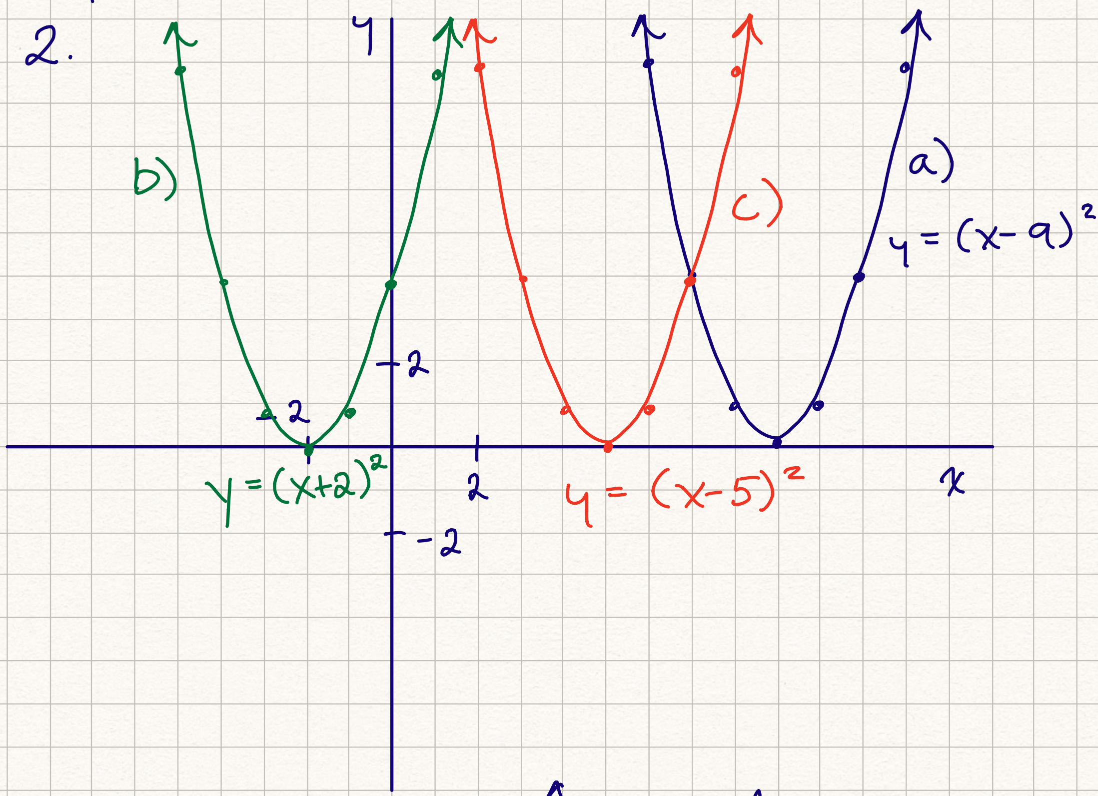
Opportunity to Learn - Part A

2.



