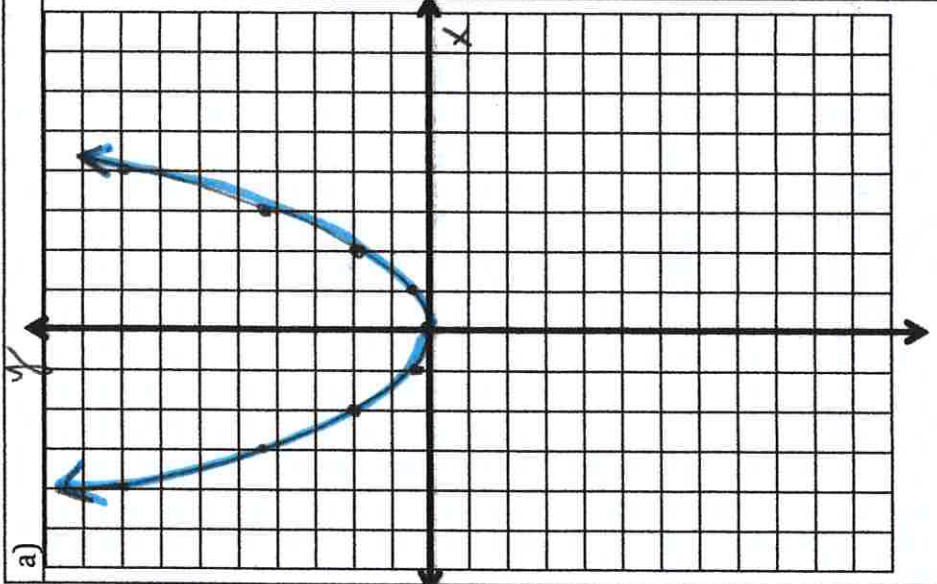


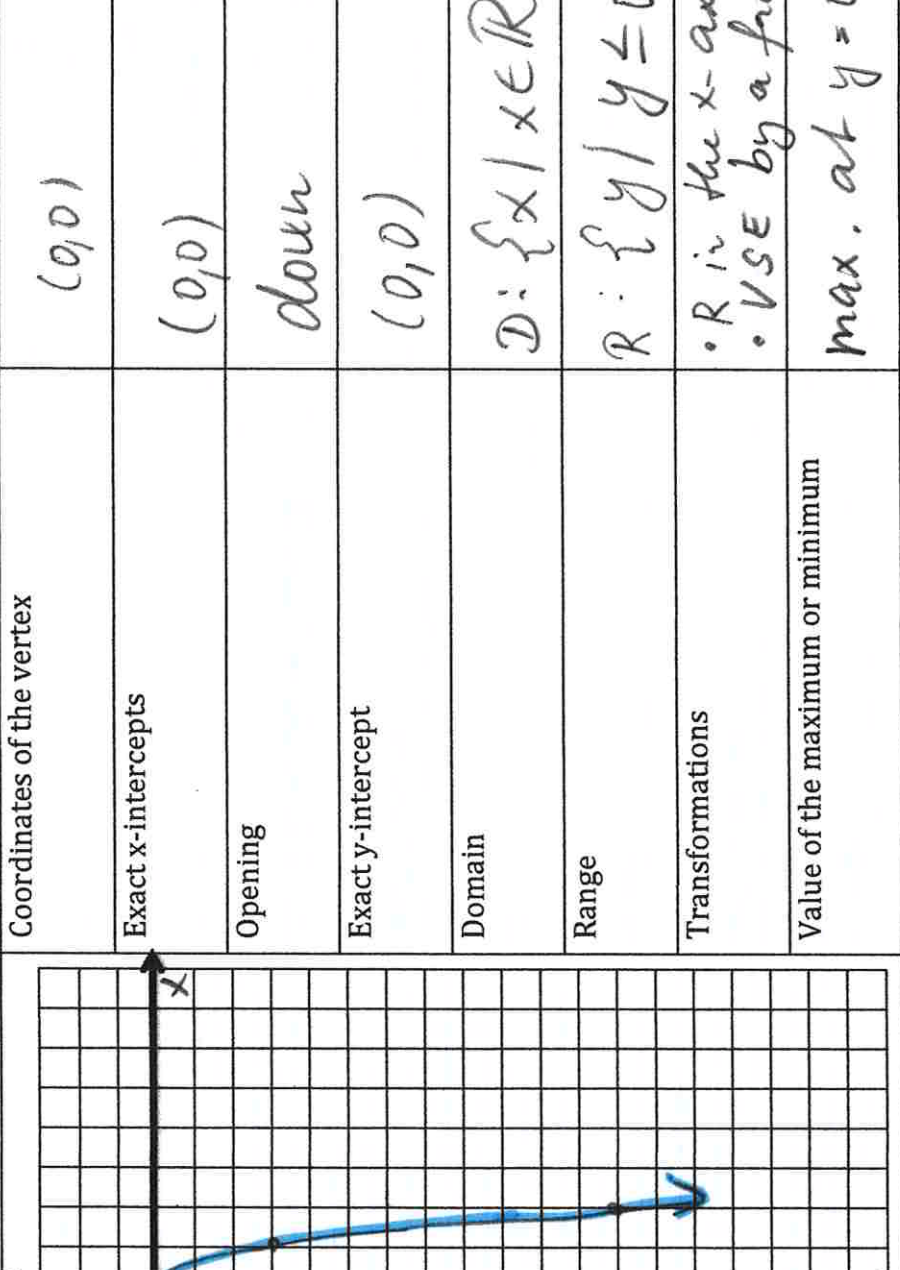
VERTICAL STRETCH AND COMBINED TRANSFORMATIONS OF A QUADRATIC FUNCTION

- [5] 1. Given an equation, describe all transformations of the original graph $f(x) = x^2$. Read the transformations left-to-right and list them in order.

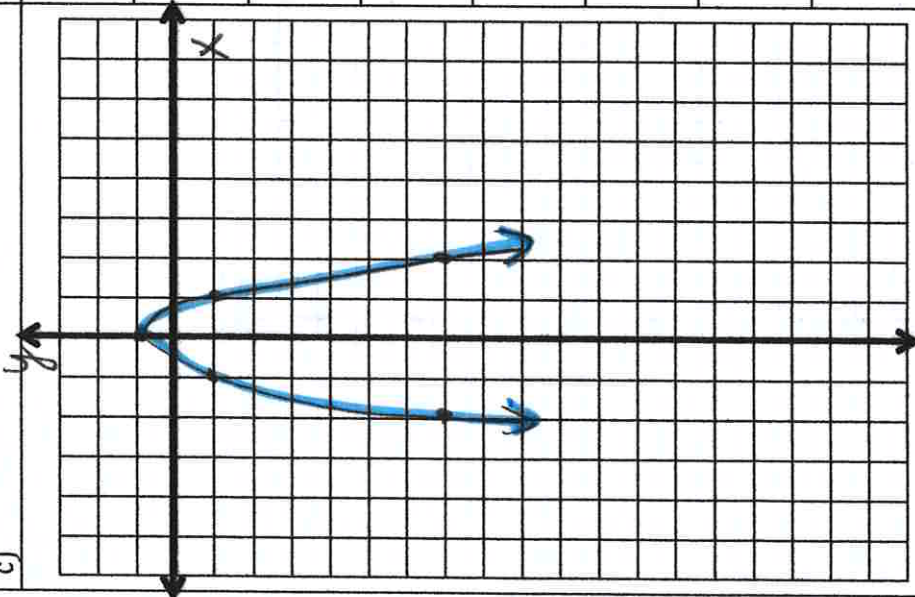
Equation	Transformations
$f(x) = 7(x - 10)^2$	<ul style="list-style-type: none"> • VSE by a factor of 7 • HT right by 10 units
$f(x) = -5(x - 1)^2 + 4$	<ul style="list-style-type: none"> • R in the x-axis • VSE by a factor of 5 • HT right by 1 unit • VT up by 4 units
$y = 0.5x^2 + 4$	<ul style="list-style-type: none"> • VSC by a factor of $\frac{1}{2}$ • VT up by 4 units
$f(x) = -3x^2$	<ul style="list-style-type: none"> • R in the x-axis • VSE by a factor of 3
! $y - 1 = (x + 2)^2$ $y = (x + 2)^2 + 1$	<ul style="list-style-type: none"> • HT left by 2 units • VT up by 1 unit

