12-4-13

6.6 1, 13, 15, 23 Review

(13.)

$$\frac{x}{6} - \frac{6}{x} = 0$$

LCD $= 6 \cdot x$

$$6 \cdot x \cdot \left(\frac{x}{6} - \frac{6}{x}\right) = 6 \cdot x \cdot 0$$ CLEAR... FRACTION!

$$= 0$$

$$6 \cdot x \cdot \frac{x}{6} - 6 \cdot x \cdot \frac{6}{x} = 0$$

$$x^2 - 36 = 0$$

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

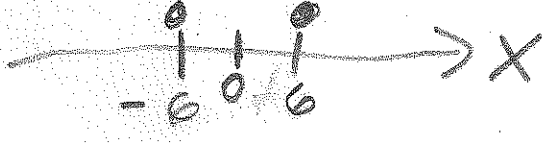
FACTOR!

$$(x+6)(x-6) = 0$$ ← $A \cdot B = 0$ RULE!

$x + 6 = 0$ OR $x - 6 = 0$

$-6 \quad -6$ $+6 \quad +6$

$x = -6$ OR $x = +6$



You can also solve using ideas from sec 9.1:

$x^2 = 36$

$x = \pm\sqrt{36}$

$\sqrt{36} = 6$

$6^2 = 36$

$x = \pm 6$

$x = -6$ OR 6

15. 6.6 Explicit

$$\frac{2}{x} = \frac{5}{x} - \frac{1}{4}$$

LCD $= 4x$

$$4x \cdot \left(\frac{2}{x}\right) = 4x \cdot \left(\frac{5}{x} - \frac{1}{4}\right)$$

$$8 = 4x \cdot \frac{5}{x} - 4x \cdot \frac{1}{4}$$

$$8 = 20 - x$$

$+x \quad +x$

$$8 + x = 20$$

$-8 \quad -8$

$$x = 12$$

Finish the class!

6.7 Applications

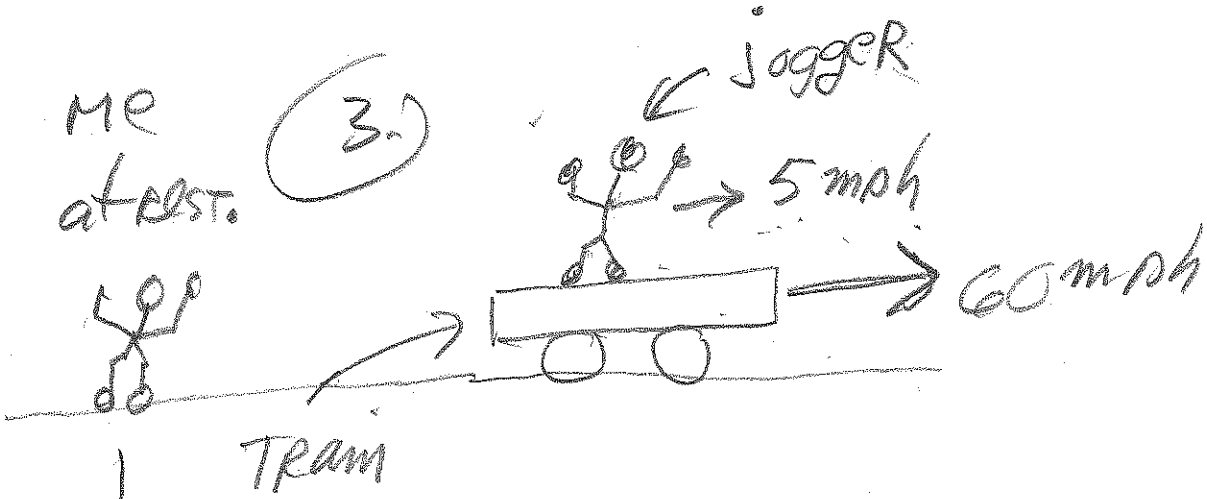
problem

EX

1 → 3

3 → 19

4 → 22



→ I see jogger move 65 mph

= 5 mph + 60 mph

= TOTAL rate

= TOTAL speed

speed = rate

2 rates, slow and fast.

