# Hypothesis Cubes – Nature of Science Lesson

**Explain the cube rule to students:**
No touching the cube, moving the cube or causing it to move in ANY way!

**Directions:**
Observing the five visible sides, determine what is on the bottom of the cube. Find as many patterns (evidence) to support your idea as you possibly can.

**Method:**
1) First, place Cube 1 on desk for students being careful they don't see the bottom.
2) Give them 5 minutes to determine what is on the bottom and write down their lines of evidence – the patterns they see that support both the color and number they determine should be on the bottom.
3) Share patterns found on Cube 1 to support the number and color they think is on the bottom of Cube 1.
4) Without letting students see the bottom of Cube 1, replace it with Cube 2 and give them the same cube rule and directions.
5) Give them 15 minutes to determine what is on the bottom and write down their lines of evidence – the patterns they see that support the color, numbers and name they determine should be on the bottom.
6) With a few minutes left, instruct them to come up with their final evidence supported guess as to exactly what is on the bottom of Cube 2.
7) Share patterns found on Cube 2 to support the conclusions groups have come to about what should be on the bottom.
8) Let them look at the bottom of Cube 2. DO NOT **EVER** GIVE THEM THE "ANSWER"!

**Hints, Tips and Variations:**
- You can put students in groups of four sitting on the four sides of a desk or table. Then add the rule that they are not allowed to move from their seats. This forces students to communicate with each other about the sides of the cube they can see.
- It is helpful to tell them that there are about 10 patterns they can find for Cube 1.
- You might need to give them a hint about opposite side connections but generally at least one group will figure this out.
- You can give them the strategy of drawing all the sides on a piece of paper so they can see them all at once if they don't come up with this strategy on their own.
- You can have them list the "variables" they are trying to support with patterns of evidence – color, name, gender, top number, bottom number, etc.
- Sometimes for Cube 2, you might want to give a hint about the names and numbers being connected. Depends on the time you have and if students catch this on their own.
- Some groups will write the name they guess without using block letters. Good discussion about details!
- You want at least one group to come up with a competing hypothesis for Cube 2, so artfully give hints that push some of them in a different direction if necessary.

**Cube 1 Hypothesis and Patterns**

**Hypothesis:** It has the number 2 and it is shaded or grey in color.

Patterns:

- There is a series of numbers 1, 3, 4, 5, 6 and 2 is missing.
- Opposite sides are opposite colors, so if the top is white the bottom should be grey.
- Opposite sides add up to 7 like a normal die – 1+6 and 3+4 – so if 5 is on the top, then the bottom number should be 2.
- Opposite sides are odd and even. 5 is odd so the bottom number should be even.
- There are three white sides and only two grey sides, so the bottom should be grey.
- Even numbers are shaded grey. A 2 on the bottom means it should be shaded grey as well.

**Cube 2 Hypotheses and Patterns**

**Hypothesis 1:** It is red, has the numbers 4 on the bottom and 8 on the top and the name is FRANCINE.

**Hypothesis 2:** It is red, has the numbers 4 on the bottom and 5 on the top and the name is FRANN or FRANI or FRANY.

**Hypothesis 3:** It is red, has the numbers 4 on the bottom and 7 on the top and the name is FRANCIS.

**Patterns:**

- Opposite sides are the same color so because the top is red, the bottom should also be red.
- Opposite sides have a male and then a female names so the name on the bottom should be a female name.
- Opposite sides have the same number on the bottom so the bottom number should be 4.
- The top right number is the number of letters in each name – 5 for FRANK, 3 for ROB, 7 for ROBERTA, 6 for ALBERT, 4 for ALMA.
- The bottom number is the number of letters opposite side names have in common – 3 for **ROB** and **ROB**ERTA, 2 for **AL**BERT and **AL**MA. So we know with a 4 for **FRANK** that the bottom name should start with **FRAN**.
- The competing hypotheses come from reasoning for the top right number. It could be 8 because there is a series of numbers – 3, 4, 5, 6, 7 – so 8 would be the next number and it can't be 2 because of the lower number giving the name at least four letters. OR It could be 5 because the top right numbers on opposite sides add up to 10 – 3+7 and 6+4 – so with a 5 on top it would also have to be a 5 for the top right number on the missing side. OR It could be 7 because …
- There are all kinds of other crazy patterns, some with complicated algorithms, to support their hypothesis.