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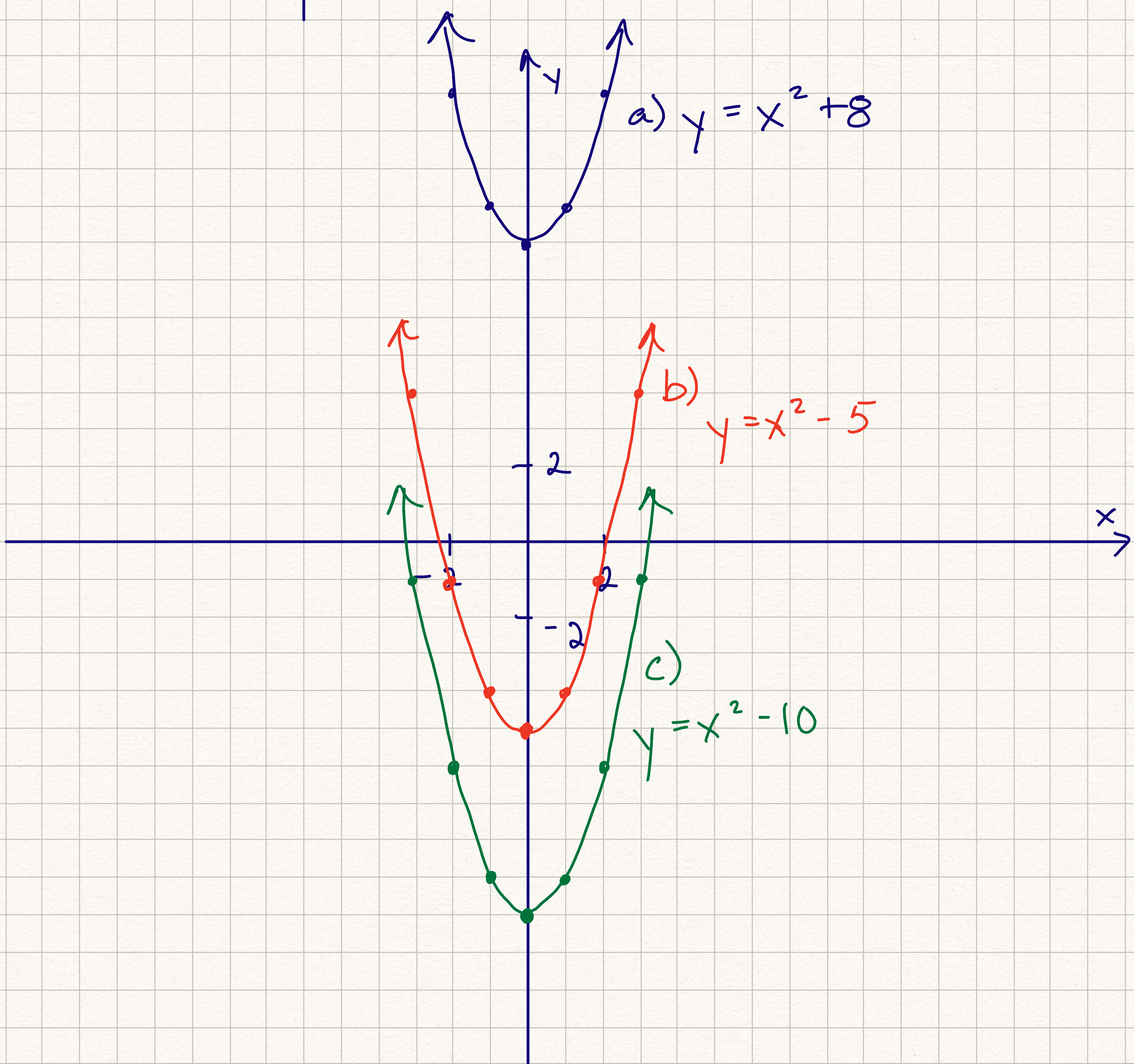

