

## Shared Work

I can do it in 7 hrs.

She can do it in 10 hrs.

How long working together?

I do  $\frac{1}{7}$   $\frac{\text{job}}{\text{hr}}$ . That's my rate

Let  $x$  = the amt of time I spend working on the job with "her," in hours. Then

$$\frac{1}{7}x = \left(\frac{1}{7} \frac{\text{job}}{\text{hr}}\right)(x \text{ hrs})$$

$$\frac{1}{7}x + \frac{1}{10}x = 1 \text{ job.}$$

Jobs  $\frac{x}{7} \cdot \frac{10}{10} + \frac{x}{10} \cdot \frac{7}{7} = 1 \cdot \frac{70}{70}$  Jobs

$$\frac{10x + 7x}{\text{LCD}} = \frac{70}{\text{LCD}}$$

$$17x = 70$$

$$x = \frac{70}{17} = 4\frac{2}{17} \text{ hrs}$$

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Suppose I show up 2 hours late.

Let  $x$  = how long I spend on the job (hrs)  
How long did each of us work?           

$$\frac{1}{7}x + \frac{1}{10}(x+2) = 1$$

$$\frac{1}{7}(x-2) + \frac{1}{10}x = 1, \text{ if } x = \text{time SHE spent. (hrs)}$$

$$\S 5.6 \#s 5, 9,$$

$$x, x+1$$

$$\frac{1}{x} + \frac{1}{x+1} = \frac{7}{12}$$

$$\frac{2}{3} \quad \frac{3}{2}$$

$$\frac{1}{\left(\frac{2}{3}\right)} = 1 \cdot \frac{3}{2} = \frac{3}{2}$$

Speed in still H<sub>2</sub>O is  $5 \frac{\text{mi}}{\text{hr}}$

3 miles down in same time it takes to go 1.5 miles up. How fast is the current? Let  $c = \text{speed of current} \left(\frac{\text{mi}}{\text{hr}}\right)$

$$D = rt \Rightarrow t = \frac{D}{r}$$

	D	r
up	1.5	$5 - c$
Down	3	$5 + c$

$$\frac{1.5}{5 - c} = \frac{3}{5 + c}$$

$$t = \frac{1.5}{5 - c} \quad t = t$$

$$t = \frac{3}{5 + c}$$

$$8' 6.1$$

$$77b \quad \sqrt[3]{16a^4 b^8 r^{77}} = \sqrt[3]{2^{3+1} a^{3+1} b^{6+2} r^{75+2}}$$

$$= \sqrt[3]{\underline{2^3} \cdot \underline{2^1} \cdot \underline{a^3} \cdot \underline{a^1} \cdot \underline{b^6} \cdot \underline{b^2} \cdot \underline{r^{75}} \cdot \underline{r^2}}$$

$$= 2^{\frac{3+1}{3}} a^{\frac{3+1}{3}} b^{\frac{6+2}{3}} r^{\frac{75+2}{3}} \sqrt[3]{2 a b^2 r^2}$$

$$= 2 a b^2 r^{25} \sqrt[3]{2 a b^2 r^2}$$

$$\begin{array}{r} 25 r^2 \\ \underline{77} \\ 60 \\ \underline{17} \\ 2 \end{array}$$

$$77 - 2 = 75$$

$$\S 6.3 \quad 7\sqrt{2} - 5\sqrt{2} = 2\sqrt{2}$$

$$\sqrt{48} - 3\sqrt{27} + 2\sqrt{75}$$

$$4\sqrt{3} - 3 \cdot 3\sqrt{3} + 2 \cdot 5\sqrt{3}$$

$$4\sqrt{3} - 9\sqrt{3} + 10\sqrt{3}$$

$$= (4 - 9 + 10)(\sqrt{3})$$

$$= 5\sqrt{3}$$

$$\begin{array}{r} 2 \overline{)48} \\ 2 \overline{)24} \\ 2 \overline{)12} \\ 2 \overline{)6} \\ \quad 3 \end{array} \quad \begin{array}{r} 3 \overline{)27} \\ 3 \overline{)9} \\ \quad 3 \end{array}$$

