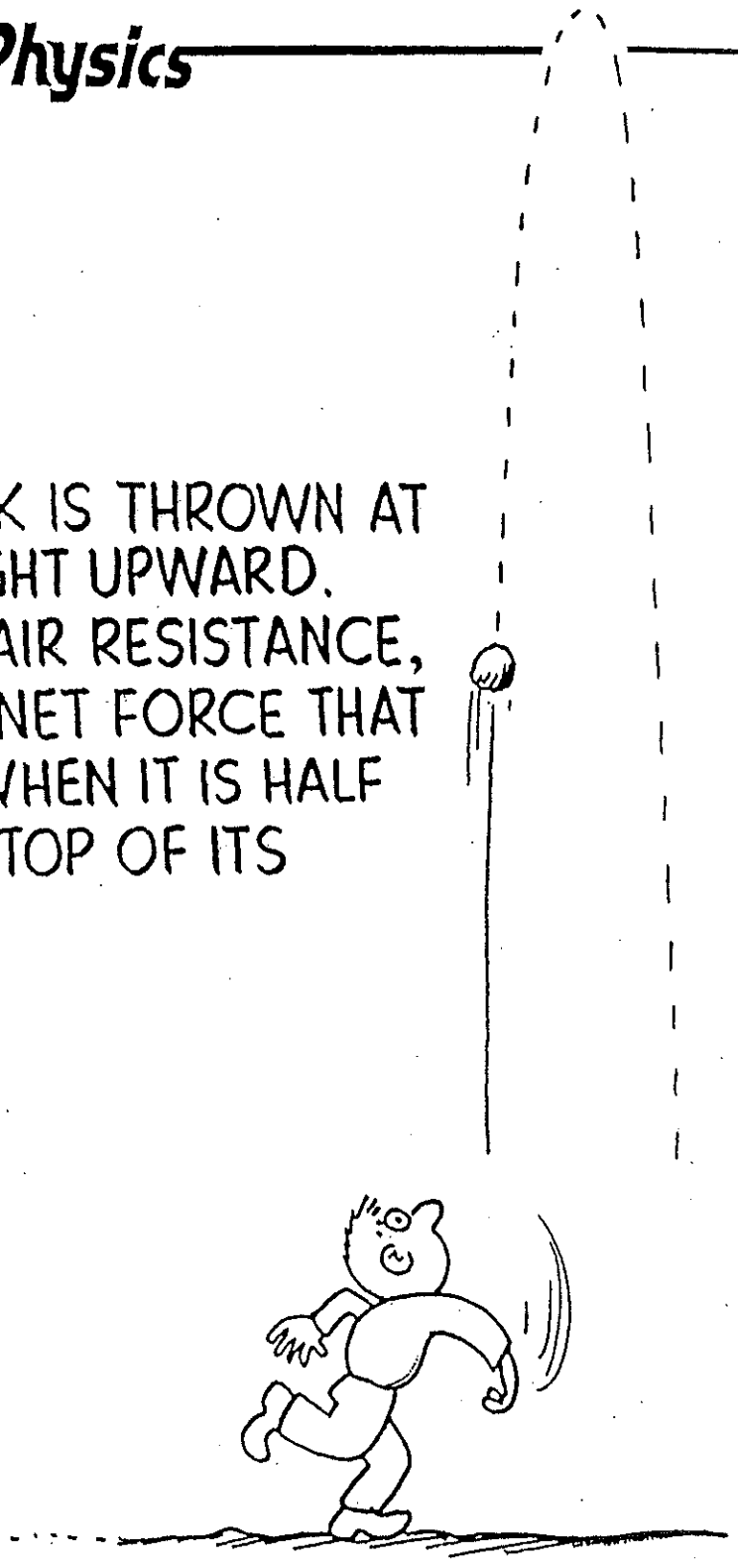
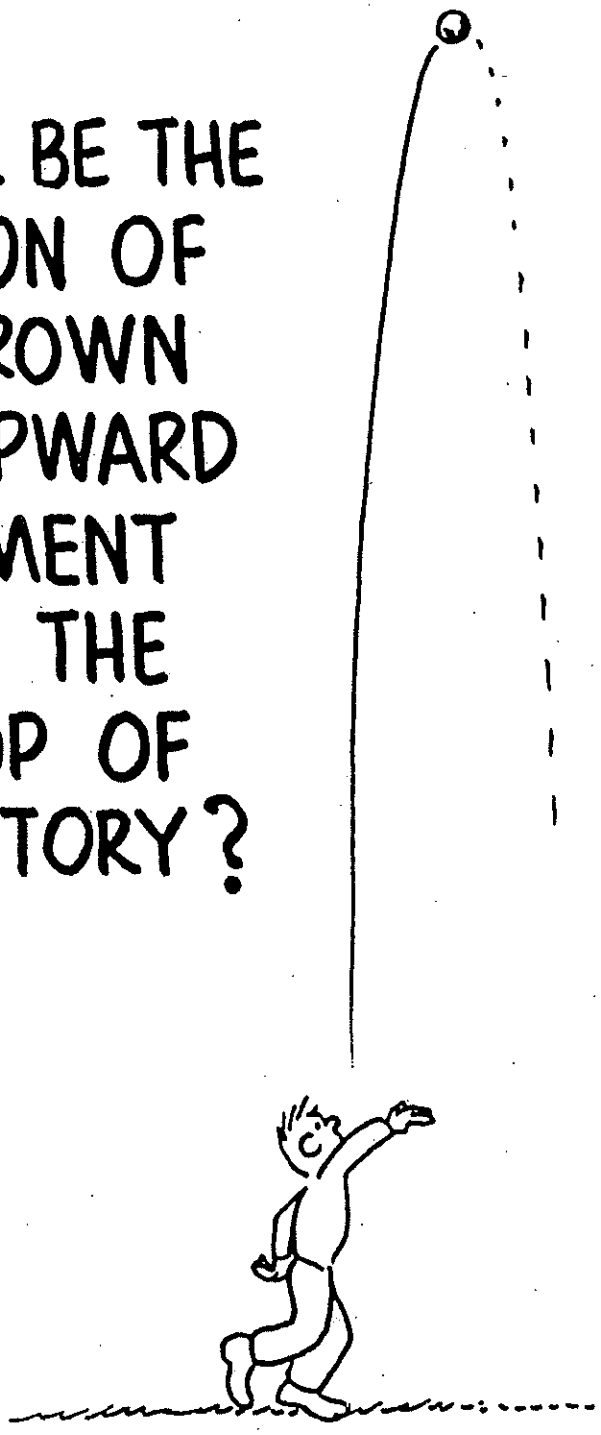
A 1-kg ROCK IS THROWN AT 10 m/s STRAIGHT UPWARD. NEGLECTING AIR RESISTANCE, WHAT IS THE NET FORCE THAT ACTS ON IT WHEN IT IS HALF WAY TO THE TOP OF ITS PATH?



