4.5 Choosing a Method

One of the most difficult parts of math can be knowing which method to use to solve an equation. You have to be familiar enough with the process and the conditions of each method in order to determine one is best to use to solve an equation. Today we are going to clarify what kinds of problems are best to solve with each method we have gone over in this unit.

Which method should I use?	
Factoring When it factors (glasses works)	Take a Square Root When there is just x^2 or $(x+c)^2$, no term with just x
Complete the Square When a=1 and b is even	Quadratic Formula When no other method works

1) For each question below, state what method you would use to solve and why. Then solve.

a. $x^2 - 10x + 6 = 0$

$-6 \quad -6$

$x^2 - 10x = -6$

$+25 \quad +25$

$\sqrt{(x-5)^2} = \sqrt{19}$ $\quad \left(\frac{-10}{2}\right)^2 = (-5)^2 = 25$

$x - 5 = \pm\sqrt{19}$

$+5 \quad +5$

$\boxed{x = 5 \pm \sqrt{19}}$

Method: Complete the square

Why: Doesn't factor, a=1 and b is even

b. $2x^2 - 18x + 28 = 0$

$2(x^2 - 9x + 14) = 0$

$2(x-7)(x-2) = 0$ $\quad -7 - 2 = -9x$

$\boxed{x = 7, 2}$

Method: Factoring

Why: It factors

c. $x^2 - 5x + 12 = 0$ $12x^2$

$a=1 \quad b=-5 \quad c=12$

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(12)}}{2(1)}$$

$$= \frac{5 \pm \sqrt{-23}}{2} = \boxed{\frac{5 \pm i\sqrt{23}}{2}}$$

Method: Quadratic formula

Why: No other method works (Doesn't factor, b is odd)

d. $3(x+4)^2 - 18 = 0$

$+18 \quad +18$

$$\frac{3(x+4)^2}{3} = \frac{18}{3}$$

$$\sqrt{(x+4)^2} = \sqrt{6}$$

$$x+4 = \pm\sqrt{6}$$

$-4 \quad -4$

$$\boxed{x = -4 \pm \sqrt{6}}$$

Method: Take a square root

Why: There is just $(x+4)^2$

2) For each equation below, state which methods would work to solve. **You do not need to solve the equation.**

a. $x^2 - 6x + 8 = 0$ 8, -4, -2

$a=1$, b even

Factoring
Complete the square
Quadratic formula

b. $2x^2 - 11x + 12 = 0$ $24x^2$, -8, -3

Factoring
Quadratic formula

c. $x^2 - 16 = 0$

Factoring (difference of squares)
Take a square root
Quadratic formula

d. $x^2 - 12x + 15 = 0$ $15x^2$, -3, -15

$a=1$, b even

Complete the square
Quadratic formula

e. $(x+4)^2 - 6 = 0$

Take a square root

f. $2x^2 + 5x - 10 = 0$ $-20x^2$

Quadratic formula

What does the equation need to look like before you start solving?

One side equal to 0 & in standard form

3) Solve each equation below using whichever method you'd like.

a. $x^2 + 25 = 0$

$-25 \quad -25$

$\sqrt{x^2} = \sqrt{-25}$

$x = \pm 5i$

$\boxed{x = -5i, 5i}$

b. $x^2 + 16x - 8 = 7$

$-7 \quad -7$

$x^2 + 16x - 15 = 0$

$+15 \quad +15$

$x^2 + 16x \underline{+64} = 15 \underline{+64}$

$\sqrt{(x+8)^2} = \sqrt{79}$

$x + 8 = \pm\sqrt{79}$

$-8 \quad -8$

$\boxed{x = -8 \pm \sqrt{79}}$

Doesn't factor
a=1 & b is even
↳ Complete the square

$\left(\frac{16}{2}\right)^2 = (8)^2 = 64$

c. $2x^2 - 13x + 12 = -3$

$+3 \quad +3$

$2x^2 - 13x + 15 = 0$ $\quad 30x^2$ $-10x$ $-3x$

$2x^2 - 10x - 3x + 15 = 0$

$2x(x-5) - 3(x-5) = 0$

$(2x-3)(x-5) = 0$

$\boxed{x = \frac{3}{2}} \quad \boxed{x = 5}$

d. $2x^2 + 12 = 10x$

$2x^2 - 10x + 12 = 0$

$2(x^2 - 5x + 6) = 0$ $\quad 6x^2$ -2 -3

$2(x-2)(x-3) = 0$

$\boxed{x = 2} \quad \boxed{x = 3}$

e. $x^2 - 6x + 25 = -13$

$+13 \quad +13$

$x^2 - 6x + 38 = 0$

$-38 \quad -38$

$x^2 - 6x \underline{+9} = -38 \underline{+9}$

$\left(\frac{-6}{2}\right)^2 = (-3)^2 = 9$

$\sqrt{(x-3)^2} = \sqrt{-29}$

$x - 3 = \pm i\sqrt{29}$

$+3 \quad +3$

$\boxed{x = 3 \pm i\sqrt{29}}$

f. $x^2 + 11x = 20$

$-20 \quad -20$

$x^2 + 11x - 20 = 0$

$a=1 \quad b=11 \quad c=-20$

$x = \dfrac{-11 \pm \sqrt{(11)^2 - 4(1)(-20)}}{2(1)}$

$= \dfrac{-11 \pm \sqrt{201}}{2}$

$\sqrt{201}$
$\wedge$
3 67

$\boxed{x = \dfrac{-11 \pm \sqrt{201}}{2}}$

Doesn't break down or reduce, so we're done