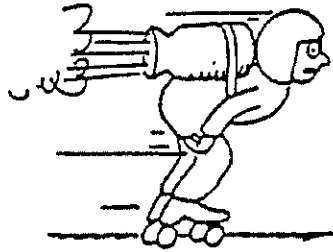**CONCEPTUAL *Physics*** PRACTICE PAGE

Chapter 4 Newton's Second Law of Motion
Force and Acceleration

1. Skelly the skater, total mass 25 kg, is propelled by rocket power.

   a. Complete Table I.
      (Neglect resistance.)

TABLE I

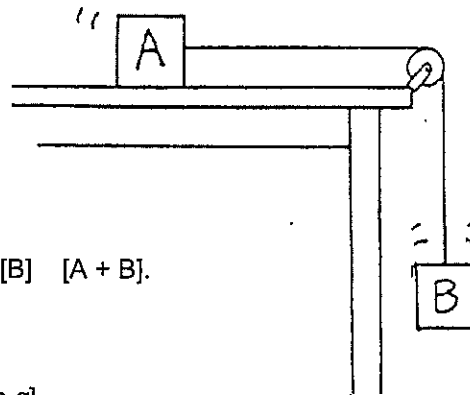| FORCE	ACCELERATION
100 N	
200 N	
	10 m/s²

   b. Complete Table II for a
      constant 50-N resistance.

TABLE II

FORCE	ACCELERATION
50 N	0 m/s²
100 N	
200 N	

2. Block A on a horizontal friction-free table is accelerated by a force from a string attached to Block B. Block B falls vertically and drags Block A horizontally. Both blocks have the same mass, *m*. (Neglect the string's mass.)

   a. The *mass* of the system (A + B) is   [*m*]   [2 *m*].

   b. The *force* that accelerates (A + B) is the weight of   [A]   [B]   [A + B].

   c. The weight of B is   [*mg*/2]   [*mg*]   [2 *mg*].

   d. Acceleration of (A + B) is   [less than *g*]   [*g*]   [more than *g*].

   e. Use $a = \dfrac{F}{m}$ to show the acceleration of (A + B) as a fraction of *g*. _____

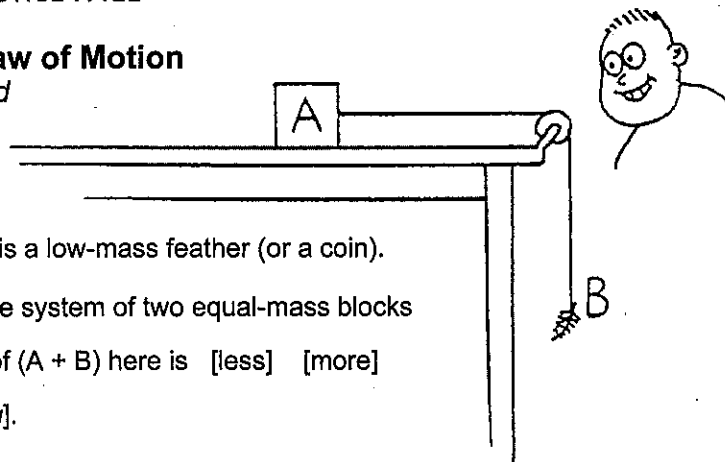If B were allowed to fall by itself, not dragging A, then wouldn't its acceleration be *g*?

Yes, because the force that accelerates it would only be acting on its own mass — not twice the mass!

Chapter 4 Newton's Second Law of Motion
*Force and Acceleration—continued*

3. Suppose A is still a 1-kg block, but B is a low-mass feather (or a coin).

    a. Compared to the acceleration of the system of two equal-mass blocks

    (previous page), the acceleration of (A + B) here is   [less]   [more]

    and is   [close to zero]   [close to g].

    b. In this case, the acceleration of B is

    [practically that of free fall]   [nearly zero].
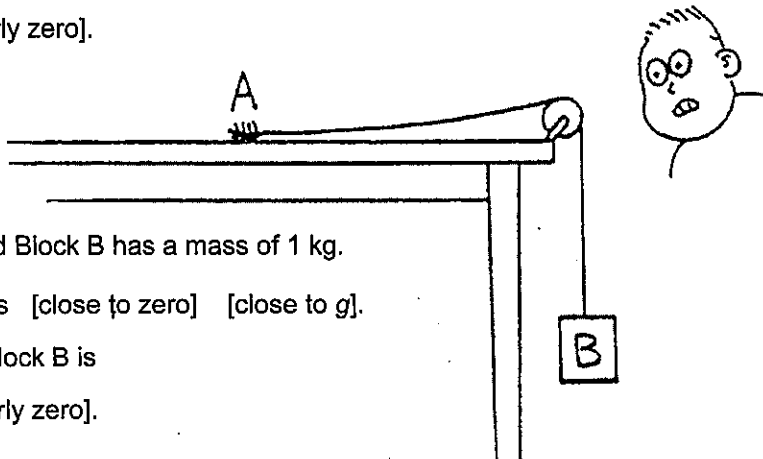
4. Suppose A is the feather or coin, and Block B has a mass of 1 kg.

    a. The acceleration of (A + B) here is   [close to zero]   [close to g].

    b. In this case, the acceleration of Block B is

    [practically that of free fall]   [nearly zero].

5. Summarizing 2, 3, and 4, where the weight of one object causes the acceleration of two objects, we see the range of possible accelerations is between

   [zero and g]   [zero and infinity]   [g and infinity].

6. Consider a ball that rolls down a uniform-slope ramp.
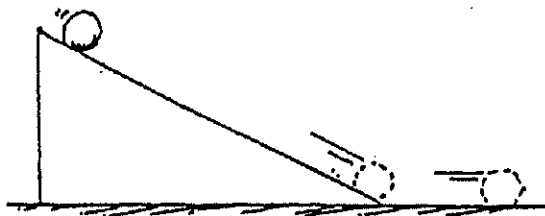
    a. Speed of the ball is   [decreasing]   [constant]   [increasing].

    b. Acceleration is   [decreasing]   [constant]   [increasing].

    c. If the ramp were steeper, acceleration would be   [more]   [the same]   [less].

    d. When the ball reaches the bottom and rolls along the smooth level surface

    it   [continues to accelerate]   [does not accelerate].