thanx to Howard Brand

Hewitt Drew It!

WHAT WILL BE THE ACCELERATION OF A ROCK THROWN STRAIGHT UPWARD AT THE MOMENT IT REACHES THE TIPPITY-TOP OF ITS TRAJECTORY?



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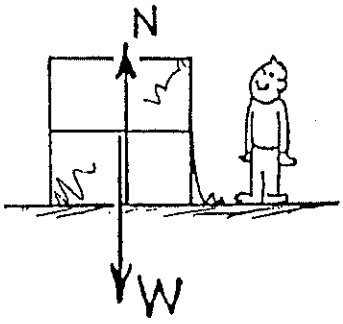
Name _____ Date _____

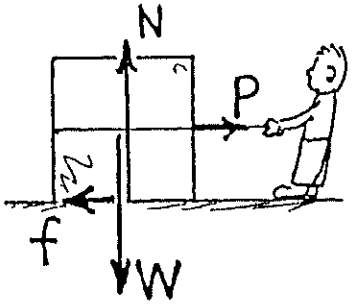
CONCEPTUAL Physics PRACTICE PAGE

Chapter 4 Newton's Second Law of Motion
Friction



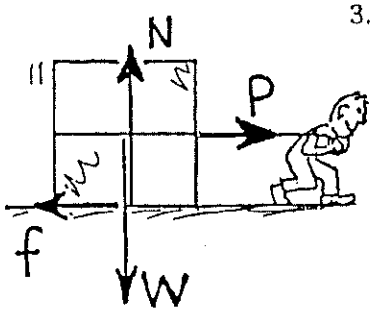
1. A crate filled with delicious junk food rests on a horizontal floor. Only gravity and the support force of the floor act on it, as shown by the vectors for weight W and normal force N.

