- 1(a) An object is released from the top of the Empire State building, which has a height of 381 m. How long does it take from when it is released until it hits the street below?
- (b) What is the speed of the object when it hits the ground.
- 2. The graph on the right shows the velocity, $v_x(t)$, of an object moving on the *x*-axis as a function of time, *t*.
 - (i) Assume the object is at the origin at time t = 0. At what time during the 30 s will it be furthest from the origin?
 - (ii) What is the displacement of the object during the interval from t = 0 to 7.5 s?
 - (iii) What is the displacement of the object during the interval from t = 0 to 30 s?



3. The position, x(t), of an object along the x-axis is given by the following algebraic expression:

$$x(t) = a + bt - ct^2 + dt^3,$$

where a, b, c and d are all positive constants. Derive an algebraic expression for the time at which the velocity has its minimum value. Your expression should be in terms of some or all of the given constants a, b, c and d.