

Learning Goal: We are learning to find factor pairs, and to expand more complicated polynomials.

Today, we are going to play a game. Before we play this game, we need to first figure out how to make lists of factor pairs. A **factor pair** is two numbers which *multiply* to a given number.

Create the complete list of factor pairs for each number.

$$\begin{aligned} \text{a) } 24 &= 1 \times 24 \\ &2 \times 12 \\ &3 \times 8 \\ &4 \times 6 \end{aligned}$$

$$\begin{aligned} \text{b) } 32 &= 1 \times 32 \\ &2 \times 16 \\ &4 \times 8 \end{aligned}$$

$$\begin{aligned} \text{c) } 45 &= 1 \times 45 \\ &3 \times 15 \\ &5 \times 9 \end{aligned}$$

$$\begin{aligned} \text{d) } 144 &= 1 \times 144 \\ &2 \times 72 \\ &3 \times 48 \\ &4 \times 36 \\ &6 \times 24 \\ &8 \times 18 \\ &9 \times 16 \\ &12 \times 12 \end{aligned}$$

$$\text{e) } 73 = 1 \times 73$$

$$\begin{aligned} \text{f) } 1890 &= 1 \times 1890 \\ &2 \times 945 \\ &3 \times 630 \\ &5 \times 378 \\ &6 \times 315 \\ &7 \times 270 \\ &9 \times 210 \\ &10 \times 189 \\ &14 \times 135 \\ &15 \times 126 \\ &18 \times 105 \\ &21 \times 90 \\ &27 \times 70 \\ &30 \times 63 \\ &35 \times 54 \\ &42 \times 45 \end{aligned}$$

Now that we see how to create a list of factor pairs, we will now add an element which will have us search for a **specific** factor pair. In the following examples, you will be given a number to multiply to and a number to add to. This means that you will need to find a factor pair which both multiplies to and adds to the given numbers. Without further adieu, let's play "Find the Pair!"

Find the **SINGLE** factor pair that satisfies the given conditions. (Note: M = multiply to, A = adds to)

a) M: $45 = 3 \times 15$
A: $18 = 3 + 15$

b) M: $-132 = 12 \times (-11)$
A: $1 = 12 + (-11)$

M	A	S#	B#
+	+	+	+
+	-	-	-
-	-	+	-
-	+	-	+

$2 + (-3)$
 $(-2) + 3$

-132
 $= -1 \times 132$
 $= -2 \times 66$
 $= -3 \times 44$
 $= -4 \times 33$
 $= -6 \times 22$
 $= -11 \times 12$

c) M: $60 = (-3)(-20)$
A: $-23 = (-3) + (-20)$

60
 -1×60
 -2×30
 -3×20

e) M: $-216 = (8)(-27)$
A: $-19 = (8) + (-27)$

-216
 1×-216
 2×-108
 3×-72
 4×-54
 6×-36
 8×-27

Success Criteria:

- I can use the distributive property to expand larger polynomials
- I can find all of the factor pairs for a given number
- I can find a specific factor pair that meets a set of conditions