

Climbing the Career Ladder Board Game

Teacher notes

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INTRODUCTION

Slides 2

This aim of this session is to explore flow charts and algorithms, see where they are used in the real world and understand how maths (and Operational Research) is used in real life.

PLAYING THE GAME

Time: 10-15 minutes

Slide 3

Split the students into pairs. Distribute the board game (attached), cards (attached), career profiles (attached), counters and dice amongst the pairs.

Explain the simple rules to the game, which are highlighted on the slide. Allow the students to enjoy playing the game for 5-10 minutes (depending on how quickly the pairs manage to complete the game).

Encourage students to look at the career profiles in order to understand the careers mentioned. Tell students that all of these careers involve A-Level Maths and a degree in Maths or a Maths-related subject.

ALGORITHMS: FLOW CHARTS

Time: 5 minutes

Slide 4 & 5

Ask the students if they know what an algorithm is. State that an **algorithm** is a *process or set of rules which are to be followed in order to complete calculations or problem-solving operations*. Inform them that the purpose of algorithms therefore is to solve a problem in the most efficient way possible.

Flowcharts help to represent an algorithm as a diagram, making it easier to visualise. Ask students to give a definition of a flow chart. Their answer (if known/given) should be that it is a symbolic representation of a process. Inform students that we will look at basic versions of flow charts for now, in order to understand them. In real life however, they are used on a much larger, complicated scale in industry.

Explain to the students what each symbol in a flow chart represents. Tell students that they need to take care when creating their own flow charts that they choose the correct symbols. This is because bigger flow charts are likely to be interpreted by computers, therefore accuracy is extremely important to ensure the problem is solved appropriately.

ALGORITHMS: CREATE YOUR OWN

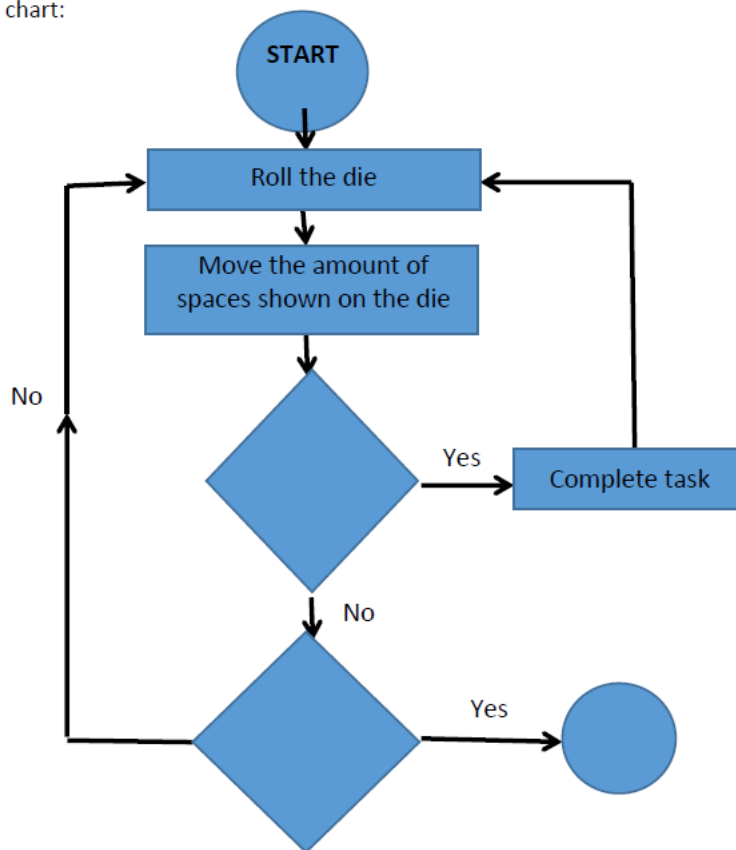
Time: 15 minutes

Slide 6

Ask students to now create their own basic algorithm on the game which they have just played. They **do not** need to think about **specifically** what they have to do on each space, at this stage. Downloaded from www.LearnAboutOR.co.uk

Discuss their ideas and draw the correct flow chart on the board, using input from the whole class. The correct flow chart should look like the following: (Note: The students may put a couple of extra steps in, but as long as every command joins up and the flow chart is not too specific at this stage, the algorithm is correct.)

Correct flow chart:



Now encourage students to play the game again, but each person should record the path which their counter takes **exactly**. This involves recording whether they have to miss a go or move forward/backward any spaces, as well as any work experience cards they have to pick and any decisions they have to make as a result of this.

FLOW CHARTS: THE NEXT STAGE & AN EXAMPLE

Time: 15 minutes

Slide 8 & 9

Encourage students to now create a flow chart, using the records they have just created of their counter throughout the game. This should be a bit more complicated

than the first one drawn, yet they should try and make it as simple as possible. This idea is demonstrated in slide 6: "An Example". The decision symbols should have two options (as appropriate) however the student should only continue down the path they chose in the game. (This is because if they continued along both paths this would get too complicated at this stage.)

EVALUATION

Time: 10 minutes: 5 minutes working and 5 minutes discussion

Slide 10

Encourage the students to work individually to answer the questions given on the slide. Emphasise that if they provide an opinion for any of the questions, they should justify their opinion.

Discuss with the students the answers they have come up with. This task designed to encourage students to reflect on the lesson and what they have learnt.

ALGORITHMS IN REAL LIFE

Time: 10 minutes

Slide 11 - 14

Ask the students if they can think of any examples where algorithms and flow charts are used in real life. Allow students to read slide 7 which gives some examples of algorithms being used in real life, from an online article. Inform students that this whole process relates to the discipline of Operational Research. **Operational Research** involves applying often advanced and analytical methods to real life problems, in order to help make better decisions.

Next, distribute the video question and answer sheets (attached) between each of the students. Tell them that you are now going to show them a video interview with Dr Bill Dowsland which will tell them a bit about what he does as a job and how he uses algorithms as part of his every day working life. Encourage students to fill in the question and answer sheet during the video. This sheet will not be marked or tested: it is just an aid to help students understand the video, as well as it encouraging them to listen attentively.

OPERATIONAL RESEARCH

Time: 10 minutes

Slide 16-20

These slides get the students thinking about what Operational research is and why it's used. Slide 16 emphasis when it may be used (when a decision is complex or you don't know what the best way to do something is) and slide 17 provides definitions of methods used.