On-level Physics
Projectiles and Vectors

This unit will allow each student to:

a. gain a better understanding of the concepts of vectors and projectile motion as well as describing projectiles as they apply to free fall and through the use of graphs
b. continue making proper scientific measurements and calculations
c. define and properly use all vocabulary
d. properly apply all terms and concepts in describing/explaining real world examples
e. continue making and interpreting scientific graphs
f. teach someone else the concepts discussed
g. practice proper laboratory safety

This will be accomplished by each student that is able to:

1. recognize and relate SI and USCS units of time, distance, speed, velocity, and acceleration
2. recognize a time, distance, speed, velocity, and acceleration by the units only
3. perform calculations using proper problem solving techniques (K-U-E-S) to determine (a) speed, time, or distance (b) velocity, displacement, or time and (c) acceleration, change in velocity, or time
4. distinguish between scalar and vector quantities
5. draw a vector to properly represent a vector quantity
6. determine the resultant of two vectors: (a) in the same direction, (b) in opposite directions, and (c) perpendicular to each other
7. graphically determine the horizontal and vertical components of a vector
8. completely describe the motion of projectile
9. explain the independence of horizontal and vertical components of a projectile's motion
10. use the concept of free fall to assist in determining velocity vectors of a projectile
11. predict the range of a projectile based on the launch angle
12. perform calculations using proper problem solving techniques (K-U-E-S) to determine the variables of projectile motion
13. experimentally determine the range of a horizontally launched projectile
14. describe satellite motion as a special case of projectile motion

Textbook Reference – Physics: Principles and Problems

Chapter 6 – Motion in Two Dimensions (Sections 1 &3); Chapter 5 - Forces in Two Dimensions (Section 1)

Key Terms – *write the definitions of the boldface terms on your own paper, definitions are available at thetetersz one.net*

scalar, vector, projectile, parabolic path, resultant, horizontal component, vertical component, range, satellite

Daily Grade: Daily questions/homework/review sheet
/30

Projectiles and Vectors Review

Answer each question as completely as possible on a separate sheet of paper.

A. What is a scalar? Give three examples of scalar quantities.

B. What is a vector? Give three examples of vector quantities.

C. Explain how to determine the resultant of two vectors (a) in opposite directions (b) in the same direction, and (c) perpendicular to each other.

D. What is the maximum resultant for a 5 cm vector and a 2 cm vector? the minimum resultant? Draw each set of vectors and the resultant.

E. What is the resultant velocity of a boat going across a river the boat's velocimeter reads 4 m/s West and the river is flowing 3 m/s South? Draw your solution and then use the Pythagorean Theorem to verify the magnitude.

F. Define projectile. Give some examples of projectiles.

G. Draw the path of a projectile. Label the horizontal and vertical velocity vectors at a point going up, at the top of the path, and at a point going down.

H. Explain what happens to a projectile’s horizontal velocity as the vertical velocity changes?

I. Which component (horizontal or vertical) of a projectile's velocity does not change if we ignore the air?

J. At what point in its flight does a projectile have its minimum resultant speed?

K. Find the resultant speed of a projectile with a horizontal speed of 5 m/s and a vertical speed of 40 m/s. How long will this projectile stay in the air?

L. A rock launched with and angle of 20° above the ground travels 234 m. How far will the rock travel if it is launched with and angle of 70° above the ground? Explain why.

M. What is the vertical speed of a horizontally launched projectile two seconds after it is launched?

N. Explain how a satellite orbiting the earth is actually just “falling around the earth.”

O. About how fast does an object need to travel horizontally in order to orbit the earth?