**Section 8.1 Modeling the Spread of an Illness**

**BITS (Blue-Itchy-Toe-Syndrome) Simulation Game**

green = healthy

yellow = infected

red/pink = sick

blue = recovered

**Materials:** Dice

Health status cards:

**Set up:**

C

A

H

G

F

E

D

B

1. Read the background on BITS in Section 8.1 of the workbook.
2. Everyone in the class begins at the “Healthy” stage which is indicated by displaying the green status card. All are arranged into two concentric circles, each across from a partner.

**Begin the simulation:**

Day 0:

Two individuals in the inner circle are designated as “infected” and the information is added to the recording sheet.

C

A

H

G

F

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D

B

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Day | 🡪 | 0 | 1 | 2 | 3 | 4 | 5 |
| Healthy |  | 14 |  |  |  |  |  |
| Infected |  | 2 |  |  |  |  |  |
| Sick |  | 0 |  |  |  |  |  |
| Recovered |  | 0 |  |  |  |  |  |

* Transition to next day:
  + Since they are across from students who are infected, students G and D have to roll the dice to determine whether they get infected. A roll of “1” means they stay healthy, a roll of 2 or higher means they become infected. Suppose both G and D roll higher than a “1” so start start “Day 1” with the yellow (infected) status card.
  + Each stage of the illness lasts one day, so the two students in the inner circle who were infected on Day 0, become pink (sick) on Day 1.
  + Students who are healthy and do not become infected, remain healthy.

Day 1:

All students adjust their status cards according to the transition guidelines. Day 1 begins as shown and results are recorded.

C

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Day | 🡪 | 0 | 1 | 2 | 3 | 4 | 5 |
| Healthy |  | 14 | 12 |  |  |  |  |
| Infected |  | 2 | 2 |  |  |  |  |
| Sick |  | 0 | 2 |  |  |  |  |
| Recovered |  | 0 | 0 |  |  |  |  |

* Transition to next day:

E

C

B

A

H

G

F

D

* + Instructor selects a random number from 1-3 (suppose it’s 2) and has students in the outer circle move two places to their right (counter-clockwise) so everyone is across from a different student as shown.
  + Now there are four students who need to roll the dice: students A and F (since they are partnered with sick/pink students), and the two students across from D and G. Suppose student A rolls a “1” while the other three roll higher than a 1.
  + Students adjust their status cards by one day (pink become blue, yellow become pink, newly infected become yellow).
  + Students who are healthy and do not become infected, remain healthy.

Day 2:

All students adjust their status cards according to the transition guidelines above so that Day 2 begins as shown and results are recorded.

E

C

B

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H

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F

D

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Day | 🡪 | 0 | 1 | 2 | 3 | 4 | 5 |
| Healthy |  | 14 | 12 | 9 |  |  |  |
| Infected |  | 2 | 2 | 3 |  |  |  |
| Sick |  | 0 | 2 | 2 |  |  |  |
| Recovered |  | 0 | 0 | 2 |  |  |  |

* Transition to next day:

G

E

D

C

B

A

H

F

* + Instructor randomly selects 2 again, so students in the outer circle move two places to their right.
  + Students C and H cannot get infected from someone who has recovered, so do not need to roll the dice.
  + Student F and partner are both already infected, so do not need to roll the dice.
  + Only three students need to roll the dice: student A, and the students across from G and D. Suppose student A (who has either a strong immune system or impeccable hygiene practices!) again rolls a “1” while the other two roll higher than a 1.
  + Students adjust their status cards by one day (pink become blue, yellow become pink, newly infected become yellow).
  + Students who are healthy and do not become infected, remain healthy.

Day 3:

All students adjust their status cards according to the transition guidelines above so that Day 3 begins as shown and results are recorded.

G

E

D

C

B

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H

F

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Day | 🡪 | 0 | 1 | 2 | 3 | 4 | 5 |
| Healthy |  | 14 | 12 | 9 | 7 |  |  |
| Infected |  | 2 | 2 | 3 | 2 |  |  |
| Sick |  | 0 | 2 | 2 | 3 |  |  |
| Recovered |  | 0 | 0 | 2 | 4 |  |  |

The play continues in a similar manner until there are no newly infected individuals for two consecutive days. (Why?)