ظاهرا برای صدا نمیتونم کاری کنم.

تو خونه مشکلی ندارم، ولی دانشگاه

مشکل دارم.

سعی میکنم بنویسم.

بذارین یکم امتحان کنیم

سعی میکنم تایپ کنم

از این به بعد

حالا دیگه نباید صدا بیاد.

میکروفن رو قطع کردم.

داشتم میگفتم از این به بعد به انگلیسی

حرف میزنم (مینگلیسی). شما میتونین

فارسی یا انگلیسی حرف بزنین.

تو این کلاس قراره هر بار یک
فیزیک یا ریاضی باشه، به انگلیسی

In this class, we are going to discuss topics in physics or mathemtics, in English

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برسیم.

OK I am going to talk about dimensional analysis

I just wrote that half of the mark comes from midterm(s), and the other from the final.

dimensional = یدعب

Let us give this a shot. It turned out that I cannot write in Persian.

We can continue for a while

If I go to physics, things become simpler

OK dimensional analysis.

You know that every quantity has a dimension. OK?

For example, in the equation

$x = v\,t$

x is displacement

v is speed

t is time

The dimsnion of x is length

The dimension of time is time

The dimension of speed is length divided by time OK?

I am denoting these like

$[x] = L$

$[t] = T$

$[v] = L\ T^{(-1)}$

The equation is so that, if I multiply all lengths by r

and if I multiply all times by s

Then the result doesn't change:

$x \to r\ x$

$t \to s\ t$

$v \to (r / s)\ v$

$r\ x = ((r/s)\ v)\ (s\ t)$

OK?

This is the base of dimensional analysis.

With dimensional analysis

there is a way to check if an equation is wrong.

For example, if I had written

$x = v\ t^2$

The above equation is wrong. You can see that if I change length and times like before,

I arrive at

$r\ x = ((r/s)\ v)\ (s^2\ t)$

That is

$x = s\ v\ t^2$

This is not the same as the previous equation.

OK?

The reason that the equation is wrong, is that the dimensions of the left-hand side and the right-hand side are not the same:

$[x] = L$ $[v\ t^2] = L\ T$

So, an equation is wrong, if the dimensions of the left and right are not the same.

If the dimensions of the left and right are the same, the equation can be correct, or wrong.

This is correct $x = v\ t$

For a particle moving with constant speed and the displacement is zero at $t = 0$

But this is not correct

$x = 2\ v\ t$

Although the dimensions of the left and right are the same. OK?

It is said that the equation ($x = 2\ v\ t$) is dimensionally correct. But it is not totally correct.

Another way to say this:

(an equation is dimensionally correct) is a necessary condtion that (the equation is correct)

(an equation is dimensionally correct) is not a sufficient condition that (the equation is correct)

Or,

Using dimensional analysis, one can be sure that an equation is wrong
(if it is dimensionally wrong)

But one cannot be sure that the equation is correct (if it is dimensionally correct).

OK?

OK the last example:

Consider a particle starting its motion at t = 0, with a constant acceleration a.
The aim is to write a relation between its displacement x, the time t, and a

You can see that
[a] = L T^(-2)

And you can see that this is dimensionally wrong: x = a t

But this is dimensionally correct: x = a t^2

And yet, the above equation is not totally correct. The correct equation is

x = (1/2) a t^2

In the next session, I am going to continue this, and also talk about ways to guess the form of the correct equation (not just making sure that something is wrong).

OK?