

Factor Pattern Power

Use expression structure to factor completely.

HIGH SCHOOL • HSA-SSE.A.2

CCSS.Math.Content.HSA-SSE.A.2 "Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$."

NAME _____

DATE _____

SPOT THE STRUCTURE

First, factor out any greatest common factor. Then look for a difference of squares: $A^2 - B^2 = (A - B)(A + B)$. A square can be a number, a variable term, or a larger expression.

WORKED EXAMPLE

Factor completely: $121p^2 - 36q^2$

1. $121p^2 = (11p)^2$ and $36q^2 = (6q)^2$.

2. Rewrite: $(11p)^2 - (6q)^2$.

3. Apply the difference of squares pattern:
 $(11p - 6q)(11p + 6q)$.

Answer: $(11p - 6q)(11p + 6q)$

PRACTICE 6 problems

1 Factor completely: $x^2 - 64$

ANSWER _____

2 Factor completely: $64a^2 - b^2$

ANSWER _____

3 Factor completely: $16m^2 - 49n^2$

ANSWER _____

4 Factor completely: $12x^2 - 75$

ANSWER _____

5 Factor completely: $2y^3 - 32y$

ANSWER _____

6 Factor completely: $a^4 - 1$

ANSWER _____

APPLY IT Show your work

- 1** A game designer models the area of a bonus zone with the expression $x^2 - 64$ square meters. Factor the expression completely to show its difference-of-squares structure.

WORK SPACE

ANSWER _____

- 2** For a music festival fundraiser, a club models its net amount with $P = 3t^2 - 75$. Factor the expression completely.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Factor completely and explain the structure you used: $18x^3 - 8x$.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Factor completely: $x^2 - 64$	$(x - 8)(x + 8)$
2	Factor completely: $64a^2 - b^2$	$(8a - b)(8a + b)$
3	Factor completely: $16m^2 - 49n^2$	$(4m - 7n)(4m + 7n)$
4	Factor completely: $12x^2 - 75$	$3(2x - 5)(2x + 5)$
5	Factor completely: $2y^3 - 32y$	$2y(y - 4)(y + 4)$
6	Factor completely: $a^4 - 1$	$(a - 1)(a + 1)(a^2 + 1)$

PART 2 • APPLY IT

1. $(x - 8)(x + 8)$ Recognize $x^2 - 64$ as $x^2 - 8^2$. Apply the difference of squares pattern.
2. $3(t - 5)(t + 5)$ Factor out the greatest common factor, 3, to get $3(t^2 - 25)$. Then factor $t^2 - 25$ as a difference of squares.

CHALLENGE

$2x(3x - 2)(3x + 2)$. Factor out $2x$ first to get $2x(9x^2 - 4)$, then factor $9x^2 - 4$ as a difference of squares.

Accept factors in any order. Students must factor out the greatest common factor before using the difference of squares when a common factor is present.