# 4. WHY THINGS MOVE AS THEY DO

Answers to conceptual exercises

28. It would be easier to lift a rocket off the moon's surface, because the force of gravity on the rocket (i.e. the rocket's weight) is smaller.
40. The backward push by the ball on the pitcher's hand.
48. The drive force is needed to "balance" or "oppose" the forces of air resistance and road resistance.

Answers to problems

18. The brick presses upward against your hand, with a 100 N force.

Table pushing
upward

Gravity
pulling
downward

Your hand
pushing
downward..
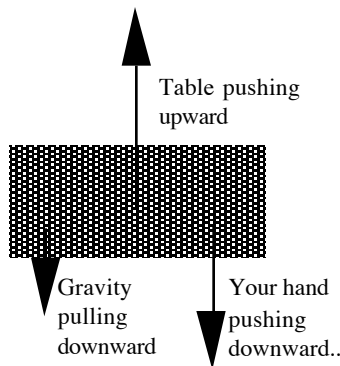
5. THE MECHANICAL UNIVERSE

Answers to conceptual exercises

3. The magnitude is your weight (in pounds, or in newtons), and the direction is downward.
20. Jupiter's radius is much larger than Earth's radius.
38. Because they formed from the flat, pancake-shaped or disk-shaped gas cloud described in Section 5.3.

Answers to problems

5. $F = 6.7 \times 10^{-11} \, m_1 \times m_2 / d^2$

$= 6.7 \times 10^{-11} \, (10^{-3} \, \text{kg}) \times (4 \times 10^{30} \, \text{kg}) / (10^4 \, \text{m})^2$

$= 2.7 \times 10^9 \, \text{N}$ (2.7 billion newtons)!