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Factoring by Grouping

Factors of -90	Sum of factors
-1, 90	89
1, -90	-89
-2, 45	43
2, -45	-43
-3, 30	27
3, -30	-27
-5, 18	13
5, -18	-13
-6, 15	9
6, -15	-9

$15x^2 + 9x - 6$
 $(15x^2 - 6x) + (15x - 6)$
 $3x(5x - 2) + 3(5x - 2)$
 $(3x + 3)(5x - 2)$

- 1 Complete the following table of factors and sums.
- 2 Explain how to factor the given quadratic polynomial by grouping.
- 3 Factor the polynomial $15x^2 + 9x - 6$
- 4 Factor the given polynomial.
- 5 Consider the appropriate factorization.
- + with lots of tips, answer keys, and detailed answer explanations for all of the problems.



The complete package, including all problems, hints, answers, and detailed answer explanations is available for all [sofatutor.com](https://www.sofatutor.com) subscribers.



Complete the following table of factors and sums.

Fill in the blanks.

Factors of -90		Sum of factors	Factors of -90		Sum of factors
-1	90	89	3	-30	<input type="text" value="2"/>
1	-90	-89	-5	18	13
-2	<input type="text" value="1"/>	43	5	<input type="text" value="3"/>	<input type="text" value="4"/>
2	-45	-43	<input type="text" value="5"/>	15	<input type="text" value="6"/>
-3	30	27	6	-15	-9



Hints for solving these problems

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of 5

Complete the following table of factors and sums.

Hint #1

The product of a pair of factors must be -90 . If you know one factor, just divide -90 by that factor to get the other factor in the pair.

Hint #2

$$-9 \times 10 = -90 \text{ and } -9 + 10 = 1$$

An example of a pair of factors of -90 and their sum:



Answers and detailed answer explanations for these problems

1
of 5

Complete the following table of factors and sums.

Answer key: 1: 45 // 2: -27 // 3: -18 // 4: -13 // 5: -6 // 6: 9

For $15x^2 + 9x - 6$, we first multiply $15 \times -6 = -90$.

We then know that we are looking for all pairs of factors of -90 , and one pair in particular which sum up to 9.

Let's calculate the products and sums of all pairs of factors of -90 :

- $-1 \times 90 = -90$ and $-1 + 90 = 89$
- $1 \times (-90) = -90$ and $1 - 90 = -89$
- $-2 \times 45 = -90$ and $-1 + 90 = 89$
- $2 \times (-45) = -90$ and $2 - 45 = -43$
- $-3 \times 30 = -90$ and $-3 + 30 = 27$
- $3 \times (-30) = -90$ and $3 - 30 = -27$
- $-5 \times 18 = -90$ and $-5 + 18 = 13$
- $5 \times (-18) = -90$ and $5 - 18 = -13$
- $-6 \times 15 = -90$ and $-6 + 15 = 9$
- $6 \times (-15) = -90$ and $6 - 15 = -9$

We can now see that the pair -6 and 15 satisfies our requirements: $-6 \times 15 = -90$ as well as $-6 + 15 = 9$.