Zoe Dives Deep: Ocean Gravity Adventure

Grade 5 science ocean-animals

Students will be able to explain how gravity pulls objects toward Earth and affects the motion of ocean animals and objects underwater.

Name: _____ Date: _____

1. Zoe is a deep-sea scientist. She drops a special ocean pearl into the water. The pearl sinks straight to the seafloor. What force pulls the pearl downward? Circle the correct answer: (A) magnetism (B) gravity (C) wind (D) friction

2. True or False: Zoe finds a rare sea-glass gem on the ocean floor. Gravity pulls the gem toward Earth's center. True or False?

3. Zoe watches a sea turtle swimming upward. Gravity pulls the turtle down. The turtle's flippers push it up. What would happen if the turtle stopped swimming? Use the word gravity in your answer.

4. Zoe discovers a unique glowing jellyfish near a shipwreck. The jellyfish floats near the surface. Its body is mostly water. Zoe writes this hypothesis: 'Objects with less mass sink faster.' Is Zoe's hypothesis supported by what she sees? Explain using gravity.

5. Fill in the blanks. Zoe is taking notes on gravity underwater. Use the word bank: pulls, weight, mass, surface, center. Gravity _____ all objects toward Earth's _____. An object's _____ is the measure of how hard gravity pulls on its _____.

6. Zoe compares two hidden treasure chests on the seafloor. Chest A is filled with heavy gold coins. Chest B is filled with hollow coral. Both chests are the same size. Zoe predicts Chest A has greater weight. Explain why, using gravity and mass. Then explain what would happen if both chests were lifted to the surface.

7. Zoe observes a rare giant squid releasing ink and shooting upward. She notices: the squid moves up fast, then slows down, then stops rising and starts to sink. Explain each phase using the idea of gravity as a constant downward force. What is always true about gravity during all three phases?

8. Zoe has completed her deep-sea mission. She found a hidden treasure — a glowing meteor rock on the seafloor. Back on the research ship, Zoe wonders: would this meteor rock weigh the same on the Moon as it does on Earth? The Moon's gravity is about six times weaker than Earth's. The rock's mass does not change. Explain the difference between mass and weight. Then explain whether the rock's mass and weight would change on the Moon. Use what you learned today about gravity to support your answer.

Answer Key: Zoe Dives Deep: Ocean Gravity Adventure

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Before Q6, ask students to predict whether a sea turtle or a rock would sink faster and why — this primes the gravity-versus-buoyancy reasoning the question tests.

1. Zoe is a deep-sea scientist. She drops a special ocean pearl into the water. The pearl sinks straight to the seafloor. What force pulls the pearl downward? Circle the correct answer: (A) magnetism (B) gravity (C) wind (D) friction

Answer: Q1: Gravity is the force that pulls all objects toward Earth. The pearl sinks because gravity pulls it down toward the seafloor. Answer: (B) gravity

2. True or False: Zoe finds a rare sea-glass gem on the ocean floor. Gravity pulls the gem toward Earth's center. True or False?

Answer: Q2: Gravity always pulls objects toward Earth's center. The gem on the seafloor is being pulled downward by gravity, not sideways or upward. Answer: TRUE

3. Zoe watches a sea turtle swimming upward. Gravity pulls the turtle down. The turtle's flippers push it up. What would happen if the turtle stopped swimming? Use the word gravity in your answer.

Answer: Q3: Gravity pulls the turtle downward toward the seafloor. When the turtle swims, its flippers create an upward force that overcomes gravity. If the turtle stopped swimming, gravity would pull it downward and it would sink. Answer: The turtle would sink because gravity would pull it toward the seafloor with no upward force to resist it.

4. Zoe discovers a unique glowing jellyfish near a shipwreck. The jellyfish floats near the surface. Its body is mostly water. Zoe writes this hypothesis: 'Objects with less mass sink faster.' Is Zoe's hypothesis supported by what she sees? Explain using gravity.

Answer: Q4: A hypothesis must match the observation. The jellyfish floats because its body is mostly water, giving it low density relative to the ocean around it. Gravity still pulls it down, but the water pushes back up with equal force. Zoe's hypothesis is NOT fully supported — mass alone does not decide how fast something sinks. Density compared to water matters too. Answer: Zoe's hypothesis is not well supported. Gravity pulls the jellyfish down, but its water-filled body is almost the same density as ocean water, so it floats. Mass alone does not determine sinking speed.

5. Fill in the blanks. Zoe is taking notes on gravity underwater. Use the word bank: pulls, weight, mass, surface, center. Gravity _____ all objects toward Earth's _____. An object's _____ is the measure of how hard gravity pulls on its _____.

Answer: Q5: Gravity pulls all objects toward Earth's center. An object's weight is the measure of how hard gravity pulls on its mass. Answer: pulls / center / weight / mass

6. Zoe compares two hidden treasure chests on the seafloor. Chest A is filled with heavy gold coins. Chest B is filled with hollow coral. Both chests are the same size. Zoe predicts Chest A has greater weight. Explain why, using gravity and mass. Then explain what would happen if both chests were lifted to the surface.

Answer: Q6: Weight is the force of gravity pulling on an object's mass. Chest A has more mass because gold coins are denser and heavier than hollow coral. More mass means gravity pulls on it with greater force, so Chest A has greater weight. If both chests were lifted to the surface, Chest A would require more force to lift because gravity is pulling its greater mass downward more strongly. Chest B would be easier to lift. Answer: Chest A has greater weight because gravity pulls

harder on its larger mass. Lifting Chest A to the surface needs more upward force to overcome gravity than lifting Chest B.

7. Zoe observes a rare giant squid releasing ink and shooting upward. She notices: the squid moves up fast, then slows down, then stops rising and starts to sink. Explain each phase using the idea of gravity as a constant downward force. What is always true about gravity during all three phases?

Answer: Q7: Gravity is a constant force that always pulls the squid downward toward Earth's center. Phase 1 — moving up fast: the squid's jet force is stronger than gravity, so it rises. Phase 2 — slowing down: the jet force is fading; gravity is pulling back and slowing the squid's upward movement. Phase 3 — sinking: the jet force is gone; gravity is the only net force, pulling the squid back down. What is always true: gravity never stops. It pulled downward during every phase, even when the squid was moving up. Answer: Gravity constantly pulled the squid toward the seafloor in all three phases. The squid's own force temporarily overcame gravity, but once that force stopped, gravity caused the squid to sink.

8. Zoe has completed her deep-sea mission. She found a hidden treasure — a glowing meteor rock on the seafloor. Back on the research ship, Zoe wonders: would this meteor rock weigh the same on the Moon as it does on Earth? The Moon's gravity is about six times weaker than Earth's. The rock's mass does not change. Explain the difference between mass and weight. Then explain whether the rock's mass and weight would change on the Moon. Use what you learned today about gravity to support your answer.

Answer: Q8: Mass is the amount of matter in an object — it never changes no matter where the object is. Weight is the force of gravity pulling on that mass — it changes when gravity changes. On Earth, gravity is strong, so it pulls hard on the meteor rock's mass, giving it a large weight. On the Moon, gravity is about six times weaker. The same mass is pulled with much less force. So the meteor rock's mass stays exactly the same on the Moon, but its weight becomes about six times less. This shows that weight depends on gravity, but mass does not. Zoe's discovery proves that understanding gravity is the key to understanding how objects behave anywhere in the universe — from the ocean floor to the Moon. Answer: Mass stays the same on the Moon. Weight becomes about six times less because the Moon's gravity is six times weaker than Earth's. Gravity determines weight; mass is always constant.