I now want to discuss how we add vectors and how we subtract vectors.

Let A be a vector with x component A of x x roof, A of y y roof plus A of z z roof. So these are the x component of the vector, the y component, and the z component of the vector. And I have another vector B. B of x x roof plus B of y y roof plus B of z z roof. And I want to add them. And a vector C equals the sum of these two vectors A plus B.

The addition is now very simple. I add the x components of A and B. And that's the new components in the x direction. I add the y components. Ay plus B of y y roof plus A of z plus B of z z roof. In other words, the x component of the vector C equals A of x plus B of x. The y component equals A of y plus B of y and the z component equals A of z plus B of z.

If I show you a simple two-dimensional case-- so I will only show you two vectors, which both happen to be in the x and the y plane. Then I can show you very easily what it means geometrically when you add vectors. Of course, what I'm telling you holds in general. The only reason why I show you in the two-dimensional plane is because that's all I have. That's my pad.

So let this be the y-axis and this be the x-axis. This is the origin, x direction and positive y direction. And I have here a vector A and assume we have here a vector B. This vector has an x component B of x and this one has an x component A of x. So what should be the x component of the sum of the two? That must be B of x plus A of x. So I take this portion and I put it here. And so this must be C of x, the sum of the two. I know somewhere here along this line must be the endpoint of the vector C.

This component is A of y and this component is B of y. Now I know that the y component of C must be A of y plus B of y. So I take this part and put it right on top of here so that this has the same length as this. And so this is now the endpoint of my vector C. There is C. And that is A plus B.

The x component of C is Ax plus Bx. And the y component of C is Ay plus By. Ay plus By.

Now if you look carefully you can see that I could have done it, perhaps in a much faster way. I could simply have constructed the parallelogram. With A and B as the sides, I draw a line at the tip of B, parallel to A. And I draw a line at the tip of A, parallel to B. And where the two come together, that is where the vector C ends. So this is a geometrical representation, which helps me a great deal.

There's another way that you can look at this. You can say I can also find this point by taking the vector

B and put a tail of vector B at the head of vector A. So look what I'm doing. The tail of vector B goes at the head of vector A. Where do I end up? There.

I can also take vector A and put a tail of vector A at the tip of vector B. There we go. And I end up at that point. So both are very good ways of finding the vector C.