You try---setup

Claim: for all integers $a, b, c, n,$ with $n > 0$:

$$a \equiv b \pmod{n} \rightarrow a + c \equiv b + c \pmod{n}$$

Proof:

Divides

For integers x, y we say $x|y$ ("x divides y") iff there is an integer z such that $xz = y$.

Equivalence in modular arithmetic

Let $a \in \mathbb{Z}, b \in \mathbb{Z}, n \in \mathbb{Z}$ and $n > 0$.
We say $a \equiv b \ (mod\ n)$ if and only if $n|(b - a)$

Another Proof (statement)

For all integers, a, b, c: Show that if $a \nmid (bc)$ then $a \nmid b$ or $a \nmid c$.

Signs you might want to use proof by contrapositive

1. The hypothesis of the implication you're proving has a "not" in it (that you think is making things difficult)
2. The target of the implication you're proving has an "or" or "not" in it.
3. There's a step that is difficult forward, but easy backwards
   e.g., taking a square-root forward, squaring backwards.
4. You get halfway through the proof and you can't "get ahold of" what you're trying to show.
   e.g., you're working with a "not equal" instead of an "equals" or "every thing doesn't have this property" instead of "some thing does have that property"

All of these are reasons you might want contrapositive. Sometimes you just have to try and see what happens!

GCD and LCM definitions

Greatest Common Divisor

The Greatest Common Divisor of a and b (gcd(a,b)) is the largest integer c such that $c|a$ and $c|b$

Least Common Multiple

The Least Common Multiple of a and b (lcm(a,b)) is the smallest positive integer c such that $a|c$ and $b|c$.