

**Intermediate Algebra**  
**Skill Builder # PF – 10**  
**Factoring the Difference of Squares**

A polynomial is a difference of squares if it looks like

$$a^2 - b^2 \text{ or } \square^2 - \circ^2$$

and will factor as

$$(a - b)(a + b) \text{ or } (\square - \circ)(\square + \circ)$$

Examples

1.  $x^2 - 64$

Solution:

$$x^2 - 64 = x^2 - 8^2 = (x - 8)(x + 8)$$

2.  $81 - n^2$

Solution:

$$81 - n^2 = 9^2 - n^2 = (9 - n)(9 + n)$$

3.  $4a^2 - b^2$

Solution:

$$\begin{aligned} 4a^2 - b^2 &= (2a)^2 - b^2 \\ &= (2a + b)(2a - b) \end{aligned}$$

4.  $25y^2 - 16x^2$

Solution:

$$\begin{aligned} 25y^2 - 16x^2 &= (5y)^2 - (4x)^2 \\ &= (5y - 4x)(5y + 4x) \end{aligned}$$

5.  $\frac{a^2}{36} - \frac{b^2}{64}$

Solution:

$$\begin{aligned} \frac{a^2}{36} - \frac{b^2}{64} &= \left(\frac{a}{6}\right)^2 - \left(\frac{b}{8}\right)^2 \\ &= \left(\frac{a}{6} - \frac{b}{8}\right)\left(\frac{a}{6} + \frac{b}{8}\right) \end{aligned}$$

6.  $\frac{1}{9}x^2 - \frac{1}{4}y^2$

Solution:

$$\begin{aligned} \frac{1}{9}x^2 - \frac{1}{4}y^2 &= \left(\frac{1}{3}x\right)^2 - \left(\frac{1}{2}y\right)^2 \\ &= \left(\frac{1}{3}x - \frac{1}{2}y\right)\left(\frac{1}{3}x + \frac{1}{2}y\right) \end{aligned}$$

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Factor.

1.  $x^2 - 36$

2.  $49 - x^2$

3.  $81n^2 - m^2$

4.  $m^2 - 64n^2$

5.  $16a^2 - 81b^2$

6.  $49b^2 - 144a^2$

7.  $\frac{y^2}{81} - \frac{x^2}{100}$

8.  $\frac{1}{25}a^2 - \frac{1}{49}b^2$

9.  $\frac{4}{49}n^2 - \frac{25}{81}$

10.  $4 - \frac{36}{121}y^2$

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**Answers**

1.  $(x-6)(x+6)$

2.  $(7-x)(7+x)$

3.  $(9n-m)(9n+m)$

4.  $(m+8n)(m-8n)$

5.  $(4a-9b)(4a+9b)$

6.  $(7b+12a)(7b-12a)$

7.  $\left(\frac{y}{9}-\frac{x}{10}\right)\left(\frac{y}{9}+\frac{x}{10}\right)$

8.  $\left(\frac{1}{5}a+\frac{1}{7}b\right)\left(\frac{1}{5}a-\frac{1}{7}b\right)$

9.  $\left(\frac{2}{7}n-\frac{5}{9}\right)\left(\frac{2}{7}n+\frac{5}{9}\right)$

10.  $\left(2-\frac{6}{11}y\right)\left(2+\frac{6}{11}y\right)$

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