

Algebra 1 8.8

Factor binomials that are the difference of squares

Use the difference of squares to solve equations

difference

factor

solve

whiteboards

(-)



$$5 \cdot 5 = 5^2 = 25$$

$$x \cdot x = x^2$$

Look for a pattern...

$$\begin{array}{r} x+5 \\ x-5 \\ \hline -5x-25 \\ x^2+5x \\ \hline x^2-25 \end{array}$$

$$\begin{array}{r} x-3 \\ x+3 \\ \hline 3x-9 \\ x^2-3x \\ \hline x^2-9 \end{array}$$

$$\begin{array}{r} x-8 \\ x+8 \\ \hline 8x-64 \\ x^2-8x \\ \hline \end{array}$$

$$\begin{array}{r} x-7 \\ x+7 \\ \hline x^2-49 \end{array}$$

$$\begin{array}{r} x-9 \\ x+9 \\ \hline x^2-81 \end{array}$$

$$\begin{array}{r} x-10 \\ x+10 \\ \hline x^2-100 \end{array}$$

$$x^2-64$$

D.O.S

$$(\quad)^2 - (\quad)^2$$

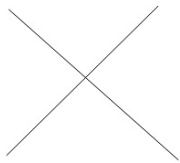
$$\begin{array}{r} x+7 \\ x-7 \\ \hline x^2-49 \end{array}$$

KeyConcept Difference of Squares

Symbols $a^2 - b^2 = (a + b)(a - b)$ or $(a - b)(a + b)$

Examples $x^2 - 25 = (x + 5)(x - 5)$ or $(x - 5)(x + 5)$

$t^2 - 64 = (t + 8)(t - 8)$ or $(t - 8)(t + 8)$



$$x^2 - 16 = (x + 4)(x - 4)$$

$$x^2 - 49$$

$$x^2 - 36$$

$$x^2 - 121$$

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

Is the first thing something squared?
 Is the second thing something squared?
 Are they subtracted?

$$x^2 - 49 = (x+7)(x-7)$$

$$n^2 + 64 \cdot \text{not fact.}$$

$$x^3 - 36 \text{ not fact.}$$

$$4a^2 - 16 = (2a+4)(2a-4)$$

$$\uparrow$$

$$(\quad)(\quad)$$

$$\begin{array}{r} \cancel{n+8} \\ \cancel{n+8} \\ \hline \cancel{8n+64} \\ \cancel{n^2+8n} \end{array}$$

Example 1 Factor Differences of Squares

Factor each polynomial.

a. $16h^2 - 9a^2$

$$(4h + 3a)(4h - 3a)$$

Is the first thing something squared?
Is the second thing something squared?
Are they subtracted?

b. $121 - 4b^2$

$$(11 + 2b)(11 - 2b)$$

$$(11 - 2b)(11 + 2b)$$

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

~~$$-9 + x^2$$
$$-9x - x^2$$~~

Always check for GCF first

c. $\frac{27g^3}{3g} - \frac{3g}{3g}$

$$1^2 =$$

$$3g(g^2 - 1)$$

↓

$$3g(3g+1)(3g-1)$$

GuidedPractice

1A. $81 - c^2$

$$(9 + c)(9 - c)$$

1B. $64g^2 - h^2$

$$(8g + h)(8g - h)$$

GCF?

1C. $\frac{9x^3}{x} - \frac{4x}{x}$

$x(9x^2 - 4)$

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

Can it be rearranged?

1D. $\frac{-4y^3}{y} + \frac{9y}{y}$

$y(-4y^2 + 9)$

$y(9 - 4y^2)$

$y(3 + 2y)(3 - 2y)$

When is it finished? Check your answer...can anything be factored again? Watch out for DOS.

Example 2 Apply a Technique More than Once

Factor each polynomial.

a. $b^4 - 16$

esp. diff of squares...
easy to overlook

b. $625 - x^4$

GuidedPractice

2A. $y^4 - 1$

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

2C. $81 - x^4$

2D. $16y^4 - 1$