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I spend countless hours writing, researching, editing and generating graphics/charts for each question. I want to continue creating useful content for you to use - however, I also want to ensure my work is fairly compensated.

Therefore, below are the terms and conditions for use of our materials.

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- Distributing and/or posting our content online (for example, on social media or a blog).

Thank you for supporting us. And, we look forward to helping you with your teaching practice. Please feel free to reach out to us if you have any questions or suggestions.

Sincerely,

Kent
REAL Science Challenge Founder
Science Department Head (Burnaby South Secondary)

TYPE 1: COMPETING THEORIES

- Students are given a theory and then asked if they agree or disagree with the theory. Or, they're given 2 different theories explaining the same phenomenon and asked which one they agree with. Students need to tell me (a) whether they agree or disagree, (b) why they agree or disagree, and (c) to provide a counter example or an alternate explanation.

SAMPLE QUESTION: Competing Theories

Lemons can be juiced by cutting a lemon in half and then pressing it against the dome of a citrus juicer. One day, Leo collected 15 mL of lemon juice using a citrus juicer. Leo's friend, Brian, suggested Leo heat up the lemons before juicing them. Brian said that heating up the lemon before juicing will result in more juice being collected.



Do you agree with Brian's hypothesis? Draw a model as part of your explanation.

For your response:

1. Choose a side (“Yes, I agree” or “No, I disagree”),
2. Explain why you agree or disagree. Hint: connect particle movement (according to KMT) to whether more or less juice will be collected, and
3. Provide a situation where the opposite may be true.

TYPE 2: SHOW AND TELL

- Students are asked to predict a trend. In their response, students need to first graph out their trend and then write a proper hypothesis statement that includes an If, then, because, and however statement.

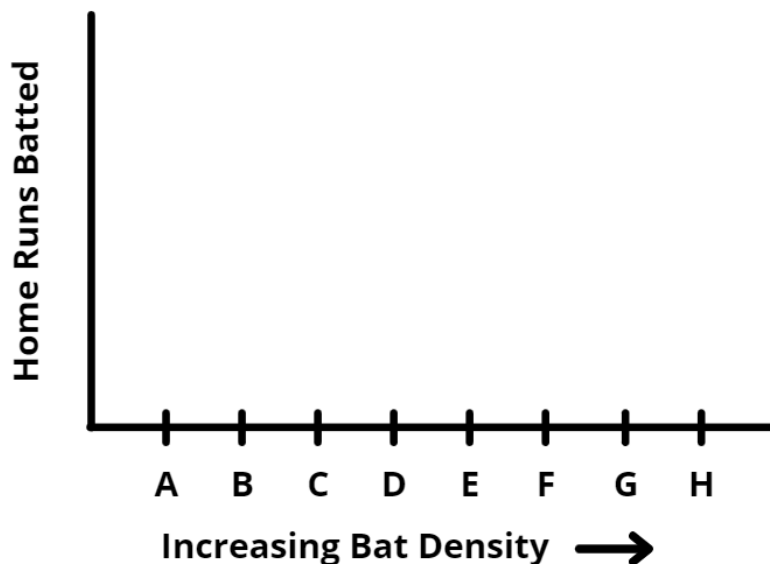
SAMPLE QUESTION: Show and Tell

Baseball players want a bat that is easy to control and makes it easy to swing effectively and efficiently. However, they also want one that is sturdy enough to hit the ball hard so that the ball travels farther. Thus, ball players may test a variety of bats.

Assume we want to study the effect of bat density on the number of home runs a team will hit in a single season. We provide a baseball team with 7 bats (A, B, C, D, E, F, G) of increasing density (A is the least dense, G is the densest). Assume all bats we're testing have the same size and shape.



On the graph below, sketch your prediction of how using bats of increasing density will affect the number of home runs hit in a single season. In other words, if players use bats of increasing density, will the number of home runs struck increase, decrease, or remain the same? After, write your prediction out using the "if...then...because...however..." format below.



Prediction

If bat density increases, then home runs batted will *<increase/decrease/stay the same>* because *<provide reason/explanation>*. However, *<provide counter example>*...

TYPE 3: MULTIVERSE

- Students are asked to solve a problem using what they've learned in class while following the rules of an alternate reality. In their response, students need to draw connections with what they learned in science class to the alternate reality.

SAMPLE QUESTION: Multiverse

Let's assume a very small amount of alien genetic material has been discovered. It's a double-helix structure like our DNA. However, instead of having phosphate (P), sugar (S), and 4 bases (A, G, C, T), this alien genetic material is made up of the following objects in the following amounts:

M	K	E	N	T	L	U	I
2	12	3	1	2	12	1	3

Draw the structure of this genetic material below. And, explain how you came up with this structure.

TYPE 4: ANALOGOUS TASK

- Students are asked to solve a problem using what they've learned in class while following the rules of an alternate reality. In their response, students need to draw connections with what they learned in science class to the alternate reality.

SAMPLE QUESTION: Analogous Task

The foods and drinks we consume can be acidic or basic. For example, lemons, which are sour, are acidic. But, did you know that potatoes, which are not sour, are also acidic. Hence, this is why both lemon batteries and potato batteries can be made in the science lab.



Rank the following foods in from most acidic to most basic (ie. from lowest pH to highest pH). After, explain how you came up with your rank.

- | | | | |
|-----------------------------|--------------------------|-----------------------|----------------------------|
| 1. <i>Asparagus, stalks</i> | 6. <i>Carrot Juice</i> | 11. <i>Crackers</i> | 16. <i>Oranges</i> |
| 2. <i>Bananas</i> | 7. <i>Chicken</i> | 12. <i>Grapes</i> | 17. <i>Rice, white</i> |
| 3. <i>Beef, ground</i> | 8. <i>Cheddar Cheese</i> | 13. <i>Honey</i> | 18. <i>Spinach, fresh</i> |
| 4. <i>Bread</i> | 9. <i>Corn, sweet</i> | 14. <i>Mangos</i> | 19. <i>Tomatoes, fresh</i> |
| 5. <i>Butter</i> | 10. <i>Crab</i> | 15. <i>Mayonnaise</i> | 20. <i>Watermelon</i> |

Lowest pH

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

Highest pH

Explanation:
