9. (5 pts) $8x^2+22x-105=0$

Magic Number: $-8(105) = -840$

$22 = 32 - 10 \qquad -320$

$= 42 - 20 \qquad -840$ Sweet!

$8x^2+42x-20x-105$

$2x(4x+21)-5(4x+21)$

$A\cdot 2x - A\cdot 5$

$= A(2x-5) = (4x+21)(2x-5)$

$a = 8 \quad b = 22 \quad c = -105$ THE CHEAT

$b^2-4ac = 22^2-4(8)(-105) = 3844$

$\cancel{2}, \cancel{3}, \cancel{5}, 7, 11, 13, 17, 23, 29,$

Calculator would've told us $\sqrt{3844}$

$$\begin{array}{r|l} 2 & 3844 \\ 2 & 1922 \\ 31 & 961 \\ & 31 \end{array}$$

$\sqrt{2\cdot 2\cdot 31\cdot 31} = 2\cdot 31 = 62$

So $x = \dfrac{-22 \pm 62}{2(8)} = \dfrac{2(-11\pm 31)}{2(8)}$

$= \dfrac{-11\pm 31}{8}$ → $\dfrac{20}{8} = \dfrac{5}{2}$, → $\dfrac{-42}{8} = \dfrac{-21}{4}$

$8x^2+22x-105$

$= 8\left(x-\frac{5}{2}\right)\left(x+\frac{21}{4}\right)$

$= 2\left(x-\frac{5}{2}\right)(4)\left(x+\frac{21}{4}\right)$

$= \boxed{(2x-5)(4x+21)}$

$5\sqrt{x+3} = x+5$

$(\quad\quad)^2 = (\quad\quad)^2$

$25(x+3) = (x+5)^2 = x^2+10x+25$

$25x+75 = x^2+10x+25$

$0 = x^2-15x-50 = 0$

$x^2-15x+\left(\frac{15}{2}\right)^2-\frac{225}{4}-\frac{200}{4} = 0$

$\left(x-\frac{15}{2}\right)^2 = \frac{425}{4}$

$x-\frac{15}{2} = \pm\sqrt{\frac{425}{4}} = \pm\frac{5\sqrt{13}}{2}$

$x = \frac{15\pm5\sqrt{13}}{2}$

$$\begin{array}{r|l} 5 & 425 \\ 5 & 85 \\ & 13 \end{array}$$

Composition $(f \circ g)(x) = f(g(x))$

$f(x) = \sqrt{2x+1}$, $g(x) = \dfrac{x+1}{x-2}$

$(f \circ g)(x) = f(g(x)) = \sqrt{2g(x)+1}$

f(☺) = √(2☺+1)

$f(\boxed{g(x)}) = \sqrt{2\boxed{g(x)}+1}$

$= \sqrt{2\left(\frac{x+1}{x-2}\right)+1}$

Trickiest Part : Domain $(f \circ g)$

$\mathcal{D}(f \circ g) = \{x \mid x \in \mathcal{D}(g) \text{ and } g(x) \in \mathcal{D}(f)\}$

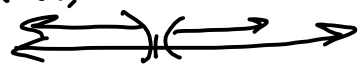
$\nearrow$ $f(g(x))$

$f(x) = \frac{1}{x}$, $g(x) = \sqrt{2x-4}$

$\mathcal{D}(f) = \mathbb{R} \setminus \{0\} = \{x \mid x \neq 0\}$

$= (-\infty, 0) \cup (0, \infty)$

=



0

$\mathcal{D}(g) =$ Need $2x-4 \geq 0$

$2x \geq 4$

$\sqrt{}$

$\mathcal{D}(g) = \{x \mid x \geq 2\}$

$= [2, \infty)$

=

2

$(f \circ g)(x) = \frac{1}{g(x)} = \frac{1}{\sqrt{2x-4}}$

$\boxed{\mathcal{D}(f \circ g) = \{x \mid x \in \mathcal{D}(g) \text{ and } g(x) \in \mathcal{D}(f)\}}$

