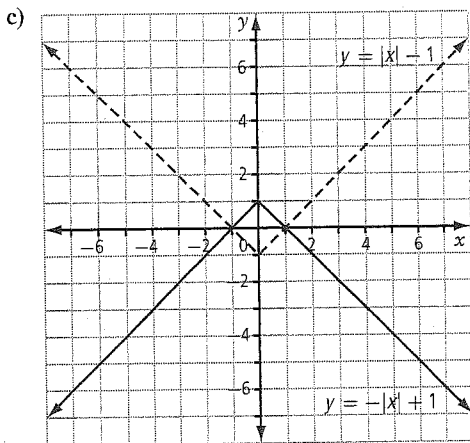
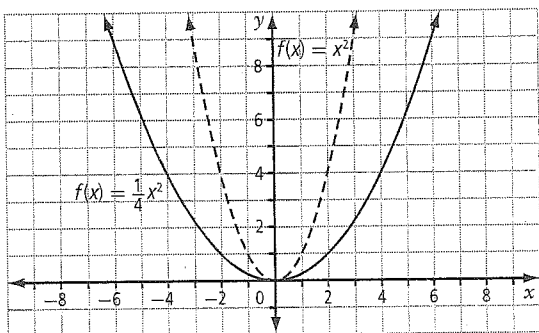


$y - 4 = -(x - 2)^2$; same y -intercept, same x -intercepts (zeros), different orientation, one has a maximum value and one has a minimum value, same shape, vertex has same x -coordinate (h) and opposite y -coordinate (k)

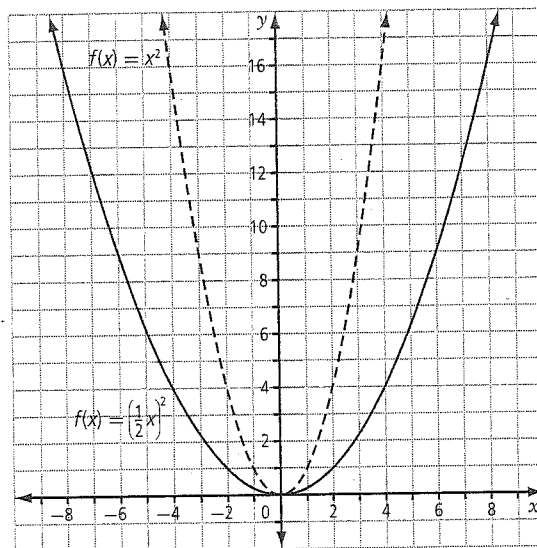


$y - 1 = -|x|$; same x -intercepts (zeros), different y -intercepts, different orientation, one has a maximum value and one has a minimum value, same shape, vertex has same x -coordinate (h) and opposite y -coordinate (k)

3. a) $(x, y) \rightarrow (x, \frac{1}{4}y)$; $f(x) = \frac{1}{4}x^2$



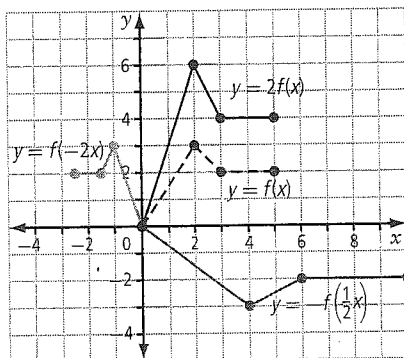
b) $(x, y) \rightarrow (2x, y)$; $f(x) = (\frac{1}{2}x)^2$



4. a) $(\frac{1}{2}x)^2 = (\frac{1}{2})^2 (x)^2 = \frac{1}{4}x^2$

b) Example: Given $f(x) = x^2$, any horizontal stretch by a factor of p is equivalent to a vertical stretch by a factor of $\frac{1}{p^2}$.

