

Free Fall Mini Labs

Name: _____

For each of these mini labs, complete the task provided and show all work.

The Videos:

One key variable that you will want to measure precisely and accurately is **time**. To make this job a little easier, a running stopwatch has been added to the video. Please note that this stopwatch starts at the beginning of the video so you will need to determine an initial and final time to calculate the overall duration of the event. The video will run once in real time and again in slow motion. It is recommended to collect timestamps from the slow motion footage for the most precise measurements.

Equations and Constants

$v = u + at$	$s = ut + \frac{1}{2}at^2$	$v^2 = u^2 + 2as$	$s = \frac{(v+u)t}{2}$	$g = 9.81 \text{ m s}^{-2}$
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Part 1: Tik Tok Cliff Dive

During the summer of 2020, this clip went viral on the video sharing app Tik Tok. People were astonished by how this cliff diver seems to fall forever before hitting the water.

[CLICK HERE to access the Tik Tok Cliff Dive video](#)

Your Task: Determine the height of the cliff

Record all assumptions and show all work below ↓



Part 3: Bowling Ball Impact

Now that I'm watching this bowling ball smack the ground so close to the house, it's got me wondering, how fast did it hit??

[CLICK HERE to access the Bowling Ball Drop video](#)

Your Task: Calculate the impact velocity of the bowling ball

Record all assumptions and show all work below ↓



Part 4: Air Time

Some athletes have some pretty impressive hops. If we know how high they jump, we should also be able to figure out how long they are airborne.

[CLICK HERE to access the Vertical Jump Video](#)

Your Task: Calculate the total air time based on the jump height of 47.1 inches

Record all assumptions and show all work below (don't forget to convert to meters) ↓

Once you have a value calculated based on his total height, use the stopwatch on the video to get an estimate for how long he was in the air. If your answer is not in this ballpark, revisit your calculation. Remember that the total hang time is the time to go up **and** come back down

Hang Time measured with Hudl	
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