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