**Question 2 [16 marks]:**

In rolling a pair of dice, a possible outcome can be abstracted by the numbers facing up, say, by 24, by 53, and so forth:

(a) List all the possible outcomes using this abstraction. (6 marks)

['1,1', '1,2', '1,3', '1,4', '1,5', '1,6',

'2,1', '2,2', '2,3', '2,4', '2,5', '2,6',

'3,1', '3,2', '3,3', '3,4', '3,5', '3,6',

'4,1', '4,2', '4,3', '4,4', '4,5', '4,6',

'5,1', '5,2', '5,3', '5,4', '5,5', '5,6',

'6,1', '6,2', '6,3', '6,4', '6,5', '6,6']

(b) Use brute force to count the possible outcomes with the numbers facing up have a sum of 5. (5 mark)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Blue Dice** | **Grey Dice** | **Sum** | **Blue Dice** | **Grey Dice** | **Sum** |
| 1 | 1 | 2 | 1 | 4 | **5** |
| 2 | 1 | 3 | 2 | 4 | 6 |
| 3 | 1 | 4 | 3 | 4 | 7 |
| 4 | 1 | **5** | 4 | 4 | 8 |
| 5 | 1 | 6 | 5 | 4 | 9 |
| 6 | 1 | 7 | 6 | 4 | 10 |
| 1 | 2 | 3 | 1 | 5 | 6 |
| 2 | 2 | 4 | 2 | 5 | 7 |
| 3 | 2 | **5** | 3 | 5 | 8 |
| 4 | 2 | 6 | 4 | 5 | 9 |
| 5 | 2 | 7 | 5 | 5 | 10 |
| 6 | 2 | 8 | 6 | 5 | 11 |
| 1 | 3 | 4 | 1 | 6 | 7 |
| 2 | 3 | **5** | 2 | 6 | 8 |
| 3 | 3 | 6 | 3 | 6 | 9 |
| 4 | 3 | 7 | 4 | 6 | 10 |
| 5 | 3 | 8 | 5 | 6 | 11 |
| 6 | 3 | 9 | 6 | 6 | 12 |

There is 4 sums of 5 using this brute force table above

(c) Use brute force to count the possible outcomes with the numbers facing up have a sum divisible by 5.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Blue Dice** | **Grey Dice** | **Sum** | **Sum % 5** | **Blue Dice** | **Grey Dice** | **Sum** | **Sum % 5** |
| 1 | 1 | 2 | 2 | 1 | 4 | **5** | **0** |
| 2 | 1 | 3 | 3 | 2 | 4 | 6 | 1 |
| 3 | 1 | 4 | 4 | 3 | 4 | 7 | 2 |
| 4 | 1 | **5** | **0** | 4 | 4 | 8 | 3 |
| 5 | 1 | 6 | 1 | 5 | 4 | 9 | 4 |
| 6 | 1 | 7 | 2 | 6 | 4 | 10 | **0** |
| 1 | 2 | 3 | 3 | 1 | 5 | 6 | 1 |
| 2 | 2 | 4 | 4 | 2 | 5 | 7 | 2 |
| 3 | 2 | **5** | **0** | 3 | 5 | 8 | 3 |
| 4 | 2 | 6 | 1 | 4 | 5 | 9 | 4 |
| 5 | 2 | 7 | 2 | 5 | 5 | 10 | **0** |
| 6 | 2 | 8 | 3 | 6 | 5 | 11 | 1 |
| 1 | 3 | 4 | 4 | 1 | 6 | 7 | 2 |
| 2 | 3 | **5** | **0** | 2 | 6 | 8 | 3 |
| 3 | 3 | 6 | 1 | 3 | 6 | 9 | 4 |
| 4 | 3 | 7 | 2 | 4 | 6 | 10 | **0** |
| 5 | 3 | 8 | 3 | 5 | 6 | 11 | 1 |
| 6 | 3 | 9 | 4 | 6 | 6 | 12 | 2 |