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# Worksheet 13

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1. If a projectile is shot vertically upward from a point  $2m$  above ground level with with an initial velocity of  $24.5 m/s$ , then its height in meters after  $t$  seconds is given by  $h = 2 + 24.5t - 4.9t^2$ .

(a) What is the velocity of the object after 2 seconds?

(b) What will be the velocity of the object at the instant when it reaches its maximum height?

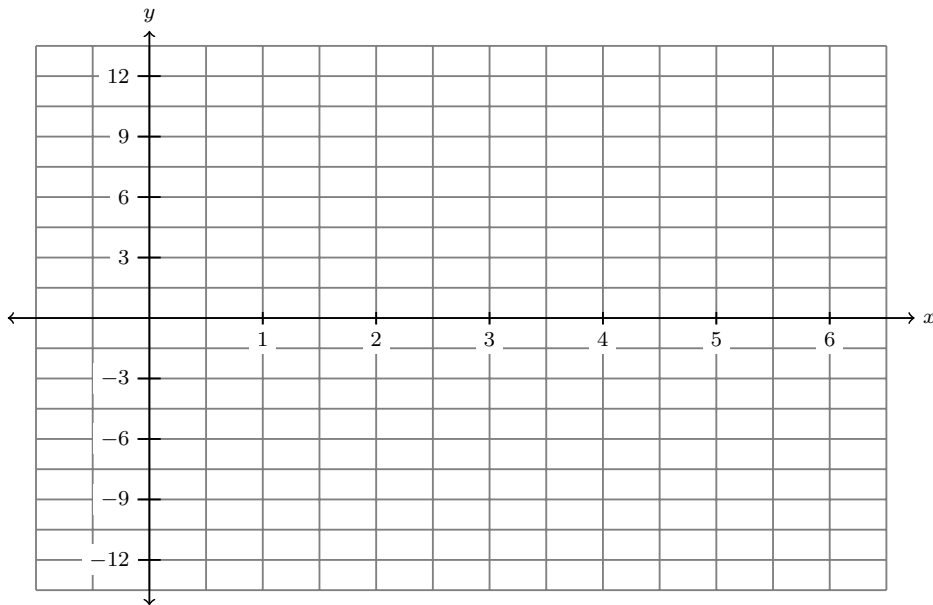
(c) When does the projectile reach its maximum height, and what is the maximum height?

2. A particle moves up and down with position  $s(t) = t^3 - 6t^2 + 9t$ , where  $s$  is in meters and  $t$  is in seconds.

(a) Find the velocity function for the particle.

(b) Find the acceleration function for the particle.

(c) Graph the position, velocity, and acceleration functions (with respect to time) for  $0 \leq t \leq 5$ .



(d) When is the particle moving up? Down? When is the particle at rest?

(e) When is the particle speeding up? Slowing down? *Hint: this is tricky. Think of an object moving up and down on a spring—can you imagine different times when it is speeding up?*