Hello students, how are you all? I hope you all are fine. Today we are going to discuss about T-Test. How to find out the difference between the two means. We covered this in the last video also but there we covered the difference between two means when I have an independent sample given. Here dependent sample is given. In short, we called it unpaired test. What will be called as paired test. So, with example, with formulas we will talk about which formulas and how you will use them. So, without any delay, let's start. Welcome to Gate Smashers. My name is Ankit Rodha. Let's go to the screen of the laptop. So, now see how can T-Test be used? Let's talk about that. In the last video, what we saw was that our samples were independent. That means one sample is not different from another sample. What we used to call T-Test there? Not dependent sample but independent sample. Where we named distribution as unpaired. In a way, we talked about unpaired test. As I have shown you the name of the file. But today in this video, we are going to discuss about dependent sample. If one sample depends on another or you can say paired T-Test. I have told you the best example of this. If a student is given a medicine at 2 am and another dose is given at 3 am. Then the exact check of the second dose is to see what effect it has on his body. Which is clear, it will not give exact value. Because the effect of the first medicine will also be on his body. So, this is about dependent samples. So, in the case of dependent, always note one thing. T-Test will always take only one thing. The value is obvious. We check T-calculated. Less comes from tabulated value. So, we give H0 here. That means our hypothesis is accepted. Otherwise, alternate hypothesis. That means the claim that the medicine company is doing, we reject it. That its claim is wrong. But always remember one thing. As I told you in the live class earlier. That four types of T-Test. Four types of questions can come out. For them, I have clearly given you direct formulas. If this type of question comes, do this. If this type of question comes, do this. Because many students had a problem in hypothesis. I understand that this is not the topic of your line. So, for this, if you think that hypothesis is a little out of your understanding. If you can cover this much. If you come to the test of 1 to 2 numbers. Then definitely you will cover. So, without any delay, let's start. Today's first formula. Now, it is obvious that we are talking about formulas. I will tell you only two questions. I will do one here and show. You will answer me in the comment section. The formula is based. Any question comes, all the formulas are based. It says that T is equal to. What will it depend on? If dependent sample comes. That is mean of D multiplied by root n divided by S. Where D is the difference mean. What is D here? D comes after the difference mean. Now I will tell you how to find it. Difference will come after the mean. N is the number of sample. Which I have the sample. And S is the standard deviation of the sample. Now how to find the standard deviation here? The formula of standard deviation will be. Sqrt . Now the formula will be. Summation of D minus mean of D. Sqrt . Where n minus 1 is the degree of freedom. Now do not think that everywhere. Degree of freedom will be n minus 1. The next video that will come. There is the degree of freedom n minus 2. So for every formula, for every question. I am doing the topic separately. So that you can apply the exact formula. And you get the answer from the exam point of view. Now as. Here the question is shown. Let's understand the question first. He says that medicine is given to 5 patients and the difference in their hemoglobin was recorded to be before drug and after drug. He says that is it reasonable to be given medicine to 5 patients and the difference in their hemoglobin is recorded to be before drug and after drug. He says that is it reasonable to believe that medicine has no effect on the body. Is it true that medicine is affecting the body or not? We have to check whether it is affecting or not. We have data of 5 patients. He says that he has not given the drug before the testing of his hemoglobin. After giving the drug. He says that the two patients are making a relation. The data is connected to each other. It means that the second data is also depending on the first test. If the body had 12 hemoglobin before the medicine, then it increased to 13. On an average, we have to check whether it will affect or not. We will use t-test here. Because n is less than 30. We do not have standard deviation of the whole population. There were only two rules. So first of all, what you have to do here? You have to check the two data given to you. Before drug and after drug. Now we will find the difference between these two. After taking the drug, how much hemoglobin came? 13. So 13-12 is 1. The second value is minus first. 14-13 is 1. This is known as the difference. 14-10 is 4. 13-8 is 5. And 16-7 is 9. So this difference came after taking the medicine. After taking the medicine. Now he says that Minus the mean of the drug. So first we will find the D-bar. That is summation of D. How much is the summation? 9 plus 5 is 14. Plus 4 is 18. 19 and 20. What is the value of D? 20 came after taking the medicine. So D is equal to 20 divided by Total sample is 5. So this is 4. Now we will do D-bar in D-minus. So 1-4 is minus 3. 4-4 is 0. 5-4 is 1. 9-4 is 5. Now he says that Let's do

