

Name \_\_\_\_\_

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## Gluten-Free Baking

A new fad is sweeping the nation's fancier food stores: gluten-free baking. Most people have never heard of gluten unless they've gotten wind of this trend. However, for those who are allergic to gluten, it's much more than a trend.

People who are allergic to gluten abstain from eating it; they don't want it in their food. Yet they still like the taste of regular baked goods. So they turn to gluten-free baked goods, which look just like regular ones. Then what makes them different? In order to understand the nature of gluten-free baked goods, it is necessary to examine the nature of gluten itself.



Gluten, often thought of as a matrix or scaffolding, is a protein present in wheat. In order to make flour, a necessary ingredient in almost any type of baking, one must grind up wheat. But when wheat is ground into flour, the gluten doesn't disappear. It's still there. So, the challenge lies in the removal of gluten from wheat flour.

Unfortunately, it's impossible to remove gluten from wheat. But don't despair! Many substitutes for flour exist, and since these aren't made of wheat, they don't contain gluten. These substitutes include rice, maize, tapioca, and more. Flax meal, a very nutritious grain, can be used in a similar way as flour, though it has larger particles. Even beans can be ground up to make bean flour, also known as soy flour. Oats are yet another grain that can be ground into flour. These flours do not contain gluten, and are therefore suitable to make gluten-free flour. But while there are many good substitutes, it is still important to be cautious; some grains are closely related to wheat and therefore also contain gluten. Rye is an example of a grain which, genetically speaking, is too similar to wheat to be used in gluten-free baking.

So that was easy, right? With so many available substitutes, who needs *wheat* flour anyway? But wait...not so fast. Remember that gluten is like a matrix, similar to a three-dimensional grid. Without gluten, a cake will not have any structure and will not rise. Its ingredients—sugar, eggs, butter, chocolate—will sit in a sad heap at the bottom of the pan. You'll be left with puddle, and you might as well have cooked a Mars bar in the oven. A baked good needs gluten for the ingredients to cling to, like vines on an arbor, so it will assume the desired shape and structure. So, even though we can find many good substitutes for wheat flour (that don't have gluten in them), we still need to find something that will replace the *function* of gluten. We need a new matrix.

When searching for a new matrix, though, it is important to consider how it will expand during the course of baking. How does a cake become big and fluffy? Flour certainly isn't big and fluffy—it sits packed densely in a heavy sack. A cake only rises because a leavening agent is present in the batter. A leavening agent is any substance that leavens something, or makes it rise by producing bubbles. Yeast and sodium bicarbonate (baking soda) are examples of leavening agents. They produce bubbles that get caught in the gluten matrix while the cake bakes. So, similar to the inflation of a fancy air mattress, the air fills the first section quickly.

When that section is full, the air continues on to fill the next section. This process continues until the mattress is full. The new matrix must be able to trap air in a way similar to the fancy mattress. This is the only way to make the cake rise.

To form a matrix, we need the ingredients to stick together. This will ensure that they are leavened properly by the leavening agent. Certain ingredients, called binders, work like glue, similar to gluten. (And since glue sounds like gluten, it is also a very good way to think about gluten.) Eggs are binders, because a broken egg is sticky. Fruit is also often a binder. A very expensive powder called xanthan gum is a binder. (You could guess that because chewing gum is sticky.) Other kinds of gums exist as well, such as guar gum and acacia gum. These binders stick to each other and won't come apart when bubbles rise up through the batter. This means the batter will retain its shape. It won't cave in on itself (like the Mars bar) and it won't fall apart.

With so many binders, no one needs boring old gluten. You'll have invented a new and exciting matrix all on your own, and you'll be a friend to lovers of gluten-free baking!

1) As used in paragraph 2, which is the best definition for **abstain**?

- A. refrain
- B. detest
- C. stop
- D. ignore
- E. decelerate

2) Over the course of the passage, the author compares gluten to

- I. scaffolding
- II. glue
- III. a building

- A. I only
- B. II only
- C. I and II only
- D. II and III only
- E. I , II, and III

3) According to the author, gluten is

- A. protein
- B. flour
- C. leavening agent
- D. chamber
- E. vessel

- 4) In paragraph 6, the author tells us that “Flour certainly isn’t big and fluffy—it sits packed densely in a heavy sack.” This statement is intended to
- I. illustrate the difficulties involved in handling large quantities of flour
  - II. emphasize the idea that flour needs something extra to make it expand
  - III. clarify the notion that baked goods that lack a leavening agent will not rise
- A. I only  
B. I and II only  
C. II and III only  
D. I , II, and III
- 5) In paragraph 6, the author compares filling an air mattress to the
- A. flour in a cake  
B. bubbles in a cake  
C. gluten in a baked good  
D. ingredients in a baked good  
E. flour in a baked good
- 6) Based on information in paragraph 6, which of the following could be used as a leavening agent?
- A. water  
B. Coca-Cola  
C. orange juice  
D. milk  
E. iced tea
- 7) The author's tone can best be described as
- A. matter-of-fact  
B. enthusiastic  
C. sarcastic  
D. annoyed  
E. fanatical



## Answers and Explanations

1) A

Core Standard: **Craft and Structure**

**abstain** (*verb*): to hold oneself back voluntarily, especially from something regarded as improper or unhealthy.

In paragraph 2, we learn that “people who are allergic to gluten abstain from eating it; they don’t want it in their food.” So we know that those who *abstain* from eating gluten refuse it or go voluntarily without it. If you refuse something this means you refrain from partaking in it, as in both cases the refusal is voluntary. Therefore **(A)** is correct.