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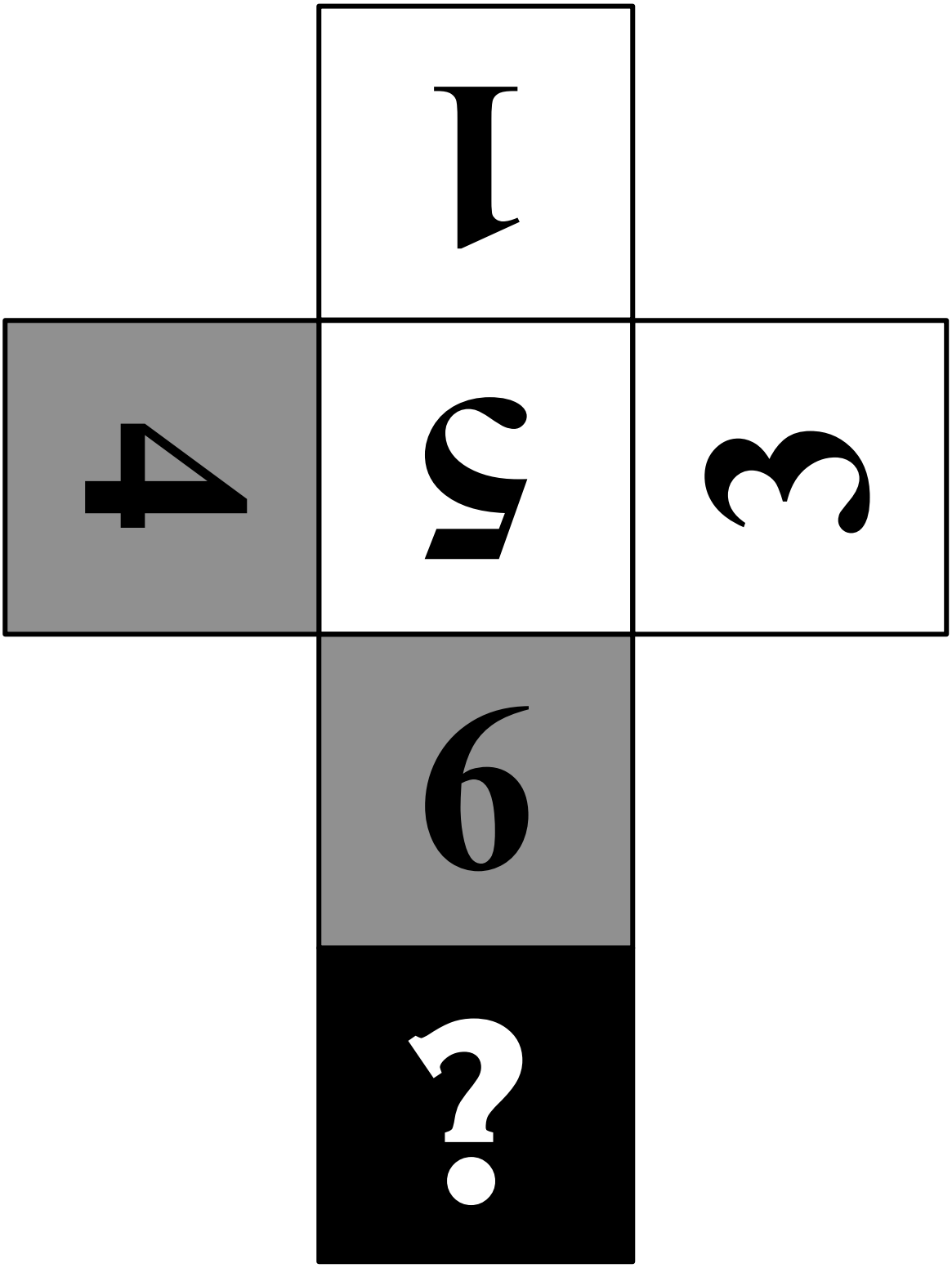
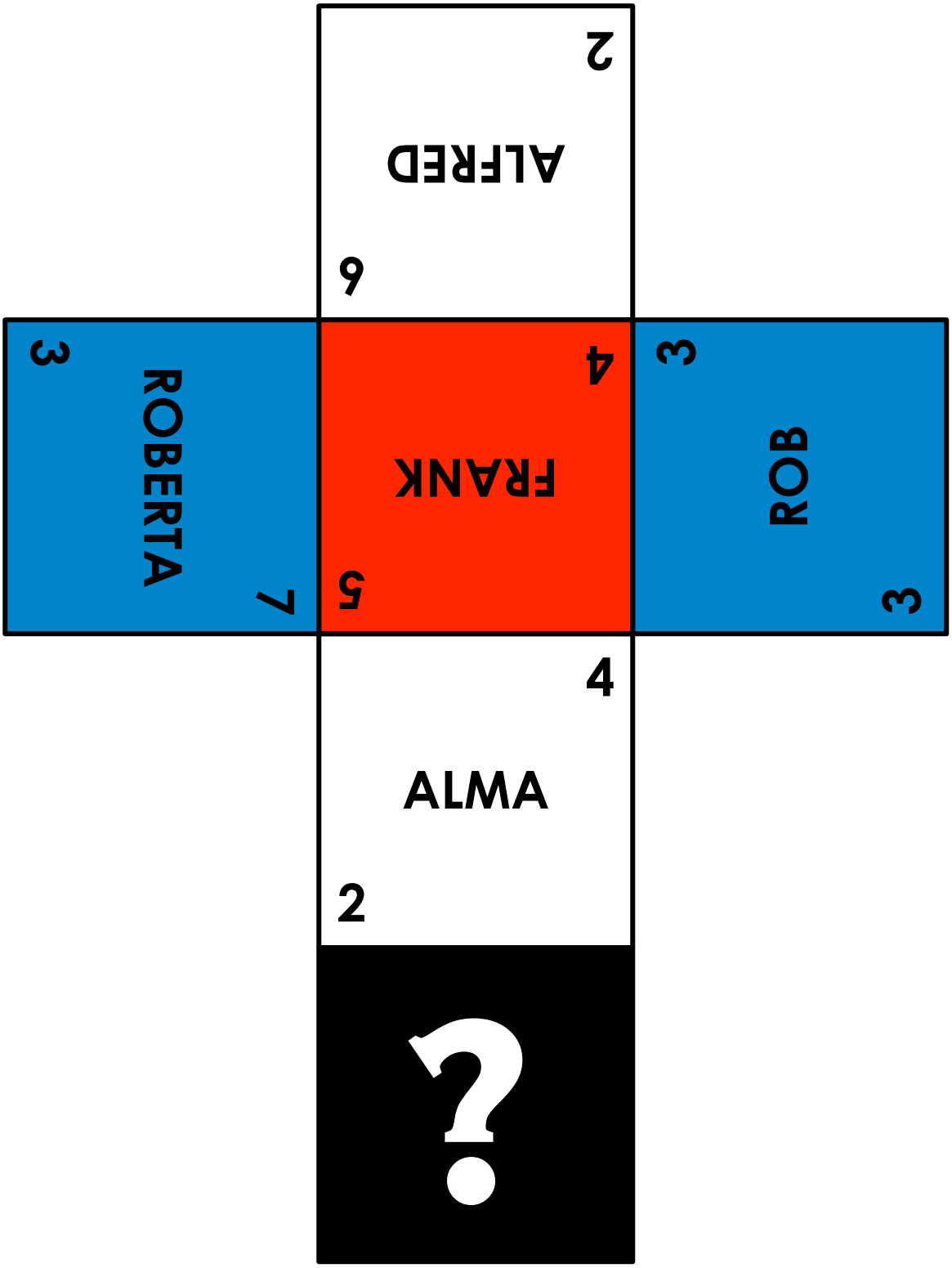
Cube 1



Cube 2



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# Design-Your-Own Cube