[50] 2. Graph the given function and describe its properties. (10 marks each)

<p>a)</p> 	<p>$f(x) = 0.5x^2$</p> <p>Coordinates of the vertex $(0,0)$</p> <p>Opening up</p> <p>Exact x-intercepts $(0,0)$</p> <p>Exact y-intercept $(0,0)$</p> <p>Domain $D: \{x x \in \mathbb{R}\}$</p> <p>Range $R: \{y y \geq 0, y \in \mathbb{R}\}$</p> <p>Transformations • VSC by a factor of $\frac{1}{2}$</p> <p>Value of the maximum or minimum • min. at $y = 0$</p>
--	--

b)		$f(x) = -3x^2$
Coordinates of the vertex		(0,0)
Exact x-intercepts		(0,0)
Opening		down
Exact y-intercept		(0,0)
Domain		$D: \{x \mid x \in \mathbb{R}\}$
Range		$R: \{y \mid y \leq 0, y \in \mathbb{R}\}$
Transformations		<ul style="list-style-type: none"> • R in the x-axis • VSE by a factor of 3
Value of the maximum or minimum		max. at $y = 0$

c)	$f(x) = -2x^2 + 1$
	Coordinates of the vertex
	Exact x-intercepts *
	Opening
	Exact y-intercept
	Domain
	Range
	Transformations
	Value of the maximum or minimum



