

## Factoring Practice

If possible, factor the polynomials below.

1.  $x^2 + 23x - 50$

$(x+25)(x-2)$

~~$\begin{array}{r} -50 \\ 25 \quad -2 \\ \hline 23 \end{array}$~~

2.  $x^2 - 121$

$(x-11)(x+11)$

3.  $2x^2 + 9x + 10$

$2x^2+4x+5x+10$   
 $2x(x+2)+5(x+2)$   
 $(2x+5)(x+2)$

~~$\begin{array}{r} 20 \\ 4 \quad 5 \\ \hline 9 \end{array}$~~

4.  $25x^2 - 36$

$(5x-6)(5x+6)$

5.  $3x^2 - 7x - 6$

$3x^2-9x+2x-6$   
 $3x(x-3)+2(x-3)$   
 $(3x+2)(x-3)$

~~$\begin{array}{r} -18 \\ -9 \quad 2 \\ \hline -7 \end{array}$~~

6.  $49x^2 + 9$

Not factorable

7.  $x^2 - 3x - 54$

$(x-9)(x+6)$

~~$\begin{array}{r} -54 \\ -9 \quad 6 \\ \hline -3 \end{array}$~~

8.  $6x^2 + 7x - 3$

$6x^2-2x+9x-3$   
 $2x(3x-1)+3(3x-1)$   
 $(2x+3)(3x-1)$

~~$\begin{array}{r} -18 \\ 9 \quad -2 \\ \hline 7 \end{array}$~~

9.  $x^2 - 17x + 42$

$(x-14)(x-3)$

~~$\begin{array}{r} 42 \\ -14 \quad -3 \\ \hline -17 \end{array}$~~

10.  $9x^2 - 1$

$(3x-1)(3x+1)$

## Solving Practice

1.  $y = x^2 - 11x - 42$

$$0 = (x-14)(x+3)$$

$$x-14=0 \quad x+3=0$$

$$x=14 \quad x=-3$$

$$\begin{array}{r} -42 \\ -14 \quad 3 \\ -11 \end{array}$$

2.  $y = 144x^2 - 25$

$$0 = (12x-5)(12x+5)$$

$$12x-5=0 \quad 12x+5=0$$

$$12x=5 \quad 12x=-5$$

$$x = \frac{5}{12} \quad x = -\frac{5}{12}$$

3.  $y = 6x^2 - 13x - 5$

$$0 = (2x-5)(3x+1)$$

$$0 = 2x(3x+1) - 5(3x+1)$$

$$0 = (2x-5)(3x+1)$$

$$2x-5=0 \quad 3x+1=0$$

$$2x=5 \quad 3x=-1$$

$$x = \frac{5}{2} \quad x = -\frac{1}{3}$$

$$\begin{array}{r} -30 \\ -15 \quad 2 \\ -13 \end{array}$$

$$\begin{array}{r} 10 \\ -5 \quad -2 \\ -7 \end{array}$$

4.  $y = 5x^2 - 7x + 2$

$$0 = 5x^2 - 5x - 2x + 2$$

$$0 = 5x(x-1) - 2(x-1)$$

$$0 = (5x-2)(x-1)$$

$$5x-2=0 \quad x-1=0$$

$$5x=2 \quad x=1$$

$$x = \frac{2}{5}$$

## Given the Roots, Write the Polynomial Practice

Given these roots, write the original polynomial (don't forget that imaginary and complex roots have a conjugate! They come in pairs!)

1. Roots  $x = -7$  and  $x = 4$

$$(x+7)(x-4)$$
$$x^2 - 4x + 7x - 28$$
$$x^2 + 3x - 28$$

2. Roots  $x = 1, x = -3,$  and  $x = -2$

$$(x-1)(x+3)(x+2)$$
$$(x^2 + 3x - x - 3)(x+2)$$
$$(x^2 + 2x - 3)(x+2)$$
$$x^3 + 2x^2 - 3x$$
$$+ 2x^2 + 4x - 6$$
$$x^3 + 4x^2 + x - 6$$

3. Root  $x = -6i$

$$(x+6i)(x-6i)$$
$$x^2 - 36i^2$$
$$x^2 + 36$$

4. Root  $x = 4 + i$

$$x = 4 \pm i$$
$$(x-4)^2 = (\pm i)^2$$
$$x^2 - 8x + 16 = i^2$$
$$x^2 - 8x + 16 = -1$$
$$x^2 - 8x + 17$$

5. Roots  $x = 2$  and  $x = 6i$

$$(x-2)(x-6i)(x+6i)$$
$$(x-2)(x^2 + 36)$$
$$x^3 - 2x^2 + 36x - 72$$

6. Roots  $x = -5, x = 5 - 3i$

$$(x+5) \quad x = 5 \pm 3i$$
$$x-5 = \pm 3i$$
$$x^2 - 10x + 25 = 9i^2$$
$$x^2 - 10x + 25 = -9$$
$$(x+5)(x^2 - 10x + 34)$$
$$x^3 - 10x^2 + 34x$$
$$+ 5x^2 - 50x + 170$$
$$x^3 - 5x^2 - 16x + 170$$