p	q	If p then q.
F	F	T
F	T	T
T	F	F
T	T	T

p q

Predict

edice = to bring forth from inside

education.

If p then q.

p implies q

p चं true असणं हे q च्या true असण्यासाठी पुरेसं आहे.

(p implies q) $\equiv$ True.

---

p is sufficient for q.

q is necessary for p.

q चं True असणं हे p च्या True असण्यासाठी आवश्यक आहे.
(पण पुरेसं असेलच असं नाही)

p cannot be true while q is false!

ABCD is a square implies ABCD is a quadrilateral.

p implies q.

p is sufficient for q.

---

p is sufficient for q.

q is necessary for p.

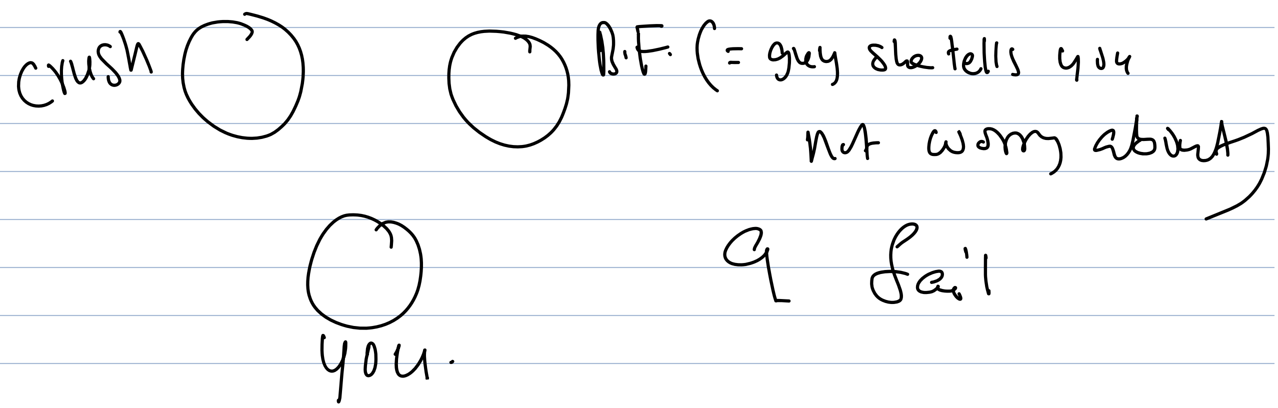
If p then q.

not q is sufficient for not p.

$p \longrightarrow q \equiv \neg q \rightarrow \neg p$

implication → contrapositive.

p	q	$p \to q$	$\neg q$	$\neg p$	$\neg q \to \neg p$
F	F	T	T	T	T
F	T	T	F	T	T
T	F	F	T	F	F
T	T	T	F	F	T



$p \rightarrow q$ Original Implication

$\neg q \rightarrow \neg p$ Contra-positive of original Implication.

Original Implication $\equiv$ Contra-positive of original Implication.

$q \to p \equiv$ Converse of original implication.

ABCD square $\to$ ABCD Quad $\equiv$ T
ABCD Quad $\to$ ABCD square. $\equiv$ F

ABC is right angled triangle (at B) $\to$ $AC^2 = AB^2 + BC^2$.

$AC^2 = AB^2 + BC^2$ $\to$ ABC is right angled Δ (at B.)

$q \to p$ $\equiv$ Converse

q is suff. for p.
p is necessary for q.
not p is suff. for not q
$\neg p \to \neg q \equiv$ Contrapositive of converse
$\equiv$ inverse of original implication.

$\equiv$	$p \to q$	Original implication (O.I.)
	$\neg q \to \neg p$	Contrapositive of (O.I)
$\equiv$	$q \to p$	Converse of O.I.
	$\neg p \to \neg q$	Inverse of O.I.

Inverse of ⟵ Contra positive of each other ⟶ Converse of

O.I.   O.2

---

p only if $q \equiv p \to q$

q if $p \equiv p \to q$.

---

p if $q \equiv q \to p$.

q only if $p \equiv q \to p$.

