Recall prime numbers:

Their factors are only 1 and itself

ex: 2, 3, 5, 7, 11, 13, ...

$2 = 2 \times 1$ <u>only</u>

$3 = 3 \times 1$ <u>only</u>

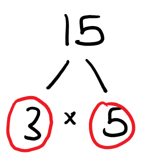
$5 = 5 \times 1$ <u>only</u>

⋮

All whole numbers that are greater than 2 can be written as a product of primes. To do this, we use factor trees:

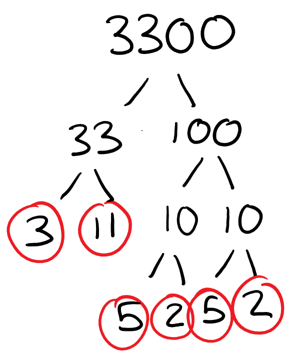
(product → multiplication)

Ex: Prime factor 15



⇒ we say, "the prime factorization of 15 is 3×5"

Ex: Prime factor 3300



$$\Rightarrow 3300 = 2 \times 2 \times 3 \times 5 \times 5 \times 11$$
$$= 2^2 \times 3 \times 5^2 \times 11$$

<u>Note:</u> For large numbers you may be able to draw more than one factor tree. This is fine, you will get the same answer.

Greatest Common <u>Factor (GCF)</u>

Greatest Common Factor (GCF)

The largest factor common between 2 or more numbers.

ex: GCF 16 and 32

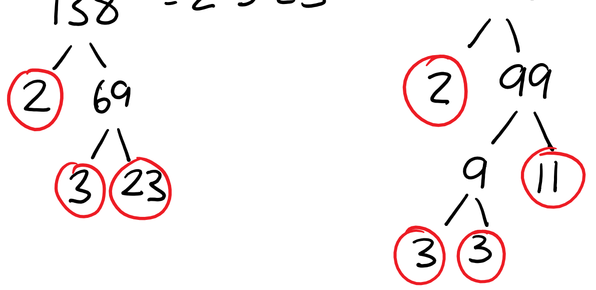
16: 1, 2, 4, 8, 16
32: 1, 2, 4, 8, 16, 32

↳ GCF (16)

For large numbers, prime factorization is useful:

Ex: GCF between 138 and 198.

$138 = 2 \cdot 3 \cdot 23$ $\qquad$ $198 = 2 \cdot 3^2 \cdot 11$



★ Take each common factor and multiply them together to get the GCF ★

138: 2 · 3 · 23
198: 2 · 3 · 11

$2 \times 3 = 6$

∴ The GCF is 6

Lowest Common Multiple (LCM)

The smallest multiple common across 2 or more numbers.

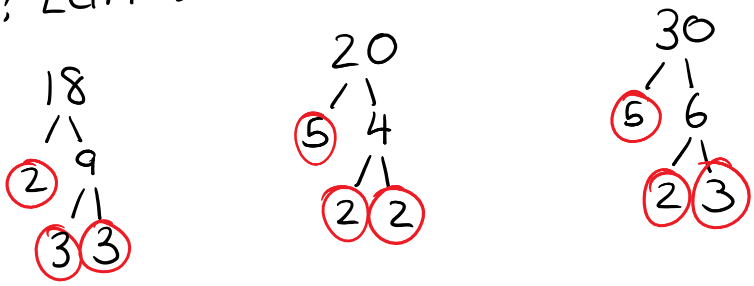
ex: LCM between 18 and 20?

18: 18, 36, 54, 72, 90, 108, 126, 144, 162, 180
20: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200

↳ LCM (180)

Again, prime factorization is useful:

Ex: LCM between 18, 20, and 30



$18 = 2 \times 3^2$

$20 = 2^2 \times 5$

$30 = 2 \times 3 \times 5$

exponents are equal, doesn't matter which you select.

$2^2 \quad 3^2 \quad 5$

$\Rightarrow 2^2 \times 3^2 \times 5 = 180$

∴ The LCM is 180

★ Look at each factor and select the one with the largest exponent ★

HW:

Pg. 140

#6, 8-13, 19