

BY NANCY HONOVICH

Crash course?

Scientists wonder if a space rock could destroy life on Earth.

Many scientists predict that if an asteroid were to crash into Earth, the impact would look like a fireball.



Scientist Mike Shara at the American Museum of Natural History

On July 16, 1994, scientists around the world turned their telescopes toward Jupiter to watch an amazing event. A number of icy objects known as the Shoemaker-Levy 9 comet hurtled toward the giant planet at a speed of 60 kilometers (37 miles) per second. As the comet hit the planet, it caused huge shock waves, which lifted large clouds of gas into the upper part of the **atmosphere**.

When the blasts were over, Jupiter was left with a few scars: Gray areas of gas and dust had formed in the planet's atmosphere and remained there for several months. But for scientists—and anyone else who observed the event—the effects were more lasting. People everywhere were left wondering: Could this happen to Earth?

After seeing Shoemaker-Levy 9 crash into Jupiter, people began to pay closer attention to objects that could strike Earth. These objects include comets much like Shoemaker-Levy 9 and, more important, large **asteroids**. As many of these objects move around the sun, their paths sometimes take them within 160,934 km (100,000 mi) of Earth. That may seem far, but for most scientists, it's a little too close for comfort.

Mike Shara, an **astrophysicist** (astroh-fih-zih-sist) at the American Museum of Natural History in New York, studies how objects in the universe collide. He estimates that a space object the size of a cruise ship narrowly misses Earth about every 10 years.

Could one of these objects actually strike our planet? And if so, is

there anything we could do to stop the impact before it happens? Shara discusses the possibilities.

Why do space objects collide in the first place?

All objects in the universe—such as asteroids, comets, planets, and stars—experience **gravity**. This pulling force causes the objects to tug on each other and to change each other's path. Sometimes, two objects move toward the same place at the same time. Because these objects don't have eyes, they don't know to get out of the way. Sometimes, they collide.

Are any of these objects headed our way?

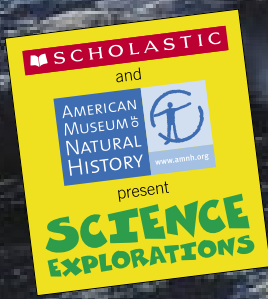
Yes, many. But they won't strike Earth any-time soon. An asteroid called MN4 will come within 35,400 km (21,997 mi) of Earth on April 13, 2029. That's pretty close, especially when you figure that the moon is about 385,000 km (240,000 mi) from Earth. And the asteroid is large. It measures about 300 meters (984 feet) across—that's about three times the length of a football field.

During its close flyby, will we be able to see MN4 from Earth?

It depends on where you are and how clear it is outside. If the night is clear, it'll appear almost as bright as the stars in the Big Dipper. The best views will be from Asia, Europe, and Africa.

When the Shoemaker-Levy 9 comet struck Jupiter, it caused dark spots to form on the planet.

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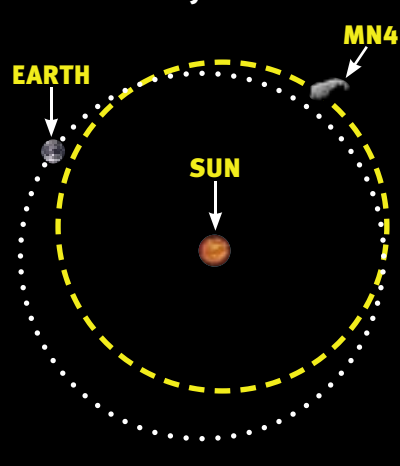


A meteorite that crashed into Earth caused Barringer Crater.



ROCK AROUND THE SUN

As MN4 circles the sun, its path will take it very close to Earth.



What would happen if an asteroid like MN4 were to strike Earth?

It would not mean the end of life on Earth, but it would still be terrible. In Arizona, there is a hole in the ground that measures roughly one mile across. This hole, called Barringer Crater, was formed by a meteorite that crashed into Earth about 50,000 years ago. MN4 is about 10 times bigger than that meteorite. It has a thousand times more mass and would release a lot more energy as it crashed. So just imagine the size of the crater it would cause!

boulders out of the ground. These boulders would crash back down all over Earth for the next few days. It's also possible that MN4 would turn into a fireball, which would set off forest fires for hundreds of miles. The fires would then release huge amounts of ash into the atmosphere—and that might block out light from the sun. If it were to crash into the ocean, it would cause a giant tsunami, or wave, which could destroy many coastal cities.