(3.) person 1 has fast rate:

$$\frac{1 \text{ house}}{75 \text{ hr}} = \frac{1}{75} \text{ hph}$$

person 2 has slow rate:

$$\frac{1 \text{ house}}{100 \text{ hr}} = \frac{1}{100} \text{ hph}$$

$$\text{total rate} = \left(\frac{1}{75} + \frac{1}{100}\right) \text{ hph}$$

# of houses painted = total rate • time

JUST LIKE:

# of miles driven (distance) = total speed • time

6.7

(3.) 1 house = total rate · time

$$1 = \left(\frac{1}{75} + \frac{1}{100}\right) \cdot t$$

Solve:

$$\frac{1}{1} = \frac{t}{75} + \frac{t}{100}$$

$LCD = 1, 75, 100 = 300$

F	G*
2	2
3	1
5	2

$75 = 5 \cdot 15 = 5 \cdot 3 \cdot 5$ (i)

$100 = 5 \cdot 2 \cdot 2 \cdot 5$ (ii)

2 factorization (i), (ii)

$LCD = 2^2 \cdot 3^1 \cdot 5^2 = 4 \cdot 3 \cdot 25 = 300$

*G = greatest # of times factor (F) appears in a factorization

$$\frac{1}{1} = \frac{t}{75} + \frac{t}{100}$$

$$300 \cdot \frac{1}{1} = 300 \cdot \left(\frac{t}{75} + \frac{t}{100} \right)$$

$$300 = 4t + 3t$$

F L

$$75 \overline{)\,300}$$
$$300$$
$$4$$

$$300 = 7t$$

$$42\tfrac{6}{7}h = \frac{300}{7}h = t$$

$$t = \boxed{42.9\,h}$$

$$7 \overline{)\,300.0} = 42.85$$
$$-28\downarrow$$
$$20\downarrow$$
$$-14$$
$$60$$
$$56$$

$42.9\,h$ TOGETHER

(2) Cara: $\frac{1 \text{ porch}}{3 \text{ hr}}$

$= \frac{1}{3}$ pph

Etta: $\frac{1 \text{ porch}}{5 \text{ hr}} = \frac{1}{5}$ pph

$1 = \underbrace{\left(\frac{1}{3} + \frac{1}{5}\right)}_{\text{Rate total}} \cdot e$

$\frac{1}{1} = \frac{e}{3} + \frac{e}{5}$ distribution

$15 \cdot \left(\frac{1}{1} = \frac{e}{3} + \frac{e}{5}\right)$ LCD = 15

$$15.1 = 15.\frac{t}{3} + 15.\frac{t}{5}$$

$$15 = 5t + 3t$$

$$15 = 8t$$

$$\frac{15}{8} = t$$

$$1\frac{7}{8}h = t$$

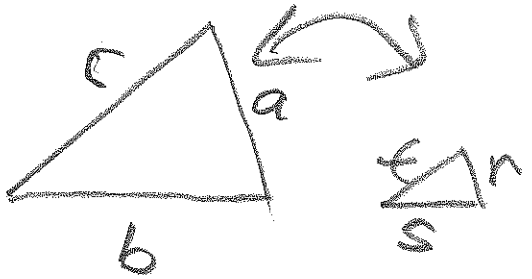
$$1.87 = 1.9h$$

$$t = 1.9h$$

$$\begin{array}{r} 1.87 \\ 8\overline{)15.00} \\ -8 \\ \hline 70 \\ -64 \\ \hline 60 \\ 56 \end{array}$$

