

What's Going On?

Checking In

Minds on

What's the Pattern?

Action!

Working Backwards

Consolidation

Finding Factors

Learning Goal - I will be able to factor standard form equations when $a = 1$.

Minds on

What's the Pattern?

$$(x + 2)(x + 3) = x^2 + 5x + 6$$

$$(x + 1)(x + 7) = x^2 + 8x + 7$$

$$(x + 4)(x + 2) = x^2 + 6x + 8$$

$$(x + 5)(x + 6) = x^2 + 11x + 30$$

Minds on

What's the Pattern?

$$(x + 2)(x + 3) = x^2 + 5x + 6$$

The **coefficient on the x** (+5 in this case) is the **sum** of the two numbers in the original expression (+2 and +3 in this case)

The **constant term** (+6 in this case) is the **product** of the two numbers in the original expression (+2 and +3 in this case)

Minds on

What's the Pattern?

$$(x + 9)(x + 4)$$

$$= x^2 + \underline{13x} + \underline{36}$$

↑
y-intercept

Minds on

What's the Pattern?

$$(x + 12)(x + 10)$$

$$= x^2 + \underline{22}x + \underline{120}$$

Minds on

What's the Pattern?

$$\begin{array}{c}
 (x + 5)(x - 2) \\
 \begin{array}{c}
 +5 - 2 \quad (+5)(-2) \\
 \swarrow \quad \searrow \\
 = x^2 + \underline{3x} - \underline{10}
 \end{array}
 \end{array}$$

Ruh Roh!

There's a negative in there!

Minds on

No Worries!

$$(x + 5)(x - 2)$$
$$= x^2 + \underline{3x} - \underline{10}$$

The negative sign doesn't change the rule!!

The **coefficient on the x** (+3 in this case) is the **sum** of the two numbers in the original expression (+5 and -2 in this case)

The **constant term** (-10 in this case) is the **product** of the two numbers in the original expression (+5 and -2 in this case)

Minds on

No Worries!

$$(x - 6)(x + 4)$$

$$= x^2 \quad \underline{-2x} \quad \underline{-24}$$

Minds on

No Worries!

$$(x - 3)(x - 7)$$

$$= x^2 - 10x + 21$$

**The product of two negatives is a positive!

Action!

Working Backwards

SAME $x^2 + 8x + 15$ SAME

$= (x + 3)(x + 5)$
 $= (x + 5)(x + 3)$

Find two numbers that add to 8

and multiply to 15!

$$+1 + 15 = +16$$

$$-1 - 15 = -16$$

$$+3 + 5 = +8$$

Action!

Working Backwards

$$x^2 + 8x + 15 = (x + 3)(x + 5)$$

This "working backwards" is actually called

FACTORING

Action!**Expand***FOIL
GRID*

$$(x + 3)(x + 5)$$

$$x^2 + 8x + 15$$

Factor*Find 2 #'s
that add to 8
AND multiply to 15*

Action!

Factoring

$$x^2 + 8x + 15 = (x + 3)(x + 5)$$

We had to find two numbers that multiplied to +15 and added to +8.

1. Write out the **factors** of +15.
(Pairs of numbers that multiply to make +15)
2. Determine which pair **sums** to +8.
Those are your numbers!

Action!

Factoring

$$x^2 + bx + c$$

We have to find two numbers that multiply to c and add to b .

1. Write out the **factors** of c .
(Pairs of numbers that multiply to make c)
2. Determine which pair ^(adds) **sums** to b .
Those are your numbers!

Action!

Factor **Factoring**

$$x^2 + 3x - 18$$

one +
one -

We have to find two numbers that multiply to -18 and add to +3.

1. Write out the **factors** of -18.
(Pairs of numbers that multiply to make -18)

2. Determine which pair **sums** to +3.
Those are your numbers!

$$+1 - 18 = -17$$

$$-1 + 18 = +17$$

$$+2 - 9 = -7$$

$$-2 + 9 = +7$$

$$+3 - 6 = -3$$

$$\boxed{-3 + 6 = +3}$$

$$= (x - 3)(x + 6)$$

Consolidation

Finding Factors

Complete the table below by finding two numbers (a and b) that are ~~the product~~ ~~and~~ ~~sum~~ of the given numbers.

