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Part of the UBC MECH OER project

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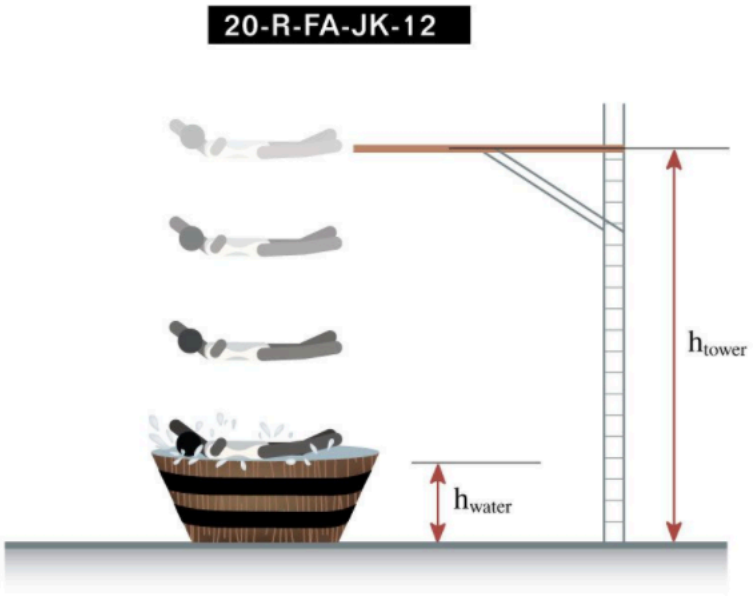
Original sketch by Jennifer Kirkey
Professional drawing by Brina Schrenk



https://en.wikipedia.org/wiki/Professor_Splash

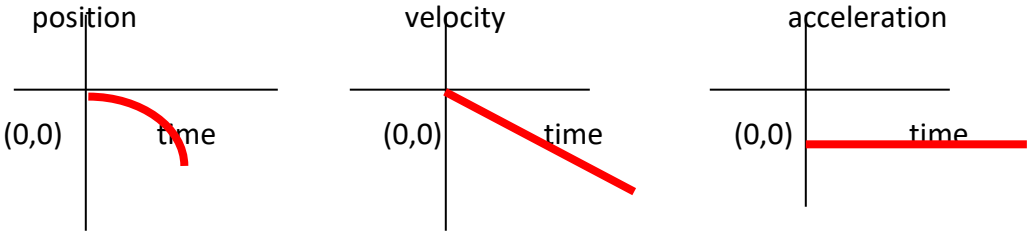
Bell Flop Physics answers

People dive from a high tower, then belly flop into shallow water coming to rest close to the bottom of the water. Assume Professor Splash starts from rest at the top of the 10.30 metre tower. He free falls 10.00 metres until he reaches the top of the water, then the water exerts a force on him stopping him in 30.0 cm before he reaches the bottom of the water.

a) Ignoring friction and air resistance, how fast is he moving just before he hits the water? Free fall motion.

$m g h = \frac{1}{2} m v^2$ So v = 14.0 m/s down (2 marks).

b) Sketch the motion graphs for this part of the question.
Only this part. (3 marks)



c) When he hits the water he is moving quickly, but stops at the bottom of the pool after moving through 30.0 centimetres of water. What is the acceleration of the water on Professor Splash, assuming it is constant acceleration?

$(v\ final)^2 = (\ v\ initial)^2 + 2\ a\ (displacement)$

v_o= 14.0 m/s

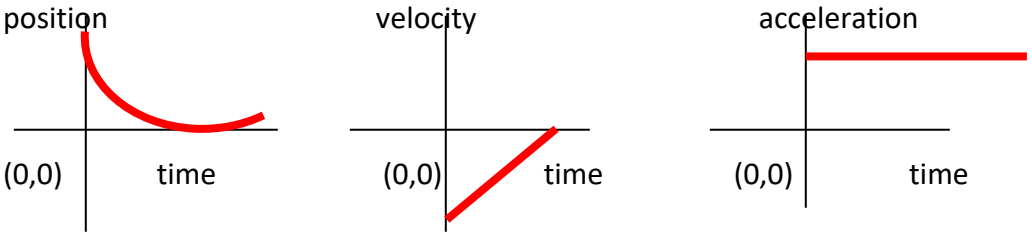
v_f= 0 so

a = 326 or 330 m/s^2 (2 marks).

Direction is up (1 mark)

d) If Professor Splash has a mass of 100 kg, then the force acting on him is 32600 N.

e) Sketch the motion graphs for this part of the question.
Only this part. (3 marks)



The accelerations in the two parts are in different directions.

d) How many "g"s is this acceleration. In other words, what is the ratio of the answer in (c) to g = 9.80 m/s^2. Please note that a human has survived 42 g. Most people start to black out at 4g or 5 gs.

($326\ m/s^2$) / ($9.80\ m/s^2$) = 33 g (1 mark).