Math 115

Summer 2017

Lecture 18

Solve by Square-Root method:

$(3x-5)^2 = 25$

$3x-5 = \pm\sqrt{25}$

$3x-5 = \pm 5$

$3x-5 = 5$ or $3x-5 = -5$

$3x = 10$ $\quad$ $3x = 0$

$x = 10/3$ $\quad$ $x = 0$

$\{0, 10/3\}$

$$\frac{x-6}{8} = \frac{8}{x+6}$$

1) Cross-Multiply

2) Use square-root method to Solve

$(x-6)(x+6) = 64$

$x^2 - 36 = 64$

$x^2 = 64 + 36$

$x^2 = 100$

S.R.M.

$x = \pm\sqrt{100}$

$\boxed{x = \pm 10}$ $\{\pm 10\}$

$x^2 - 4x - 12 = 0$

Solve by Factoring:

$(x-6)(x+2) = 0$

$x - 6 = 0$ or $x + 2 = 0$

$\boxed{x = 6}$ $\boxed{x = -2}$

$\{-2, 6\}$

Solve by Completing the Square:

$x^2 - 4x + 4 = 12 + 4$

$(x-2)^2 = 16$

S.R.M.

$x - 2 = \pm\sqrt{16}$

$x - 2 = \pm 4$

$x = 2 \pm 4$

$\boxed{x = 6}$ $\boxed{x = -2}$

$\{6, -2\}$

$(2x+5)(3x-1)=45$

1) Foil, Simplify, write in $ax^2+bx+c=0$ form. $6x^2-2x+15x-5-45=0$

$6x^2+13x-50=0$

2) Solve by using Quadratic formula. $\{-25/6, 2\}$

$b^2-4ac=(13)^2-4(6)(-50)=169+1200=1369$

If 1369 is a perfect-square, then we could also use factoring method.

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-13\pm\sqrt{1369}}{2(6)}=\frac{-13\pm37}{12}$ $x=\frac{24}{12}=2$ $x=\frac{-50}{12}=-25/6$

Mary drove 225 miles in the same time than Lisa drove 165 miles.

Lisa was driving 20 mph slower than Mary.

	d	r	t
Mary	225	x	t
Lisa	165	x-20	t

we know $d=r\cdot t$, $t=\frac{d}{r}$

Solve $\frac{11}{x-20}=\frac{15}{x}$

$15(x-20)=11x$

$15x-300=11x$

$15x-11x=300$

$4x=300$

$\boxed{x=75}$

$\frac{165}{x-20}=\frac{225}{x}$

Solve $\frac{\cancel{165}^{\cancel{33}^{11}}}{x-20}=\frac{\cancel{225}^{\cancel{45}^{15}}}{x}$

Mary 75 mph

Lisa 55 mph

Mike ran 21 miles in the same time that he biked 60 miles.

His speed biking was 1 mph slower than 3 times his speed running.

① Complete the chart below

	d	r	t	
Running	21	x	t	$\Rightarrow t=\frac{21}{x}$
Biking	60	$3x-1$	t	$\Rightarrow t=\frac{60}{3x-1}$

Runs @ 7 mph,
Bikes @ 20 mph.

② Find his speed on each part.

$$\frac{21}{x}=\frac{60}{3x-1}$$

$$7(3x-1)=20x$$

$$21x-7=20x$$

$$\boxed{x=7}$$

Lisa walked 7 miles, and then hiked 12 miles in her training for Ninja Warriors Competition.

She walked 3 mph faster than she hiked.

Total training time 4 hours.

Find her speed on each part.

	d	r	t
Walk	7	$x+3$	t_W
hike	12	x	t_H

$$t_W+t_H=4$$

$$\frac{7}{x+3}+\frac{12}{x}=4$$

$$LCD=x(x+3)$$

$\frac{7}{x+3} + \frac{12}{x} = 4$

LCD $= x(x+3)$

$7x + 12(x+3) = 4x(x+3)$

$7x + 12x + 36 = 4x^2 + 12x$

$4x^2 - 7x - 36 = 0$

$a=4,\ b=-7,\ C=-36$

$b^2-4ac=(-7)^2-4(4)(-36)$

$= 625$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{7 \pm \sqrt{625}}{8}$

$x = \frac{7 \pm 25}{8}$

$x = \frac{7+25}{8} = \frac{32}{8} = 4$

$x = \frac{7-25}{8}$

4 mph → Hiking

7 mph → Walking

Allen jogged 35 miles, then he walked 6 miles.

He jogs 4 mph faster than he walks.

Total time 7 hrs. find his speed jogging.

$t_j + t_w = 7$

$\frac{35}{x} + \frac{6}{x-4} = 7$

$35(x-4) + 6x = 7x(x-4)$

$35x - 140 + 6x = 7x^2 - 28x$

$41x - 140 = 7x^2 - 28x$

$7x^2 - 28x - 41x + 140 = 0$

$7x^2 - 69x + 140 = 0$

$a=7,\ b=-69,\ C=140$

$b^2-4ac = 841$

$(-69)^2-4(7)(140)=$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-69) \pm \sqrt{841}}{2(7)} = \frac{69 \pm 29}{14}$$

$x = 7$

$x = \frac{98}{7} \approx 3$ Not practical

7 mph