   a. The net force on the crate is (zero) (greater than zero).
   b. Evidence for this is _____.



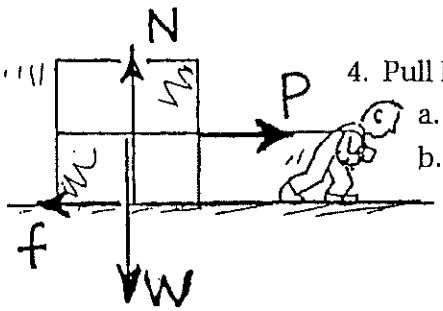
2. A slight pull P is exerted on the crate, not enough to move it. A force of friction f now acts,

   a. which is (less than) (equal to) (greater than) P.
   b. Net force on the crate is (zero) (greater than zero).



3. Pull P is increased until the crate begins to move. It is pulled so that it moves with constant velocity across the floor.

   a. Friction f is (less than) (equal to) (greater than) P.
   b. Constant velocity means acceration is (zero) (greater than zero).
   c. Net force on the crate is (less than) (equal to) (greater than) zero.



4. Pull P is further increased and is now greater than friction f.
   a. Net force on the crate is (less than) (equal to) (greater than) zero.
   b. The net force acts toward the right, so acceleration acts toward the (left) (right).

5. If the pulling force P is 150 N and the crate doesn't move, what is the magnitude of f? _____

6. If the pulling force P is 200 N and the crate doesn't move, what is the magnitude of f? _____

7. If the force of sliding friction is 250 N, what force is necessary to keep the crate sliding at constant velocity? _____

8. If the mass of the crate is 50 kg and sliding friction is 250 N, what is the acceleration of the crate when the pulling force is 250 N? _____ 300 N? _____ 500 N? _____

Name _____ Date _____

CONCEPTUAL **Physics** PRACTICE PAGE

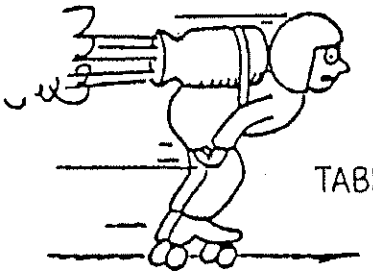
Chapter 4 Newton's Second Law of Motion
Force and Acceleration

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

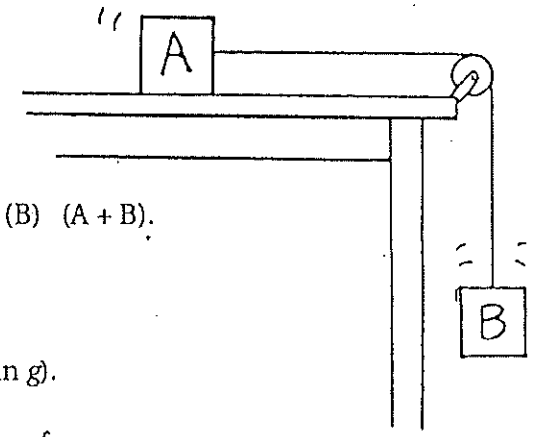


   b. Complete Table II for a constant 50-N resistance.

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. B falls vertically and drags A horizontally. Both blocks have the same mass *m*. (Neglect the string's mass.)



