1. Sketch graphs of all three relations on the same set of axes. Label the x-intercepts, vertex, and axis of symmetry for each parabola. Then, describe the similarities and differences between the graphs.

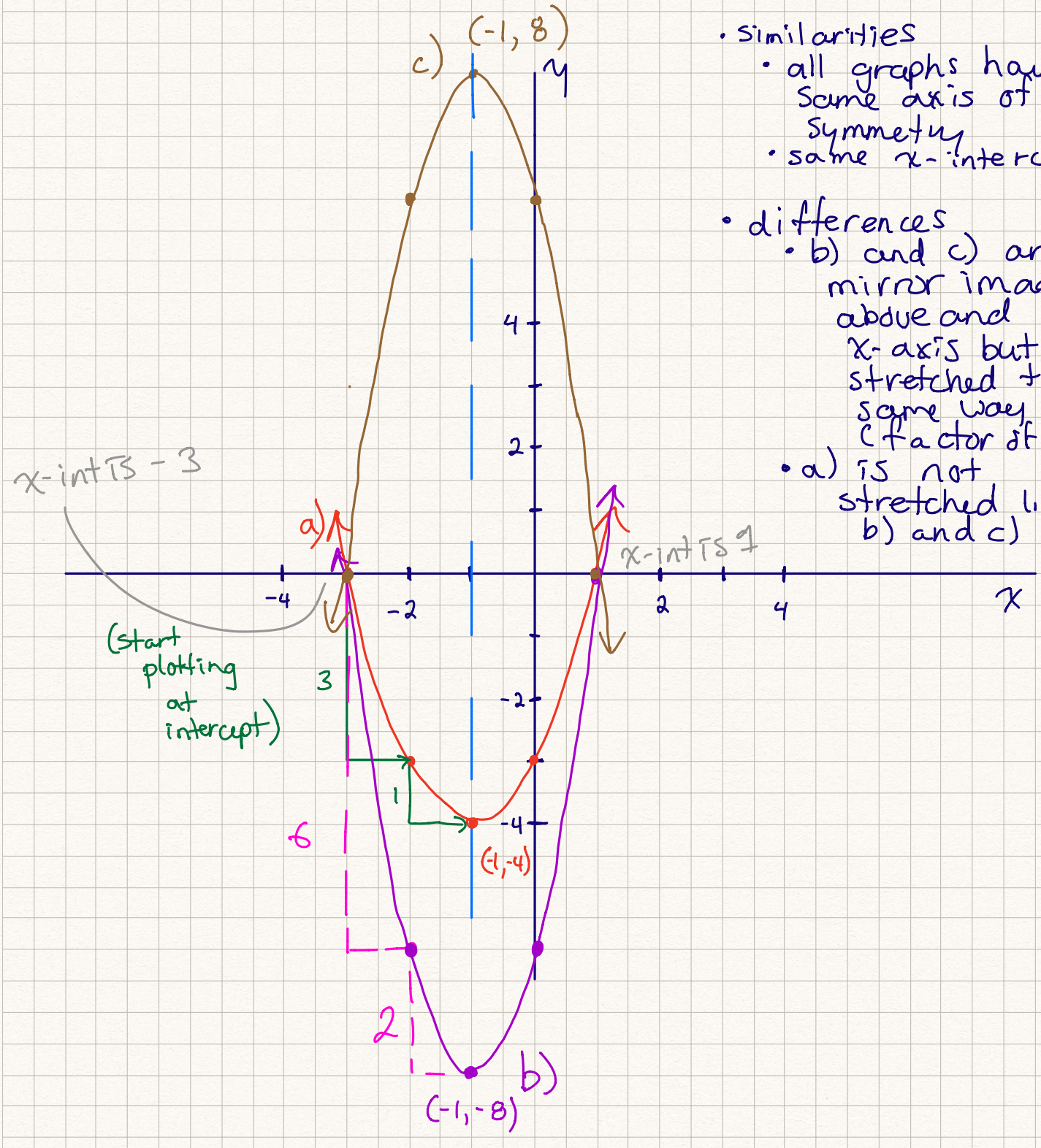
a) $y = (x + 3)(x - 1)$ $a = 1$ so step pattern is 1, 3, 5...

b) $y = 2(x + 3)(x - 1)$ $a = 2$ " " " " 2, 6, 10...

c) $y = -2(x + 3)(x - 1)$ $a = 2$ " " " " 2, 6, 10 (opening down)

$x = -1$ (axis of symmetry for all graphs)

1.