5. a) $y = 2f(x)$ b) $y = -f(\frac{1}{2}x)$ c) $y = f(-2x)$



6. Answers may vary.

1.3 Combining Transformations, pages 18–25

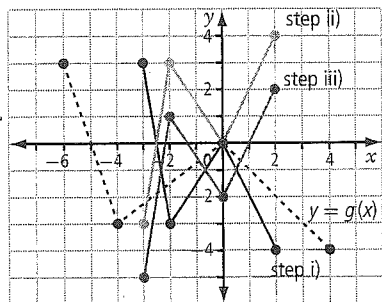
1. Steps i) and ii) may be reversed and the answer will still be correct.

a) i) reflection in the y -axis, ii) vertical stretch by a factor of 4, iii) translation 5 units down

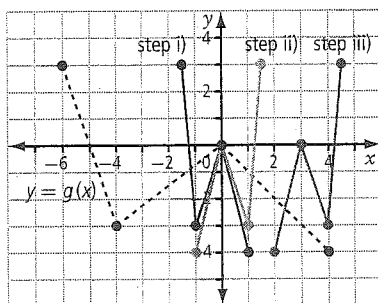
b) i) horizontal stretch by a factor of $\frac{1}{2}$, ii) reflection in the x -axis, iii) translation 7 units to the left

c) i) horizontal stretch by a factor of 4, ii) vertical stretch by a factor of 1.75, iii) translation 1.5 units to the right

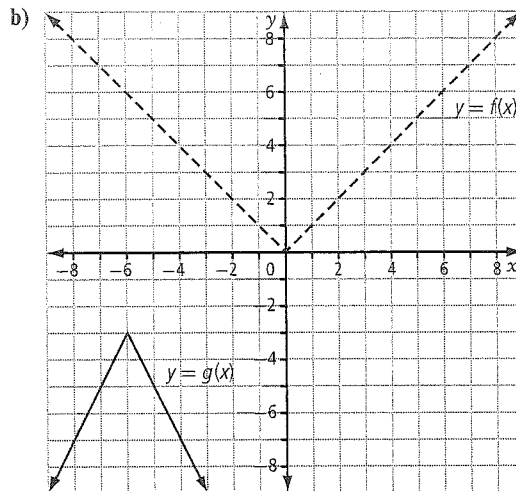
- d) i) horizontal stretch by a factor of $\frac{1}{3}$ and reflection in the y -axis, ii) vertical stretch by a factor of $\frac{1}{2}$ and reflection in the x -axis, iii) translation 3 units up and 1 unit to the left
2. a) $y + 7 = -f\left(\frac{1}{6}x\right)$
 b) $y = \frac{1}{2}|-(x-3)|$
 c) $y + 4 = -\frac{1}{9}(x-10)^2$ or $y + 4 = -\left[\frac{1}{3}(x-10)\right]^2$
3. a) (6, 6)
 b) (-11, -10)
 c) (18, 30)
4. (3, -12), (-14, 8), and (24, -24)
5. a) i) horizontal stretch by a factor of $\frac{1}{2}$, ii) reflection in the x -axis, iii) translation 2 units down



- b) i) horizontal stretch by a factor of $\frac{1}{4}$,
 ii) reflection in the y -axis,
 iii) translation 3 units to the right

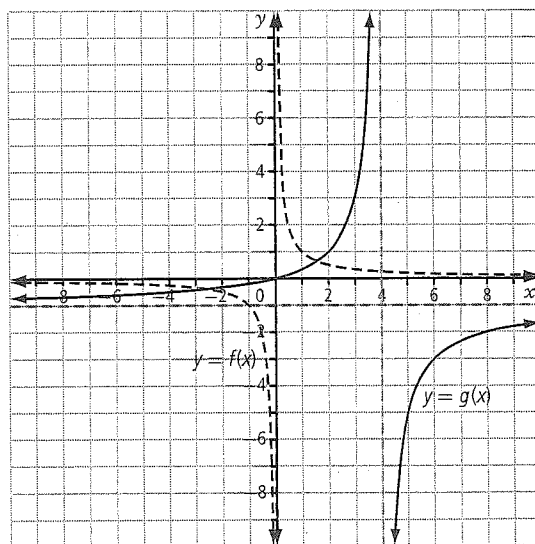


6. a) $y = -2|x + 6| - 3$



7. a) $y = -\frac{1}{\frac{1}{4}(x-4)} - 1$ or $y = -\frac{4}{x-4} - 1$

b)



8. $y - 7 = -2f(x + 5)$

9. $y = 2f\left(-\frac{1}{2}x\right)$

10. $y = f(-2x) + 3$

11. Answers may vary.