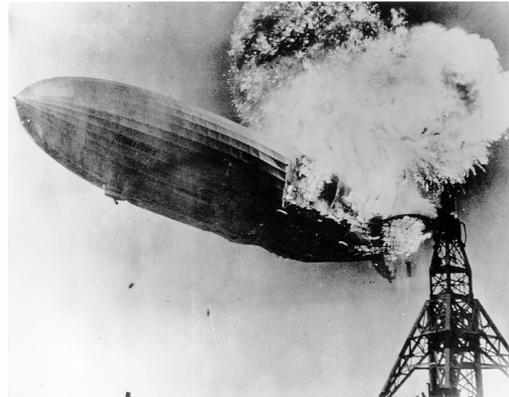# Physics20
UNIT 1- KINEMATICS
ASSIGNMENT 4 due: Monday September 29th Period 4

1.   A Learjet traveling at its maximum cruising air velocity of 843 kmh^{-1} [N] encounters a crosswind of 85 kmh^{-1} [W]. What is the resultant ground velocity of the Learjet??

2.   Peter rows his boat due north at 4.00 ms^{-1}. The river flows at 6.00 ms^{-1} due east and is 360 m across. In what direction relative to the shore will Peter's boat go?

3.   The Hindenburg, a 245m Zepplin (shown here falling to the ground after mysteriously catching fire at Lakehurst Naval Air Station in Manchester Township New Jersey, May 6th, 1937) could travel from London to New Jersey (5586 km) and back in five days, 19 hours and 51 minutes.

   a)   What is the Zepplin's velocity, in ms^{-1} for the journey?

   b)   What is it's speed?

   c)   If the Zepplin is running East to West across the Atlantic, what is its velocity if it encounters a 29 ms^{-1} wind blowing East to West?

d) What would be the Hindenburg's final velocity if it encountered the same velocity wind but it was blowing South to North?

e) If the Zepplin was traveling at 135 kmh⁻¹ 15° North of East to compensate for a cross wind how long would it take to cross the Atlantic (5586 km).

4. As part of a triathlon, swimmers must cross a 60m wide River with a velocity of 1.50 ms⁻¹ [E].

a) If a fast swimmer with a swim velocity of 3.00 ms⁻¹ [N] attempts to cross the river, what is their resultant velocity?

b) How long will it take them to cross the river?

c) If a slower swimmer with a maximum swim speed of 2.75 ms⁻¹ wished to swim straight south across the river, what should be the swimmer's heading?

5.   Annie Taylor, a schoolteacher, part-time daredevil and dancing instructor, was the first person to go over Niagara falls when she did so in a barrel on October 24th 1901.

   a.)   If the water velocity is 40 kmh^{-1} [W] how far to the West, from the edge of the falls, would her barrel have landed?

6.   David "Cannonball" Smith Sr., a human cannon ball is launched at 112 kmh^{-1} and 45° to the horizontal. The height where The Cannonball leaves the ground is 5 m.

   a.   What is the initial upwards velocity?

   b.   What is The Cannonball's zenith?

   c.   How long does it take The Cannonball to reach the catching net if it is 4m off the ground?

   d.   How far away should the front edge of a 400 m² square net be placed if it is to catch The Cannonball at it's center?