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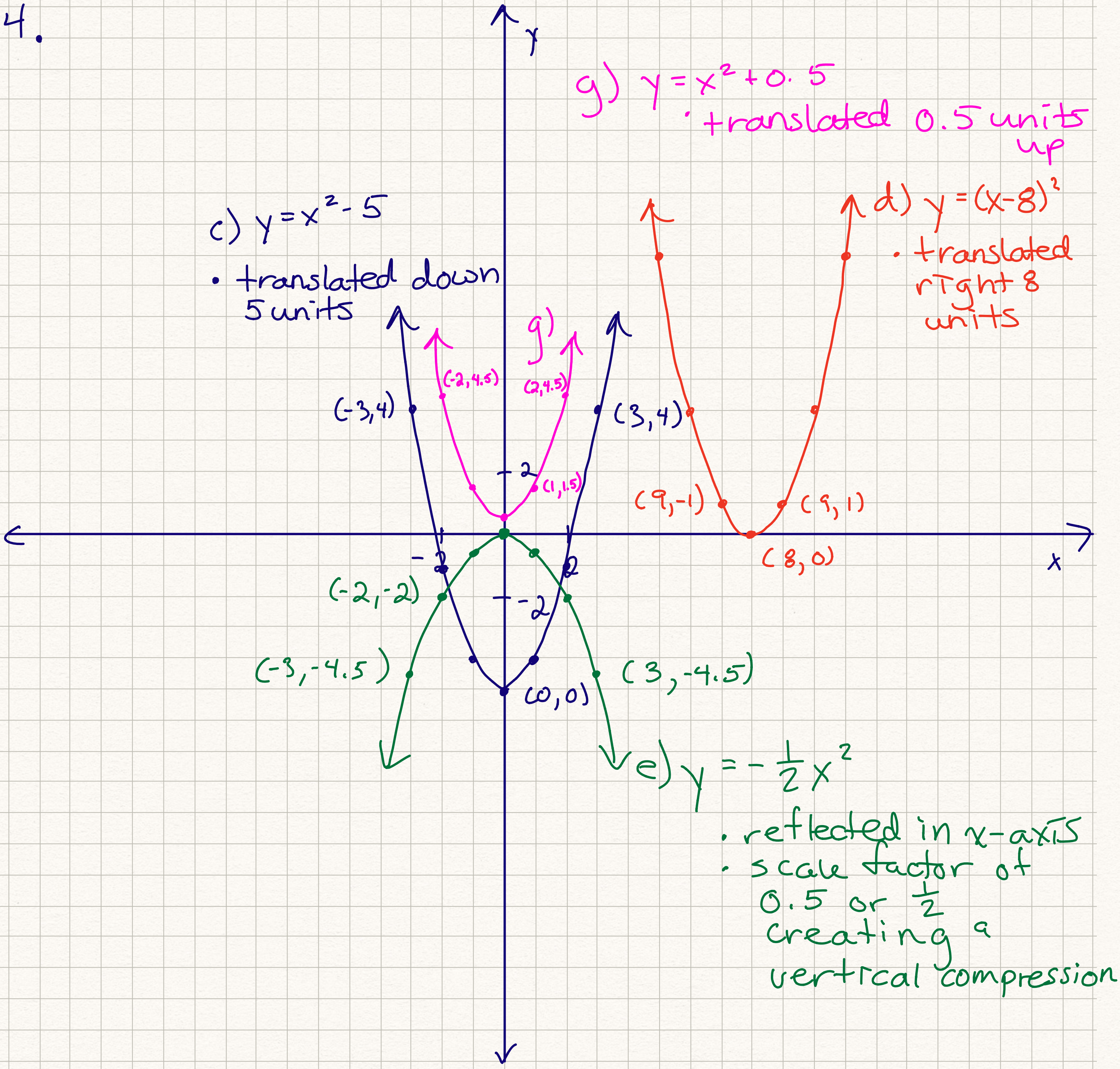


6.

Connect and Apply

6. Write an equation for the quadratic relation that results from each transformation.

a) The graph of $y = x^2$ is translated 6 units upward.

b) The graph of $y = x^2$ is translated 4 units downward.

a) $y = x^2 + 6$

b) $y = x^2 - 4$

7.

7. Write an equation for the quadratic relation that results from each transformation.

a) The graph of $y = x^2$ is translated 7 units to the left.

b) The graph of $y = x^2$ is translated 5 units to the right.

c) The graph of $y = x^2$ is translated 8 uni[ts] to the left.

d) The graph of $y = x^2$ is translated 3 units to the right.