If you *detest* something, you strongly dislike it. Those who cannot eat gluten do not necessarily dislike it. They are just allergic to it. They still search for foods that mirror the taste found in those that contain gluten. This means **(B)** is incorrect.

*Stop* implies an action that has been in progress in the recent past. But people who are allergic to gluten may have resisted eating it for a long time. Abstaining from gluten continuously is not the same as stopping eating gluten at one point. This means **(C)** is incorrect.

*Ignore* means not to pay attention. But those who cannot eat gluten must pay special attention to it, so they can avoid it and come up with viable substitutes. Therefore **(D)** is incorrect.

*Decelerate* means to slow down. Although one may slow down before stopping a certain action, this word does imply refusal. So **(E)** is incorrect.

2) C

Core Standard: **Key Ideas and Details**

In paragraph 3, the author writes, “Gluten, often thought of as a matrix or scaffolding, is a protein present in wheat.” This supports **option (I)**.

In paragraph 7, the author writes, “Certain ingredients, called binders, work like glue, similar to gluten.” This supports **option (II)**.

The author does not compare gluten to a building. This eliminates **option (III)**. Therefore **(C)** is correct.

3) A

Core Standard: **Key Ideas and Details**

In paragraph 3, we learn that “gluten, often thought of as a matrix or scaffolding, is a protein present in wheat.” Therefore **(A)** is correct.

The passage does not provide information to support choices **(B)**, **(C)**, **(D)** and **(E)**. Therefore they are incorrect.

4) D

Core Standard: **Integration of Knowledge**

The passage does not provide information about the difficulties involved in handling large quantities of flour. This eliminates **option (I)**.

In paragraph 6, the author tells us that “a cake only rises because a leavening agent is present in the batter.” Although there are many good flour substitutes, they still will not work correctly unless a leavening agent is added to them. The fact that flour is dense and heavy emphasizes the idea that flour needs something extra to make it expand. This supports **option (II)**.

The specific thing that baked goods need in order to rise is “a leavening agent,” as we learn in paragraph 6. Without the leavening agent, baked goods will not rise, because flour itself is dense, not “big and fluffy.” Knowing this property of flour helps clarify the notion that baked goods lacking a leavening agent will not rise. This supports **option (III)**.

This means **(D)** is correct.

5) B

Core Standard: **Key Ideas and Details**

In paragraph 6, we learn that the leavening agent produces “bubbles that get caught in the gluten matrix while the cake bakes. So, similar to the inflation of a fancy air mattress, the air fills the first section quickly.” The air mattress analogy corresponds to the image of gluten as a three-dimensional grid. The leavening agent produces bubbles that get trapped in the matrix, slowly inflating it and giving it shape. In the air mattress, the chambers filling up with air represent the bubbles in the matrix. This means **(B)** is correct.

The passage does not provide information to support choices **(A)**, **(C)**, **(D)**, and **(E)**. Therefore they are incorrect.

6) B

Core Standard: **Integration of Knowledge**

In paragraph 6, we learn that “a leavening agent is any substance that leavens something, or makes it rise by producing bubbles.” Coca-Cola is the only liquid among the choices that has bubbles (that make it rise or expand), because it is carbonated. Since it is the only liquid that produces bubbles, we can infer that **(B)** is correct.

The passage does not provide information to support choices **(A)**, **(C)**, **(D)**, and **(E)**. Therefore they are incorrect.

7) B

Core Standard: **Integration of Knowledge**

The author encourages the reader to try new ways of baking and explains the chemical process with accessible images. The author speaks directly to the reader in sentences like “But don’t despair!” and “So that was easy, right?” The use of exclamation points also indicates excitement and enthusiasm. The passage ends on a very upbeat note: “You’ll have invented a new and exciting matrix all on your own, and you’ll be a friend to lovers of gluten-free baking!” All of these details lead us to understand that the tone is enthusiastic. Therefore **(B)** is correct.

The tone has too much emotion to be described as matter-of-fact. This means **(A)** is incorrect.

There is no language in the passage to make us think the author is being sarcastic. This makes **(C)** incorrect.

The author may be silly at times, but he or she is certainly not annoyed, so **(D)** is incorrect.

Although the author is enthusiastic, he or she is not fanatical, as this is too strong. Therefore **(E)** is incorrect.

**8) D**

Core Standard: **Integration of Knowledge**

Using the information in the passage, we know that a recipe for a successful cake needs flour, a binder, and a leavening agent. Only the fourth recipe contains everything necessary to make a gluten-free carrot cake: carrots, two types of binders (eggs and applesauce), a leavening agent (baking soda), and gluten-free flours (soy and oat). Therefore **(D)** is correct.

In the first recipe, the all-purpose flour, which is made of wheat, contains gluten. It would not be gluten-free, so **(A)** is incorrect.

The second recipe contains rye, which is closely related to wheat and still contains gluten, as discussed in paragraph 4. It also lacks a leavening agent and so would be flat. This means **(B)** is incorrect.

The third recipe would make a gluten-free carrot cake, but it would not rise because it does not contain a leavening agent. This makes **(C)** incorrect.

In the final recipe, the wheat flour, which is made of wheat, contains gluten. It would not be gluten-free, so **(E)** is incorrect.