the square of this. Because we need it in the formula. So this is done. Square of 3 is 0. Square of 1 is square. Square of 5 is 25. So the answer is 9 plus 1 is 10. 35 plus 9 is 44. This is what we got. Now first we will talk about standard deviation. What was the formula of standard deviation? This one. Standard deviation says that Sqrt of Whatever our answer is. How much did we get? We got 44 after doing addition. So 44 divided by N-1. That means 5-1 is 4. So root 11 is our standard deviation. 3 point something. And let's check the exact value of this once. In calculator, Root 11. 3.31 So here what is the exact value? 3.31 So I got the answer after coming here. Standard deviation is here. Now we will apply t-test. What does t-test say? This is the value of t. It says that whatever the mean of difference we got. What did we get? We got 4. This is what we got. What was the value of mean? Yes, 4. Minus, multiplied by root of N. How many samples are there? 5. So this is 2.23. The value of standard deviation is 3.31. That means the answer is 4 into 2.31. So this is the value of standard deviation. So this is 2.23 divided by 3.31. Let's check the exact once. In multiply. 4 multiplied by 2.23 divided by 3.31. So this exact value is 2.70. Now our t-value is 2.70. But keep one thing in mind. This is our t-calculated value. What was the value of t-calculated? 2 point. What was the value? 2.70. Now we need t-tabulated value. Now how is t-tabulated value? The level of significance is not given. What did I tell you in the last video? Whenever there is no level of significance. 0.05 is 5%. And the degree of freedom is 5 minus 1 is 4. So in t-table, which I have provided you earlier. So in t-table, what will happen to me? 0.05. Or I will show you on the screen once. So that it is clear. No. I will show you the value of t-table. One second. Let's go to t-table. I will provide t-table in the description box. 0.05 and 4. Degree of freedom. Which I have attached in the last file. You can see from there. The value is 2.776. The value is here. One second. 2.776. Now obviously if t-calculated. T-tabulated. Then t-tabulated. So t-tabulated. So t-tabulated. So t-tabulated. So t-tabulated. So t-tabulated. If t-tabulated is less than t-tabulation, then our null hypothesis will be accepted. Null hypothesis will be accepted. What does this mean? Is it reasonable to believe that medicine has no effect on the body? There is no effect. Null hypothesis is correct. Right? So this was our first question. Where we only need data and nothing else. I am showing the next question on your screen. You will answer it in the comments. It says that you have taken 10 tests. 10 tests taken by the math teacher and marks are scored by these. So here the value of n is 10. And in short, the degree of freedom is 9. We have data. Now you will say, sir, what happened? This is not a dependent sample. Why is it not a dependent sample? It says 10 tests taken by the math teacher and marks are scored by these. 10 tests are these. We have to tell that is there any improvement or not? Is there any improvement or not? Now when does improve mean that there were 10 marks in the first test and we had 2 marks in the next test? There are 10 marks in this question. The marks given in the first test and the marks given in the tenth test. The marks given in the middle test are not given by anyone. If he took so many marks in the first test and took so many in the tenth test, then what improvement did he do? What improvement did he do in the first test and in the last test? Answer me in the comments. T calculated and T tabulated. Tell me how much less and what are the values? I hope I am providing formulas. You will get help. Especially those who found the hypothesis to be tough. You will clear the topic with a simple example. In the next video, I will ask you only one question on formulas. Because here you have to keep the formula in mind. In the hypothesis. So see you in the next video where we will see the second use of T test. Where we will talk about correlation. See you in the next video. Same time, same place, same day. I hope you liked the video. If you liked the video, then do ask questions in the comment section. Definitely reply. Have a good day to all of you. Bye. Bye. Bye.