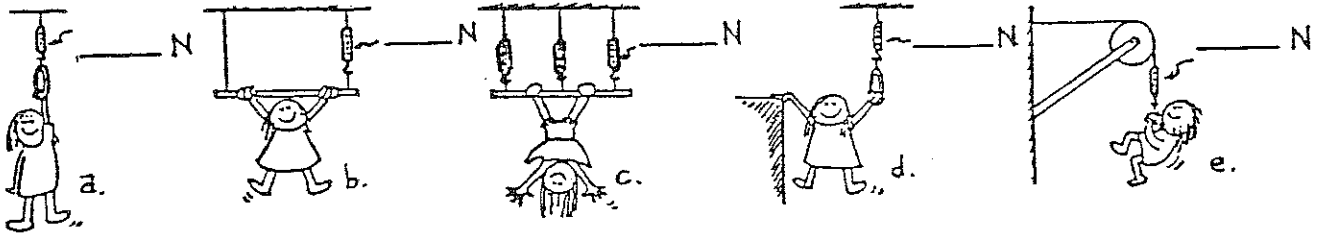


Chapter 4: Newton's Second Law—Force and Acceleration

1. In each case below, the girl hangs at rest. Since she is not accelerating, the net force on her is zero. This means the upward pull of the rope(s) equals the downward pull of gravity. She weighs 300 N. What is the scale reading in each case?



2. (Complete both equations below.) In Chapter 2, acceleration was defined in terms of a change in velocity and time. Write the definition as a word equation in the form of a quotient.

acceleration = _____

In this chapter we express acceleration by an equation that tells how it is produced. This equation is

acceleration = _____

3. Two people with the same mass of 50 kg are riding in a pickup truck at 20 m/s. They are brought to an abrupt stop in a head-on collision with a drunk driver who has crossed the divider line. One person wears a seat belt and is brought to a stop in 0.10 s. The other is not wearing a seat belt and is brought to a halt by the dashboard in 0.01 s.

- What is the deceleration of the person who comes to a stop wearing the seatbelt?
[Answer: _____]
- How much average force is exerted by the seatbelt to bring the first person to a stop?
[Answer: _____]
- What is the deceleration of the person who comes to a stop by hitting the dashboard?
[Answer: _____]
- How much average force is exerted by the dashboard on the person?
[Answer: _____]

4. Skelly the skater has a total mass of 25 kg and propels himself by rocket power.

- a. Complete Table I for the case where resistance effects can be neglected.

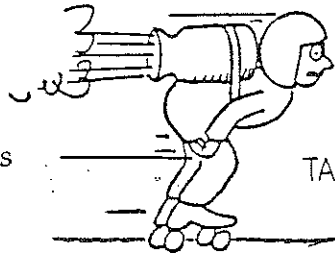
TABLE I

FORCE	ACCELERATION
100 N	
200 N	
	10 m/s ²

- b. Complete Table II for the case where resistance in each trial is a constant 50 N.

TABLE II

FORCE	ACCELERATION
50 N	0 m/s ²
100 N	
200 N	



5. (Circle the correct answers.) A ball rolls down a constant slope ramp. The acceleration is

(decreasing) (constant) (increasing)

If the ramp is steeper, the acceleration is

(more) (the same) (less)

When the ball reaches the bottom and rolls along the smooth level surface it

(continues to accelerate) (does not accelerate)



6. When a ball rolls down this ramp of varying slope, the ball's acceleration is greater

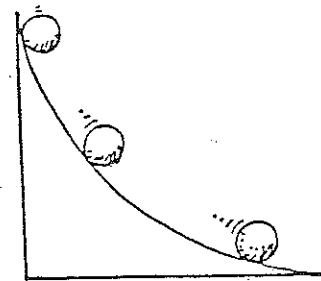
(at the top) (at the middle) (at the bottom)

(same everywhere)

The speed of the ball is greater

(at the top) (at the middle) (at the bottom)

(same everywhere)



In this special case, the speed is greatest when the acceleration is

(greatest) (least)

[Remember this example when somebody tells you that acceleration and speed are both the same ... because they are not!]

7. In the box at the right, sketch a ramp on which the acceleration of the ball will be very little at the top and progressively greater as it moves down the ramp.

