

Physics

Projectiles Motion

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 (HMH)

Chapters/Sections

3.1	3.2	3.3
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Key Terms – *write the definitions of the boldface terms on your own paper, definitions are available at theteterszone.net*

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

Projectile Motion 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 an angle of 20° above the ground travels 234 m. How far will the rock travel if it is launched with an 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?