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**:
   1. Work out how many burning neighbours the tree has.
   2. 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.

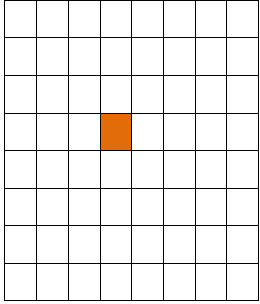
The probability of catching fire from one neighbouring tree is **1/3**.

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 Record how your fire spreads here:

is burning; time-step 0 is complete.



**Model reliability**

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

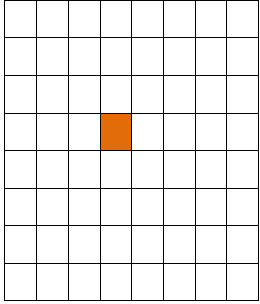
EITHER: Repeat your experiment on the next page or swap this sheet with another member of your group to try a different condition

**Repeat 1:**

**Condition: \_\_\_\_\_\_\_\_\_ Probability: \_\_\_\_\_ Dice numbers: \_\_\_\_\_\_\_\_\_\_\_**

Here is your orchard. The coloured tree Record how your fire spreads here:

is burning; time-step 0 is complete.

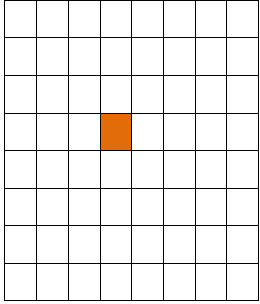


**Repeat 2:**

**Condition: \_\_\_\_\_\_\_\_\_ Probability: \_\_\_\_\_ Dice numbers: \_\_\_\_\_\_\_\_\_\_\_**

Here is your orchard. The coloured tree Record how your fire spreads here:

is burning; time-step 0 is complete.



**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?