$= \{x \mid x \geq 2 \text{ and } \sqrt{2x-4} \neq 0\}$

$= \{x \mid x \geq 2 \text{ and } x \neq 2\}$

$\sqrt{2x-4} \neq 0$

$2x-4 \neq 0$

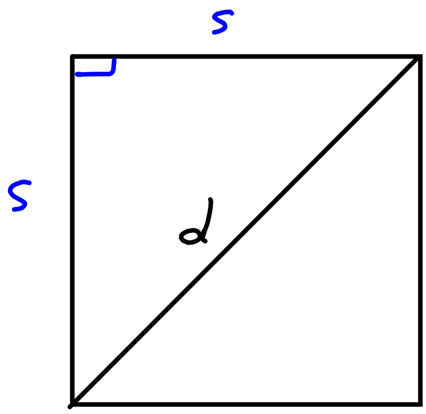
$2x \neq 4$

$x \neq 2$

$= \{x \mid x > 2\}$

$= (2, \infty) = \mathcal{D}(f \circ g)$

2.1 #101



P = perimeter $= 4s$

$A = \boxed{\text{Area} = s^2}$

$s^2 + s^2 = d^2$

$\sqrt{2s^2} = \sqrt{d^2}$

$\boxed{\sqrt{2}\, s = |d| = d}$ so $s = \frac{d}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{\sqrt{2}\, d}{2}$

$s = \sqrt{\ }$

$\sqrt{2}\sqrt{s^2} = \sqrt{d^2}$

$\sqrt{2}\,|s| = |d|$

$\sqrt{2}\, s = \pm d$

$= d$

$d = |d| = \sqrt{2}\,|s| = \sqrt{2}\, s$

because $d, s \geq 0$.

$A = s^2$

$P = 4s$

want function A as function of P ; $A = A(P)$

$P^2 = 16s^2$

$\frac{P^2}{16} = s^2 = A$!

$A = \boxed{A(P) = \frac{P^2}{16}}$

d as func of A

$A = s^2 = \left(\frac{d}{\sqrt{2}}\right)^2$ $\qquad s = \frac{d}{\sqrt{2}}$

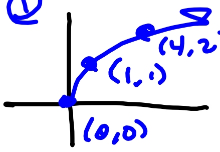
$A = \frac{d^2}{4} = A(d)$

Graph $g(x) = 3\sqrt{2x-14} - 15$

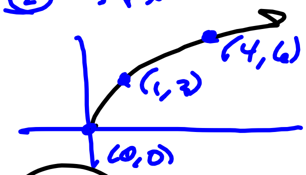
$= 3\sqrt{2(x-7)} - 15$

1 $\sqrt{x}$ $\rightarrow$ 2 $3\sqrt{x}$ $\rightarrow$ 3 $3\sqrt{2x}$ $\rightarrow$ 4 $3\sqrt{2(x-7)}$ $\rightarrow$ 5 $3\sqrt{2(x-7)} - 15$

1 $\sqrt{x}$

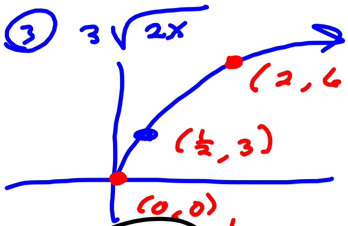


2 $3\sqrt{x}$



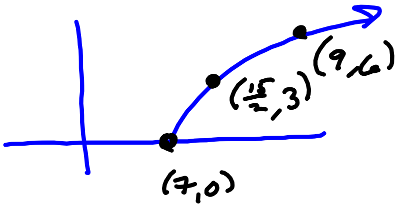
3y

3 $3\sqrt{2x}$



$\frac{1}{2}x$ *

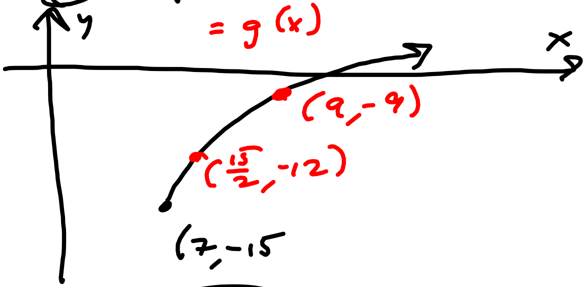
4 $3\sqrt{2(x-7)}$



$\frac{1}{2}+7 = \frac{1+14}{2} = \frac{15}{2}$

x+7 *

5 $3\sqrt{2(x-7)} - 15$
$= g(x)$



y−15

* f(bx) does "$\frac{1}{b}x$" to all x-coords in previous graph

f(x−b) does "x+7" to all x-coords in previous graph

So the x's are counter-intuitive.

$\sqrt{3x}$ gets things done in 3 times faster, so it takes $\frac{1}{3}$ of the time.

$\sqrt{x-7}$ gets done 7 units later, so move Right 7, even though the function SEEMS "x−7" inside the function to say the opposite

DELAY by 7 units.