All three problems are of equal weight, and will be graded on a scale of 0-20.

1. At the instant shown below, car A has a constant speed of 25 m/s, and car B has a speed of 30 m/s and is gaining speed at the rate of 5 m/s².

(a) What is the velocity of car A relative to car B?

(b) What is the acceleration of car A relative to car B?
2. The 70 kg window washer pulls himself up in a mass-less platform by exerting a downward force of 220 N on the free end of the rope.

(a) What force is exerted on the painter by the platform?

(b) What is the acceleration of the painter?
3. The fearsome 5 kg block is shot with a 50g bullet travelling horizontally at a speed of 500 m/s. The bullet is fully embedded in the block 0.015 s after first contact. The subsequent motion of the block along the smooth surface is then slowed by a mass-less spring whose stiffness is 100 N/mm.

(a) What is the velocity of the block immediately after impact?

(b) What is the average force acting on the bullet during impact?

(c) What is the maximum distance the spring will compress?