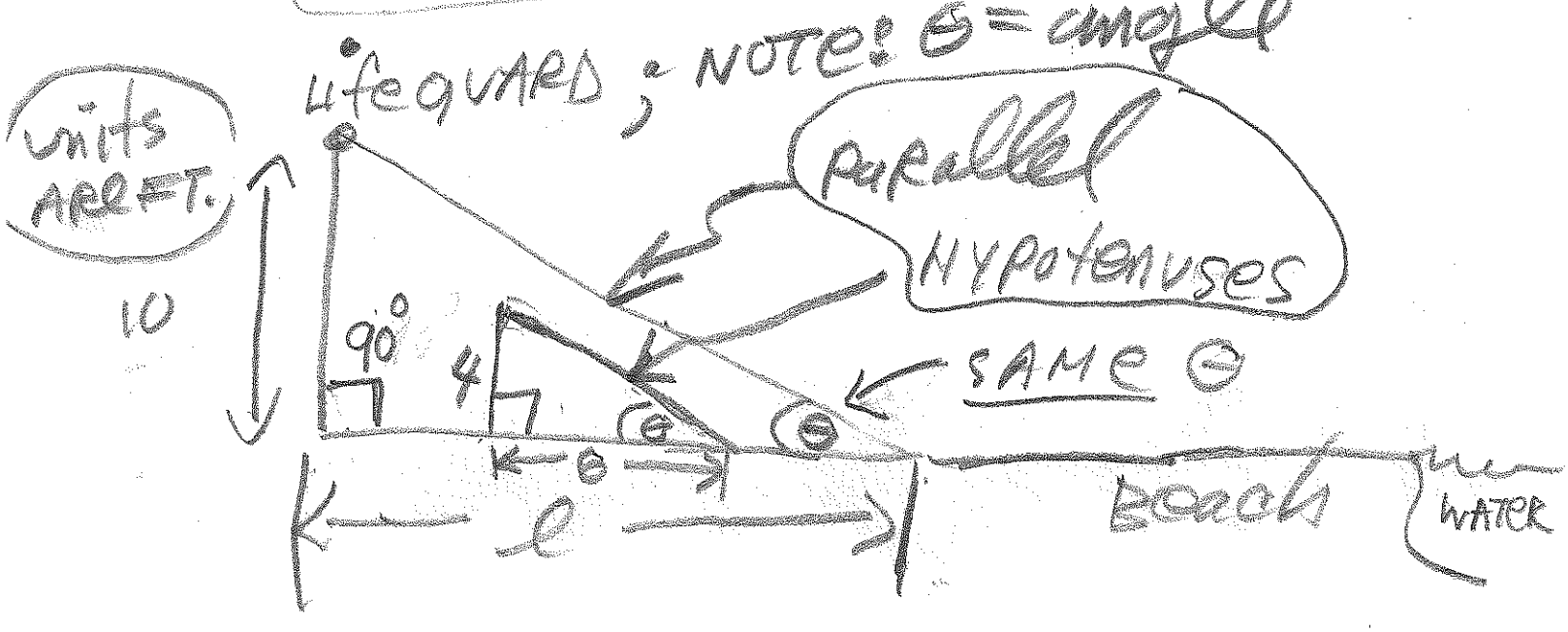
27.

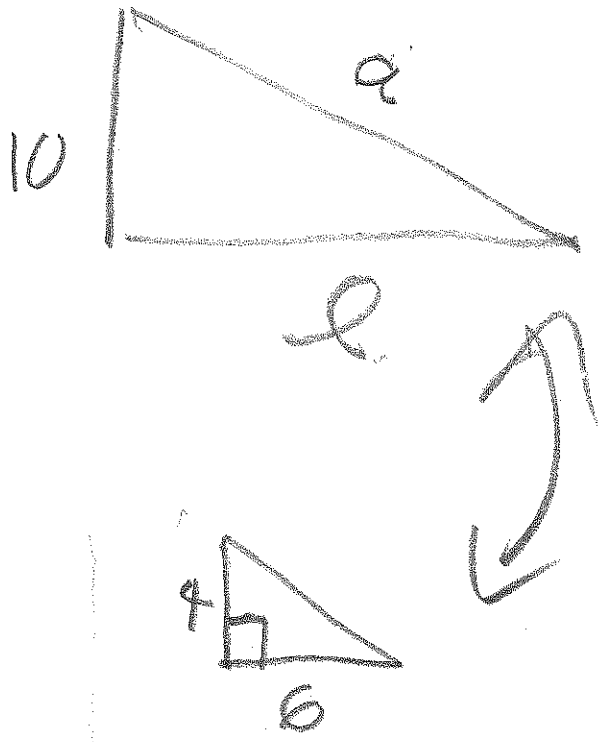
SIMILAR triangle



same angles; different scale.

