Ri Off the Shelf Masterclass: Modelling Forest Fires

Worksheet 2 – Fire Modelling

You start with **one burning tree in the centre of the orchard** at time-step 0. Run the model for seven time-steps.

Each time-step:

1. Choose a new colour for this time-step.
2. Work out which trees could catch fire (which have burning neighbours?). Mark them with a **dot**. Tip: Remember to include diagonals as well!
3. Look at **each dotted tree**:
    a. Work out how many burning neighbours the tree has.
    b. Roll the die **once for each burning neighbour** that tree has; if any of the rolls turn up a 'catch fire' number, the tree will start burning in the next time-step. Mark it with a **cross**.
4. Once you have worked out all the trees which will burn, colour them in.
5. Record how many trees have started burning in this time-step in the table below.
6. This time-step has finished; repeat the instructions for the next time-step.

Conditions

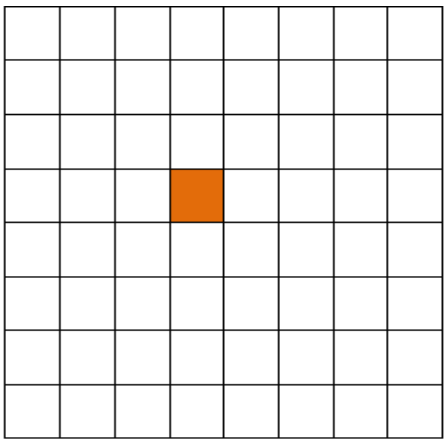
You are modelling under **normal** conditions.

The probability of catching fire from one neighbouring tree is **1/3**.

Use a six-sided die and pick **two** numbers: _____ and _____ .

If you roll either of these numbers, the tree is going to catch fire.

Here is your orchard. The coloured tree is burning; time-step 0 is complete.



Record how your fire spreads here:

Model reliability

It is important to **repeat** models to see if they always give similar predictions.

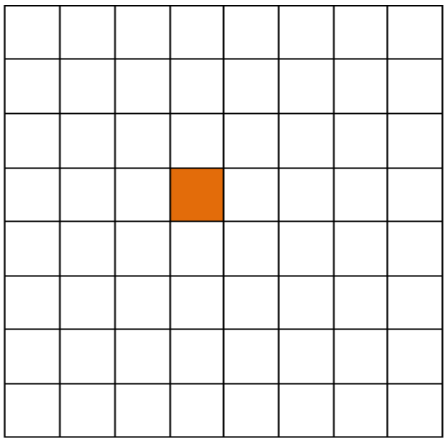
EITHER: Repeat your experiment on the next page or swap this sheet with another member of your group to try a different condition

Repeat 1:

Condition: _____ Probability: _____ Dice numbers: _____

Here is your orchard. The coloured tree is burning; time-step 0 is complete.

Record how your fire spreads here:

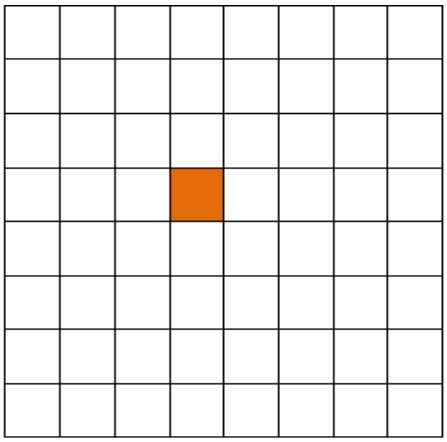


Repeat 2:

Condition: _____ Probability: _____ Dice numbers: _____

Here is your orchard. The coloured tree is burning; time-step 0 is complete.

Record how your fire spreads here:



Comparisons

Compare the different conditions within your group and discuss the following:

- How does your fire spread?
- How do the different conditions alter the spread of fire for each model?
    - Do the spreads of the fire have different shapes?
    - How quickly is the orchard covered in each case?
    - How long does it take for all the trees to be burning, or does that not happen?
    - Is one situation very different from the others? If so, why do you think this is?
- Has anything surprised you about the spread of your fire?