Cycle 16 Free Fall Kinematics

Assume free fall for all problems.

1. Dana Kunze dove from a height of 52.4 m. Assuming he started from rest and that he was in free fall...

a) How long should his fall have taken?

b) What was his final velocity, just before he hit the water?

c) In the video, his fall takes about 3.3 s. Comparing this number to your answer for part a, would you say that he was in exact free fall, close to free fall, or not close at all to free fall?

2. You are exploring the Grand Canyon and are curious about how far down it goes. You drop a rock over the edge and hear it hit about 19 seconds later. How far down is it?

3. Copy the Free Fall Table. Can you figure out the pattern and correctly deduce t = 5 s?

t	v	Δy
0 s	0	0
1 s	-10 m/s	-5 m
2 s	-20 m/s	-20 m
3 s	-30 m/s	-45 m
4 s	-40 m/s	-80 m
5 s		

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4. If a penny were dropped from the observation deck of the Empire State Building (369 m), and if it experienced no drag on the way down, how fast would it be going when it reached the pavement?

5. A ball is thrown upward at 30 m/s and then comes back down to its original height.

a) How long does it take to get to the top?
b) How long does it take to come back down from the top?
c) How high up did it go?
d) How fast was it moving when it returned to its original height?

4. Rain falls from clouds that could be as high as 2,000 meters up. If rain experienced no drag on the way down, how fast would it be going when it reached the ground?

5. A ball is thrown upward at 20 m/s and then comes back down to its original height.

a) How long does it take to get to the top?
b) How long does it take to come back down from the top?
c) How high up did it go?
d) How fast was it moving when it returned to its original height?