

Velocity Vector and Projectile Review

- 1.) A boat travels across a 15.0 m wide river, the river flows at $3.0 \frac{\text{m}}{\text{s}}$ east, and the boat motor can create a velocity of $4.5 \frac{\text{m}}{\text{s}}$. If the boat aims north:
- What is its resultant, as viewed from the shore?
 - How long does it take the boat to reach the other bank?
 - How far is the boat downstream when it reaches the other bank?
 - 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 $1.2 \frac{\text{m}}{\text{s}}$, find:
- the distance from the base where the jumper hits the water.
 - the final horizontal velocity just before impact.
 - the final vertical velocity just before impact.
 - the final velocity just before impact.

3.) A football is kicked 48.0 m , if it started with a velocity of $6.40\frac{\text{m}}{\text{s}}$ 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 wicket which is 10.0 m away. If the throw is at 45° , and lands right on the wicket, what was its initial velocity?

5.) A cat leaps horizontally at $3.0\frac{\text{m}}{\text{s}}$ 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.) $5.4\frac{\text{m}}{\text{s}}$ @ 34° E of N, 3.33 s , 10.0 m , 42° W of N

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

3.) $t = 0.840\text{ s}$, $\vec{d}_x = 4.11\text{ m}$, $\vec{d}_y = 0.861\text{ m}$, $4.90\frac{\text{m}}{\text{s}}$ horizontal 4.) $9.9\frac{\text{m}}{\text{s}}$ at 45° above horizontal

5.) $5.75\frac{\text{m}}{\text{s}}$ at 58.5° below the horizontal

6.)

