transformation:

a) A horizontal expansion by a factor of 2

b) A vertical expansion be a factor of 5

c) A horizontal compression by a factor of $\frac{4}{7}$

d) A vertical compression by a factor of $\frac{2}{3}$

e) A reflection in the x-axis and a horizontal compression by 0.5

f) A reflection in the x-axis, a vertical expansion by a factor of 3 and a horizontal expansion by 2.

2) Sketch a graph of the following transformed functions:

a) $y = f(2x)$

b) $y = f(\frac{1}{2}x)$

f(x)=3sin x

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b) $y = -3f(\frac{1}{2}x)$

$d)\ y = \frac{1}{2}f(-2x)$+1

4) A polynomial function has the equation $P(x) = (x-2)(x+3)(x-6)$. Determine the zeros and the y intercept of this function, then determine the zeros and the y intercept of the new transformed functions:

a) $y = 2P(x)$ b) $y = -0.5P(2x)$ c) $y = P(-\frac{1}{2}x)$

5) Write the equation of the image of:

a) $y = 3^x$ after a vertical compression of $\frac{3}{4}$

b) y = $\sqrt{x-2}$ after a horizontal expansion by 2 and a reflection in the y-axis

c) $y = 4x - x^2$ after a horizontal expansion by a factor of 3

e) $y = \frac{1}{x} + 3$ after a vertical compression by a factor of 0.5, a horizontal compression by $\frac{1}{4}$, and a reflection in both the x-axis and the y-axis.