$$\frac{a}{r} = \frac{c}{t} = \frac{b}{s}$$





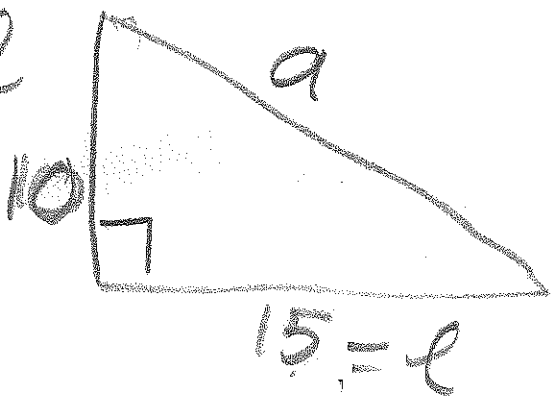
SIMILIAR

$\frac{10}{4} = \frac{\ell}{6}$ CROSS-multiply

$10 \cdot 6 = 4 \cdot \ell$

$60 = 4 \cdot \ell$

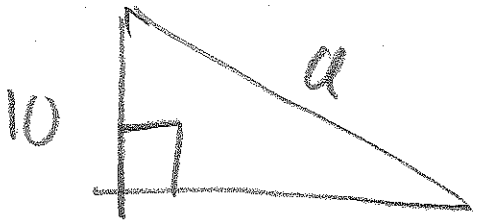
$15_{FT} = \ell$



follow up from 5.7

Pythagorean Theorem

Find a



$a^2 = 10^2 + 15^2$

$a^2 = 100 + 225$

$a^2 = 325$

$a = \sqrt{325}$

sec 9.1 → calculator

8.1
Ex

proof

1 → 11, 13

2 → 19, 27, 29

3 → 31

4 → 39

5 → 47

6, 7 → 53, 63, 67

8.2 → 11, 17, 23 (Ex 1)

29, 31 (Ex 2)

53, 55, 59 (Ex 4)

8.6

try 5, 7

9.1 →

Ex

Proof.

1 → 5

2 → 9, 13

3 → 21, 23

4 → 35, 37

8.1 square roots

let a be a number.

let c = square root of a.

then $\boxed{c^2 = a}$

examples:

	a	c	work
nine →	9	-3 and 3	$(-3)^2 = 9$, $(3)^2 = 9$
	16	-4 and 4	$(-4)^2 = 16$, $(4)^2 = 16$
	169	-13 and 13	$(-13)^2 = 169$, $(13)^2 = 169$

Note: 3 = positive square root of 9.

$\sqrt{\text{☮}}$ = positive square root of ☮

$3 = \sqrt{9}$

$\sqrt{9}$ = positive square root of 9.

$3 = \sqrt{9}$

3 = positive square root of 9 since $(3)^2 = 9$.

Note: -3 = negative square root of 9.

Note: $-3 = -\sqrt{9} = -$ (Positive square root of 9)

$\sqrt{9}$ = positive square root of 9.

8.1

(11.) 100 find the square roots

$\sqrt{100} = 10$

why? $10^2 = 100$

$-\sqrt{100} = -10$

why? $(-10)^2 = 100$

Problem	number	square roots	
(11.)	100	10, -10	$10^2 = 100, (-10)^2 = 100$
(13.)	36	6, -6	$6^2 = 36, (-6)^2 = 36$

Note: $6 = \sqrt{36}$ = positive square root.

$-6 = -\sqrt{36}$ = negative square root.

8.1

(19.) Simplify

$\sqrt{100}$ = the square root of 100

$\sqrt{\square}$ = square root of $\square$

$\sqrt{100}$ = the square root of 100

$\sqrt{100}$ = positive square root of 100

$\sqrt{100} = 10$

$10^2 = 100$

Quick example: $\sqrt{144} = 12$

Reason: $12^2 = 144$

(27.) $\sqrt{900}$ = square root of 900

= the positive square root of 900.

$\sqrt{900} = 30$

reason: $(30)^2 = 900$

$30^2 = 900$

Quick example:

$\sqrt{25} = 5$

because $5^2 = 25$

NOTE! $-\sqrt{25} = -5$

Reason: since $\sqrt{25} = 5$, $-\sqrt{25} = -5$.

(29) $-\sqrt{144}$

= negative square root of 144

= $-$ (positive square root of 144)

= $-$ ($\sqrt{144}$)

= $-$ (12) = -12.

NOTE: square root of 144

= positive square root of 144.

(31.) RADICAL $\sqrt{}$

$\sqrt{109}$ ← RADICAND = 109

(39.) $\sqrt{11}$ irrational since 11 is not a perfect square.

QUICK Example: $\sqrt{16}$ is RATIONAL since $16 = 4^2$

$\Rightarrow \sqrt{16} = 4$ RATIONAL.

