

## Logic

The study of logic dates back at least to the time of Aristotle (384 BCE–322 BCE) in ancient Greece. Logic is now an important part of mathematics, and essential to other disciplines such as computer science, the law, economics. Logic is important whenever you have to develop an argument. As from 2023, logic is part of Specialist Mathematics in VCE.

**Learning intention:** The intention of this lesson is to learn some of the basics about logical reasoning through problem solving. The problems below may not look mathematical, but they are—logic is part of mathematics.

**Success criteria:** By the end of the lesson, you will appreciate the difference between the words “and” and “or”. I hope that you will be able to say to yourself, “That was fun: I enjoyed the experience.”

### Data

*Jane tells the truth on Monday, Tuesday, Wednesday and Thursday. She lies on all other days.*

*David tells the truth on Monday, Friday, Saturday and Sunday. He lies on all other days.*

### Problems

1. One day they both said, “Yesterday I lied”. On what day of the week did they say this?
2. On which day(s) can Jane and David both say, “Tomorrow I will tell the truth”?
3. On which day(s) can exactly one of the two say “I lied two days ago”?
4. Are there any days when both Jane and David can say “Today I am telling the truth”? If so, name them.
5. Are there any days when both Jane and David can say “Today I am lying”? If so, name them.
6. Are there any days when Jane can say “David is telling the truth”, and David can say “Jane is lying”? If so, name them.
7. Are there any days when both of them can say “Exactly one of us is telling the truth today”? If so, name them.
8. Are there any days when both of them can say ‘Yesterday I said “Tomorrow I will tell the truth” ’? If so, name them.
9. Are there any days when both of them can say ‘In two days I will say “Yesterday I lied” ’? If so, name them.
10. What did you learn from the above problems?

### Acknowledgement

The problems above are based on a problem from *Problemo*, which is a resource developed by Australian Maths Trust for the benefit of Australian students.