5.A rocket is fired vertically upwards with initial velocity $80 \mathrm{~m} / \mathrm{s}$ at the ground level. Its engines then fire and it is accelerated at $4 \mathrm{~m} / \mathrm{s}^{2}$ until it reaches an altitude of $\mathbf{1 0 0 0}$ m . At that point the engines fail and the rocket goes into free-fall. Disregard air resistance.
(a) How long was the rocket above the ground?
(b) What is the maximum altitude?
(c) What is the velocity just before it collides with the ground?
6.A rock is dropped from rest into a well.
(a) The sound of the splash is heard 4 s after the rock is released from rest.

How far below to top of the well is the surface of the water? (the speed of sound in air at ambient temperature is $336 \mathrm{~m} / \mathrm{s}$ ).
(b) If the travel time for the sound is neglected, what \% error is introduced when the depth of the well is calculated?
7.A ferries wheel with radius 20 m which rotates counterclockwise, is just starting up. At a given moment, a passenger on the rim of the wheel and passing through the lowest point of his circular motion is moving at $3.00 \mathrm{~m} / \mathrm{s}$ and in gaining speed at a rate of $0.5 \mathrm{~m} / \mathrm{s}^{2}$.
Find the magnitude of the passenger's acceleration at the instant.
8. In an action film hero is supposed to throw a grenade from his car, which is going $90 . \mathrm{km} / \mathrm{h}$, to his enemy's car, which is going $110 \mathrm{~km} / \mathrm{h}$. The enemy's car is 15.8 m in front of the hero's when he lets go of the grenade. If the hero throws the grenade so its initial velocity relative to him is at an angle of 45(degree) above the horizontal, what should the magnitude of the initial velocity be? The cars are both traveling in the same direction on a level road. Ignore air resistance.

Find the magnitude of the velocity both relative to the hero and relative to the earth.
9.A skier is accelerating down a 30 degree hill at $3 \mathrm{~m} / \mathrm{s}^{2}$.
(a) What is the vertical component of her acceleration?
(b) How long will it take her to reach the bottom of the hill, assuming she starts from rest and accelerates uniformly, if the elevation is $\mathbf{3 0 0} \mathbf{~ m}$ ?
10.A ball is thrown from a point 1 m above the ground. The initial velocity is $20 \mathrm{~m} / \mathrm{s}$ at an angle of 40 degrees above the horizontal.
(a) Find the maximum height of the ball above the ground.
(b) Calculate the speed of the ball at the highest point in the trajectory.
11. What is the speed ( $\mathrm{m} / \mathrm{sec}$ ) needed for a stunt driver to launch from a 20 degree ramp to land15 $m$ away?
What is his maximum height?