$$\begin{array}{r} 3 \overline{)75} \\ 5 \overline{)25} \\ \quad 5 \end{array}$$

(34)

$$\frac{\sqrt{12}}{6} + \sqrt{\frac{1}{3}} + \frac{\sqrt{3}}{3}$$

$$= \frac{2\sqrt{3}}{6} + \frac{\sqrt{1}}{\sqrt{3}} + \frac{\sqrt{3}}{3}$$

$$= \frac{\sqrt{3}}{3} + \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} + \frac{\sqrt{3}}{3}$$

$$= \frac{\sqrt{3}}{3} + \frac{\sqrt{3}}{3} + \frac{\sqrt{3}}{3}$$

$$= \frac{\sqrt{3} + \sqrt{3} + \sqrt{3}}{3}$$

$$= \frac{3\sqrt{3}}{3} = \sqrt{3}$$

$$\underline{\underline{\sqrt{3} \sqrt{3} = \sqrt{3 \cdot 3} = 3}}$$

Rationalize  
the denominator.

$$3 \sqrt{1.732}$$

$$\underline{\underline{1.732}} \overline{)1.0000}$$

§ 6.5

It's understood that  $3x+1 \geq 0$

$$\sqrt{3x+1} = 4$$
$$\left(\overset{\text{outside}}{\sqrt{3x+1}}\right)^2 = 4^2$$

$$3x+1 = 16$$

$$3x = 15$$

$$\boxed{x=5}$$

$$\text{Let } x = -50$$

$$\text{Then } \sqrt{(3x+1)^2} = \sqrt{(-150+1)^2}$$

$$= \sqrt{(-149)^2} = 149 = |3x+1|$$

$$(-149)(-149) = 149^2 =$$

$$\sqrt{\overset{\text{Inside}}{(3x+1)^2}} = |3x+1|$$

$$\sqrt{3x+1} - 4 = 1$$

$$\sqrt{3x+1} = 5$$

$$(\sqrt{3x+1})^2 = 5^2$$

$$3x+1=25$$

$$3x=24$$

$$x=8$$

$$\sqrt{3x+1} + 4 = 1$$

$$\sqrt{3x+1} = -3$$

Never!

$$(\sqrt{3x+1})^2 = (-3)^2$$

Squaring Twice!

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

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

$$\underline{x+3} = \underline{x} - 6\sqrt{x} + 9$$

$$6\sqrt{x} = 6$$

$$\sqrt{x} = 1$$

$$(\sqrt{x})^2 = 1^2$$

$$\boxed{x = 1}$$

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

$$x - 6\sqrt{x} + 9$$

$$(\sqrt{x} - 3)(\sqrt{x} - 3)$$

$$= x - 3\sqrt{x} - 3\sqrt{x} + 9$$

$$= x - 6\sqrt{x} + 9$$

$$\sqrt{x} \sqrt{x} = (\sqrt{x})^2 = x$$

S6.6

$$\sqrt{-36} = \sqrt{(-1)(36)} = \sqrt{-1} \sqrt{36}$$

ISWYDT

$$i^{30} = i^{2 \cdot 15} = (i^2)^{15}$$

TWSS

$$= (-1)^{15} = -1$$

LMFAO

$$i^{32} = 1$$

$$i^2 = -1 \\ \sqrt{-1} = i$$

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ADDITION

$$(5+2i) - (3+6i)$$

$$= 5+2i-3-6i$$

$$= 2-4i$$

Always write  
complex #s in  
the form  $a+bi$

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MULTIPLICATION

$$3i(2-7i)$$

$$6i - 21i^2$$

$$= 6i + 21$$

$$= \boxed{21+6i}$$

$$(7-6i)(2+3i)$$

$$= 14+21i-12i-18i^2$$

$$= 14+9i+18$$

$$= 32+9i$$



Division

$$\frac{7-6i}{2+3i}$$

$$(a+b)(a-b) = a^2 - b^2$$
$$(a+b)(a+b) = a^2 + 2ab + b^2$$
$$(a-b)(a-b) = a^2 - 2ab + b^2$$