   (Circle the correct answers)

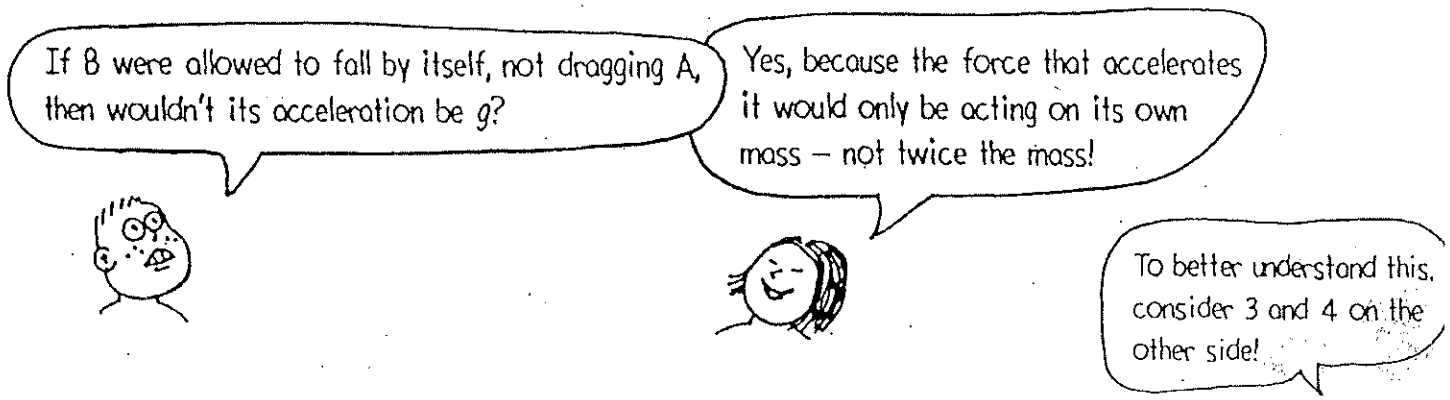
   a. The *mass* of the system [A + B] is (*m*) (2 *m*).

   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*).

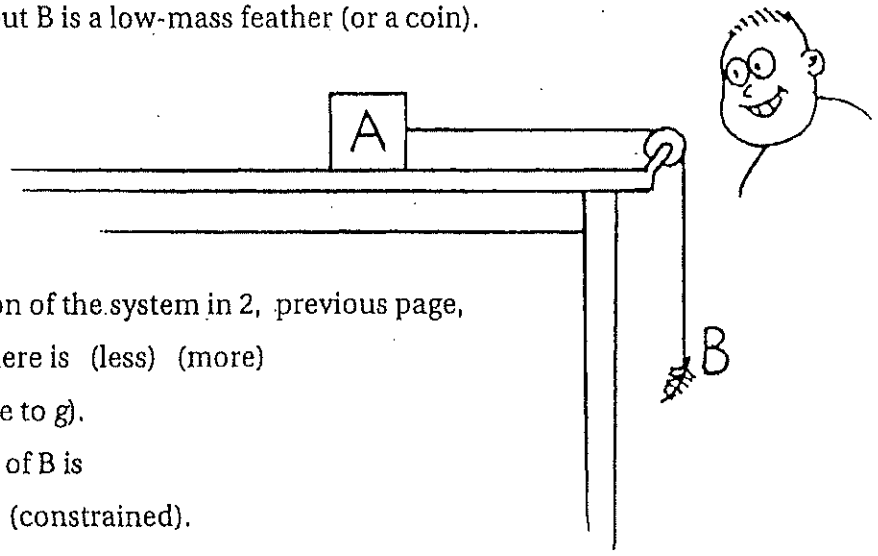
   d. Acceleration of [A + B] is (less than *g*) (*g*) (more than *g*).

