

Chapter 3 Newton's First Law of Motion—Inertia

Exercises

3.1 Aristotle on Motion (pages 29–30)

Fill in the blanks with the correct terms.

1. Aristotle divided motion into two types: _____ and _____.
2. Natural motion on Earth was once thought to be either _____ or _____.
3. Aristotle thought that it was natural for heavy things to _____ and for light things to _____.
4. Aristotle also thought that _____ motion was natural for objects beyond Earth and that the planets and stars moved in perfect circles around _____.
5. What force was thought to have caused a horse and cart to experience violent motion? _____
6. Before the 1500s, the proper state of objects was thought to be one of _____, unless they were being pushed or pulled or were moving toward their natural resting place.
7. Is the following statement true or false? Early thinkers thought that violent motion was imposed motion. _____
8. Is the following statement true or false? It was commonly thought by many ancient thinkers that if an object moved “against its nature,” then a force of some kind was responsible. _____

3.2 Copernicus and the Moving Earth (page 30)

Determine if each of the following statements is true or false.

- _____ 9. Copernicus thought that Earth and other planets move around the sun.
- _____ 10. Copernicus thought that Earth was at the center of the universe.
- _____ 11. Copernicus did not publish his ideas until he was near death.
- _____ 12. Copernicus lived a long and happy life after his works were published.
13. Why did Copernicus do most of his work in secret?

3.3 Galileo on Motion (pages 30–32)

14. What was one of Galileo’s great contributions to physics?

15. A force is any _____ or _____.

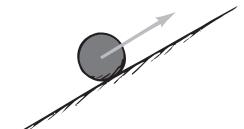
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- 16.** Explain what friction is and how it acts.

17. In the drawings below, describe each type of slope on the top line. On the bottom line, describe the slope's affect on speed.



a. _____



b. _____



C. _____

18. Based on his experiments with rolling balls, Galileo was able to conclude that when friction is present, a _____ is needed to keep an object moving.

- 19.** Describe the property of inertia in your own words.

3.4 Newton's Law of Inertia (pages 33–35)

- 20.** What is another name for Newton's first law of motion?

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- 21.** State Newton's first law of motion.

22. Use Newton's first law of motion to explain what happens to dishes on a table when the tablecloth is quickly pulled from beneath them.

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23. Objects in a state of rest tend to remain at rest; only a _____ will change that state.

- 24.** Use Newton's first law of motion to explain why an air hockey puck slides on the game table with no apparent loss in speed. Name two things that can cause the puck to change its state of motion.

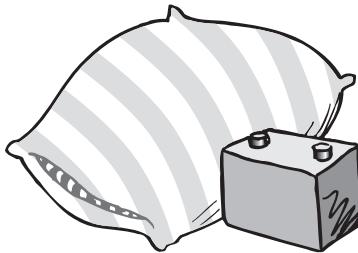
25. Once an object is moving in a force-free environment, for how long will it move in a straight line? _____

Chapter 3 Newton's First Law of Motion—Inertia**3.5 Mass—A Measure of Inertia (pages 36–38)**

26. Circle the letter of each sentence that is true about the mass of an object.

- The amount of inertia an object has depends on its mass.
- The more mass an object has, the greater its inertia.
- Volume and mass are the same quantity.
- Mass is usually measured in kilograms.

27. Which item below has more mass? Which has more volume? Which has the greater inertia?



28. Is the following sentence true or false? Mass is a measure of the gravitational force acting on an object. _____

29. _____ is a measure of the amount of material in an object and depends on the number of and kind of atoms that compose it.

30. Is the following sentence true or false? A stone has the same mass on Earth and on the moon, but its weight is less on the moon.

31. _____ is the quantity of matter in an object.

32. _____ is the force of gravity on an object.

Match each phrase with the correct word.

Phrase**Word**

- | | |
|--|-------------|
| _____ 33. traditional unit of weight
in the United States | a. kilogram |
| _____ 34. measure of matter in most
parts of the world | b. mass |
| _____ 35. SI unit of mass | c. pound |
| _____ 36. SI unit of force | d. newton |

3.6 The Moving Earth Again (pages 38–39)

37. If Earth is rotating at 30 km/s, explain how a bird sitting on a tree can drop down vertically and grab a worm that is crawling on the ground.

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38. A girl is sitting on a bus that is traveling at 30 km/h. She is throwing her tennis ball gently into the air and catching it. Circle the letter of each true statement.

- a. The tennis ball is moving faster than the girl riding on the bus.
- b. The tennis ball is behaving as if the bus were at rest.
- c. The inertia of the tennis ball changes when it is thrown.
- d. Gravity affects only the vertical motion of the tennis ball.

Match the ideas on motion with the correct scientist.

Idea	Scientist
_____ 39. did not recognize inertia	a. Aristotle
_____ 40. developed the law of inertia	b. Newton
_____ 41. believed that horizontal motion was "unnatural"	c. Galileo
_____ 42. was one of the first to recognize that no force was needed to keep an object in motion	