Algebra II Journal

Module 4: Inferences

Predicting the Future

This journal belongs to:

Module 4: Inferences

Algebra II Journal: Reflection 1

Let's perform a **simulation** to answer the question "Can lightning strike the same place twice?"

Storm chaser and photographer Dan Robinson researched this question and determined that there is *approximately* a 25% chance that lightning will strike the same place twice. You can read his research report at Lightning Myths: Lightning Never Strikes the Same Place Twice.

First, develop a hypothesis regarding lightning striking the same place twice. Record it below. Identify the population parameter as given by Mr. Robinson's report above.

Instead of using given data, let's collect some data! Since we cannot go out and "storm chase" a bunch of lightning storms, you will need a **probability model** in order to collect the data. This is just a tool to help collect the data. We will create a pretend lighting storm using a simple coin. This will be your probability model for the experiment.

Place a large sheet of paper on the floor. Stand above the sheet of paper and flip your coin. Using a marker, make a dot where the coin fell. The falling coin represents a lightning bolt, and the dot is where the bolt hit the ground. Now, flip the coin again. Did the 'lightning bolt' strike the same place twice?

Repeat this experiment ten times. Be sure to record how many times the lightning (i.e., coin) hits the original spot you marked.

Trial	How many times the lightning hit the original spot
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Now analyze the lightning bolt results.
Form your conclusions about this experiment by responding to the following reflection questions. Submit your responses to your teacher.

How close were your results to the population parameter?

Does your experiment support or reject your hypothesis? Use examples from your data, the population parameter, and what you know about statistics to support your answer.

Based on the results of your experiment, would you predict lightning to strike the same place twice in the next lightning storm? Why or why not? Use the results of your experiment to justify your answer.

Algebra II Journal: Reflection 2

Respond to the following reflection questions and submit to your teacher.

Form your hypothesis about whether the online number cube roller is truly random. Be sure to reference the population parameter.

Roll the interactive number cubes 100 times. Record the data in the table below.

Trial (roll)	Number Shown on Cube A	Number Shown on Cube B
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

(table continued)

Trial (roll)	**Number Shown on Cube A**	**Number Shown on Cube B**
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
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59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		

(table continued)

Trial (roll)	Number Shown on Cube A	Number Shown on Cube B
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