   e. Use *a* = to show the acceleration of [A + B] as a fraction of *g*. _____



Force and Acceleration continued

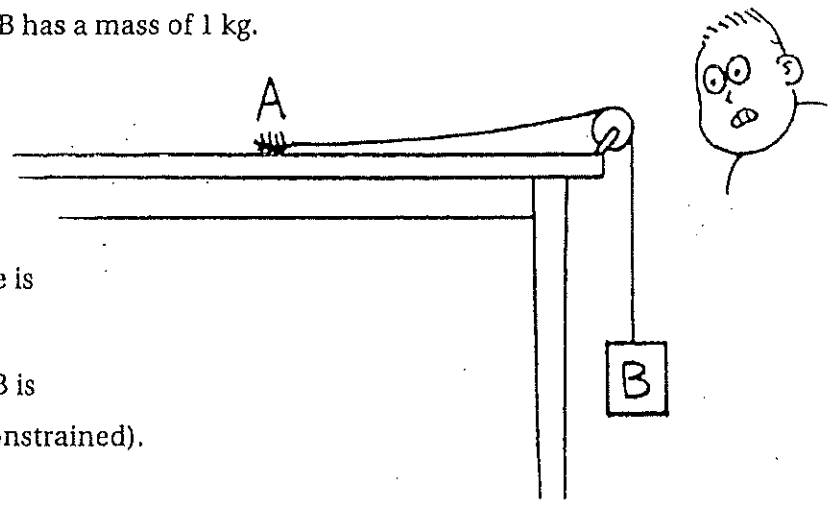
3. Suppose A is still a 1-kg block, but B is a low-mass feather (or a coin).



a. Compared to the acceleration of the system in 2, 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) (constrained).

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



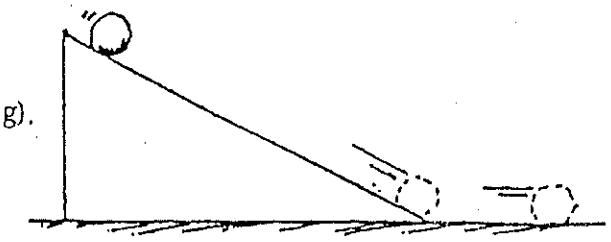
a. The acceleration of [A + B] here is (close to zero) (close to *g*).

b. In this case the acceleration of 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.



a. Acceleration is (decreasing) (constant) (increasing).

b. If the ramp were steeper, acceleration would be (more) (the same) (less).

c. When the ball reaches the bottom and rolls along the smooth level surface it (continues to accelerate) (does not accelerate).

WHICH ENCOUNTERS THE GREATER FORCE OF AIR RESISTANCE--- A FALLING ELEPHANT OR A FALLING FEATHER?

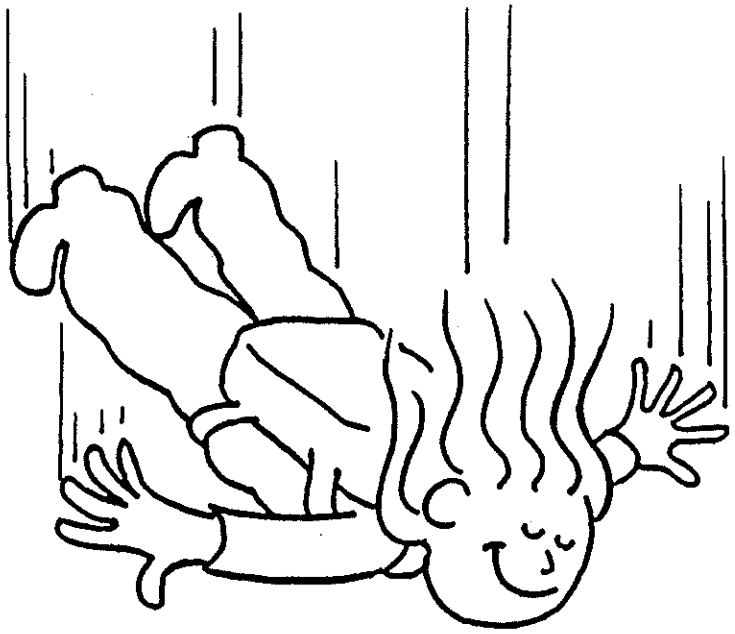
Hewitt Drew It!

As she falls faster and faster through the air, her acceleration

a) increases

b) decreases

c) remains the same



Fallling and Air Resistance

Bronco skydives and parachutes from a stationary helicopter. Various stages of fall are shown in positions *a* through *f*. Using Newton's 2nd law,

$$a = \frac{F_{NET}}{m} = \frac{W-R}{m}$$

find Bronco's acceleration at each position (answer in the blanks to the right). You need to know that Bronco's mass *m* is 100 kg so his weight is a constant 1000 N. Air resistance *R* varies with speed and cross-sectional area as shown.

