

Please upload your solution to Problem 3 to canvas for marking after the workshop.

### Problem 1

The position of a particle moving along an  $x$ -axis is given by  $x = 12t^2 - 2t^3$ , where  $x$  is in meters and  $t$  is in seconds. Determine:

- (a) the position,
- (b) the velocity, and
- (c) the acceleration of the particle at  $t = 4$  s

### Problem 2

A rock is thrown vertically upward from ground level at time  $t = 0$ . At  $t = 1.5$  s it passes the top of a tall tower, and 1.0 s later it reaches its maximum height. What is the height of the tower?

### Problem 3

Two particles move along an  $x$  axis. The position of particle 1 is given by  $x_1 = 6.00t^2 + 3.00t + 2.00$ ; the acceleration of particle 2 is given by  $a_2 = -8.00t$  and, at  $t = 0$ , its velocity is  $v_2 = 20\text{ms}^{-1}$ . When the velocities of the particles match, what is their velocity?

### Problem 4

A ball is shot vertically upward from the surface of another planet. A plot of  $y$  versus  $t$  for the ball is shown in the figure below, where  $y$  is the height of the ball above its starting point and  $t = 0$  at the instant the ball is shot. The figure's vertical scaling is set by  $y_s = 30.0\text{m}$ . What are the magnitudes of :

- (a) the free-fall acceleration on the planet and
- (b) the initial velocity of the ball?

