

A gaming company is coming out with a new wireless controller. Its current wireless controller has been critiqued as not having an adequate playing time with a full charge. The company claims that the new controller will last much longer. They used 20 participants to test the two controllers. With a full charge, they had the participants play until the controllers' charge died. The data, in hours, is below.

Current Controller	33	31	27	25	30	26	29	30	32	35
New Controller	29	28	32	33	36	31	30	27	32	31

The company decides to use a t -test, at the 5% significance level, to determine if there is a change in the mean charge of the game controllers.

- (a) To use the t -test, the company is making an assumption. State this assumption. (1 mark)
- (b) State the null and alternative hypotheses for this t -test. (1 mark)
- (c) Find the t -value and p -value for this test. (3 marks)
- (d) State the conclusion of this test, in context, giving the reason. (2 marks)

Mark scheme:

- (a) The controllers battery charge lengths are distributed normally. (A1)

Or

The variance of the two controller groups is equal. (A1)

- (b) $H_0: \bar{C} = \bar{N}$ and $H_a: \bar{C} < \bar{N}$ (A1)

where C represents the current controller and N the new controller.

- (c) $df = 18, t = -0.851$ (M1)

$p\text{-value} = 0.203$ (A2)

- (d) Since $0.203 > 0.05$ (R1)

Do not reject H_0 .

There is insufficient evidence, at the 5% level, of a change in the length of charge in the game controller. (A1)