Vectors

Mr. Nims

1 Vector intro

1.1 how many directions?

For each of the situations below, would use of a vector(s) or a scalar be more appropriate?

Measuring the height of a building:

Telling a driver the speed limit on a highway:

Determining if you have a fever:

Figuring out if 2 cars will collide:

2 The basics of vectors

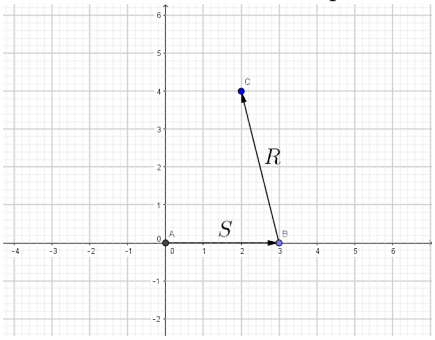
2.1 Learning to add

Let $\vec{A} = -3\hat{x} + 2\hat{y} + \hat{z}$
Let $\vec{B} = \hat{x} - \hat{y} + \hat{z}$

Calculate the following:
$\vec{A} + \vec{B}$
$\vec{A} - 2\vec{B}$

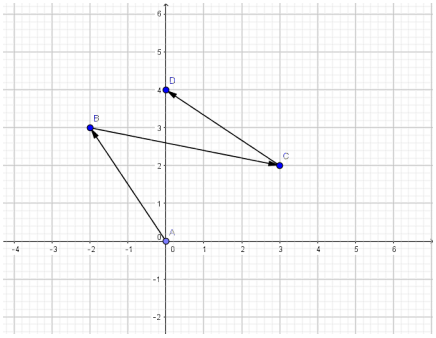
2.2 Thinking geometrically

A car travels the full length of vector $\vec{s}$, before turning and traveling the full length of vector $\vec{r}$. Draw the vector that indicates the displacement of the car.



2.3 Why we should care about geometry

Frank walks the path shown in the diagram below. What is his final displacement? Write your answer as a vector.



If he had instead walked the other direction (started at point D and walked to Point A) what would his displacement have been in that case. Write your answer as a vector (ie $A\hat{x}+B\hat{y}+C\hat{z}$ where A,B,C are numbers).

What is the length of the vector you wrote? You may leave your answer as $\sqrt{\text{number}}$

2.4 The dot product

A force with a vector given by 8 N$\hat{\text{x}}$ + 8 N$\hat{\text{y}}$ is applied to an object initially at rest at a position of -4 m$\hat{\text{y}}$. The object moves to a point 9 m$\hat{\text{x}}$ + 7 m$\hat{\text{y}}$. How much work was done on the object?