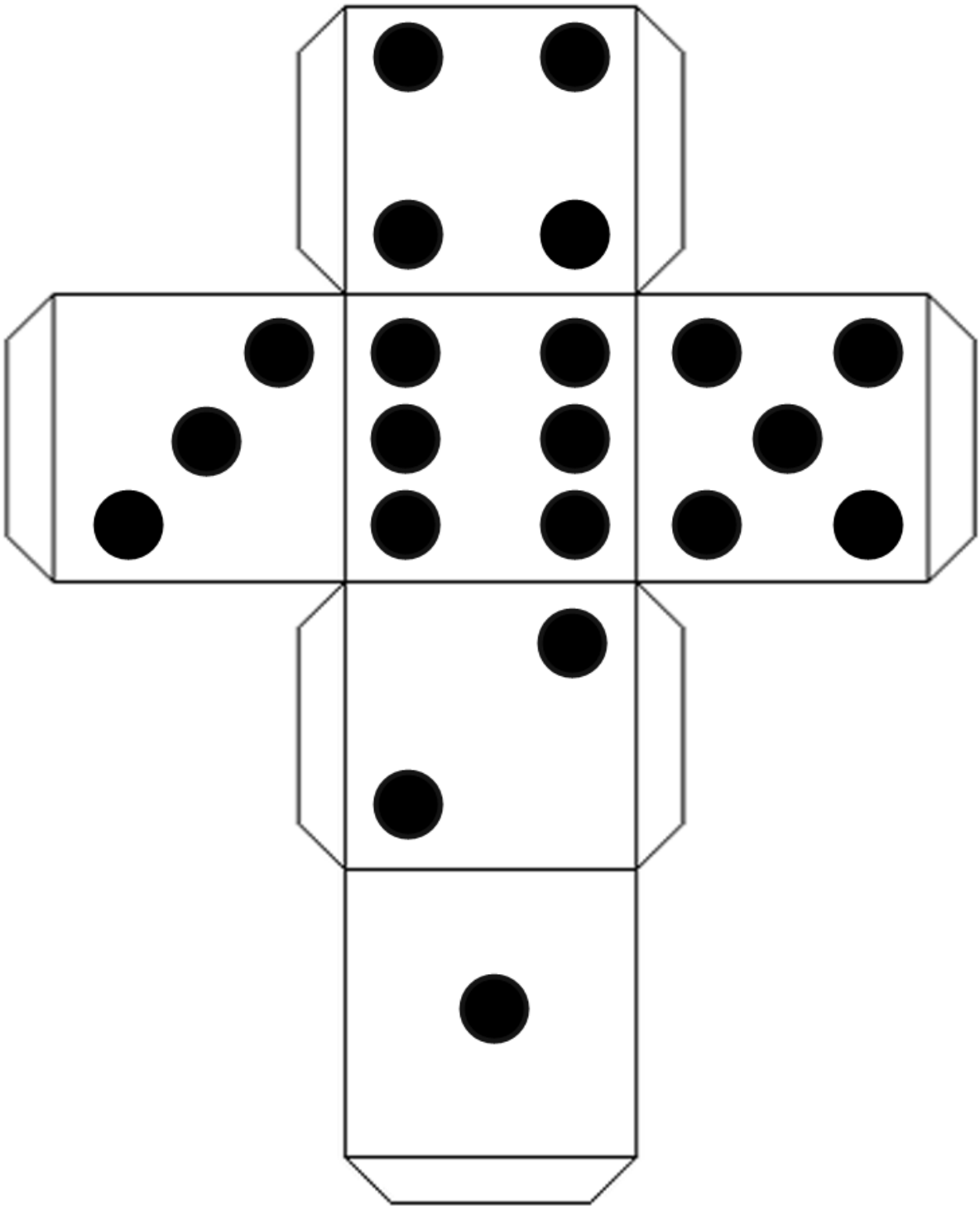
Based on your data, do you have enough evidence to support or reject your hypothesis? Be sure to use specific mathematical data and statistical references to support your claim.

