**Year 8 Probability – Not-Quite-So-Quick Quizzle**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| 1 | Explain what is meant by two events being **mutually exclusive**. |  |
| 2 | A pack of cards has 52 cards, with 13 of each of the four suits.  What’s the probability that after I pick a random card, the card is red and an even number?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 3 | 1. Given that I throw three coins, list all possible outcomes (the sample space) after 3 throws (using H for Heads and T for Tails). 2. Hence determine the probability that I throw exactly 2 heads in 3 throws.   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 4 | I throw two six-sided dice and add their values.  Draw a sample space to illustrate this. |  |
| 5 | Hence (using your above table) determine the probability of the sum of two dice thrown being equal to a prime number (note that 1 is not prime).  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 6 | I have a biased spinner with four sides labelled A, B, C and D. The table below show the probability of spinning each side:   |  |  |  |  | | --- | --- | --- | --- | | A | B | C | D | | 0.1 | 0.5 |  |  |  1. Determine .  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. If I spun this spinner 150 times, how many times would I expect to see a C? |  |
| 7 | 1. Laurie claims that the probability of throwing a heads on an unfair coin is 0.3. Hayden throws this coin 200 times and sees 63 heads. Hayden claims that Laurie is wrong. Do you agree? Explain why. 2. In Battersea Dogs & Cats Home, there are cats, dogs and staff. Dhruv picks one of these things from the home. He claims that because there are three choices, the probability of picking a cat is . Explain why Dhruv is wrong. |  |
| 8 | 1. I throw a fair coin 80 times and see a **heads** 36 times. What’s the relative frequency/experimental probability of seeing a **tails**?   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. I throw another unfair coin and hence calculate the relative frequencies of heads and tails as 0.15 and 0.85. What’s the smallest number of heads and smallest number of tails I could have thrown?   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 9 | I throw 6 dice.   1. How many ways are there that I could see all of the numbers 1 to 6 (in any order)?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. [Difficult] By considering also how many possible outcomes there are, hence determine the probability that when I throw 6 dice, I see all of the numbers 1, 2, 3, 4, 5 and 6, giving your answer to 3dp.   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 10 | The probability that Jim succeeds in his maths test is 0.3. The probability that he succeeds in his English test is 0.4. Jim claims that the probability he succeeds in his maths test **or** his English test is therefore 0.7.  Is he right? Explain why.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 11 | A robot is on a square grid at the indicated position. On each move, the robot randomly moves left, right, up or down.  A  Robot   1. What’s the probability the robot is at the point A after exactly one move?   \_\_\_\_\_\_\_\_\_\_\_ 2. What’s the probability the robot is at the point A after exactly 2 moves?    \_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 12 | [Difficult] Continuing from the question above, what is the probability that the robot is at the point A after exactly 3 moves?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 13 | The following table shows the preference of TV show for 100 children, who were all asked to pick between Doctor Who and Sherlock (but weren’t allowed to choose both).   |  |  |  | | --- | --- | --- | |  | Doctor Who | Sherlock | | Boys | 25 | 35 | | Girls | 20 | 20 |  1. What is the probability that a randomly chosen child is a boy and prefers Sherlock?  \_\_\_\_\_\_\_\_\_\_ 2. Given that a boy is randomly chosen, what is the probability that they prefer Doctor Who?  \_\_\_\_\_\_\_\_\_\_ |  |

**Answers**

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| 1 | Explain what is meant by two events being mutually exclusive.  **The events can’t happen at the same time.** |  |
| 2 | A pack of cards has 52 cards, with 13 of each of the four suits.  What’s the probability that after I pick a random card, the card is red and an even number? |  |
| 3 | 1. Given that I throw three coins, list all possible outcomes (the sample space) after 3 throws (using H for Heads and T for Tails). **HHH, HHT, HTH, HTT,  THH, THT, TTH, TTT** 2. Hence determine the probability that I throw exactly 2 heads in 3 throws. |  |
| 4 | I throw two six-sided dice and add their values.  Draw a sample space to illustrate this.  **2D table with vertical and horizontal headings indicated. Values [2, 3, 4, 5, 6, 7], [3, 4, 5, 6, 7, 8], … indicated across rows.** |  |
| 5 | Hence (using your above table) determine the probability of the sum of two dice thrown being equal to a prime number (note that 1 is not prime). |  |
| 6 | I have a biased spinner with four sides labelled A, B, C and D. The table below show the probability of spinning each side:   |  |  |  |  | | --- | --- | --- | --- | | A | B | C | D | | 0.1 | 0.5 |  |  |  1. Determine . 2. If I spun this spinner 150 times, how many times would I expect to see a C?  **30 times.** |  |
| 7 | 1. Laurie claims that the probability of throwing a heads on an unfair coin is 0.3. Hayden throws this coin 200 times and sees 63 heads. Hayden claims that Laurie is wrong. Do you agree? Explain why.  **No. We would expect to see 60 heads on average, and 63 is close to 60, so the Laurie is probably right.** 2. In Battersea Dogs & Cats Home, there are cats, dogs and staff. Dhruv picks a random creature from the home. He claims that because there are three choices, the probability of picking a cat is . Explain why Dhruv is wrong. **Because there’s different numbers of dogs/cats/humans, so the chances of each aren’t equal.** |  |
| 8 | 1. I throw a fair coin 80 times and see a **heads** 36 times. What’s the relative frequency/experimental probability of seeing a **tails**? 2. I throw another unfair coin and hence calculate the relative frequencies of heads and tails as 0.15 and 0.85. What’s the smallest number of heads and smallest number of heads I could have thrown?  **3 (since )** |  |
| 9 | I throw 6 dice.   1. How many ways are there that I could see all of the numbers 1 to 6 (in any order)? 2. By considering also how many possible outcomes there are, hence determine the probability that when I throw 6 dice, I see all of the numbers 1, 2, 3, 4, 5 and 6, giving your answer to 3dp. |  |
| 10 | The probability that Jim succeeds in his maths test is 0.3. The probability that he succeeds in his English test is 0.4. Jim claims that the probability he succeeds in his maths test **or** his English test is therefore 0.7.  Is he right? Explain why.  **No, because the two events aren’t mutually exclusive (and thus we can’t add the probabilities).** |  |
| 10 | A robot is on a square grid at the indicated position. On each move, the robot randomly moves left, right, up or down.    A  Robot   1. What’s the probability the robot is at the point A after exactly one move? **1/4** 2. What’s the probability the robot is at the point A after exactly 2 moves?  **0** |  |
| 11 | [Difficult] Continuing from the question above, what is the probability that the robot is at the point A after exactly 3 moves?  **(The nine possible paths are LUR, RUL, UUD, DUU, URL, ULR, UDU, RLU, LRU. The number of total possible paths increases by a factor of 4 each time there’s an extra move)**  **Give half a mark for denominator of 64.** |  |
| 12 | The following table shows the preference of TV show for 100 children, who were all asked to pick between Doctor Who and Sherlock (but weren’t allowed to choose both).   |  |  |  | | --- | --- | --- | |  | Doctor Who | Sherlock | | Boys | 25 | 35 | | Girls | 20 | 20 |  1. What is the probability that a randomly chosen child is a boy and prefers Sherlock?  **35/100 or 7/20 or 0.35** 2. Given that a boy is randomly chosen, what is the probability that they prefer Doctor Who? **25/60 or 5/12 or 0.417** |  |