Read 3.4

Group tomorrow

Exam 1 next wednesday

chp 1-3

multiple choice

~$\frac{1}{2}$ concept ~$\frac{1}{2}$ calculational

may bring 1 $8\frac{1}{2} \times 11$" handwritten sheet with you

will post old exam on class web page soon

office hours 1:30-2:30 Today

2:45-3:45 Thursday

Interactive Question

(B)

An object is dropped from rest and is free-falling near the surface of the earth. Which of the following is true?

A) The velocity and the acceleration are increasing.
B) The velocity is increasing but the acceleration is constant.
C) The velocity is increasing, but the acceleration is decreasing.
D) The velocity and the acceleration are constant.

Interactive Question

(B)

A ball is thrown straight up and rises for a while then stops and falls. Which of the following is true.

A) The acceleration is first upward, then downward
B) The velocity is first upward, then downward, but the acceleration is always downward.
C) The acceleration is always downward, except when the ball is at its highest point.
D) The velocity and the acceleration are always in the same direction.
E) The velocity and the acceleration are always in opposite directions.

Interactive Question

(B)

If you drop a brick from a building in the absence of air resistance, it accelerates downward at ~~10~~ 9.8 m/s^2. If instead you throw it downward, its acceleration after release

A) is always down with a magnitude less than ~~10~~ 9.8 m/s^2
B) is always down with a magnitude equal ~~10~~ 9.8 m/s^2
C) is always down with a magnitude more than ~~10~~ 9.8 m/s^2
D) changes. Sometimes it is upward and sometimes it is downward
E) Is impossible to determine with the information given

Problem: A boy drops a ball from rest from the top of a building 40.0 m high. How long will it take to reach the ground?

Given $v_0 = 0$ $\quad d = -40\,m$

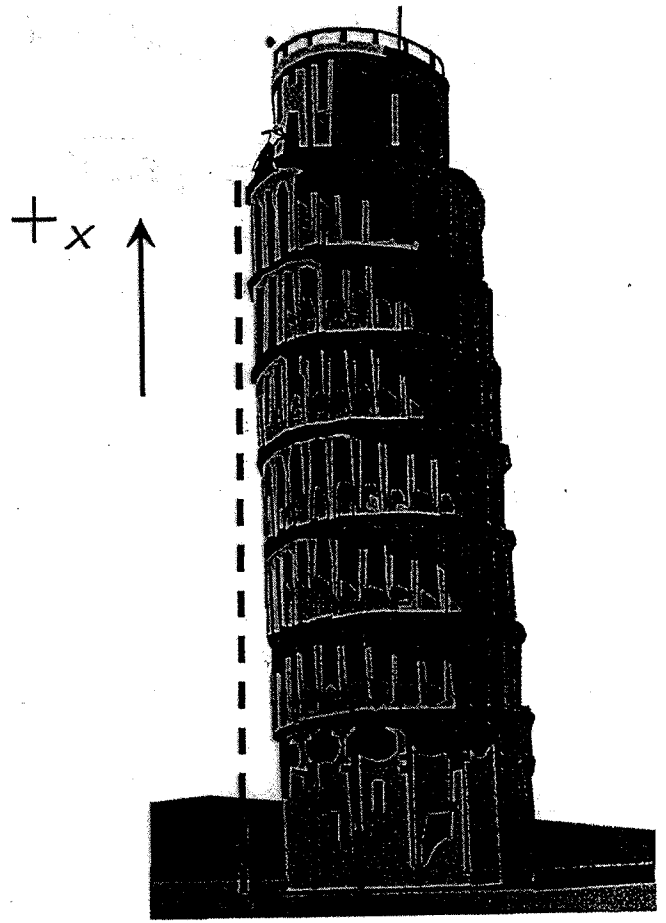
want t $\quad a = -9.8\,m/s^2$

$d = v_0 t + \frac{1}{2} a t^2$ ($v_0 = 0$)

