

TEST 1 Q2 PHYSICS

CHAPTER 3 Relative Motion, Vectors, 2-dimensional (projectile) motion

Relative motion:

Explain the concepts of

Reference frames

Relative velocity

Special relativity

Sketch the path of a

ball thrown on a moving train from the point of view of the train, the ball, an observer on the ground, an observer on another train... both for a normal train and one moving close to the speed of light.

How to find the velocity of one object with respect to another if you know the velocity of each with respect to the ground...

Vectors:

Relative motion with 2 dimensions instead of one.

What is a vector?

How to add vectors to find the resultant (head to tail: graphical method, right triangles... (law of sines??)).

What properties are vectors?

And which are scalars?

How and why there are 6 ways to add three vectors.

How to find the angle of the resultant.

How to find the x/y, horizontal/vertical, north/east, components of a vector at an angle.

Projectile motion:

Why and how do we separate motion into x/y perpendicular components?

What is projectile motion?

What is the path of a projectile and how does this explain why you CAN'T make a vector of displacements in projectile motion?

What property is the same in the x and y direction for projectile motion?

What is the angle of maximum range for a projectile and why?

What information do you know about a projectile while it is at the top of its arc?

What information do you know about a projectile fired horizontally?

What information do you know about a projectile fired from the ground that lands on the ground?

Draw a strobe diagram of the vertical and horizontal components of a projectile's motion.

What formula is always used in the x direction and why?

What formulas are usually used in the y direction?

Why can you never answer "how fast are you going"?

A passenger on a train going east is skateboarding towards the back, while throwing a spear towards the front, while there is an ant walking towards the point of the spear.

Describe the path of the spear as seen from the: passenger, ground, ant, train.

How would you calculate the velocity of the ant?

A piece of chalk is dropped by a teacher walking at a speed of 1.5 m/s. From the teacher's perspective how does the chalk appear to fall? How does it fall from the ground's point of view?

Why are there two answers to the question: How far did you travel?

Two vectors acting at right angles to each other having the magnitude 6 and 8 have a resultant with a magnitude of

What are quantities that are given as scalar or vectors? What does a vector mean?

How would parabolic motion be different at speeds close to the speed of light?

Describe the two ideas (postulates) that lead to the theory of special relativity:

What are the consequences of special relativity? (How do the properties we know change at speeds close to the speed of light?)

A small airplane flies at a velocity of 145 km/h toward the south as observed by a person on the ground. The airplane pilot measures an air velocity of 170.0 km/h south. What is the velocity of the wind that affects the plane?

While following directions on a treasure map, a person walks 75.0 m south, then turns and walks 4.50 m east. Which single straight-line displacement could the treasure hunter have walked to reach the same spot?

A boat crosses a 30 meter wide river with an initial speed of 20 m/s aimed straight across (perpendicular to the current). If the current is 5 m/s, where and when will the boat reach the other side?

If a plane is pointed due east, but the path it takes from the ground is due south, the wind must be blowing

If I take a journey and walk three different legs to my journey, describe how to calculate the total displacement.

What are the conditions necessary for projectile motion? Describe the change in vertical and horizontal velocity

What does a strobe diagram seen from above (projected horizontally) look like for an object that is thrown in the air?

What does a strobe diagram seen from head

on (projected vertically) look like for an object that is thrown in the air?

An arrow is shot in the air with a velocity of 61 meters per second at an angle of 20 degrees. How high will the arrow go?

A stone is thrown at an angle of 30.0° above the horizontal from the top edge of a cliff with an initial speed of 12 m/s. A stopwatch measures the stone's trajectory time from the top of the cliff to the bottom at 5.6 s. What is the height of the cliff?

A model rocket flies horizontally off the edge of the cliff at a velocity of 50.0 m/s. If the canyon below is 100.0 m deep, how far from the edge of the cliff does the model rocket land?

Where would a baseball pitcher have to aim a fastball to have it pass at the height of a batter's chest? Why?

In projectile motion, the rising and falling times are equal if the landing position is related how to the launching position?

A firefighter 60 meter away from a burning building directs a stream of water from a fire hose at an angle of 30 degrees above the horizontal. If the velocity of the stream is 20 m/s, at what height will the stream of water strike the building?(on earth with no air resistance)

** Honors: at what angle should you hold the hose in order to hit the building level with you?

** Honors: Calculate the journey of a man who walks 50 miles at 76 degrees west of south, then 40 miles at 65 degrees north of east for 3 hours in each leg. What is the velocity of a plane that wants to catch him exactly, that is being blown by a 12 mph north wind?