a) $y = (x+7)^2$

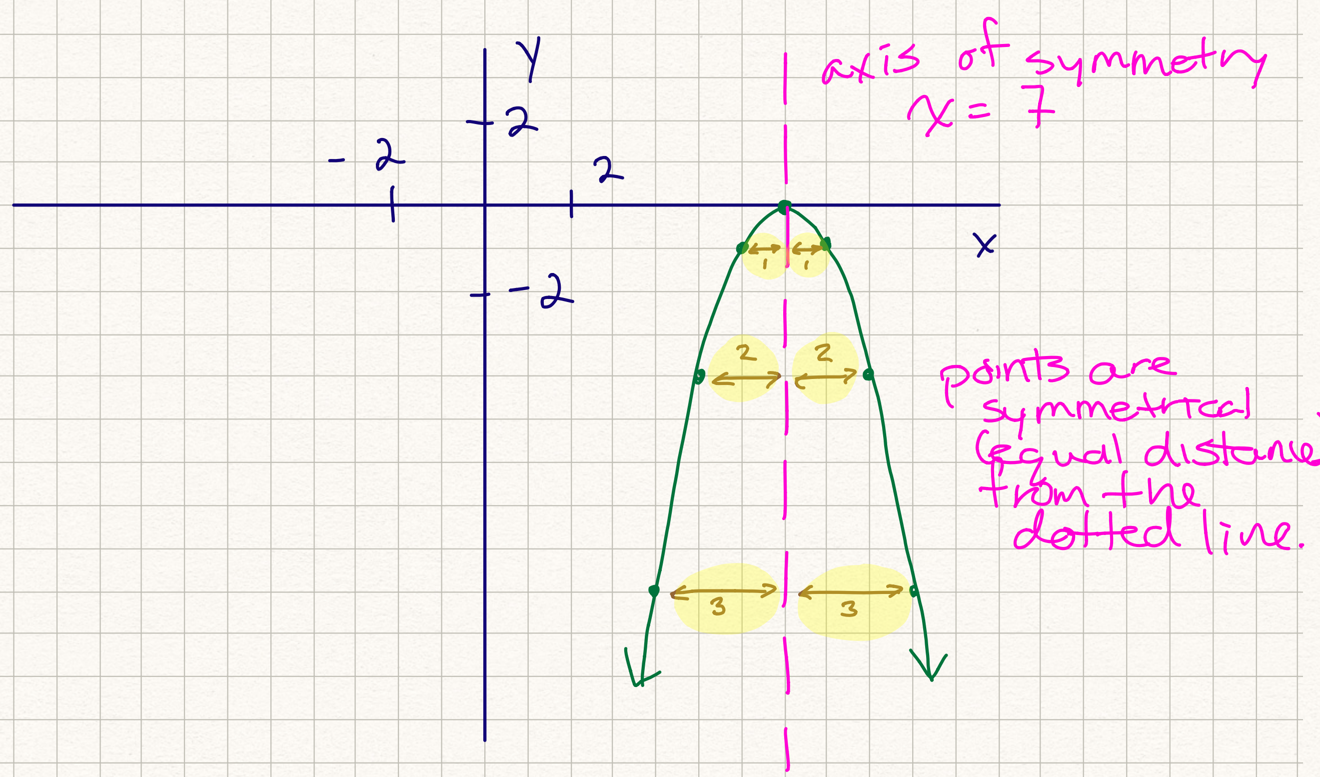
b) $y = (x-5)^2$

c) $y = (x+8)^2$

d) $y = (x-3)^2$

Opportunity to Learn - Part B

C1) The vertical line through the vertex is called the "axis of symmetry" because the points of the graph are an equal distance horizontally from each other on either side of the vertical line.



C2) We say $y = 2x^2$ has been stretched vertically because the "a" value of 2 causes all the "y" values of the points in the transformed relation to be doubled, compared to $y = x^2$. So, the transformed relation is "vertically stretched".

C3

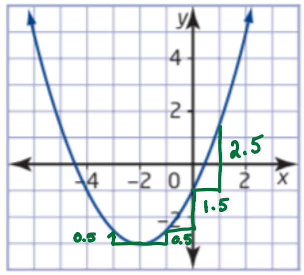
C3 Which equation is correct for the graph shown? Explain your reasoning.

