

$-4/7x$ is ambiguous

\swarrow \searrow

$-\frac{4x}{7}$ $-\frac{4}{7x}$

$(-4/7)x$ is OK

$-\frac{4}{7}x$ is OK

$f(2) = 2^2 - 2(2)$ $f(2) = 2^2 - 2(2)$

$f(2) = 4 - 4$ $f(x) = 4 - 4$

$f(2) = 0$ $f(x) = 0$

unnecessary \rightarrow No, $f(x) = x^2 - 2x$

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

$f(x) = (x+3)^2 - 2(x+3)$ No.

\rightarrow No, $f(x)$ is $x^2 - 2x$, NOT $(x+3)^2 - 2(x+3)$

$$f(-3) = (-3)^2 - 2(-3)$$

$$= 9 + 6$$

$$= 15$$

$(-3, 15)$ shows the corresponding point on the graph. Nice touch.

$g(x) = \sqrt{2-x} + 3$

$f(x) = \sqrt{x}$ No.

Flip $f(-x) = \sqrt{-x}$ $= f(x)$

Right 2 $f(-(x-2)) = \sqrt{-(x-2)} = f(x)$

Up 3 $f(-(x-2)) + 3 = \sqrt{-(x-2)} + 3 = f(x)$

$2-x = -(-2+x)$
 $= -(x-2)$

flip Right 2
 $-x \rightarrow -(x-2)$

We have no rule for replacing $-x$ by $-x+2$

But $-x$ by $-(x-2)$ means Right 2.

$$g(x) = \sqrt{2-x} + 3$$

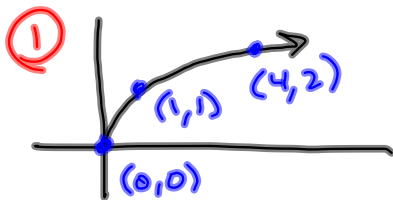
$$= \sqrt{-(x-2)} + 3$$

$$2-x$$

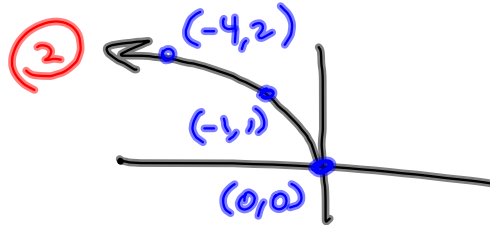
$$= -x+2$$

$$= -(x-2)$$

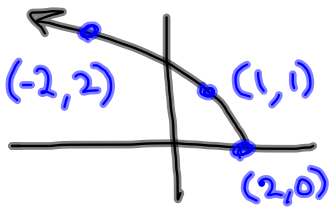
$$\sqrt{x} \xrightarrow{\textcircled{1}} \sqrt{-x} \xrightarrow{\textcircled{2}} \sqrt{-(x-2)} \xrightarrow{\textcircled{3}} \sqrt{-(x-2)} + 3 \xrightarrow{\textcircled{4}} = g(x)$$



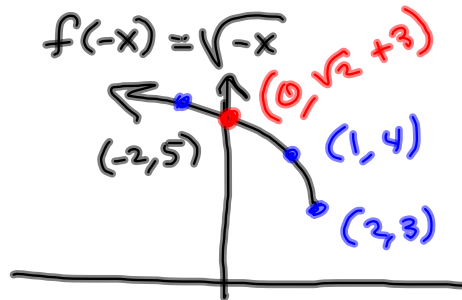
$$f(x) = \sqrt{x}$$



$$f(-x) = \sqrt{-x}$$



$$f(-(x-2)) = \sqrt{-(x-2)}$$



$$f(-(x-2)) + 3$$

$$= \sqrt{-(x-2)} + 3$$

$$= \sqrt{2-x} + 3$$

$x, \sqrt{x}, x^2, |x|$
3 key points

$$f(x) = x^2 - 2x$$

$$f(-3) = (-3)^2 - 2(-3)$$

$$= 9 + 6$$

$$= 15$$

$$(x+3)^2 = x^2 + 9 \text{ Nah.}$$

$$(x+3)(x+3) = x^2 + 3x + 3x + 9 = x^2 + 6x + 9$$

$$= (x+3)x + (x+3)3 \quad (a+b)^2 = a^2 + 2ab + b^2$$

$$= x^2 + 3x + 3x + 9$$



Computing Wind Speed With a tail wind, a small Piper aircraft can fly 600 miles in 3 hours. Against this same wind, the Piper can fly the same distance in 4 hours. Find the average wind speed and the average airspeed of the Piper.

Let w = wind speed (miles per hour)

P = piper's speed (.. ..)

600 mi \approx 3 hrs w/ wind.

600 4 hrs against wind.

$$D = rt, \quad r = \frac{D}{t} = \text{rate}, \quad t = \frac{D}{r}$$

make a guess:

$$\text{Guess } P = 200 \text{ mph}$$

$$w = 20 \text{ mph.}$$

Covered 600 miles in 3 hrs

with the wind, your speed is added to the wind speed.

Against the wind, wind speed is subtracted.

— With:

$$\text{want } 3 = t = \frac{D}{r} = \frac{600}{\underline{200+20}} = \frac{600}{220} = 2.\overline{72}$$

Against:

$$\text{Want } 4 = t = \frac{D}{r} = \frac{600}{\underline{200-20}} = \frac{600}{180} = 3.\overline{33}$$

$$\text{Want } \frac{600}{P+w} = 3 \Rightarrow 600 = 3(P+w)$$

$$\frac{600}{P-w} = 4 \Rightarrow 600 = 4(P-w)$$

$$600 = 3(P+w) \Rightarrow 200 = P+w$$

$$600 = 4(P-w) \Rightarrow 150 = P-w$$

$$P+w = 200$$

$$P-w = 150$$

$$2P = 350$$

$$P = 175$$

$$175 - w = 150$$

$$175 = 150 + w$$

$$25 = w$$

Check in the original.

Key step, to me, for this method was

$$\frac{600}{200+20} = 3$$

$$\frac{600}{200-20} = 4$$

Tables
are good.

	$D = r \cdot t$	D	r	t
WIND			w	
PIPER			p	
with	600		$p+w$	3
against	600		$p-w$	4

Tuesday
Homework
instead of
Monday.

$$t \cdot r = D$$

$$3(p+w) = 600$$

$$4(p-w) = 600$$

$$3(p+w) = 4(p-w)$$