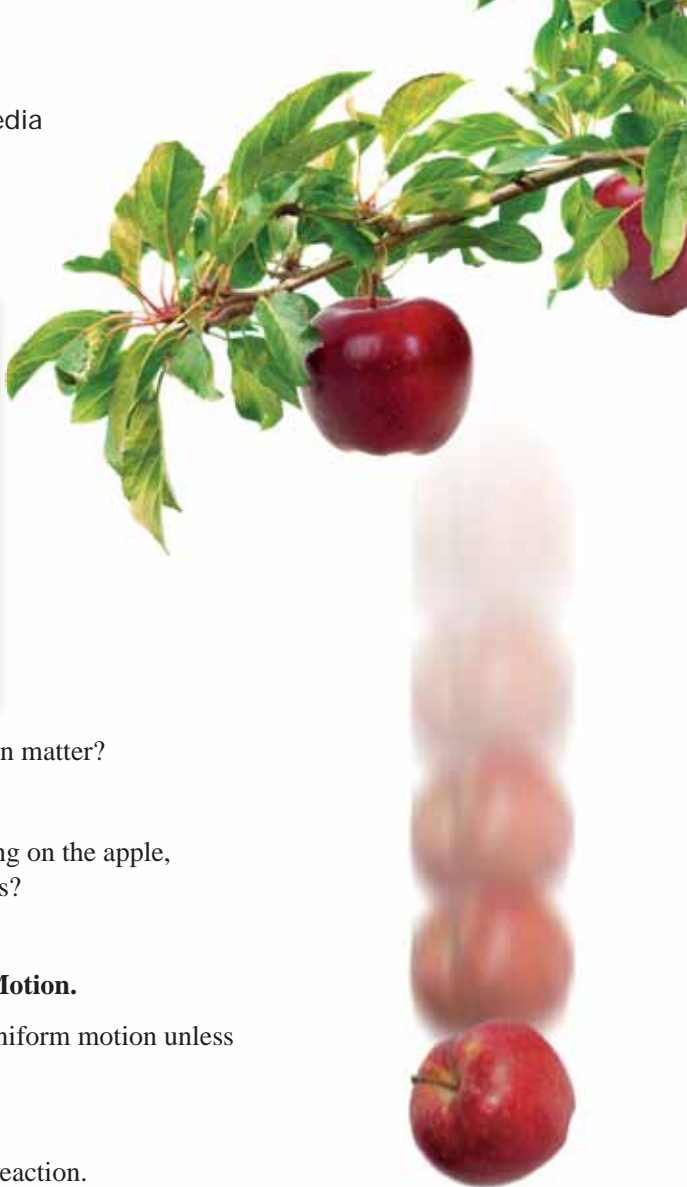


Section 3.3

Universal Gravity In Exercises 17 and 18, use the excerpt.

“Why should that apple always descend perpendicularly to the ground, thought [Newton] to himself; occasioned by the fall of an apple, as he sat in a contemplative mood. Why should it not go sideways, or upwards? But constantly to the earth’s center? Assuredly, the reason is, that the earth draws it. There must be a drawing power in matter. . . . If matter thus draws matter; it must be in proportion of its quantity. Therefore, the apple draws the earth, as well as the earth draws the apple.”

Memoirs of Sir Isaac Newton’s Life, William Stukeley



17. How does Newton conclude that there is a drawing power in matter? What type of reasoning is this? Explain.
18. How does Newton conclude that, in addition to Earth pulling on the apple, the apple is pulling on Earth? What type of reasoning is this?

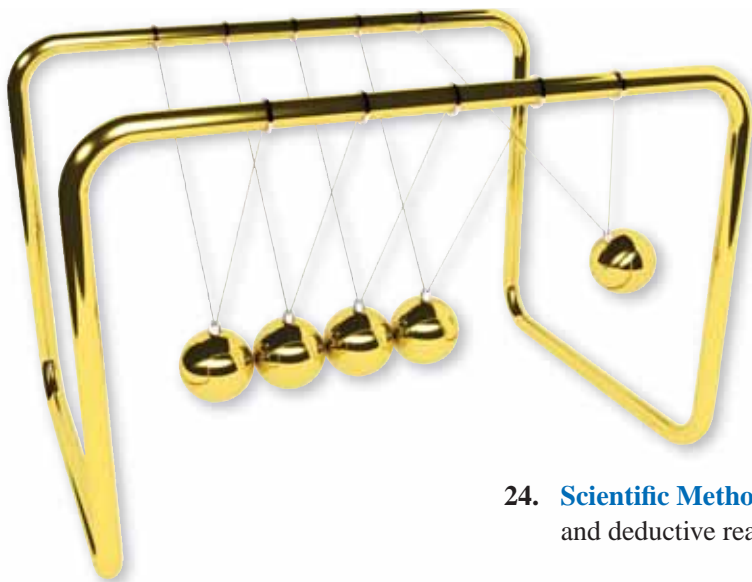
Laws of Motion In Exercises 19–23, use Newton’s Laws of Motion.

Law 1: Every object in uniform motion will remain in uniform motion unless an external force acts on it.

Law 2: Force equals mass times acceleration.

Law 3: For every action, there is an equal and opposite reaction.

19. What type of reasoning do you think Newton used to arrive at his three laws of motion? Explain.
20. What type of reasoning do you think Newton used to apply his three laws of motion? Explain.



21. Write a syllogism that involves Newton’s first law.
22. Write a syllogism that involves Newton’s third law.
23. In the twentieth century, it was discovered that Newton’s second law does not hold at high velocities. Explain this revelation in the context of inductive reasoning.

24. **Scientific Method** Explain the relationship between inductive and deductive reasoning in science.