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

$$= \left( \frac{7-6i}{2+3i} \right) \left( \frac{2-3i}{2-3i} \right)$$
$$= \frac{14 - 21i - 12i + 18i^2}{2^2 - 6i + 6i - 9i^2}$$

$$\left( \frac{7+9i}{13+2i} \right) \left( \frac{13-2i}{13-2i} \right)$$
$$= \frac{91 - 14i + 117i - 18i^2}{13^2 + 2^2}$$
$$= \frac{109 + 103i}{173} = \frac{109}{173} + \frac{103}{173}i$$

$$\frac{14 - 33i + 18i^2}{2^2 - (3i)^2}$$

$$\frac{14 - 33i - 18}{4 - 9i^2}$$

$$= \frac{-4 - 33i}{4 + 9}$$

$$= \frac{-4 - 33i}{13}$$

$$= -\frac{4}{13} - \frac{33}{13}i$$
$$a + bi$$

$$x^2 - 6x - 40 = 0$$

$$x^2 - 6x = 40$$

$$x^2 - 6x + 9 = 40 + 9$$

$$(x-3)^2 = 49$$

$$\sqrt{(x-3)^2} = \sqrt{49}$$

$$|x-3| = 7$$

$$x-3 = \pm 7$$

$$x = 3 \pm 7$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

Replace  $b$  by  $\frac{b}{2}$ !

$$\left(a - \frac{b}{2}\right)^2 = a^2 - ab + \left(\frac{b}{2}\right)^2$$

Completing the  
Square.

$$x^2 + 6x + 40 = 0$$

$$a^2 - 2ab + b^2$$

$$a^2 + 2ab + b^2$$

$$x^2 + 6x + 3^2 = -40 + 9$$

$$(x+3)^2 = -31$$

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

$$(x-7)^2 = x^2 - 14x + 7^2$$

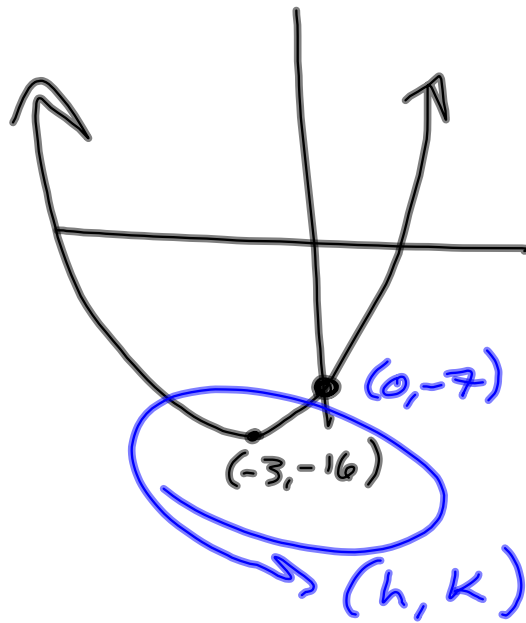
$$x = y$$

$$x + 3 = y + 3 \quad !?$$

~~$x^2 + 6x - 7$~~

$$= x^2 + 6x + 3^2 - 9 - 7$$
$$= (x+3)^2 - 16$$

Rewriting  $ax^2 + bx + c$   
in the form  $a(x-h)^2 + k$



S'6.3 #s 1, 3, 5, 11, 27, 29, 31

S'6.5 #s 1, 3, 5, 9, 11, 19, 31, 37, 39

S'6.6 #s 1, 3, 25, 27, 41, 45, 47, 59, 67 plus  
more (coming next time)

S'7.1 I #s 35, 37, 45, 49

S'7.1 II Re-write each of the following  
in the form  $y = a(x-h)^2 + k$ . Then  
graph. HINT: You work from 7.1 I  
will give x-intercepts

- ①  $x^2 + 4x - 12$   $(a+b)^2$
- ②  $x^2 + 12x + 27$
- ③  $x^2 - 5x - 2$
- ④  $4x^2 - 3x + 5$