

1.3 Exercises Part 2 p22: 2, 17-21 odd, 22, 27-31 odd

2. a)  $f(x) = 2x + 3$  up 2

$$g(x) = f(x) + 2$$

$$= 2x + 3 + 2$$

$$g(x) = 2x + 5 \checkmark$$

b)  $f(x) = x + 5$   
 horizontal shrink by factor of  $\frac{1}{2}$   
 factor of  $\frac{1}{a}$   
 $a = 2$

$$g(x) = f(ax)$$

$$= f(2x)$$

$$g(x) = 2x + 5 \checkmark$$

c)  $f(x) = x + 3$  stretch vertically by factor of 2

$$g(x) = 2 \cdot f(x)$$

$$= 2(x + 3)$$

$$g(x) = 2x + 6 \checkmark$$

doesn't belong

d)  $f(x) = 2x + 3$  translate left 1 unit

$$g(x) = f(x + 1)$$

$$= 2(x + 1) + 3$$

$$= 2x + 2 + 3$$

$$g(x) = 2x + 5 \checkmark$$

17.  $f(x) = x + 2$ ; vertical stretch by factor of 5

$$g(x) = 5 \cdot f(x)$$

$$= 5(x + 2)$$

$$g(x) = 5x + 10$$

19.  $f(x) = |2x| + 4$ ; horizontal shrink by factor of  $\frac{1}{2}$   
 by factor of  $\frac{1}{a}$   
 $a = 2$

$$g(x) = f(ax)$$

$$= f(2x)$$

$$= |2(2x)| + 4$$

$$g(x) = |4x| + 4$$

21.  $f(x) = -2|x - 4| + 2$  vertical shrink by factor of  $\frac{1}{2}$   
 (y-values in g are half the y-values in f)

$$g(x) = \frac{1}{2} \cdot f(x)$$

$$= \frac{1}{2}(-2|x - 4| + 2)$$

$$= \frac{1}{2}(-2)|x - 4| + 1$$

$$g(x) = -|x - 4| + 1$$

22.  $f(x) = 6 - x$  horizontal shrink by factor of  $\frac{1}{3}$   
(because  $x$  values of  $g$  are  $\frac{1}{3}x$  values of  $f$ )

$g(x) = f(ax)$  factor of  $\frac{1}{a}$   
 $a = 3$

$g(x) = f(3x)$   
 $g(x) = 6 - 3x$

23. shift left C.  $y = f(x+2)$

24. vertical stretch A.  $y = 2f(x)$

25. vertical shift D.  $y = f(x) + 2$

26. horizontal shrink B.  $y = f(2x)$

27.  $f(x) = x$  vertical stretch by factor of 2 followed by translation 1 up

$g(x) = 2 \cdot f(x) + 1$   
 $g(x) = 2x + 1$

29.  $f(x) = |x|$  : translation 2 units left followed by a horizontal stretch by a factor of 2

translation first  $h(x) = f(x+2)$   
 $h(x) = |x+2|$

factor of  $\frac{1}{a}$   
 $a = \frac{1}{2}$

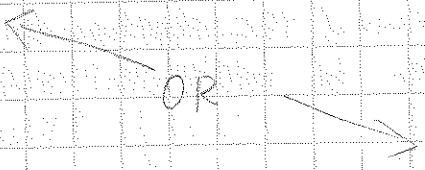
horizontal stretch  $g(x) = h(ax)$   
 $g(x) = h(\frac{1}{2}x)$   
 $g(x) = |\frac{1}{2}x + 2|$

31.  $f(x) = |x|$  reflect across  $x$ -axis  
vertical stretch by factor of 2

$g(x) = -2|x|$

OR reflect across  $x$ -axis  
horizontal shrink by factor of  $\frac{1}{2}$   
by factor of  $\frac{1}{a}$

$a = 2$



$g(x) = -f(ax)$   
 $= -f(2x)$   
 $g(x) = -|2x|$