

DUFAS these problems and have kinematics equations at the ready. If stuck, make sure to draw a diagram and identify the information that the problem includes (variables) as well as what variables it is asking you to find.

- 1) From the top of a cliff, a person uses a slingshot to fire a pebble straight downward, which is the negative direction. The initial speed of the pebble is 9.0 m/s. (a) What is the acceleration (magnitude and direction) of the pebble during the downward motion? Is the pebble decelerating? Explain. (b) After 0.50 s, how far beneath the cliff top is the pebble?
- 2) The greatest height reported for a jump into an airbag is 99.4 m by stuntman Dan Koko. In 1948 he jumped from rest from the top of the Vegas World Hotel and Casino. He struck the airbag at a speed of 39 m/s (88 mi/hi. To assess the effects of air resistance, determine how fast he would have been traveling on impact had air resistance been absent.
- 3) In a random dash a sprinter accelerates from rest to a top speed with an acceleration whose magnitude is 2.68 m/s^2 for a period of 4.5 seconds. After achieving top speed, he runs the remainder of the race without speeding up or slowing down. He runs for 15 seconds. How far does he run during the acceleration phase? How far for the entire race?
- 4) A car is traveling on a dry road with a velocity of +32.0 m/s. The driver slams on the brakes and skids to a halt with an acceleration of -8.00 m/s^2 . On an icy road, the car would have skidded to a halt with an acceleration of -3.00 m/s^2 . How much farther would the car have skidded on the icy road compared to the dry road?
- 5) Two arrows are shot vertically upward. The second arrow is shot after the first one, but while the first is still on its way up. The initial speeds are such that both arrows reach their maximum heights at the same instant, although these heights are different. Suppose that the initial speed of the first arrow is 25.0 m/s and that the second arrow is fired 1.20 s after the first. Determine the initial speed of the second arrow.
- 6) An astronaut on a distant planet wants to determine its acceleration due to gravity. The astronaut throws a rock straight up with a velocity of + 15 m/s and measures a time of 20.0 s before the rock returns to his hand. What is the acceleration (magnitude and direction) due to gravity on this planet? .
- 7) Space Shuttle travels at a speed of about $7.6 \times 10^3 \text{ m/s}$. The blink of an astronaut's eye lasts about 100 ms. How many football fields (length = 91.4 m) does the Space Shuttle cover in the blink of an eye?