A car travels down the road at 30 m/s when it applies its brakes suddenly. The car's brakes cause it to decelerate at a rate of 5 m/s^2.

a) How long does it take for the car to come to a stop?

b) How far does the car travel before it comes to a stop?

A potter's wheel is spinning with an angular velocity of 30 radians per second when she applies friction to stop it, causing it to decelerate at a rate of 5 rad/s^2.

a) How long does it take for the wheel to come to a stop?

b) How many more times does the wheel spin before it comes to a stop?

A rocket is fired straight up. Its motor burns for ten seconds. While the rocket's motor burns, it accelerates upward at 15 m/s^2; after it burns out, the rocket is in freefall.

Note: As you go through this problem, make position vs. time, velocity vs. time, and acceleration vs. time graphs for the rocket, as you gather the bits of information that enable you to make them. The part of the problem that asks you to graph them is listed last, but you shouldn't wait to the end to do it; you should do it as you go.

a) Since the rocket's acceleration changes in flight, you can't use the constant-acceleration kinematics formulae we've learned to understand the whole flight at once. How *can* you use constant-acceleration kinematics to understand this problem?

b) How high above the ground is the rocket once its motor burns out?

c) How fast is the rocket traveling once its motor burns out?

d) How fast is the rocket traveling when it reaches its maximum height?

e) What is that maximum height?

f) How long does it take for the rocket to land back on the ground?

Make position vs. time, velocity vs. time, and acceleration vs. time graphs for the rocket.