- similarities
  - all graphs have same axis of symmetry
  - same x-intercepts
- differences
  - b) and c) are mirror images above and below x-axis but are stretched the same way (factor of 2)
  - a) is not stretched like b) and c)

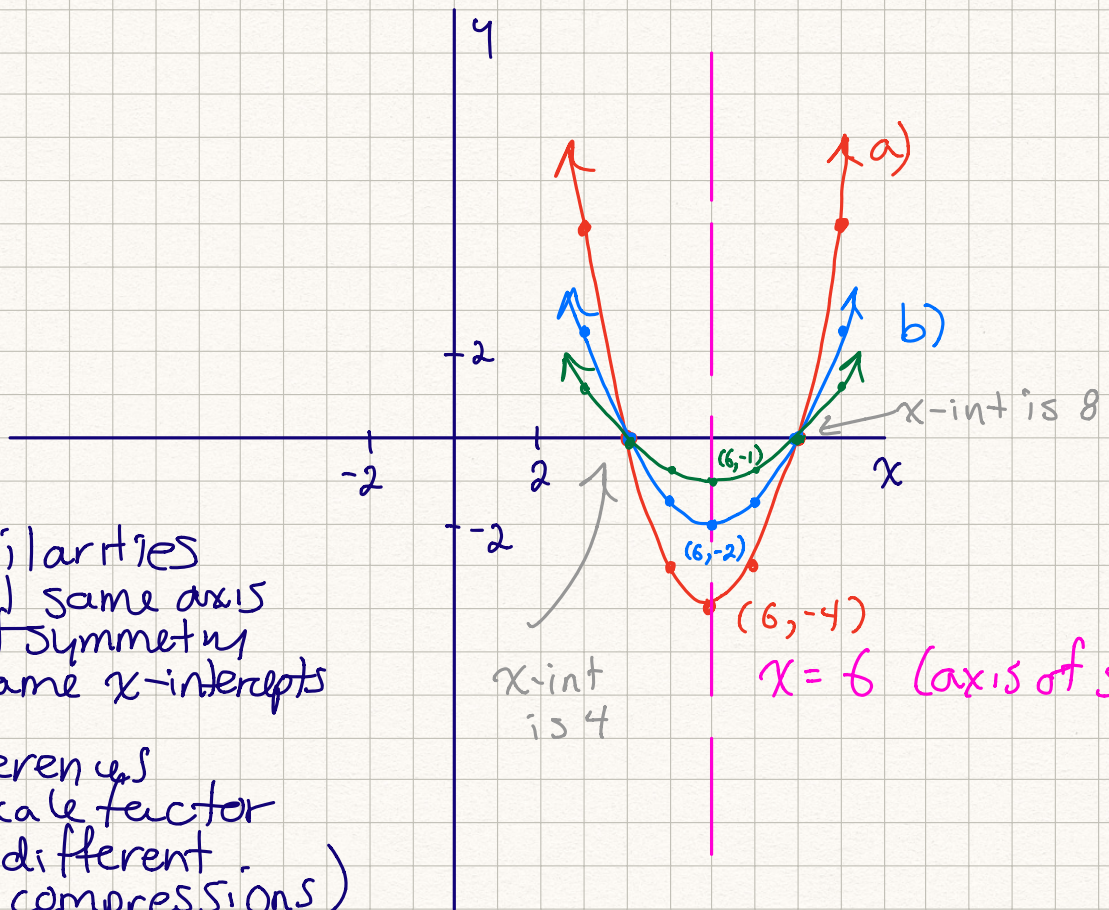
2. Sketch graphs of all three relations on the same set of axes. Label the x-intercepts, vertex, and axis of symmetry for each parabola. Then, describe the similarities and differences between the graphs.

