Velocity Vector and Projectile Review

1.) A boat travels across a $15.0\ m$ wide river, the river flows at $3.0\frac{m}{s}\ east$, and the boat motor can create a velocity of $4.5\frac{m}{s}$. If the boat aims north:

a.) What is its resultant as viewed from the shore?

b.) How long does it take the boat to reach the other bank?

c.) How far is the boat downstream when it reaches the other bank?

d.) At what angle should the boat aim to travel straight across the river?

2.) A cliff jumper leaps horizontally off a $32\ m$ high cliff with a velocity of $1.2\frac{m}{s}$, find:

a.) the distance from the base where the jumper hits the water.

b.) the final horizontal velocity just before impact.

c.) the final vertical velocity just before impact.

d.) the final velocity just before impact.

3.) A football is kicked $48.0\ m$, if it started with a velocity of $6.40\frac{m}{s}$ and an angle of $40°$, what is:

a.) the total 'air time' of the ball?

b.) the range and maximum height of the ball?

c.) the velocity at the maximum height?

4.) A horseshoe thrower must toss at a cat which is $10.0\ m$ away. If the throw is at $45°$, and lands right on the cat, what was its initial velocity?

5.) A cat leaps horizontally at $3.0\frac{m}{s}$ off a $10.0\ m$ high balcony, what is its velocity after $0.50\ s$?

6.) Sketch the $\vec{d}_x\ vs.t$ and $\vec{d}_y\ vs.t$ graphs of a **type 1** projectile.

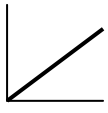
Answers - 1.) $5.4\frac{m}{s}$ @ $34°\ E\ of\ N$, $3.33\ s, 10.0\ m$, $42°\ W\ of\ N$

2.) $\vec{d}_x = 3.07\ m,\ \ \vec{v}_{x_f} = 1.2\frac{m}{s}, \vec{v}_{y_f} = -25\frac{m}{s}\ ,\ 25.1\frac{m}{s}\ at\ 3°\ E\ of\ S$

3.) $t = 0.840\ s, \vec{d}_x = 4.11\ m, \vec{d}_y = 0.861\ m, 4.90\frac{m}{s}\ horizontal$ 4.) $9.9\frac{m}{s}$

5.) $14.3\frac{m}{s}\ at\ 12.1°\ above\ vertical$

$\vec{d}_x$



$\vec{d}_y$