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| **Topic 4: Statistics and Probability** | **Spearman’s Rank Correlation Coefficient** |
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| 1. At the local pool, the swim coach conducts a test to determine if there is any association between an athlete’s age and their best time swimming the 50 m freestyle. Eight athletes are chosen at random, and their details are shown below.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Athlete | A | B | C | D | E | F | G | H |
| Athlete’s Age (yrs) | 12 | 14 | 20 | 17 | 18 | 24 | 10 | 33 |
| Time (sec) | 49.1 | 48.2 | 43.1 | 46.3 | 44.4 | 44.2 | 55.0 | 45.8 |

* 1. Complete the table of ranks.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Athlete | A | B | C | D | E | F | G | H |
| Athlete Age rank |  |  |  |  | 4 |  |  |  |
| Time rank |  |  |  |  |  |  | 1 |  |

* 1. Calculate the Spearman’s Rank Correlation Coefficient.

 (c) Interpret this $r\_{s}$ in the context of the question. (d) Suggest why the coach did not use Pearson’s Product Moment Correlation Coefficient with his data from the original table. | (2 marks)  (2 marks) (1 mark) (1 mark) |
| Mark scheme:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Athlete | A | B | C | D | E | F | G | H |
| Athlete Age rank | **7** | **6** | **3** | **5** | 4 | **2** | **8** | **1** |
| Time rank | **2** | **3** | **8** | **4** | **6** | **7** | 1 | **5** |

1. $r\_{s}= -0.628$

  (c) $r\_{s}= -0.628$ *indicates a negative correlation between a  person’s age and the best time they swim the 50 m  freestyle. The older the athlete gets, the faster their time  tends to be.*  (d) *Examples: Data may not be linear, the SRCC is less  sensitive to outliers, there could be outliers, there could be  multiple swimmers of different ages with the same swim  times.* | (A1)(A1)(A2)(R1)(R1) |