(47.) $\sqrt{8}$ is irrational since 8 is not a perfect square.

$\sqrt{8} = 2.828111\ldots$ never ends or repeats

Use $\sqrt{A^2} = |A|$, p486.

NOTE: $\sqrt{A^2} = A$ if $A \geq 0$

Examples: (i) $\sqrt{2^2} = |2|$

(ii) $\sqrt{(-2)^2}$

$= \sqrt{4}$

$= 2$

$= |-2|$

Quick formula:

$$\sqrt{A^2} = A \quad (\text{if } A \geq 0)$$

$$\sqrt{A^2} = |A| \quad \begin{pmatrix} A \geq 0 \\ \text{or } A < 0 \end{pmatrix}$$

SAY THIS:

(53.) $\sqrt{x^2} = x, \; x \geq 0$

OR SAY THIS:

$\sqrt{x^2} = |x|$, $x \geq 0$ OR $x < 0$

IF THIS IS STATED THEN → NOT NEEDED

(63.) $\sqrt{(5y)^2} = 5y; \; 5y \geq 0$ $(y \geq 0)$

$\sqrt{(5y)^2} = |5y|$.

(67.) $\sqrt{(n+7)^2} = (n+7),\ n+7 \geq 0$

$\sqrt{(n+7)^2} = |(n+7)|$

Q.1 (does not need 8.2, 8.6)

(5.) $x^2 = 81$

rule: IF $X^2 = P$,

then

$X = -\sqrt{P}$ OR $X = +\sqrt{P}$

$= \sqrt{P}$

$\Rightarrow \boxed{X = \pm\sqrt{P}}$

(5) $t^2 = 81$

$t = -\sqrt{81}$ OR $t = +\sqrt{81}$

$t = -9$ OR $t = +9$

since $\sqrt{81} = 9$

$t^2 = 81 \Rightarrow t = \pm\sqrt{81}$

$t = \pm 9$

$\boxed{t = \pm 9}$

$t = +9$ OR -9
$t = -9$ OR $+9$ $\Big\} t = \pm 9$

9.1

(20.)

$(x-1)^2 = 49$

$X^2 = P$

$X = \pm\sqrt{P}$

$(X)^2 = P$ → RULE

$X = \pm P$

$(x-1)^2 = 49$

$(x-1) = \pm\sqrt{49}$ RULE

$(x-1) = \pm 7$ $(\sqrt{49} = 7, 7^2 = 49$

$(x-1)^2 = 49$

$x-1 = \pm\sqrt{49} \Rightarrow x-1 = \pm 7$

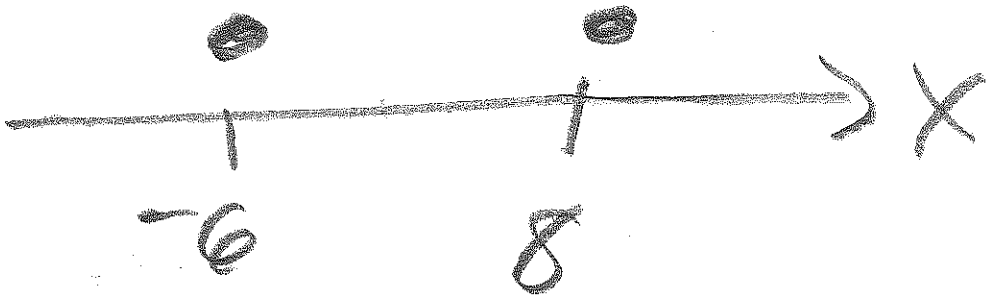
$(x-1) = \pm 7$

$x-1 = \pm 7$

$x-1 = -7$ OR $x-1 = +7$

$+1 \quad +1 \qquad +1 \quad +1$

$x = -6$ OR $x = +8$



(35.) $x^2 - 10x + 25 = 100$

Factor left $(x-5)\cdot(x-5) = 100$

$(x-5)^2 = 100$

35.

$$(x-5)^2 = 100$$

$$(x-5) = \pm\sqrt{100}$$

$$(x-5) = \pm 10$$

$$x-5 = \pm 10$$

$$x-5 = -10 \quad \text{OR} \quad x-5 = +10$$

$$+5 \quad +5 \qquad +5 \quad +5$$

$$x = -5 \quad \text{OR} \quad x = 15$$

$$x = -5, 15$$