

### Exercise 1(b)

1. Construct a truth table for  $q \vee p$ . Compare your answer with the truth value for  $p \vee q$ . What do you notice?
2. Construct a truth table for  $q \wedge p$ . What do you notice about your result by comparing with  $p \wedge q$ ?
3. Construct a truth table for:
  - (a)  $\neg p \wedge p$
  - (b)  $\neg p \vee p$
  - (c)  $\neg(\neg p)$
4. Predict what the following are equivalent to:
  - (a)  $\neg(\neg(\neg p))$
  - (b)  $p \wedge p$
  - (c)  $p \vee p$
  - (d)  $\neg p \wedge (\neg p)$
5. Show that  $\neg(p \wedge q)$  and  $\neg p \vee \neg q$  are equivalent.
6. Show that  $p \wedge (q \vee r)$  and  $(p \wedge q) \vee (p \wedge r)$  are equivalent.
7. Devise an equivalence rule to the following compound proposition:

$$\neg \neg \dots (\neg p)$$

[Hint: The rule will depend on the number of  $\neg$ ]

Let  $p$  be the proposition 'the cup is full'. By using this devised rule what is  $\neg \neg \neg \neg p$  equal to?