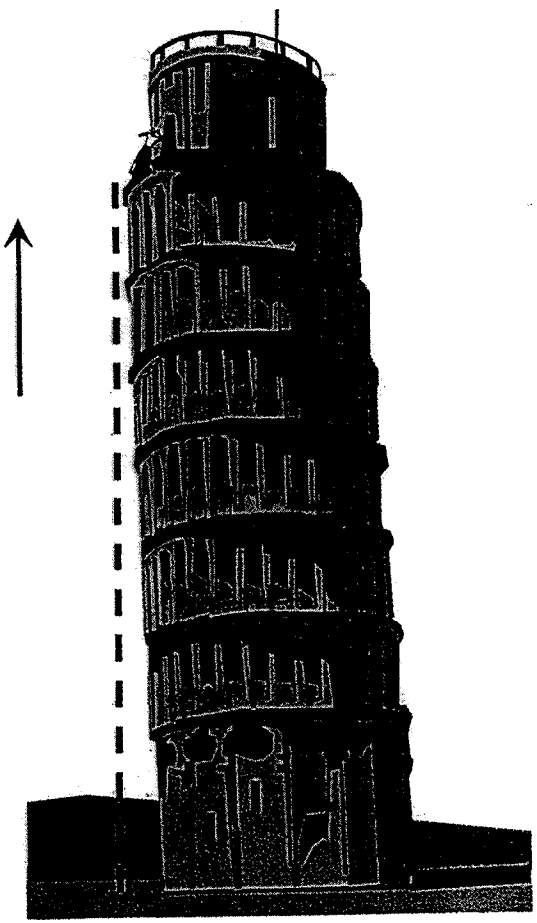
$d = \frac{1}{2} a t^2$

$t^2 = \frac{2d}{a} \qquad t = \sqrt{\frac{2d}{a}}$

$t = \sqrt{\frac{2 \cdot (-40\,m)}{-9.8\,m/s^2}} = \boxed{2.86\,s}$



Problem: A boy drops a ball from rest from the top of a building 40.0 m high. How fast will it be moving when it hits the ground?



Given $v_0 = 0\ m/s$ $\quad t = 2.85\ s$ previous

↑+ $\quad d = -40\ m$

know $= a = -g = -9.8\ m/s^2$

want v

$v = v_0^{0} + at$

$v = at$

$v = (-9.8\ m/s^2)(2.85)$

$= \boxed{-27.9\ m/s}$

+↓ $\quad d = 40\ m$

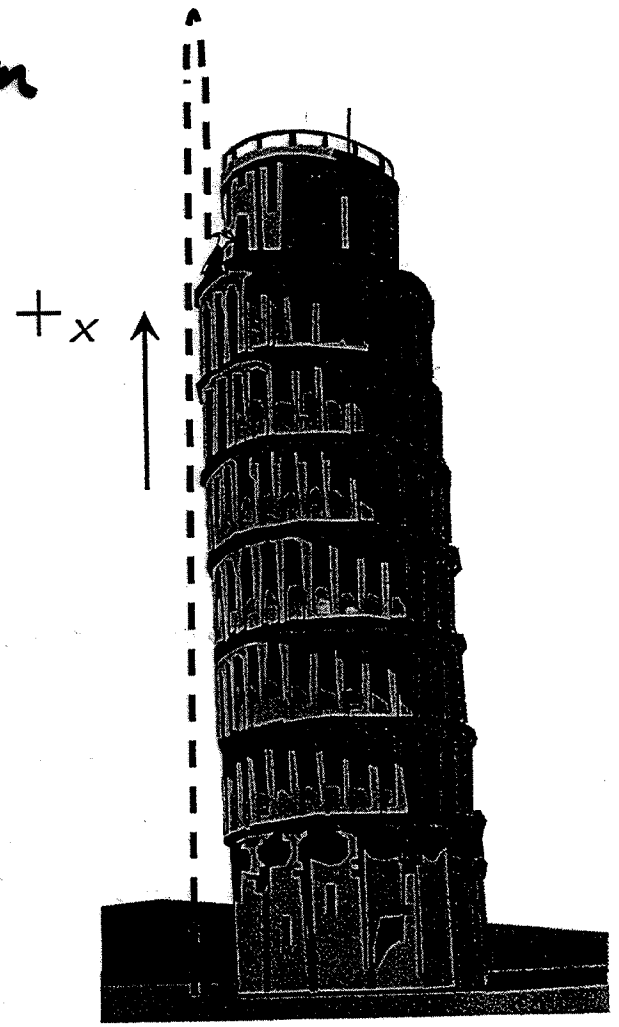
$a = 9.8\ m/s^2$ $\quad v = (9.8\ m/s^2)(2.85) = \boxed{27.9\ m/s}$

