

## 5. 2 Factoring Quadratic Equations

Recall, if  $x^2 = a$

$$x = \pm\sqrt{a}$$

### Review Simplifying radicals

Simplify

1.  $\sqrt{3}$  done.

2.  $\sqrt{16} = 4$ .

3.  $\sqrt{12} = \sqrt{4 \cdot 3}$   
 $= 2\sqrt{3}$

4.  $\sqrt{32} = \sqrt{16 \cdot 2}$   
 $= 4\sqrt{2}$

$\sqrt{32} = \sqrt{4 \cdot 8}$   
 $= 2\sqrt{8}$   
 $= 2\sqrt{4 \cdot 2}$   
 $= 2 \cdot 2\sqrt{2}$   
 $= 4\sqrt{2}$

1.  $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

2.  $\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$

1a.  $\sqrt{\frac{9}{144}} = \frac{\sqrt{9}}{\sqrt{144}} = \frac{3}{12} = \frac{1}{4}$

2a.  $\sqrt{4 \cdot 3} = \sqrt{4} \cdot \sqrt{3}$   
 $= 2\sqrt{3}$

5.  $\sqrt{54} = \sqrt{9 \cdot 6} = 3\sqrt{6}$

6.  $\sqrt{75} = \sqrt{25 \cdot 3} = 5\sqrt{3}$

7.  $\sqrt{45} = \sqrt{9 \cdot 5} = 3\sqrt{5}$

1, 4, 9,  
16, 25, 36,  
49, 64, 81,  
100, 121,  
169, 144

# Review

## Solve

①

$$9x^2 = 121$$

$$x^2 = \frac{121}{9}$$

$$x = \pm \sqrt{\frac{121}{9}}$$

$$\left( x = \pm \frac{\sqrt{121}}{\sqrt{9}} \right)$$

$$\boxed{x = +11 \quad -3}$$

$$(x)^2 = 9$$

②

$$9 \cdot (x+2)^2 = 81$$

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

$$x+2 = \pm \sqrt{9}$$

$$x+2 = \pm 3$$

$$x = -2 \pm 3$$

$$x = -2+3 \text{ OR } x = -2-3$$

$$\boxed{x = 1 \quad \text{OR} \quad x = -5}$$

$$\textcircled{3} \quad 4(x-7)^2 = 80$$
$$(x-7)^2 = 20$$
$$(x-7) = \pm \sqrt{20}$$

$$x = 7 \pm \sqrt{20}$$

$$= 7 \pm \sqrt{4 \cdot 5}$$

$$x = 7 \pm 2\sqrt{5}$$



$$x = 7 + 2\sqrt{5} \quad \text{OR} \quad x = 7 - 2\sqrt{5}$$
$$x \approx 11.47 \quad \underline{\quad} \quad \approx 2.53$$

$$\textcircled{4} \quad 7 = 2(r+1)^2 - 3$$
$$10 = 2(r+1)^2$$
$$5 = (r+1)^2$$
$$\pm\sqrt{5} = (r+1)$$

$$\boxed{-1 \pm \sqrt{5}} = r$$

$$\textcircled{5} \quad 4(s^2+7) - 9 = 39$$

$$4(s^2+7) = 48$$

$$(s^2+7) = 12$$

$$s^2+7 = 12$$

$$s^2 = 5$$

$$\boxed{s = \pm\sqrt{5}}$$

## 5.3 Factoring Quadratic Expressions

Distribute

$$a(b+c)$$



$$ab+ac$$

$$\frac{5a+10b}{5(a+2b)}$$

Factor

1)  $\underline{a}b + \underline{a}c$

$$\underline{a}(b+c)$$

2)  $\underline{a^2b^2} + \underline{ab^2} + \underline{b^2a}$

$$\underline{b^2}(a+1+1)$$

3)  $3(\underline{x+2}) - a(\underline{x+2})$

$$(x+2)(3-a)$$

Distribute:

$$(x+2)(x+1)$$

$$x^2 + x + 2x + 2$$

$$\rightarrow x^2 + 3x + 2$$

Factor:

$$x^2 + 3x + 2$$

$$(x+2)(x+1)$$

multiply to the last

add to the coeff of middle

①  $x^2 + 10x + \underline{\underline{16}}$

③  $x^2 - 6x - \underline{\underline{7}}$

②  $x^2 + 5x + \underline{\underline{6}}$

④  $x^2 + 10x - \underline{\underline{11}}$