Chapter 3

Projectile Motion

Scalars

- A quantity that can be specified from its size only with units
- No direction needed
- Examples are speed and distance
- Represented by italics; s = 2.4 m/s

Vectors

- A quantity with both magnitude and direction.
- Examples are velocity and displacement.
- Represented by boldface; v = 2.4 m/s to the north

 Velocity and displacement can be broken down into x and y components. Imagine a high jumper, he or she has both a horizontal and a vertical velocity.





Projectile Motion

- Objects that are thrown or launched into the air and are subject to gravity are called projectiles.
- The path of a projectile is a curve called a <u>parabola</u>.
- The velocity of the projectiles for sample problems will be considered constant -no air resistance





Equations

$y = -1/2 g(t^2)$

 $\mathbf{X} = \mathbf{V} (\mathbf{t})$

Example Problem

• A pelican flying along a horizontal path drops a fish from a height of 5.4 m. The fish travels 8 m horizontally before it hits the water below. What is the pelican's speed?

 $Y = -\frac{1}{2} gt^2$ X = V t



Pythagorean Theorem

 If two vectors are at a 90^o angle, use the Pythagorean Theorem to find the resultant vector.

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$$C^2 = a^2 + b^2$$

- A pirate walks 45 m north, then 7.5 m east. What is his displacement?
- Use Pythagorean theorem since it is a 90 degree angle.

Adding Vectors

- Vectors can be added graphically.
- When adding two or more vectors, the answer is called the resultant.
- Vectors can be moved as long as they don't change direction or length.
- Draw vectors using <u>head to tail method</u>.

How to use a Protractor





Grade 4 » Measurement & Data » Geometric measurement: understand concepts of angle and measure angles. » 6

Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.



- You can't draw 75 miles on a piece of paper so you change it to 7.5 cm.
- But what you do to one number you have to do to the others. For example:
- 75 miles = 7.5 cm
- 12 miles = 1.2 cm
- Then you have to UNDO it at the end of the problem so you measure 4.5 cm and the answer is???



An arrow shoots 34 m/s North than the wind blows 25 m/s at an angle of 10 degrees North West. What is the resultant?