

H.W. #18 Answers

Pg. 190-191 # 23, 24, 33, 37, 41

23. The path of Io is an ellipse with Jupiter at one focus.

24. Because the earth moves more slowly in its orbit during the summer, by Kepler's second law, it must be farther away from the sun. So the Earth is closer to the sun in the winter months.

37. $F = Gm_1 m_2 / d^2$; $m_1 = \text{earth's mass}$

$a = F/m_2$; $m_2 = \text{object's mass}$ so $a = Gm_1 / d^2$

The acceleration is independent of the object's mass. This is because heavier objects gravitational mass and inertial mass cancel each other out.

33. A force of 5 g means that an astronaut's weight is five times heavier than it is on Earth. The force exerted on an astronaut is five times the force of Earth's gravitational force.

41. No, the forces constitute an action-reaction pair, so under Newton's third law, they are equal and opposite.