

Balloon Clue Model

Use evidence to test an unseen life process.

LS.1.e.i "developing and using models construct and use models and simulations to illustrate, predict, and/or explain observable and unobservable phenomena, life processes, or mechanisms"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline statements that tell what the particle model represents, circle predictions and test results, and number the statements that explain when the model should be revised.

Modeling Yeast Fermentation

- ① Students investigated why bread dough rises by building a model of yeast fermentation. They placed warm water, sugar, and yeast in a bottle and stretched a balloon over its opening. The balloon gave them an observable clue, but it could not show what happened inside the liquid. In their particle model, yeast cells used sugar and released carbon dioxide gas. They drew gas particles moving from the liquid into the balloon. The model represented an unobservable process, not a photograph of actual cells or molecules.
- ② Next, the group used the model to make a prediction. If yeast released more carbon dioxide when more sugar was available, then a bottle with extra sugar should inflate its balloon more, as long as temperature and yeast amount stayed the same. They tested this prediction with two bottles. The extra-sugar balloon became larger. This result supported the model, but did not prove every detail. For example, the drawing did not include the many chemical reactions inside each yeast cell.
- ③ Models are useful because they can be changed and tested. Suppose a third bottle with no sugar produced little or no balloon inflation. That outcome would fit the idea that yeast needs sugar to release much carbon dioxide. If the no-sugar balloon inflated just as much as the others, the group would need to check its controls and revise the model or investigate another cause. A useful model connects evidence to an explanation and helps scientists predict what they may observe next.

2 ANSWER WITH EVIDENCE Use the passage

1 What does the balloon show, and what does the particle model explain that the balloon cannot show?

2 What did the model predict would happen in the bottle with extra sugar? Name the two conditions that had to stay the same.

3 How did the larger extra-sugar balloon affect the model? Why did it not prove every detail of the model?

4 What result from the no-sugar bottle would fit the model? What should the group do if that balloon inflated as much as the others?

3 YOUR TURN Your own words

In two panels, construct a particle model showing how dissolved O_2 moves from water across a fish's gill surface into its blood, while CO_2 moves from blood into the water. Label dissolved O_2 , gill surface, blood, and CO_2 , then write two sentences that explain the movement and predict what could happen if the water had less dissolved O_2 .

PART 1 • READ AND MARK

Underline statements that tell what the particle model represents, circle predictions and test results, and number the statements that explain when the model should be revised. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What does the balloon show, and what does the particle model explain that the balloon cannot show?	The balloon shows an observable clue that gas was produced. The particle model explains that yeast cells use sugar and release carbon dioxide gas that moves into the balloon.
2	What did the model predict would happen in the bottle with extra sugar? Name the two conditions that had to stay the same.	Its balloon should inflate more. Temperature and the amount of yeast had to stay the same.
3	How did the larger extra-sugar balloon affect the model? Why did it not prove every detail of the model?	It supported the model's prediction. It did not prove every detail because the model left out many chemical reactions inside each yeast cell.
4	What result from the no-sugar bottle would fit the model? What should the group do if that balloon inflated as much as the others?	Little or no balloon inflation would fit the model. The group should check the controls and revise the model or investigate another cause.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1 shows dissolved O_2 in water beside the gill surface, and panel 2 shows O_2 particles crossing into blood while CO_2 particles cross into water. If water has less dissolved O_2 , less O_2 will move into the blood, so the fish may have less oxygen available.

Accept equivalent descriptions of the balloon as evidence of gas production and the particle model as an explanation of an unseen process. For the model task, accept accurate labeled particle models that show O_2 moving into blood, CO_2 moving into water, and a reasonable prediction about lower dissolved O_2 .