

with a speed of 2000 feet per second, it will lose each second 32 feet per second. At the end of the 1st second the speed will be 1968 feet per second; at the end of the second, 1936; of the 3rd, 1904; and so on; so that it will lose its entire speed in $2000 \div 32 = 62\frac{1}{2}$ seconds. It will then begin to descend, gaining every second a speed of 32 feet per second, and after $62\frac{1}{2}$ seconds it will reach the ground again with a speed of 2000 feet per second.

These results are not accurately true, as we have neglected the resistance of the air, which is considerable when the velocity is high. As a matter of fact, the bullet will lose more than 32 feet per second during the first second going upward.

PROBLEMS

1. A bicyclist coasts down a hill, gaining every second a speed of $1\frac{1}{2}$ feet per second. It takes 16 seconds to go down; find the speed at the bottom; He is then carried up the opposite hill, losing each second 2 feet per second; how long will it take his machine to come to rest?

2. A body falling freely gains per second 980 centimetres per second. Find the velocity at the end of 2, 8, 20 seconds.

3. In playing bowls, a bowl was delivered at the rate of 5 feet per second. If it lost each second $\frac{1}{2}$ foot per second, how long before it came to rest?

4. A base-ball is thrown upwards with a velocity of 60 feet per second. Find its velocity at the end of 1, 2, 3 seconds. How long will it take to reach the ground again?

5. A stone sliding on the ice at the rate of 200 yards per minute is gradually brought to rest in 2 minutes. Find the acceleration in feet and seconds.

20. Space Passed Over. If we know the average speed of a body and the time it has been moving we can easily find the distance it has moved. If it has moved for 5 seconds at the average rate of 90 feet per second, the space passed over is $5 \times 90 = 450$ feet.

Consider now a body dropped from a height and allowed to fall freely. What is the average speed during the first second? At the beginning it is 0 feet per second, and at the