If $p \mid a_1 \cdot a_2 \cdot a_3 \cdot \ldots \cdot a_n$ and p is prime

then $p \mid a_i$

$5 \mid 6 \cdot 17 \cdot 26 \cdot 15 \cdot 10$

$5 \mid 15$

If $p \mid a^2$ and p is prime

then $p \mid a \cdot a$

so $p \mid a$ or $p \mid a$ so $p \mid a$

The Fundamental theorem of Arithmetic

if $n \in \mathbb{Z}$ $n \neq 0, \pm 1$

then $n = p_1 \cdot p_2 \cdot p_3 \cdots p_m \leftarrow$ p's are all prime

And if $n = q_1 \cdot q_2 \cdot q_3 \cdots q_M \leftarrow$ q's are all prime

then each $p_i = \pm q_j$ and $m = M$

$\mathbb{Z}$ is a unique factorization domain

If p is prime and $p \mid a^n$ then $p^n \mid a^n$

a^2
$\|$
$13^2 = 169$

$13 \mid 169$

$13^2 \mid 169$

$6^2 =$

$2 \mid 36$

$2^2 \mid 36$

Prove it!

Let p be prime and $p \mid a^n$

so $p \mid a \cdot a \cdot a \cdots a$

so $p \mid a$

so $a = p \cdot m$ for some $m \in \mathbb{Z}$

so $a^n = (p \cdot m)^n = p \cdot m \cdot p \cdot m \cdot p \cdot m \cdots p \cdot m$

$= p^n \cdot m^n$

so $p^n \mid a^n$

Homework # 7, 11, 17 & prove it!, 30, 4

example vid.