Chapter 6

Form of proposition

learning content

1. Eternal truths and contradictions
2. Equivalent propositions
3. Negative propositions

Eternal truth (Tautology) is a form of proposition that has truth value that is true in every case.

p	~p	p ∨ ~p
T	F	T
F	T	T

Conflict or Contradiction (Contradiction) is the form of a proposition whose truth value is false in all cases. Regardless of whether the subproposition has a truth value of true or false.

p	~p	p ∧ ~p
T	F	F
F	T	F

Equivalent propositions are the forms of both propositions that have the same truth value in every case, case by case.

p	~p	~(~p)
T	F	F
F	T	F

The forms of equivalent propositions that you should know are as follows:

1

1) $\sim(\sim p) \equiv p$

2

2) $\sim(p \wedge q) \equiv \sim p \vee \sim q$

$\sim(p \vee q) \equiv \sim p \wedge \sim q$

3

3) $p \wedge q \equiv q \wedge p$

$p \vee q \equiv q \vee p$

The forms of equivalent propositions that you should know are as follows:

4)

$$p \leftrightarrow q \equiv q \leftrightarrow p$$

$$p \leftrightarrow q \equiv \sim p \leftrightarrow \sim q$$

$$p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$$

5)

$$(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$$
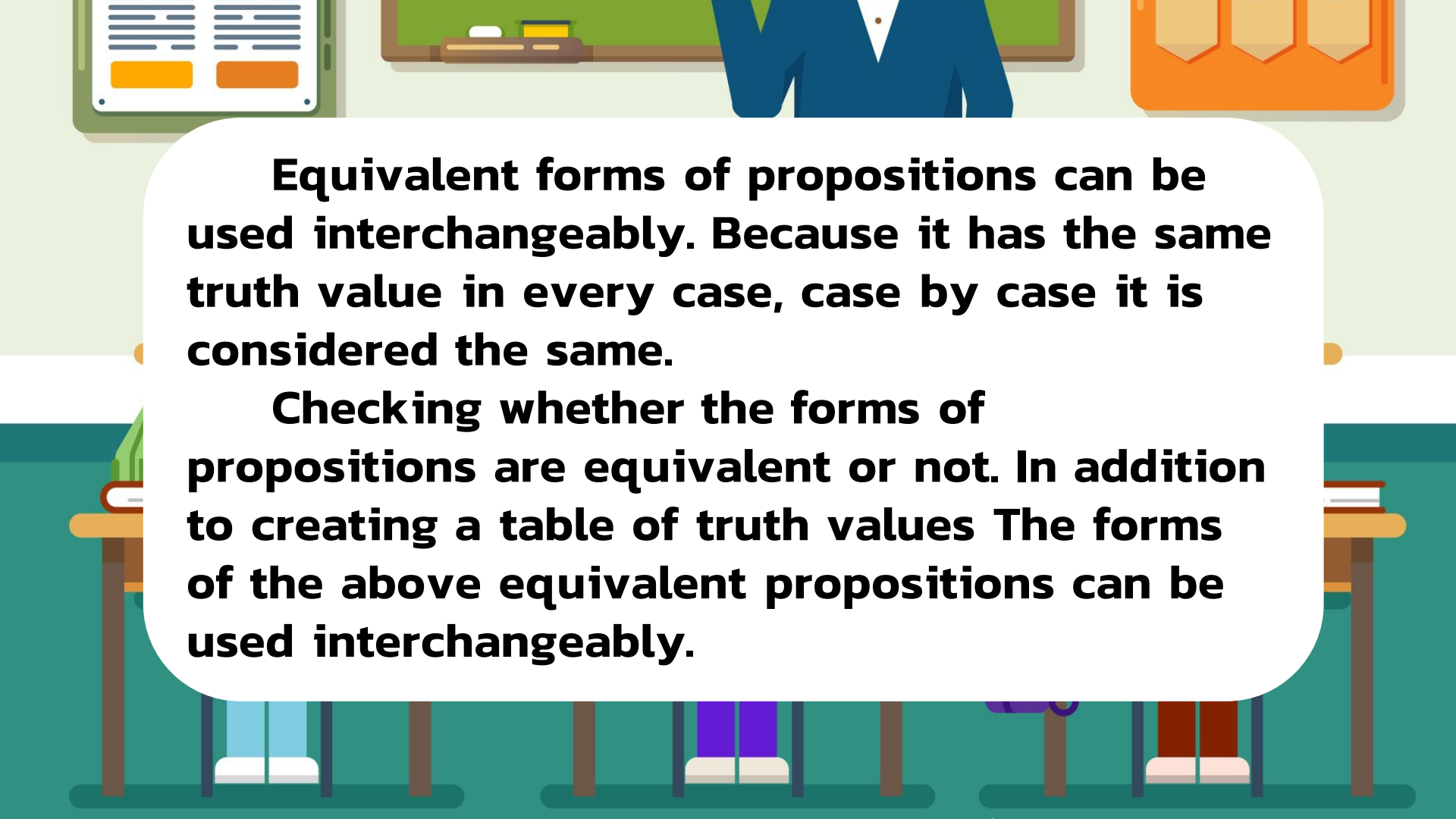
$$(p \vee q) \vee r \equiv p \vee (q \vee r)$$

$$(p \leftrightarrow q) \leftrightarrow r \equiv p \leftrightarrow (q \leftrightarrow r)$$

6)

$$p \rightarrow q \equiv \sim p \vee q$$

$$p \rightarrow q \equiv \sim q \rightarrow \sim p$$

$$\sim(p \rightarrow q) \equiv p \wedge \sim q$$

Equivalent forms of propositions can be used interchangeably. Because it has the same truth value in every case, case by case it is considered the same.

Checking whether the forms of propositions are equivalent or not. In addition to creating a table of truth values The forms of the above equivalent propositions can be used interchangeably.

3 Propositions that are rejected

A proposition that is negative (Negation Statement) is a form of both propositions that has truth value. Opposite in every case, case by case, use the symbol "~" to denote the negative. For example, A is the negative of B if and only if A is equivalent to ~B.

ข้อความ	นิเสธของข้อความ
ฝนตก	ฝนไม่ตก
$4 + 2 = 6$	$4 + 2 \neq 6$
$5 > 4$	$5 \leq 4$
สุภาพไปห้องสมุด	สุภาพไม่ไปห้องสมุด

Negation of propositions that should be known

1 1) $\sim(p \wedge q) \equiv \sim p \vee \sim q$

2 2) $\sim(p \vee q) \equiv \sim p \wedge \sim q$

3 3) $\sim(p \rightarrow q) \equiv p \wedge \sim q$

summarize

🔵 **The form of a proposition that has truth value is true in every case. Whether the subproposition has a truth value Whether true or false, it is called eternal truth.**

🔴 **The form of a proposition whose truth value is false in all cases. Whether the subproposition has a truth value Whether it is true or false is called a conflict.**

🟢 **Which two forms of a proposition have the same truth value in every case, case by case, are called equivalent propositions.**

🟠 **Any two forms of a proposition that have opposite truth values in every case, case by case, are called propositions that are negative.**