Kinematics of mass point

1. The train was moving at an average speed of $15\,m\cdot s^{-1}$. The car crossed the distance $120\,km$ in 2 hours. Which one was going at a higher average speed?

2. Pedestrian, car and train move in a straight line so that their tracked distances depend on time according to formulas $s_{\mathrm{ch}}(t) = 5 + 4t$, $s_{\mathrm{a}}(t) = 3 + 2,5t^2$, $s_{\mathrm{v}}(t) = 2 + 7t - t^2$. For each of the objects (pedestrian, car, train):
   a) analytically express how the instantaneous velocity and the instantaneous acceleration depend on time,
   b) draw graphs of time dependences of trajectory, instantaneous velocity and instantaneous acceleration,
   c) determine the type of movement,
   d) determine the speed of the pedestrian, car and train in the first and third seconds of movement.

3. The car starts from rest (zero velocity) with an evenly accelerated movement. It reaches velocity in 8 seconds $100\,km\cdot h^{-1}$.
   a) Determine how fast (acceleration) the car is moving.
   b) Calculate the speed of the car at 4 a second and the distance the car has traveled during that time.

4. The children found an old dry well, which they could not see at the bottom. So they let a stone into it. About 10 seconds they began to land on the bottom of the well. Calculate the depth of the well if we neglect the propagation time of the sound.

5. The flywheel performs 300 turns per minute.
   a) Determine the time of one turn of the flywheel.
   b) Calculate the angular velocity and the centrifugal acceleration of the flywheel points, which are at a distance of $10\,cm$ from the axis of rotation.