Problem: A boy throws a ball upward with a speed of 10.0 m/s from the top of a building 40.0 m high. What will be the velocity of the ball after (a) 0.5 seconds?, (b) 1.5 seconds

Given $v_0 = +10\ m/s$

$a = -g = -9.8\ m/s^2$

is ~~$d = 40m$~~



a) $t = 0.5\ s$

b) $t = 1.5\ s$

a) $v = v_0 + at$

$= 10\ m/s + (-9.8\ m/s^2)(0.5\ s)$

$= \boxed{+5.1\ m/s}$

b) $v = v_0 + at$

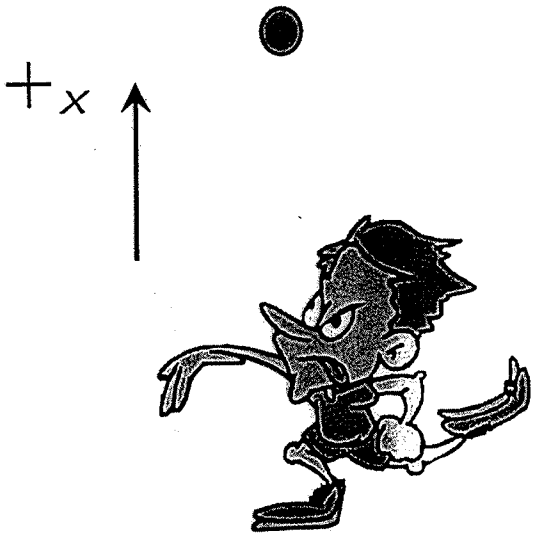
$10\ m/s + (-9.8\ m/s^2)(1.5\ s)$

$\boxed{-4.7\ m/s}$

Problem: A boy standing on the ground throws a ball straight upward with a speed of 15.0 m/s.

a) How long will it take to reach its maximum height?

b) How high will it go?



Given $v_0 = +15\ m/s$

$a = -g = 9.8\ m/s^2$

a) want t $\quad v = 0\ m/s$

$v = v_0 + at$

$0 = v_0 + at \quad -v_0 = at \quad t = \frac{-v_0}{a}$

$t = \frac{-15\ m/s}{-9.8\ m/s^2} = \boxed{1.5\ s}$

b) want d $\quad$ know t

$d = v_0 t + \frac{1}{2} a t^2$

$d = (15\ m/s)(1.5\ s) + \frac{1}{2}(-9.8\ m/s^2)(1.5\ s)^2 = \boxed{11.5\ m}$

Problem: A boy standing on the ground throws a ball straight upward and it rises to a height of 15 meters. How fast did he throw the ball?

$d = 15\,m$ want v_0

$a = -g = -9.8\,m/s^2$

$v = 0\,m/s$ at max height

don't know t, v_0

1) $v = v_0 + at$

2) $d = v_0 t + \frac{1}{2} a t^2$

1) $0 = v_0 + at \quad v_0 = -at \quad t = \frac{-v_0}{a}$

2) $d = v_0\left(\frac{-v_0}{a}\right) + \frac{1}{2}(a)\left(\frac{-v_0}{a}\right)^2$

$= \frac{-v_0^2}{a} + \frac{1}{2}\frac{v_0^2}{a} = \frac{-1}{2}\frac{v_0^2}{a} = d$

$-2da = v_0^2$

$v_0 = \sqrt{-2da} = \sqrt{-2(15\,m)(-9.8\,m/s^2)}$

$17.1\,m/s$