If scientists discovered that a large asteroid was headed towards Earth, what could we do to prevent a collision?

There are many possible solutions. One idea is to take an object that has a lot of mass up into space and park it within a few hundred yards of the asteroid. Because that

object has a lot of mass, gravity would cause it to tug gently on the asteroid. Over time, this object's pulling force would move the asteroid out of the way.

What would you say to kids who are scared that a large asteroid will crash into Earth?

Scientists are scanning the sky all the time to make sure that a large asteroid isn't headed our way anytime soon. The chance that Earth will be struck by a large asteroid or comet during your lifetime is almost zero.

Words to Know

- Comet** — a ball of ice, rock, and frozen gases that circles a star
- Atmosphere** — the layers of gas that surround a planet
- Asteroid** — a rock that moves around the sun and is smaller than a planet or a moon
- Astrophysicist** — a scientist who studies the universe
- Gravity** — the pulling force between objects
- Meteorite** — a space rock that has hit Earth
- Mass** — the amount of matter in an object

Would you be affected if you lived far from the impact site?

Yes. If MN4 were to crash on land, it would blow billions of

check it out

In early 2006, the American Museum of Natural History's Hayden Planetarium in the Rose Center for Earth and Space will open a new Space Show that journeys through the night sky to explore collisions of meteorites, stars, and galaxies that shape our universe. The Museum has been researching and celebrating the natural world for more than 135 years, and has more than 30 million objects in its entire collection. The Museum's 200 scientists travel around the world on 100 field expeditions each year, studying everything from wasps to ocean life to the universe.

To learn more, ask your teacher, or go to www.amnh.org.

Gravity Game

How does gravity affect different objects?

THINK: Suppose you and your teacher were to weigh yourselves on a scale. Who would weigh more?

PREDICT: Gravity is a force that pulls all objects toward one another. It is the same force that pulls objects towards Earth. The more mass an object has, the greater the pull of gravity. Suppose you had three equal-sized cartons: one full of cereal, one full of jelly beans, and one full of rice. Which has the most mass? Which experiences the most gravity?

Procedure:

1. Cut the milk carton into 2 pieces—the bottom part should measure 7.5 centimeters (3 inches) high. Keep the bottom part, but throw the top part away.
2. Choose one side of the carton and measure 2.5 cm (1 in.) down from the top. Using a pencil, poke a hole through this area. Make sure the hole is centered.
3. Repeat Step 2 on the opposite side of the carton.
4. Create a handle for your carton: Thread one end of twine through each hole. Tie a knot at each end.
5. Attach a paper clip to the top of the string handle and a rubber band to the other end of the paper clip. You now have a spring scale!
6. Place a piece of clay on the floor against a wall. Stick one end of the ruler into the clay. The ruler should be upright against the wall. Have a friend grasp the scale by the rubber band and hold it so that the top of the carton is even with the top of the ruler.
7. Pour the cereal into the carton. This is carton 1.
8. Watch the carton drop alongside the ruler. Measure how many centimeters or inches the carton has dropped. Be sure to measure from the top of the carton.
9. Empty the carton.
10. Repeat Steps 7 to 9 using jelly beans instead of cereal. This is carton 2.
11. Repeat Steps 7 to 9 using rice instead of cereal. This is carton 3.

Conclusions

1. Which carton was pulled the most by gravity? Which was pulled the least?
2. Based on your findings, which carton had the most mass?
3. Suppose scientists discovered two equal-size objects but didn't know what they were made of. Could the scientists determine which one would be pulled the most by Earth's gravity?

You'll Need

- * Empty, quart-size cardboard milk carton
- * Scissors
- * Thick rubber band
- * Piece of twine, 36 cm (14 in.) long
- * Ruler
- * Pencil
- * Paper clip
- * Clay
- * 1 cup of dry Cheerios cereal
- * 1 cup of jelly beans
- * 1 cup of uncooked rice



STEP 4

Thread one end of twine through each hole.



STEP 8

Watch the carton of cereal drop alongside the ruler.