

Design a Paper Helicopter

Name: _____

Student quiz — *Answer key*

Date: _____

Directions: Select the correct answer for each question below.

1. The gravitational pull **of the Sun** is responsible for the following:
 - a. Pulling the solar system planets in their orbit.
 - b. Making Earth spin around its axis.
 - c. Objects weighing less on lighter and smaller planets.
 - d. All of the above.
2. Gravitational pull:
 - a. pulls objects with mass closer together.
 - b. pushes objects with mass away from each other.
 - c. depends on the weight of objects.
 - d. becomes stronger when objects are farther away from each other.

Directions: Select the correct answer and give two examples to support your answer.

3. Gravitational pull is only noticeable when the mass of at least one of the interacting objects is large.
 - a. This statement is false.
 - b. This statement is correct.

Examples: (These are just some examples; students might choose to use others!)

- We notice the Sun's gravity pulling the solar system planets in their orbit. The Sun and the planets are large masses.
- We notice Earth's gravity pulling lighter objects (near its surface) towards it, causing them to fall, and Earth is a large mass. For example, we notice an apple falling to the surface of Earth.
- We notice Earth's gravity pulling satellites toward it, keeping them confined in an orbit. Earth is a large mass.
- We notice a pencil not being pulled toward the building because the gravity between these two objects is so small that we cannot notice it. Their masses are too small.

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Directions: Select the correct answer and give an explanation.

4. A helicopter that flies on Mars will most likely also fly on Earth.
- a. This statement is false.
 - b. This statement is correct.

Explain using the terms *weight* and *lift*.

The weight of the helicopter is less on Mars, but because it is much harder to create lift in the thin atmosphere of Mars, it is still more difficult to fly a helicopter on Mars. If the helicopter can create enough lift on Mars to keep the helicopter in the air, it will probably be able to create enough lift in the thicker atmosphere of Earth to overcome its larger weight on Earth.

Directions: Answer the question below.

5. Why do we have iterations in the engineering process?

Engineers use iterations to improve their design ideas quickly. Each test results in design feedback. Based on the test results, each design that looks promising is refined further and the designs that fail can be dropped early in the process.