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| **Topic 4: Statistics and Probability** | ***t*-test** |
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| 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.

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| **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. |
| 1. To use the *t-*test, the company is making an assumption. State

 this assumption. (b) State the null and alternative hypotheses for this *t-*test.(c) Find the *t-*value and *p-*value for this test. (d) State the conclusion of this test, in context, giving the reason. | (1 mark) (1 mark)(3 marks)(2 marks) |
| **Mark scheme:**1. The controllers battery charge lengths are distributed

 normally.**Or** The variance of the two controller groups is equal.1. $H\_{0}: \overbar{C}= \overbar{N}$ and $H\_{a}: \overbar{C} < \overbar{N}$

 where C represents the current controller and N the new  controller. (c) df = 18, *t* = -0.851 *p*-value = 0.203 (d) Since 0.203 > 0.05 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)(A1)(A1)(M1)(A2)(R1)(A1) |
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