is $\frac{1}{2}(0 + 128) = 64$ feet per second, and the space passed over, or the height to which the body rises, is $4 \times 64 = 256$ feet.

It will then descend, gaining speed in the reverse order, and will reach the ground in 4 sec., or 8 seconds from the time of leaving it.

PROBLEMS

1. A stone is dropped down a well and in $3\frac{1}{2}$ seconds reaches the bottom. Find the speed it had on reaching the bottom and then the depth of the well.

2. A motor-cyclist riding at the rate of 45 miles an hour is thrown off and strikes a telephone pole. First, find his speed in feet per second. Next, find for how long a time a body would have to fall to acquire this speed. Lastly, find the distance the body would have to fall.

3. A stone is thrown on the ice with a speed of 75 feet per second, and the retardation every second is 4 inches per second. Find how long it will move and how far it will go.

4. A body falls freely. Calculate the space passed over in 1, 2, 3, 4, 5 seconds; and then deduce the space passed over in the 1st, 2nd, 3rd, 4th, 5th seconds.

21. All Bodies if Unimpeded Fall at the Same Rate. This is what Galileo proved in 1590 by letting bodies of various sizes fall from the Leaning Tower of Pisa. Now common observation shows that a piece of lead falls much faster than a feather or a piece of paper. We at once suspect the reason for this however—it is the resistance of the air.

If the air were got rid of, these bodies would all fall at the same rate. The long tube shown in Fig. 10 is used for this experiment. Into it are put a coin, or other bit of metal, and a feather, and then by means of an air-pump the air is removed from the tube. If now the tube be quickly turned end for end the two bodies are seen to fall together.

FIG. 10.—Tube to show that a coin and a feather fall in a vacuum with the same acceleration.