A $y = (x + 2)^2 - 3$

B $y = \frac{1}{3}(x + 2)^2 - 3$

C $y = \frac{1}{2}(x + 2)^2 - 3$

D $y = -2(x + 2)^2 - 3$



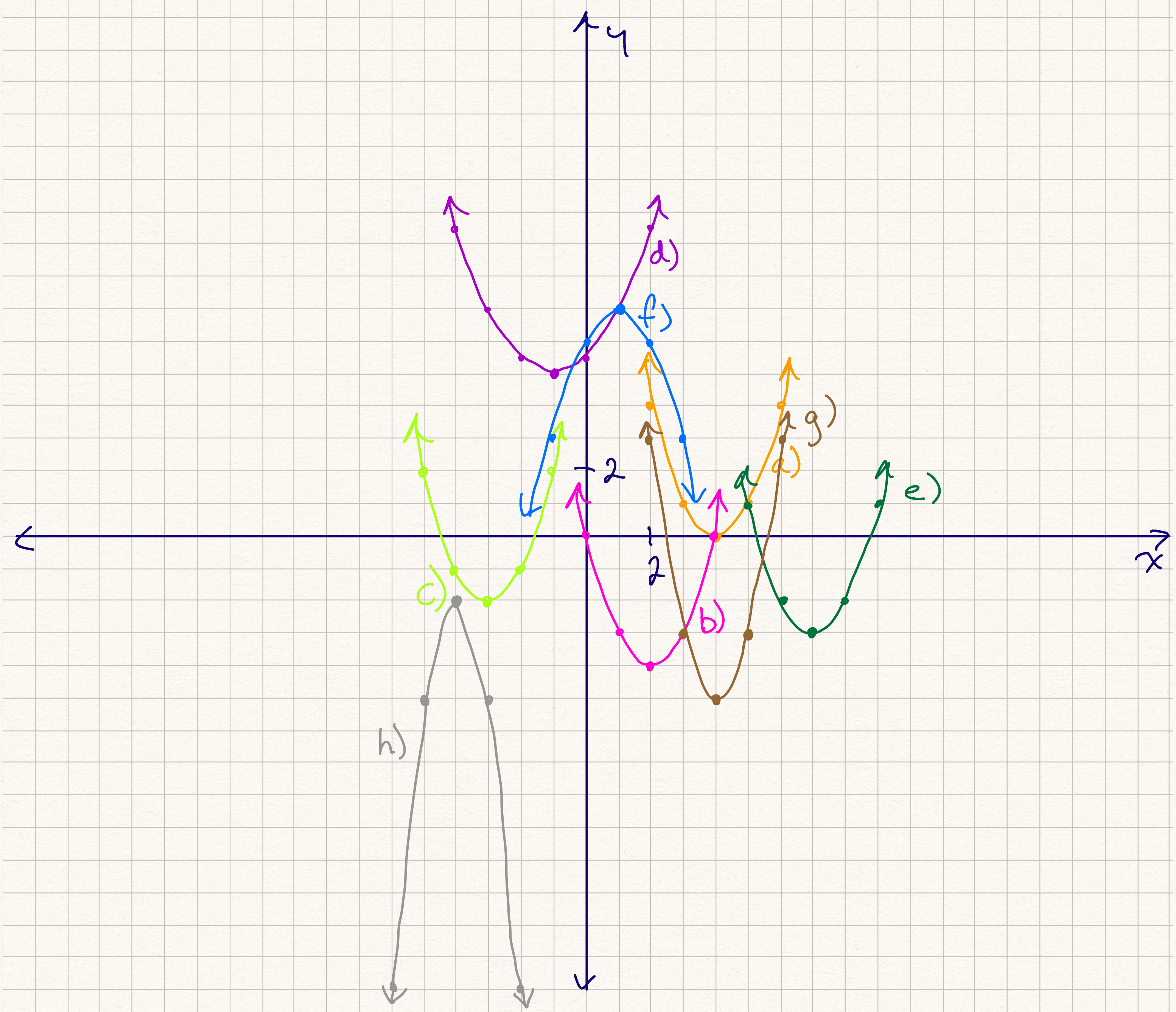
The graph has a vertex at $(-2, -3)$
h k
so $h = -2$ and $k = -3$.
All options A, B, C, D still work.
The graph opens up, so it cannot be D.

