Finding Factors

Example 1. We can write the number 30 as a multiplication in many different ways:

$30 = 10 \times 3$ and $30 = 2 \times 15$ and $30 = 5 \times 6$. There is yet one more way: $30 = 1 \times 30$.

From this we learn that 10, 3, 2, 15, 5, 6, 1, and 30 are divisors or factors of 30.

What about 7? Well, 30 is *not* divisible by 7, so 7 is not a factor of 30.

It turns out that 1, 2, 3, 5, 6, 10, 15, and 30 are <u>ALL</u> the factors of 30. No other numbers are.

1. Find all the factors of the given numbers. Think of writing the number as a multiplication in many
   different ways. Don't forget the number itself times 1!

a. 6 factors:	**b.** 10 factors:
c. 12 factors:	**d.** 15 factors:
e. 20 factors:	**f.** 18 factors:

2. These students worked and found all the factors of the given numbers. But is their work correct?
   Be a teacher detective, and check and correct their work.

a. Aiden found all the factors of 34: $34 = 2 \times 18$ $34 = 1 \times 17$ The factors are 1, 2, 17, 18.	**b.** Olivia found all the factors of 28: $28 = 1 \times 28 \qquad 28 = 2 \times 14$ $28 = 4 \times 7$ The factors are 1, 2, 4, 7, 14, and 28.
c. Jayden found all the factors of 33: $33 = 1 \times 33$ $33 = 3 \times 13$ The factors are 1, 3, 13, 33.	**d.** Isabella found all the factors of 36: $36 = 6 \times 6$ $36 = 4 \times 9$ The factors are 4, 6, and 9.

Example 2. Find all the factors of 85.

Now, it helps to be organized. Let's check if 85 is divisible by all the numbers from 1 to 10.

- It is divisible by 1 (all numbers are): $85 = 1 \times 85$.

- It is not divisible by 2. Neither by 3 (its digits add up to 13). Of course it can't be divisible by 4, 6, 8, or 10 since it is not even. And it can't be divisible by 9 since it wasn't by 3.

- It *is* divisible by 5. $85 = 5 \times 17$. And here we can see it is also divisible by 17.

- Is it divisible by 7? No, because 84 is.

Our check is complete. So, we found <u>1, 5, 17, and 85</u>. Those are all the factors of 85.

Why do we <u>not</u> have to check if 85 is divisible by 11, 12, 13, and so on?
Because *if* 85 was 11 times some number, it would be 11 times some *smaller* number than 11. We went through all the smaller numbers already and didn't find that any of them times 11 was 85.

3. Find all the factors of the given numbers.

a. 46 Check 1 2 3 4 5 6 7 8 9 10 factors: _____	**b.** 68 Check 1 2 3 4 5 6 7 8 9 10 factors: _____
c. 99 Check 1 2 3 4 5 6 7 8 9 10 factors: _____	**d.** 72 Check 1 2 3 4 5 6 7 8 9 10 factors: _____
e. 73 Check 1 2 3 4 5 6 7 8 9 10 factors: _____	**f.** 80 Check 1 2 3 4 5 6 7 8 9 10 factors: _____
g. 95 Check 1 2 3 4 5 6 7 8 9 10 factors: _____	**h.** 64 Check 1 2 3 4 5 6 7 8 9 10 factors: _____