

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

$$x^2 - 2x + 12x - 24$$

multiplied $x \cdot x$ subtracted multiplied $-2 \cdot 12$

$$x^2 + 10x - 24$$

Factor:

$$x^2 + 10x - 24$$

diff

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

1	+ 24
2	+ 12
3	+ 8
4	+ 6

$$x^2 - 10x + 24$$

sum

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

1	- 24
2	- 12
3	- 8
4	- 6

Notice the numbers that give us the last term also give us the middle term.

We will be using this fact in just a minute.

To get the last term, since it comes from multiplying, if we list the “factor pairs” of 24, we’ll have all possible ways to get there.

To determine *which* factor pair to choose to have signs correct, and get the middle term, we need to know if we must add or subtract.

The answer to that question comes from the sign of the last term.

Since last term is negative, we multiplied $+ \textit{times} -$, or $- \textit{times} +$. In either case the signs are different, so the middle term comes from subtraction.

Since last term is positive, we multiplied $+ \textit{times} +$, or $- \textit{times} -$. In either case the signs are the same, so the middle term comes from addition.

Factor: $x^2 - 11x + 28$ sum ↴ 28

$(x - 4)(x - 7)$	1 28
	2 14
	4 7

$x^2 - 13x - 48$ diff ↴ 48

$(x + 3)(x - 16)$	1 48
	2 24
	3 16
	4 12
	6 8

check: $(x+3)(x-16)$
 $x^2 - 16x + 3x - 48$
 $x^2 - 13x - 48$ ✓

Mixed Practice – Factoring:

1) $x^2 + 34x - 35$ diff ↴ 35

$(x - 1)(x + 35)$	1 35
	5 7

$x^2 + 10x - 48$ diff ↴ 48

~~$(x \quad)(x \quad)$~~

Prime	1 48
	2 24
	3 16
	4 12
	6 8

2) $x^2 - 13x + 30$ sum ↴ 30

$(x - 3)(x - 10)$	1 30
	2 15
	3 10 ✓
	5 6

4) $x^2 - 7x - 60$ diff ↴ 60

$(x + 5)(x - 12)$	1 60
	2 30
	3 20
	4 15
	5 12
	6 10

3) $x^2 - 7x + 30$ sum ↴ 30

~~$(x \quad)(x \quad)$~~

Prime	1 30
	2 15
	3 10
	5 6

5) $x^2 + 10x + 24$ sum ↴ 24

$(x + 4)(x + 6)$	1 24
	2 12
	3 8
	4 6 ✓