a) $y = (x - 4)(x - 8)$ $a = 1$ so regular step pattern of 1, 3, 5 ...

b) $y = \frac{1}{2}(x - 4)(x - 8)$ $a = \frac{1}{2}$ so step pattern is 0.5, 1.5, 2.5 ...

c) $y = \frac{1}{4}(x - 4)(x - 8)$ $a = \frac{1}{4}$ " " " " 0.25, 0.75, 1.25

2.



- similarities
  - all same axis of symmetry
  - same x-intercepts
- differences
  - scale factor (different compressions)
  - different vertex locations

7. A parabola has equation $y = (x + 2)^2$.

a) Write its x-intercepts.

b) Determine the coordinates of its vertex.

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

$y = (x+2)(x+2)$ one x-intercept (two equal intercepts)

x-ints are -2 and -2 (vertex is on x-axis)

b) $(-2, 0)$

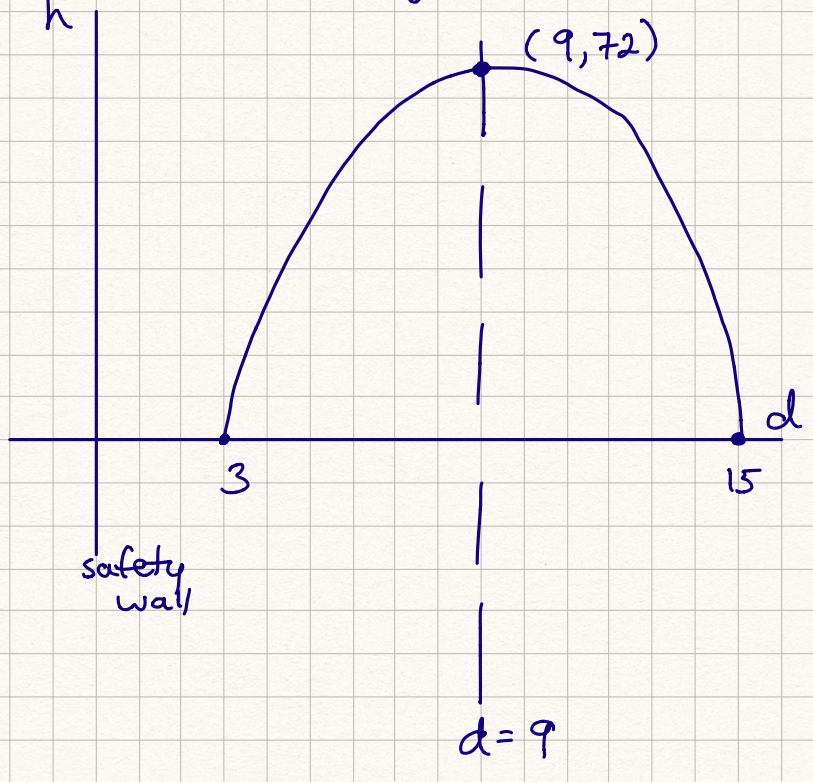
8. The predicted flight path of a toy rocket is defined by the relation $h = -2(d - 3)(d - 15)$, where d is the horizontal distance, in metres, from a safety wall, and h is the height, in metres, above the ground.

a) Sketch a graph of the path of the rocket.

b) How far from the wall is the rocket when it lands on the ground?

c) What is the maximum height of the rocket, and how far, horizontally, is it from the wall at that moment?

a)



b) It is 15 metres from the safety wall.

c) $h = -2(d-3)(d-15)$

$h = -2(9-3)(9-15)$

$= -2(6)(-6)$

$= 72$

The maximum height is 72 metres. This happens 9 m horizontally from the safety wall.