SAMPLE SPACES

LAST NAME	FIRST NAME	DATE

1 (6 points)**.** Suppose we toss a fair coin four times and record the results as a sequence, for example **HHTH** for Heads, Heads, Tails, and Heads. List all of the possible outcomes of this experiment (there are 16 of them).

Assuming that all outcomes are equally likely, find the probability that

(a) no Tails show up.

(b) Tails show up at exactly once.

(c) Heads show up twice and Tails show up twice.

(d) Heads show up three or more times in a row.

2 (3 points)**.** An experiment consist of tossing two dice: a four-sided die with numbers 1 through 4, and a six-sided die with numbers 1 through 6. Assume that all outcomes of this experiment are equally likely.

(a) Construct the sample space for this experiment.

(b) Find the probability that the two dice show the same number.

(c) Find the probability that the six-sided die shows a larger number than the other die.

3 (3 points)**.** Suppose there are 5 astronauts who are training for a space walk: Amber, Boris, Clyde, Dina, and Eliane; Boris and Clyde are male, and the rest are female. An experiment consists in choosing 2 astronauts randomly to participate in the next field test. Assume that all outcomes of this experiment are equally likely.

(a) Construct the sample space for this experiment

(b) What are the chances that Clyde gets chosen?

(c) What are the chances that both participants are female?

4 (2 points)**.** An experiment consists of buying a carton of 12 eggs and counting how many of them are cracked. Describe the sample space.

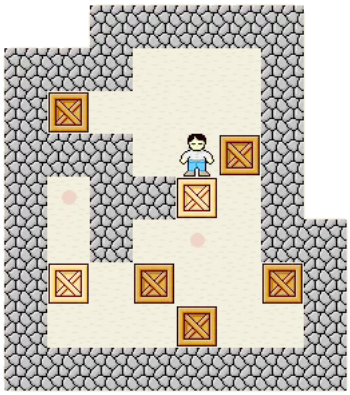
5 (2 points)**.** Describe the sample space for the experiment where we shuffle a deck of 3 playing cards: and Ace, a King, and a Queen.

6. Toss a fair coin 20 times and record the sequence of Heads and Tails.

(a) How large is this sample space?

(b) What would be the probability that no Tails show up?

7. A character in a videogame moves along a rectangular grid in discrete turns. In one turn, it can step into one of the four adjacent grid tiles.



(a) If no objects or walls are ever blocking the character's path, describe the sample space of outcomes after moving the character twice. You can visualize this sample space as a set of tiles.

(b) What does the sample space look like after making many moves?

(c) Describe the sample space of outcomes after moving the character 3 times in the maze pictured above, assuming that boxes are too heavy to move.

(d) Do it again, but now assuming that boxes can be pushed, unless there's something blocking the way on the other side of the box.