Product	Sum	a	b
10	7	+ 2	+ 5
25	10	+ 5	+ 5
32	12	+ 8	+ 4
24	-14	- 2	- 12
36	-20	- 2	- 18
-30	1	+ 6	- 5
-42	-11	+ 3	- 14
-50	23	+ 25	- 2
-64	0	+ 8	- 8

Consolidation**Factor Me!**

✓ 1. $x^2 + 7x + 10$

✓ 2. $x^2 + 23x - 50$

✓ 3. $x^2 - 11x - 42$

✓ 4. $x^2 - 20x + 36$

✓ 5. $x^2 + 12x + 32$

✓ 6. $x^2 + x - 30$

✓ 7. $x^2 - 14x + 24$

✓ 8. $x^2 + 10x + 25$

9. $x^2 - 6x + 9$

10. $x^2 - 16$

Consolidation**Factor Me!**

$$1. x^2 + 7x + 10$$

Find two numbers that multiply to 10

and add to 7

The numbers will be:

both positive

both negative

one of each

$$(x + 2)(x + 5)$$

Consolidation**Factor Me!**

$$2. x^2 + 23x - 50$$

Find two numbers that multiply to

-50

and add to

+23

The numbers will be:

both positive

both negative

one of each

larger number
is positive

$$(x + 25)(x - 2)$$

Consolidation**Factor Me!**

$$3. x^2 - 11x - 42$$

Find two numbers that multiply to

42

and add to

-11

The numbers will be:

both positive

both negative

one of each

larger
negative

$$(x - 14)(x + 3)$$

Consolidation**Factor Me!**

$$4. x^2 - 20x + 36$$

Find two numbers that multiply to +36

and add to -20

The numbers will be:

both positive

both negative

one of each

$$(x - 2)(x - 18)$$

Consolidation**Factor Me!**

$$5. x^2 + 12x + 32$$

Find two numbers that multiply to +32

and add to +12

The numbers will be:

both positive

both negative

one of each

positive

both same

Consolidation**Factor Me!**

$$6. x^2 + x - 30$$

Find two numbers that multiply to -30

and add to +1

The numbers will be:

both positive

both negative

one of each

larger positive

$$(x+6)(x-5)$$

Consolidation**Factor Me!**

$$7. x^2 - 14x + 24$$

Find two numbers that multiply to +24

and add to -14
negative

The numbers will be:

both positive

both negative

one of each

$$(x - 2)(x - 12)$$

Consolidation

Factor Me!

$$8. x^2 + 10x + 25$$

Find two numbers that multiply to +25

and add to +10
positive

both
same

The numbers will be:

both positive


both negative

one of each

$$(x + 5)(x + 5)$$

Consolidation

Perfect Square Trinomials

$$8. x^2 + 10x + 25 = (x + 5)(x + 5)$$


Both "factors" are the same!

If you gave this answer, you would only get part marks!!

We can **factor further!!!**

$$(x + 5)(x + 5) \longrightarrow (x + 5)^2$$

Consolidation**Perfect Square Trinomials**

$$8. x^2 + 10x + 25 = (x + 5)^2$$

Because $x^2 + 10x + 25$ can be factored like this, we call $x^2 + 10x + 25$ a

PERFECT SQUARE TRINOMIAL

+25 is a perfect square (It is equal to 5^2 !)

Consolidation

Factor Me!

9. $x^2 - 6x + 9$

Find two numbers that multiply to +9

and add to -6

negative

both same

The numbers will be:

both positive

both negative

one of each

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

Consolidation**Factor Me!**

$$10. x^2 - 16$$

Find two numbers that multiply to -16

and add to 0 (zero)

The numbers will be:

both positive

both negative

one of each

$$(x+4)(x-4)$$

Consolidation

Difference of Squares

$$10. x^2 - 16 = (x + 4)(x - 4)$$

**Both "factors" are the same
but with different signs!**

We say that $x^2 - 16$ is a

DIFFERENCE OF SQUARES

