Answers – Probability (Exercise A)

1.

(a) (i) A : 3, 6
B : 4

There is no outcome that would make A and B both happen together. Hence these are mutually exclusive events.

For mutually exclusive events,
P(A or B) = P(A) + P(B)

= 2/6 + 1/6

= 1/2

(ii) A: 2, 4 ,6
B: 5

There is no outcome that would make A and B both happen together. Hence these are mutually exclusive events.

For mutually exclusive events,
P(A or B) = P(A) + P(B)

= 3/6 + 1/6

= 2/3

(b) (i) If the card seleceted is king of hearts or king of diamonds, both events happen together. Therefore these are not mutually exclusive events.

(ii) If the card seleceted is ace of spades, both events happen together. Therefore these are not mutually exclusive events.

(c) (i) A: 6, 12
B: 2, 3, 4

There is no outcome that would make A and B both happen together. Hence these are mutually exclusive events.

	1	**2**	**3**	**4**	**5**	**6**
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

For mutually exclusive events,
P(A or B) = P(A) + P(B)
= 6/36 + 6/36
= 12/36
= 1/3

(ii) If the total is 8, both events happen together. Therefore these are not mutually exclusive events.

2. (a) (i) A : 3, 6
B: 4

P(A) = 2/6 = 1/3

P(A|B) = 0

Since P(A) ≠ P(A|B), events A and B are not independent.

(ii) A : 2, 4, 6
B: 5

P(A) = 3/6 = 1/2

P(A|B) = 0

Since P(A) ≠ P(A|B), events A and B are not independent.

(b) (i) P(A) = 4/52 = 1/13

P(A|B) = 2/26 = 1/13

Since P(A) = P(A|B), events A and B are independent.

(ii) P(A) = 4/52 = 1/13

P(A|B) = 1/13

Since P(A) = P(A|B), events A and B are independent.

(c) (i) P(A) = 6/36 = 1/6

P(A|B) = 0

Since P(A) ≠ P(A|B), events A and B are not independent.

(ii) P(A) = 15/36 = 5/12

P(A|B) = 5/26

Since P(A) ≠ P(A|B), events A and B are not independent.

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3. (a)

A C T
A T C
C A T
C T A
T A C
T C A

(b) P('CAT' or 'ACT') = 2/6 = 1/3

4.

A: 2, 4, 6

B : 2, 3, 5

(a) P(A and B) = P(Getting 2) = 1/6

(b) P(A) = 3/6 = ½

P(B) = 3/6 = ½

P(A) × P(B) = ½ × ½

= ¼

This means, P(A) × P(B) ≠ P(A and B)

Hence A and B are not independent events.

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5. (a) (i) P(Chem) = 95/300 = 19/60

(ii) P(Year 11 AND Not Bilology) = (30 + 31)/300 = 61/300

(c) P(Year 9) = 97/300

P(Year 9 | Physics) = 27/92

97/300 ≠ 27/92

Since P(Year 9) ≠ P(Year 9 | Physics), these events are not independent.

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6. Outcomes of the three spins are independent.

Therefore, P(three 1's) = P(1 on first spin) × P(1 on second spin) × P(1 on thrid spin)

= ¼ × ¼ × ¼

= 1/64

Similarly,

P(three 4's) = P(4 on first spin) × P(4 on second spin) × P(4 on thrid spin)

= ¼ × ¼ × ¼

= 1/64

Getting three 1's and getting three 4's cannot happen together. Therefore they are mutually exclusive events.

Hence,

P(three 1's OR three 4's) = P(three 1's) + P(three 4's)

= 1/64 + 1/64

= 1/32

(Alternatively, you can draw a tree diagram, which makes use of the same ideas above to solve the problem.)