

FACTORING QUADRATICS ($a = 1$)

OBJECTIVE

1. SWBAT factor quadratic expressions where $a = 1$.

NOTES

A GAME OF NUMBERS

Before we can begin factoring quadratics, you must become proficient at playing a certain game of numbers. In this game, you must think of two numbers that produce a certain product and a certain sum. Here's an example:

What two numbers produce a product of 18 and a sum of 11?

If the answer 2 and 9 was not obvious, try making a list of factor pairs for the product number.

(1)(18)
(2)(9)
(3)(6)

PRACTICE THE GAME: What two numbers produce a...

...product of 36 and a sum of 15?

...product of 6 and a sum of -5 ?

...product of 15 and a sum of 16?

...product of -48 and a sum of 13?

...product of -20 and a sum of 8?

...product of -30 and a sum of -1 ?

...product of 75 and a sum of 20?

...product of -36 and a sum of 0?

FACTORING QUADRATICS

Now that you know the game, let's apply it to factoring quadratics. Here are the steps:

- Given: $x^2 + bx + c$ Think: what two numbers produce a **product of c** and a **sum of b** ?
Let's call the two numbers n and m .
- Write the factors as $(x + n)(x + m)$.

Please note that the x^2 coefficient is 1. Next lesson will address the case when it is not 1.

Here's an example with actual numbers for b and c :

Factor: $x^2 + 4x - 12$ Think: what two numbers produce a product of -12 and a sum of 4?
The numbers are 6 and -2 .

The factors are $(x + 6)(x - 2)$. *(It does not matter the order of the factors)*

EXAMPLES

Factor.

1. $x^2 + 3x + 2$

2. $x^2 - 2x - 15$

3. $x^2 - x - 20$

4. $x^2 - 8x + 12$

5. $x^2 + 11x + 24$

6. $x^2 + 5x - 36$

7. $x^2 - 36x + 99$

8. $x^2 + 14x - 72$

[SHOW YOUR WORK]

Factor each quadratic expression.

1. $x^2 + 15x + 14$

2. $x^2 - 7x + 12$

3. $x^2 - x - 6$

4. $x^2 + 5x - 14$

5. $x^2 + 10x + 16$

6. $x^2 - 11x + 18$

7. $x^2 - 7x + 10$

8. $x^2 + 6x + 5$

9. $x^2 - 7x - 8$

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

11. $x^2 - 4x - 21$

12. $x^2 + 15x + 50$

13. $x^2 - 16x + 55$

14. $x^2 + 15x + 54$

15. $x^2 - 16x + 60$

16. $x^2 + 5x - 84$

17. $x^2 + 11x - 80$

18. $x^2 - 19x - 66$

19. $x^2 + 7x - 30$

20. $x^2 - 31x + 108$

Factor each quadratic expression completely. *Hint: Look for a GCF first.*

21. $3x^2 - 15x - 18$

22. $5x^2 - 5x - 10$

23. $-2x^2 + 6x + 8$

24. $4x^2 - 16x + 16$

Factor each quadratic expression.

(This might be review from Lesson 3-2, but the number game still applies. Can you see how?)

25. $x^2 - 9$

26. $x^2 - 5x$

27. $x^2 - 49$

28. $x^2 - 20x$

29. $x^2 - 144$

30. $x^2 - 36x$

★ 31. Given the formula: $a^2 + b^2 = (a + bi)(a - bi)$,
factor the following completely: $x^4 - 81$