How to make a tastier chocolate? Use geometry

By Galadriel Watson, The Washington Post, adapted by Newsela staff

Required Annotations	

Student-Created Annotations

Student-created

Required (bold)

Trick or treat! With Halloween around the corner, kids across the country are about to collect bags full of candy, including heaps of chocolate. Meanwhile, a group of researchers in the Netherlands has been experimenting with a method to make chocolate more of a "treat" than ever.

While chocolate is delicious for many reasons, this study focused on how it cracks when it is bitten.

"An aspect that I particularly like is its brittleness, and what it does when it breaks," says researcher Corentin Coulais, who teaches physics at the University of Amsterdam. To **optimize** how it feels in the mouth, "we gave geometry to chocolate," he says, "that would then change the way it breaks."



Image 1. This complicated spiral shape was the favorite of the testers - for crunchiness and overall tastiness. Photo: Andre Souto

Giving it "geometry" involved using a 3D printer to layer 72 percent dark chocolate in various ways. Rather than creating a flat, solid chunk, the machine printed it into a simple S-shape, or zigzagged super-thin layers back-and-forth several times, or swirled it into increasingly complicated **spirals**. The resulting pieces were fed to 10 eager volunteers. The researchers asked: "How crunchy was it?" "How easy

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was it to bite?" "How would you rate the overall experience?"

The crunchiest - while remaining easy to bite - was the chocolate swirled into fairly complicated spirals. It was also the top tasting experience. "More crunchiness meant that people tended to like it more," Coulais says.

The researchers also used a machine to crack the various shapes and see which was the most **brittle**. Plus, they recorded the sounds of the cracking, because a pleasurable eating experience doesn't only take place in the mouth, but can be affected by the noises in your skull. The general winner remained that spiral.

However, the spiral's not necessarily the best shape possible; it was just the best out of the few the researchers tested. "I'm sure there would be better ones if you would search more," Coulais says. It's also not necessary to create them with a 3D printer; this was just a handy method to quickly try out multiple options.

Whether chocolate will soon be made differently thanks to this research, "it's too early to say," Coulais says. He is working with a couple of organizations to see how it might be applied. He's also involved in putting together a team to look at the physics of how things crack in materials other than chocolate - ones that might be used in vehicles, for example, to make them less dangerous when they crash.

"The idea is to **embrace** failure," he says. "When you get an impact of some form, you know something is going to break." If you can control how it breaks, "maybe you can deflect the energy of the impact away from the passengers, for instance."

Understanding fractures could make life safer - in cars or airplanes or wearing helmets. It could also make those Halloween treats even more tasty.

- 1. Select the sentence from the article that suggests researchers will be able to make additional designs for chocolate.
 - a) Meanwhile, a group of researchers in the Netherlands has been experimenting with a method to make chocolate more of a "treat" than ever.
 - b) While chocolate is delicious for many reasons, this study focused on how it cracks when it is bitten.
 - c) However, the spiral's not necessarily the best shape possible; it was just the best out of the few the researchers tested.
 - d) Whether chocolate will soon be made differently thanks to this research, "it's too early to say," Coulais says.
- 2. Read this conclusion: "Discoveries from scientific research can have practical applications in other areas." Which sentence from the article provides the BEST support to the statement?
 - a) "An aspect that I particularly like is its brittleness, and what it does when it breaks," says researcher Corentin Coulais, who teaches physics at the University of Amsterdam.
 - b) To optimize how it feels in the mouth, "we gave geometry to chocolate," he says, "that would then change the way it breaks."
 - c) Plus, they recorded the sounds of the cracking, because a pleasurable eating experience doesn't only take place in the mouth, but can be affected by the noises in your skull.
 - d) If you can control how it breaks, "maybe you can deflect the energy of the impact away from the passengers, for instance."
- 3. Which statement is a central idea of the article?

4.

- a) Researchers studied how the brittleness of chocolate affected how much people enjoyed it.
- b) People prefer to eat chocolate that has been made into a complicated spiral shape with a 3D printer.
- c) Studying chocolate can help researchers improve airplanes and helmets and keep people safe.
- d) The level of enjoyment people feel when they eat is affected by the shape of the food and noises in their skulls.
- Which sentence from the article would be MOST important to include in a summary of the article?
- a) With Halloween around the corner, kids across the country are about to collect bags full of candy, including heaps of chocolate.
- b) Giving it "geometry" involved using a 3D printer to layer 72 percent dark chocolate in various ways.
- c) It's also not necessary to create them with a 3D printer; this was just a handy method to quickly try out multiple options.
- d) It could also make those Halloween treats even more tasty.