---

p is necessary & sufficient for q.

p is necessary for q AND

p is sufficient for q

p is necessary for $q \equiv q \to p$.

p is sufficient for $q \equiv p \to q$.

p	q	$p \to q$	$q \to p$	$p \to q \wedge q \to p$
F	F	T	T	T
F	T	T	F	F
T	F	F	T	F
T	T	T	T	T

p if and only if q.

p if q and p only if q

$q \to p$ $\quad$ $p \to q$

necessity $\quad$ Sufficiency

p iff q. $\equiv$ p if and only if q

p if q and p only if q

$q \to p$ and. $p \to q$.

$p \to q$ and $q \to p$ $\quad$ $(p \leftrightarrow q) \equiv T$

$p \leftrightarrow q$ | $p \equiv q$ $\quad$ $\boxed{p \equiv q}$

$(p \equiv q) \equiv (p \leftrightarrow q$ is True$)$

$p \equiv q$

---

1) Let A be an array of N elements. $(N > 8)$
m is a max element in A.

2) n is prime (p) n is integer (q) $p \to q$.

3) n is rational (p) n is integer (q) $q \to p$

4) n is real (p) n is natural (q) $q \to p$.

5) Square of all odd numbers is odd.

6) Every natural number greater than 1 can be expressed as a product of primes, not necessarily different.

7) d is the greatest common divisor of a & b.

8) l is the least common multiple of a & b.

Proposition / Predicate / $\forall, \exists$ Predicate /

$\wedge$ and $\vee$ or $\neg$ not $\rightarrow$ implication $\leftrightarrow$ bi-implication.

---

5) $P(n)$: n is an odd number
$Q(n)$: n^2 is an odd number

$$P(n) \longrightarrow Q(n)$$

$$\forall n. \left(P(n) \rightarrow Q(n) \right).$$

7) if integer m divides n completely then we will denote it as $m|n$.

$$d = G.C.D.(a, b)$$
$$\equiv$$
$$(d|a \wedge d|b) \wedge$$
$$(d'|a \wedge d'|b \rightarrow d \geq d').$$

---

logic: clarity, unambiguity, brevity, discipline

[સબ્રતા, નિઃસંદિગ્ધતા, થોડકેપણા, શિસ્ત.

ગોંગળ | whataboutry

||

Confusing

---

8) l is the least common multiple of a & b

$$[a|l \wedge b|l] \wedge$$
$$[a|l' \wedge b|l' \rightarrow l \leq l']$$

$2 = 2^1$

$3 = 3^1$

$4 = 2 \cdot 2 = 2^2$

$5 = 5^1 = 5$

$6 = 2 \times 3 = 2^1 \times 3^1$

$7 = 7^1$

$8 = 2 \times 2 \times 2 = 2^3$

$9 = 3 \times 3 = 3^2.$

$10 = 2 \times 5 = 2^1 \times 5^1$

$11 = 11^1 = 11$

$12 = 2 \times 2 \times 3 = 2^2 \times 3^1$

$13 = 13^1 = 13$

$14 = 2 \times 7 = 2^1 \times 7^1$

$15 = 3 \times 5 = 3^1 \times 5^1$

$16 = 2^4 =$

Fundamental theorem of arithmetic.

→ Burton

$$(\forall n \in N)\,(n > 1 \rightarrow (\exists p_1, p_2, p_3, \dots p_r \in Primes$$
$$\wedge \ \exists k_1, k_2, \dots, k_r \in N \text{ such that}$$
$$n = p_1^{k_1} p_2^{k_2} \dots p_r^{k_r}\ )$$

$$(\forall n \in N)\,(n>1 \rightarrow (\exists r \in N) \text{ such that}$$
$$\exists p_1, p_2, p_3 - , p_r \in Primes \ \wedge$$
$$\exists k_1, k_2, k_3, - k_r \in N \qquad \text{such that}$$
$$n = \prod_{i=1}^{i=r} p_i^{k_i}\ ).$$

$$\forall i\,(0 \le i < N),\ m \geq A[i]$$

$$P(i) : m \geq A[i]$$

$$D_p = \{0, 1, 2, --, N-1\}$$

$$(\forall i \in D_p)\,(P(i) \equiv True)$$

$$\forall i\,[0 \le i < N]\ m \geq A[i]$$

Tuesday : Programming 25-30
→ symbol.

Practical : Tues – 1/2

Wed → 1

· 50 ≥ | 30 ≥

Sat / Sun / Mond | Coding.

p01.c p21.c helloWin.c.

%. 5