Circle the correct answers.

1. When Bronco's speed is least, his acceleration is
   (least) (most).

2. In which position(s) does Bronco experience a downward acceleration?
   (a) (b) (c) (d) (e) (f)

3. In which position(s) does Bronco experience an upward acceleration?
   (a) (b) (c) (d) (e) (f)

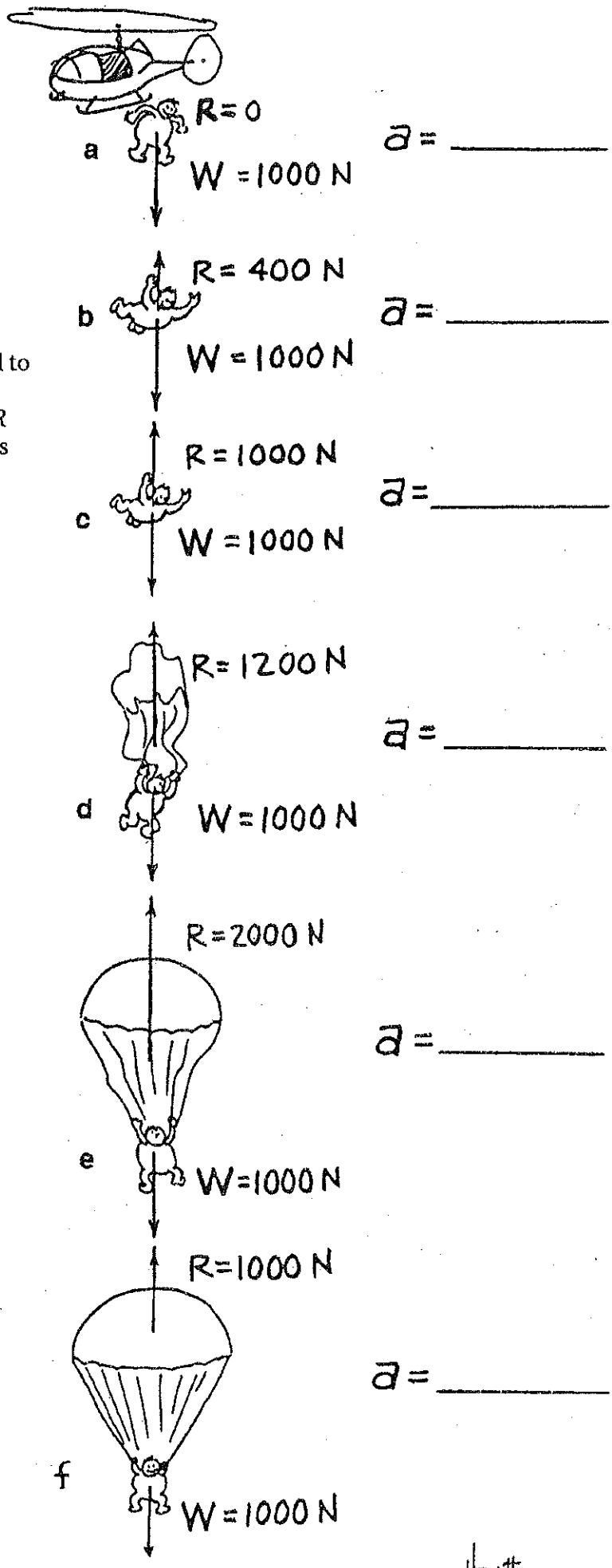
4. When Bronco experiences an upward acceleration, his velocity is
   (still downward) (upward also).

5. In which position(s) is Bronco's velocity constant?
   (a) (b) (c) (d) (e) (f)

6. In which position(s) does Bronco experience terminal velocity?
   (a) (b) (c) (d) (e) (f)

7. In which position(s) is terminal velocity greatest?
   (a) (b) (c) (d) (e) (f)

8. If Bronco were heavier, his terminal velocity would be
   (greater) (less) (the same).



Baseball Trajectory