$(0, 1)$

$(\frac{\sqrt{2}}{2}, 0)$ and $(-\frac{\sqrt{2}}{2}, 0)$

down

$(0, 1)$

$D: \{x \mid x \in \mathbb{R}\}$

$R: \{y \mid y \leq 1, y \in \mathbb{R}\}$

- R in the x-axis
- VSE by a factor of 2 *

- max. at $y = 1$

* and VT up by unit

* x-Ints: $y = 0$, solve for x

$$0 = -2x^2 + 1$$

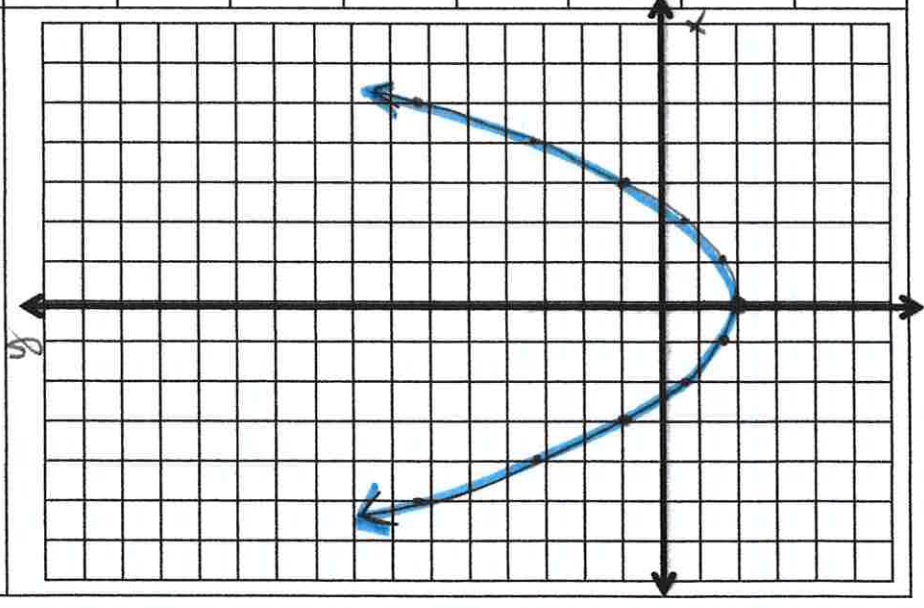
$$\frac{-1}{-2} = \frac{-2x^2}{-2}$$

$$\sqrt{\frac{1}{2}} = \sqrt{x^2}$$

$$x = \pm \sqrt{\frac{1}{2}} = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2}$$

ratio valised & the denominator

d)	$f(x) = \frac{1}{3}x^2 - 2$
Coordinates of the vertex	$(0, -2)$
Exact x-intercepts *	$(-\sqrt{6}, 0)$ and $(\sqrt{6}, 0)$
Opening	up
Exact y-intercept	$(0, -2)$
Domain	$D: \{x \mid x \in \mathbb{R}\}$
Range	$R: \{y \mid y \geq -2, y \in \mathbb{R}\}$
Transformations	<ul style="list-style-type: none"> • VSC by a factor of $\frac{1}{3}$ • VT down by 2 units
Value of the maximum or minimum	• Min. at $y = -2$



* $0 = \frac{1}{3}x^2 - 2$

$$\frac{2}{\frac{1}{3}} = \frac{\frac{1}{3}x^2}{\frac{1}{3}}$$

$$\sqrt{6} = \sqrt{x^2}$$

$$x = \pm \sqrt{6}$$

e)	$y = 0.25(x - 2)^2 - 4$
Coordinates of the vertex	$(2, -4)$
Exact x-intercepts	$(-2, 0)$ and $(6, 0)$
Opening	up
Exact y-intercept	$(0, -3)$
Domain	$D: \{x \mid x \in \mathbb{R}\}$
Range	$R: \{y \mid y \geq -4, y \in \mathbb{R}\}$
Transformations	<ul style="list-style-type: none"> • VSC by a factor of $1/4$ • HT right by 2 units • VT down by 4 units
Value of the maximum or minimum	\rightarrow min. at $y = -4$

