

**Concept-Development
Practice Page****6-2****Force and Acceleration**

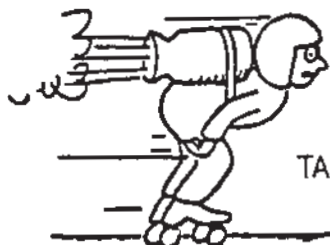
1. Skelly the skater, total mass 25 kg, is propelled by rocket power.

- a. Complete Table I
(neglect resistance)

$$a = F/25 \text{ kg}$$

TABLE I

| FORCE | ACCELERATION |
|-------|---------------------|
| 100 N | 4 m/s ² |
| 200 N | 8 m/s ² |
| 250 N | 10 m/s ² |



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

$$a = (F - 50 \text{ N})/25 \text{ kg}$$

TABLE II

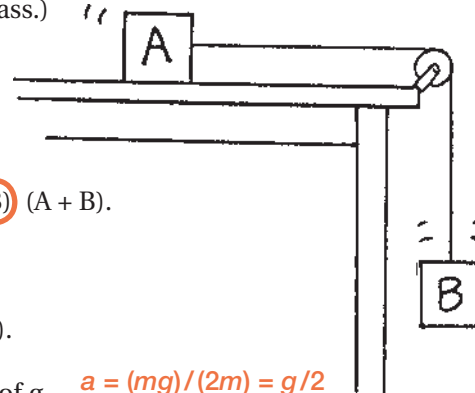
| FORCE | ACCELERATION |
|-------|--------------------|
| 50 N | 0 m/s ² |
| 100 N | 2 m/s ² |
| 200 N | 6 m/s ² |

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

Circle the correct answers.

- a. The mass of the system (A + B) is (m) **(2m)**.
- b. The force that accelerates (A + B) is the weight of (A) **(B)** (A + B).
- c. The weight of B is ($mg/2$) **(mg)** ($2mg$).
- d. Acceleration of (A + B) is **(less than g)** (g) (more than g).

- e. Use $a =$ to show the acceleration of (A + B) as a fraction of g . $a = (mg)/(2m) = g/2$



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



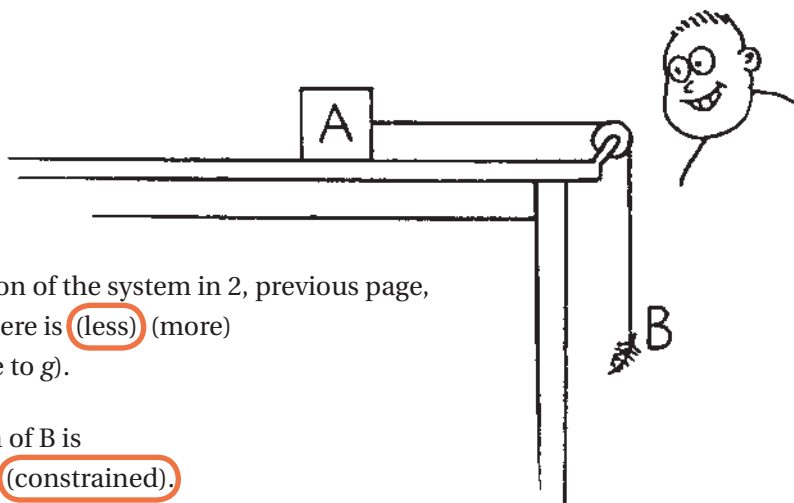
Yes, because the force that accelerates it would only be acting on its own mass – not twice the mass!



To better understand this, consider 3 and 4 on the other side!

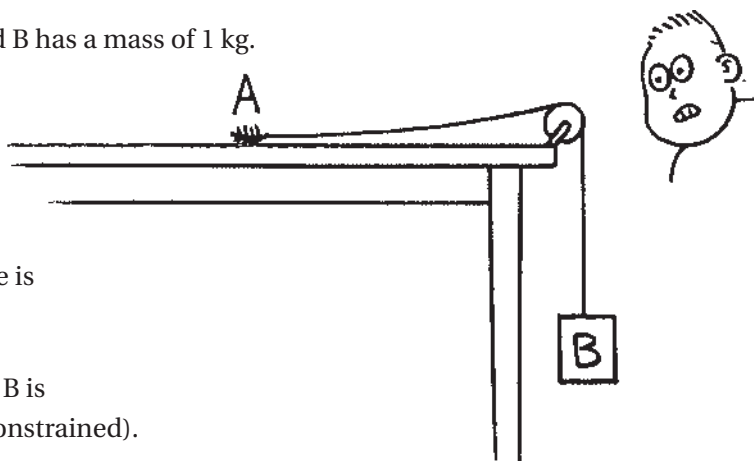
CONCEPTUAL PHYSICS

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



- Compared to the acceleration of the system in 2, previous page, the acceleration of (A + B) here is (less) (more) and is (close to zero) (close to g).
- In this case the acceleration of B is (practically that of free fall) (constrained).

4. Suppose A is a feather or coin, and B has a mass of 1 kg.



- The acceleration of (A + B) here is (close to zero) (close to g).
- In this case the acceleration of B is (practically that of free fall) (constrained).

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) (between zero and infinity) (between g and infinity).

6. A ball rolls down a uniform-slope ramp.

- Acceleration is (decreasing) (constant) (increasing).
- If the ramp were steeper, acceleration would be (more) (the same) (less).
- When the ball reaches the bottom and rolls along the smooth level surface it (continues to accelerate) (does not accelerate).



Now you're ready for the labs "Constant Force and Changing Mass" and "Constant Mass and Changing Force"!

CONCEPTUAL PHYSICS