PROJECTILE MOTION PROBLEMS
Problems document

These problems build on the skills covered in my video series "Vector components".

Brief answers to these problems are available in the Answers document.

Full solutions to the problems are available in the Solutions document, and in the YouTube videos.

You can find links to these resources at my website:
www.freelance-teacher.com

Links to the documents are also in the video description boxes for the YouTube videos.

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If you find that the video explanations move too slowly, you can simply try the problems in this Problems document, study the solutions in the Solutions document, and skip to any particular parts of the videos that cover parts of the solutions that you find confusing. Each video has a table of contents, to make it easier to skip to particular topics.

If you find a particular problem to be difficult, then, after studying the solution, *before* you try the next problem, you should take a blank piece of paper and retry that problem from scratch. Don't move on to the next problem in the series until you are comfortable with the solution for the current problem.
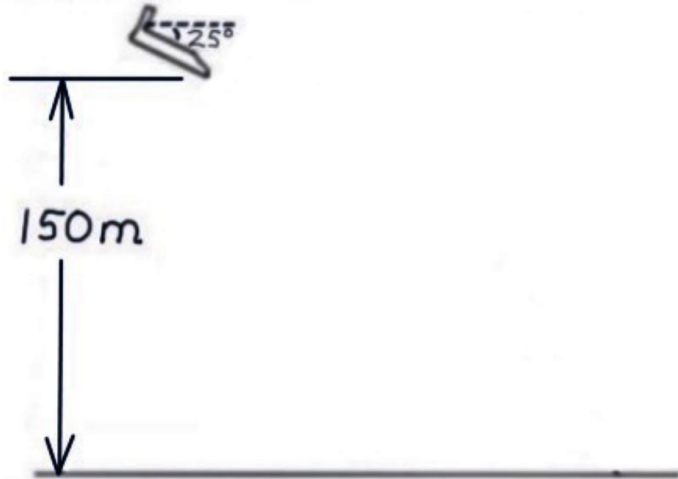
Video (1)

A cannon shoots a ball with initial velocity 20 m/s at an angle of 35° upward from the horizontal. The ball lands at a horizontal distance of 41 m from the cannon. What is the height H of the top of the cannon barrel above the ground?

Video (2)

An airplane releases a package while diving at a downward angle of 25° below the horizontal. The plane is traveling at a height of 150 m above the ground, with speed 90 m/s, when the package is released.
(a) How far away horizontally from the release point will the package land on the ground?
(b) What is the package's speed when it hits the ground?

Video (3)

A stunt motorcyclist leaves a horizontal ramp at speed v_0. The ramp is at a height of h above the ground. What horizontal distance D from the ramp does the motorcycle travel before it hits the ground?

Video (4)

A golf ball is hit from the ground into the air. The ball reaches a maximum height of 25 m, and travels a horizontal distance of 215 m before it hits the ground.
   (a) Calculate the initial speed and direction with which the ball was hit.
   (b) How long was the ball in the air?
   (c) What is the smallest value of the ball's speed over its entire trajectory?