By analyzing the step pattern (the first differences) we can see that instead of 1, 3, 5, it is 0.5, 1.5, 2.5

The first differences are half as large as usual, so "a" must be 0.5. Therefore, C is the correct option.

1.

	vertex	axis of symmetry	scale factor	opening direction	values x may take	values y may take
a) $y = (x-4)^2$	(4,0)	x=4	1	up	$-\infty$ to $+\infty$	0 to $+\infty$
b) $y = (x-2)^2 - 4$	(2,-4)	x=2	1	up	$-\infty$ to $+\infty$	-4 to $+\infty$
c) $y = (x+3)^2 - 2$	(-3,-2)	x=-3	1	up	$-\infty$ to $+\infty$	-2 to $+\infty$
d) $y = \frac{1}{2}(x+1)^2 + 5$	(-1,5)	x=-1	$\frac{1}{2}$	up	$-\infty$ to $+\infty$	5 to $+\infty$
e) $y = (x-7)^2 - 3$	(7,-3)	x=7	1	up	$-\infty$ to $+\infty$	-3 to $+\infty$
f) $y = -(x-1)^2 + 7$	(1,7)	x=1	-1	down	$-\infty$ to $+\infty$	$-\infty$ to 7
g) $y = 2(x-4)^2 - 5$	(4,-5)	x=4	2	up	$-\infty$ to $+\infty$	-5 to $+\infty$
h) $y = -3(x+4)^2 - 2$	(-4,-2)	x=-4	-3	down	$-\infty$ to $+\infty$	$-\infty$ to -2



3. Write an equation for the parabola with vertex at (2, 3), opening upward, and with no vertical stretch.

h k

a is +

a = 1

3. $y = a(x-h)^2 + k$

$y = (x-2)^2 + 3$

4. Write an equation for the parabola with vertex at (−3, 0), opening downward, and with a vertical stretch of factor 2.

a is −

h k

a ↗

4. $y = a(x-h)^2 + k$

$y = -2(x-(-3))^2 + 0$

$y = -2(x+3)^2$

5. Write an equation for the parabola with vertex at (4, −1), opening upward, and with a vertical compression of factor 0.3.

a is +

h k

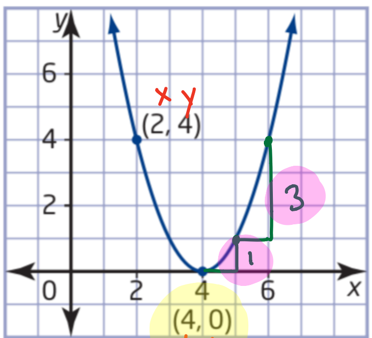
a ↗

5. $y = a(x-h)^2 + k$

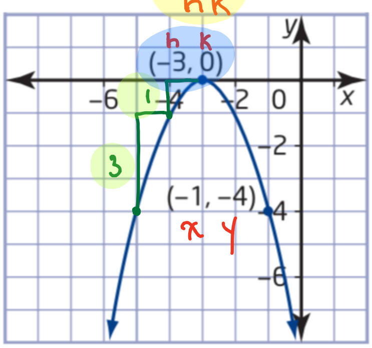
$y = 0.3(x-4)^2 - 1$

6. **6.** Write an equation for each parabola.

a)



b)



a) step pattern is 1, 3...

opens up ...

so a = 1

h = 4 k = 0

$y = a(x-h)^2 + k$

$y = (x-4)^2$

b) step pattern is 1, 3

opens down

so a = −1

h = −3, k = 0

$y = a(x-h)^2 + k$

$y = -1(x-(-3))^2 + k$

$y = -1(x+3)^2 + k$