Algebra II Journal: Reflection 3

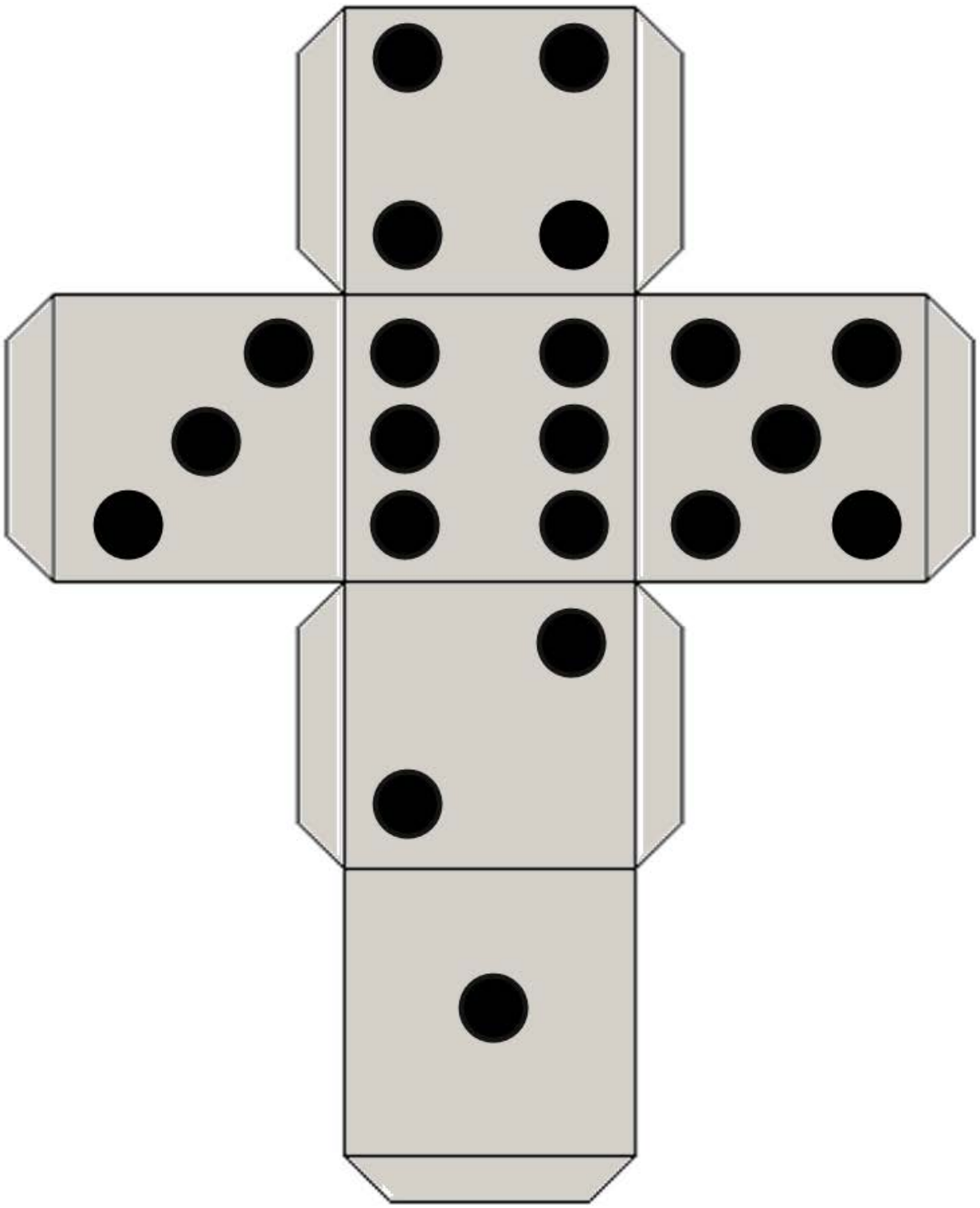
There are some statistical experiments you can conduct right in your own school! Here is an experiment for you to perform. You will need a partner.

- Print the number cube nets shown on the following pages onto card stock, if possible.
- Cut out the nets.
- Ask your partner to tape a penny to the back of one of the faces of one of the nets.
- Ask your partner to fold the corners and tape the nets together to form two three-dimensional number cubes. The penny should now be hidden from your view.

Cube A



Cube B



Consider what you know about the number cubes now. Is it a fair pair of number cubes? (In other words, do the numbers on the cubes have an equal chance of showing up?)

Respond to the following reflection questions and submit to your teacher.

Form a hypothesis about your number cubes. For example, you might state: "I believe one of these number cubes will favor the number 1 when rolled."

Determine the population parameter. For example, the population parameter for a standard six-sided number cube will have a mean of 1/6 for the number 1 showing when the number cube is rolled.

Perform a statistical experiment with your number cubes. That is, roll your number cubes 50-100 times. Record the numbers on the cubes that are observed with each roll.

Trial (roll)	Number Shown on Cube A	Number Shown on Cube B
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
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35		
36		
37		
38		
39		
40		

(table continued)

Trial (roll)	Number Shown on Cube A	Number Shown on Cube B
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
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78		
79		
80		
81		

(table continued)

Trial (roll)	Number Shown Cube A	Number Shown on Cube B
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

Determine the sample mean from your data.

Do you have enough statistical evidence to support or reject your hypothesis? Use what you know about statistics to support your conclusion.

Can you determine which number cube contains the penny? Use the results of your experiment to support your answer.