**Item Analysis Task on Probability**

**Instructions:**

Answer **all** questions in the spaces provided.

In all questions where a numerical answer is required an exact value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams are **not** drawn to scale.

*The information given below refers to Question 1 and 2*

When Mareesha plays tennis she wins her first set 65% of the time. If she wins the first set her chance of winning the next set is 75% but if she loses the first set her chance of winning the next set is 40%. One day Mareesha plays two sets of tennis.

**Question1**

The probability that she wins one set only is

1. 0.14
2. 0.1625
3. 0.3025
4. 0.65
5. 0.79
6. Draw a tree diagram of the situation

2 marks

1. Show that alternative C is the correct answer.

1 mark

Explain what error is made if alternative B is chosen

1 mark

Question 2

If Mareesha wins one set only, the probability that she won the first set is

1. 0.1625
2. 0.25
3. 0.3025
4. 0.5372
5. 0.9525
6. Find the correct answer showing your working.

2 marks

1. What misunderstanding of conditional probability would lead to alternative B? Show your working.

1 mark

1. What error would lead to alternative E?

1 mark

*The information given below refers to Questions 3 and 4*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x* | 2 | 3 | 4 | 5 |
| Pr(*X*=*x*) | 0.1 | 0.3 | 0.4 | 0.2 |

Question 3

The mean of the probability distribution shown in the table above is

1. 0.25
2. 1.0
3. 1.92
4. 3.5
5. 3.7
6. Show that the correct answer is E.

1 mark

1. What mistake would most likely lead to alternative D?

1 mark

1. If the probabilities remained the same, what change to each of the values of x would lead to an increase of 2 in the mean?

1 mark

1. If Pr(X=3) was decreased to 0.2 and Pr(X=5) was increased to 0.4, what would the other probabilities have to be changes to if the mean was to remain at 3.7?

3 marks

Question 4

The standard deviation of the distribution shown in the table is

1. 0.11
2. 0.66
3. 0.81
4. 0.90
5. 10.8
6. Find the correct answer showing your working.

2 marks

1. What error would give alternative C?

1 mark

1. What error would give alternative E?

1 mark

1. What changes would need to be made to the given probabilities to make the standard deviation larger?

2 marks