Name: _____ Date: _____

The Goo That Hardens When You Punch It

Circle group

Mix cornstarch with water in a bowl. You get a strange goo that seems to break the rules. Poke it gently. Your finger sinks in, as if it were a thick liquid. Slap it hard, or squeeze it into a ball. Now it feels firm. Open your hand, and the ball melts into a puddle. Some people call this goo oobleck.

Most liquids act the same way no matter how hard you push. Water flows whether you stir it slowly or fast. A liquid that changes with force, like this goo, is called a non-Newtonian fluid. The name comes from Isaac Newton, who studied how ordinary liquids flow.

Scientists are still working out the details. But here is the main idea. The goo is not a smooth liquid. It is made of countless tiny grains of starch floating in water. When you press slowly, the grains have time to slide past each other. The water helps them slide. When you hit it fast, the grains cannot move out of the way. They jam together. The mixture acts like a solid for a moment.

Engineers have tried making materials that stay flexible until they are hit. One example is padding that stiffens on impact. The starch can clog drains. So cooks and teachers scrape leftover goo into the trash.

Questions

1. What two ingredients make the goo?

_____

_____

2. What happens when you slap the goo hard?

_____

_____

3. What is a liquid that changes with force called?

_____

_____

4. What is the goo made of on a tiny scale?

_____

_____

5. Why does a quick hit make the goo act like a solid?

_____

_____

6. Why is water not a non-Newtonian fluid?

_____

_____

Words to know

fluid: a liquid or gas that can flow
starch: a white powder found in foods like corn and potatoes
grains: tiny, hard pieces of something
impact: a sudden hit or crash

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Goo That Hardens When You Punch It

Triangle group

Mix cornstarch with water in a bowl, and you can make a strange goo that seems to break the rules. Poke it gently and your finger sinks in as if it were a thick liquid. Slap it hard, or squeeze it into a ball, and it suddenly feels firm. Open your hand and the ball melts into a puddle again. Some people call this goo oobleck.

Most liquids behave the same way no matter how hard you push them. Water, for example, flows whether you stir it slowly or quickly. A liquid that changes with force, like this goo, is called a non-Newtonian fluid, after Isaac Newton, who studied how ordinary liquids flow.

Scientists are still working out the details of why this happens, but here is the main idea. The goo is not a smooth liquid. It is made of countless tiny grains of starch floating in water. When you press slowly, the grains have time to slide past one another, and the water acts as a lubricant between them. When you hit it fast, the grains cannot move out of the way. They jam together, and the mixture acts like a solid for a moment.

Engineers have experimented with materials that stay flexible until they are hit, such as padding that stiffens on impact. Because the starch can clog drains, cooks and teachers scrape leftover goo into the trash.

Questions

1. What two ingredients make the goo?

_____

_____

2. What happens when you slap the goo hard?

_____

_____

3. What is a liquid that changes when you push it with different force called?

_____

_____

4. What is the goo made of on a tiny scale?

_____

_____

5. Why does a quick hit make the goo act like a solid?

_____

_____

6. Why is water not a non-Newtonian fluid?

_____

_____

Words to know

fluid: a liquid or gas that can flow
starch: a white powder found in foods like corn and potatoes
grains: tiny, hard pieces of something
lubricant: something slippery that helps surfaces slide
impact: a sudden hit or crash

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Goo That Hardens When You Punch It

Square group

Mix cornstarch with water in a bowl, and you can create a peculiar goo that seems to defy the ordinary rules of liquids. Poke it gently and your finger sinks in as though it were a thick liquid. Slap it hard, or squeeze it into a ball, and it suddenly feels firm. Open your hand, and the ball melts back into a puddle. Some people call this remarkable goo oobleck.

Most liquids behave in exactly the same way no matter how forcefully you push on them. Water, for example, flows whether you stir it slowly or quickly. A liquid whose behavior changes with the amount of force applied, like this goo, is called a non-Newtonian fluid, in honor of Isaac Newton, who studied how ordinary liquids flow.

Scientists are still working out the finer details of why this happens, but the main idea is simple enough. The goo is not a smooth liquid at all. It is made of countless tiny grains of starch floating in water. When you press slowly, the grains have time to slide past one another, and the water acts as a lubricant between them. When you hit it fast, the grains cannot get out of the way in time. They jam together, and for a moment the mixture acts like a solid.

Engineers have experimented with materials that stay flexible until they are struck, such as padding that stiffens on impact. Because the starch can clog drains, cooks and teachers scrape any leftover goo into the trash.

Questions

1. What two ingredients are used to make the goo?

_____

_____

2. What happens when you slap the goo hard?

_____

_____

3. What is a liquid that changes with the amount of force applied called?

_____

_____

4. What is the goo made of on a tiny scale?

_____

_____

5. Why does a quick hit make the goo act like a solid for a moment?

_____

_____

6. Why is water not considered a non-Newtonian fluid?

_____

_____

Words to know

fluid: a liquid or gas that can flow
starch: a white powder found in foods like corn and potatoes
grains: tiny, hard pieces of something
lubricant: something slippery that helps surfaces slide
impact: a sudden hit or crash

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: The Goo That Hardens When You Punch It

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: The Goo That Hardens When You Punch It

Easier · 219 words · Flesch-Kincaid grade 3.2

1. Cornstarch and water.
2. It suddenly feels firm.
3. A non-Newtonian fluid.
4. Countless tiny grains of starch floating in water.
5. The grains cannot move out of the way in time, so they jam together.
6. Water flows the same way whether you stir it slowly or fast.

Triangle: The Goo That Hardens When You Punch It

This passage · 232 words · Flesch-Kincaid grade 6

1. Cornstarch and water.
2. It suddenly feels firm.
3. A non-Newtonian fluid.
4. Countless tiny grains of starch floating in water.
5. The grains cannot move out of the way in time, so they jam together.
6. Water flows the same way whether you stir it slowly or quickly.

Square: The Goo That Hardens When You Punch It

Harder · 253 words · Flesch-Kincaid grade 7.3

1. Cornstarch and water.
2. It suddenly feels firm.
3. A non-Newtonian fluid.
4. Countless tiny grains of starch floating in water.
5. The grains cannot get out of the way in time, so they jam together.
6. Water flows the same way whether it is stirred slowly or quickly.