

## Is Science 'True'?

Scientists can be very enthusiastic about their subject and sometimes say rather unguarded or exaggerated things. On the subject of science itself, some publicly defend the view that science is the 'only way of discovering truth about the world'. The belief that all other forms of knowledge are inferior to science is sometimes called **scientism**.

Science is a very important way of discovering certain kinds of truths, but experts in other subjects will object to the idea that scientists are doing better or 'truer' work than they are. To understand the limits of science, you have to have a clear picture of how it works. While you are playing the game explained on this sheet, think about your favourite subject (which might be science, or might not be) – are there 'truths' in that subject? How are they discovered and defended?

### Exercise: *Eleusis*

This exercise is best done as a group of four or five people. You will need a pack of playing cards in your group, which your teacher will probably supply.

For the first round, decide who is going to be the **rule maker**. That person needs to invent a rule that will be applied in playing the cards. They do not tell the remaining players what the rule is. The purpose of the game is for the remaining players to guess the rule.

The deck is partially dealt out among all the players (but not the rule maker). The remainder of the pack is placed in the centre of the table and the top card turned over and placed face up next to the pack. This is the **starter card**.

The first player picks a card from their hand and places it next to the starter card. For the first player, the choice of card has to be a guess. The rule maker then tells everyone if this card correctly follows their rule or not (still without explaining the rule or telling the players why the card is right/wrong).

If the choice is correct, the card stays alongside the starter card and the next player makes a choice, placing their card next in the sequence.

If the first card is incorrect, it goes under the starter card.

As the game progresses, there should be two lines of cards: the correct sequence (the Mainline in Figure 1) and, underneath, the incorrect cards. If more than one player offers an incorrect card before the next correct card, then the incorrect ones are placed partially on top of each other, as in the Sidelines shown in Figure 1. This is so that each player can see all the incorrect cards, as an aid to determining the rule.

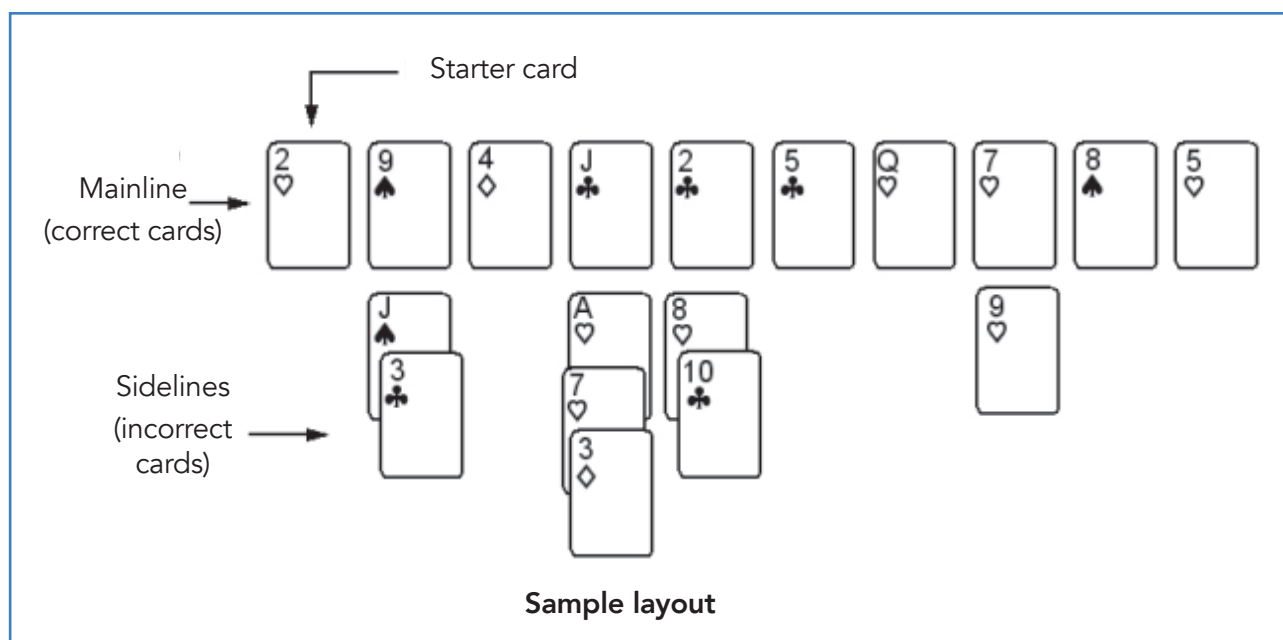


Figure 1: The game of *Eleusis* after several rounds. Can you work out the rule that is being applied in this case?

At any point, a player may decide that they have figured out the rule. They do not need to wait for their turn to announce what they think to the rule maker and the rest of the players. If the rule maker confirms that they are correct, then that player wins the game. If the players have used all their cards and not correctly guessed the rule, then the rule maker wins.

Rules can be a simple numerical sequence, or something more complicated.

### Example rules

An even-numbered card must follow an odd-numbered card and vice versa.

A red card must follow a black card and vice versa.

Follow a spade with a heart; follow a heart with a diamond; follow a diamond with a club; follow a club with a spade.

Play a card with a value that is 3 more than the previous card, with the Jack, Queen and King counting as 1, 2, 3 respectively.

### Things to consider

How does this game illustrate how science works? Which of the following points do you think apply to the game and to science? Discuss the points among your group.

- Science uses theories and experiments – how do they relate to aspects of this game?
- The evidence about what does not fit a pattern is just as important as the evidence about what does fit.

- Patterns in nature can be very simple, or they can be very complicated.
- Sometimes what looks like a simple pattern is actually the result of a complicated effect in a restricted circumstance.
- Does learning about science give you a good idea how science is done in real life?

In what other subjects are there 'hidden' rules that must be figured out?

Is it possible to come up with a rule that has more than one correct answer in a particular circumstance (or even in every circumstance)? Is it possible that there is no correct answer in a certain case? How would the rule be 'interpreted' in such situations?

When someone translates from one language to another, are there always rules that make sure that the translation is right? Is there a difference between a **correct** translation and the **best** translation?

### Wider discussion

What types of knowledge is science very good at discovering?

Come up with a list of subjects where the types of knowledge used are similar to those in science (you may need to think of subjects that you do not do in Year 10: perhaps some A-level subjects, or even those that might be covered at university).

What subjects use types of knowledge different from those in science? Is there something common to all these forms of knowledge?