

$p$

$q$

If 12 divides 36 evenly, then 3 divides 72 evenly.

If  $3 < 72$ , then 3 divides 72 evenly.

If 12 divides 36 evenly, then  $72 < 3$ .

If  $72 < 3$ , then 3 divides 72 evenly.

If  $72 < 3$ , then 12 divides 3 evenly.

T	S	R	Q	P
K	L	M	N	O
J	I	H	G	F
E	D	C	B	A

1. Bob passed through *P*.
2. Bob passed through *N*.
3. Bob passed through *M*.
4. If Bob passed through *O*, then Bob passed through *F*.
5. If Bob passed through *K*, then Bob passed through *L*.
6. If Bob passed through *L*, then Bob passed through *K*.

After an example given in a presentation by Suzanne Epp, 2006.

“If Fred was at the dock at midnight, then he’s the murderer.”

“If it’s raining at home and the windows are still open, then water is coming in.”

“If I were John and John were me, then he’d be six and I’d be three.” — A. A. Milne

“If the dryer is finished, then unload it.”

“If you finish your spinach, then I will give you some cake.”

“If it rains tomorrow, the zucchini will come up.”

An even degree is a **necessary condition** for a polynomial to have no real roots .

*means*

If a polynomial function has no real roots, then it has an even degree.

A positive global minimum is a **sufficient condition** for a polynomial to have no real roots

*means*

If a polynomial function has a positive global minimum, then it has no real roots.

Values all of the same sign is a **necessary** and **sufficient** condition for a polynomial to have no real roots.

*means*

A polynomial function has values all of the same sign if and only if the function has no real roots.