# Year 10 probability worksheet

Year 10 · 10 questions · www.tuterly.com.au

Name: _____ Date: _____

**Question 1**

A bag contains 5 red, 3 blue and 4 green marbles. One marble is chosen at random. Find:

(a) Pr(blue)

(b) Pr(not green)

Answer: _____

**Question 2**

Let $\xi = \{1, 2, 3, \ldots, 15\}$, A = {multiples of 3} and B = {odd numbers}.

(a) List the elements of $A \cap B$.

(b) Find $n(A \cup B)$.

(c) List the elements of $A' \cap B$.

Answer: _____

**Question 3**

For two events A and B, $Pr(A) = 0.45$, $Pr(B) = 0.3$ and $Pr(A \cap B) = 0.12$. Find $Pr(A \cup B)$.

Answer: _____

**Question 4**

A group of 80 students were surveyed about whether they play sport and whether they have a part-time job. The results are shown below.

| | Plays sport | Does not play sport | Total |
|---|---|---|---|
| Has a job | 18 | 12 | 30 |
| No job | 35 | 15 | 50 |
| **Total** | 53 | 27 | 80 |

Find the probability that a randomly chosen student plays sport, given that they have a job. Write your answer as a fraction in simplest form.

Answer: _____

**Question 5**

Two fair six-sided dice are rolled and the numbers are added. Find the probability that the sum is:

(a) 10

(b) less than 5.

Answer: _____

**Question 6**

At a school, 60% of students study French. Of the students who study French, 40% also study Japanese. Of the students who do not study French, 25% study Japanese. A student is chosen at random and is found to be studying Japanese. Find the probability that this student also studies French. Give your answer as a decimal rounded to two decimal places.

Answer: _____

**Question 7**

Events A and B are independent, with Pr(A) = 0.6 and Pr(B) = 0.25.

(a) Find Pr(A ∩ B).

(b) Find Pr(A ∪ B).

Answer: _____

**Question 8**

A fair spinner has ten equal sectors numbered 1 to 10. Find the probability that the spinner lands on:

(a) a prime number

(b) an even number or a multiple of 3.

Answer: _____

**Question 9**

A Venn diagram shows two overlapping sets A and B inside a sample space. The regions contain the following numbers of outcomes: in A only, 12; in both A and B, 5; in B only, 8; in neither set, 15. Find:

(a) Pr(A)

(b) Pr(A ∪ B)

(c) Pr(A ∩ B')

(d) $\Pr(A' \cap B')$

Answer: _____

**Question 10**

For two events A and B, $\Pr(A \cup B) = 0.8$, $\Pr(A) = 0.5$ and $\Pr(B) = 0.6$. Find $\Pr(A \cap B)$.

Answer: _____

# Year 10 probability: answers and worked solutions

Year 10 · 10 questions · www.tuterly.com.au

**Question 1**

**Key idea:** Pr(event) = (number of favourable outcomes)/(total number of outcomes), and Pr(not  A) = 1 - Pr(A).

**(a)** 1. Total marbles: 5 + 3 + 4 = 12. 2. Pr(blue) = 3/12 = ¼

**(b)** 1. Pr(green) = 4/12 = ⅓ 2. Pr(not green) = 1 - ⅓ = ⅔

**Answer:** (a) ¼ (b) ⅔

**Question 2**

**Key idea:** ∩ means "and" (in both sets), ∪ means "or" (in at least one set) and A' means "not in A".

1. A = {3, 6, 9, 12, 15} and B = {1, 3, 5, 7, 9, 11, 13, 15}.

**(a)** 1. Elements in both: A ∩ B = {3, 9, 15}.

**(b)** 1. n(A ∪ B) = n(A) + n(B) - n(A ∩ B) = 5 + 8 - 3 = 10. 2. Check by listing: {1, 3, 5, 6, 7, 9, 11, 12, 13, 15} has 10 elements ✓

**(c)** 1. Odd numbers that are not multiples of 3: A' ∩ B = {1, 5, 7, 11, 13}.

**Answer:** (a) {3, 9, 15} (b) 10 (c) {1, 5, 7, 11, 13}

**Question 3**

**Key idea:** The addition rule is Pr(A ∪ B) = Pr(A) + Pr(B) - Pr(A ∩ B).

1. Pr(A ∪ B) = 0.45 + 0.3 - 0.12 2. = 0.63

**Answer:** 0.63

**Question 4**

**Key idea:** P(A mid B) = (P(A ∩ B))/(P(B)), which in a table means: restrict to the row (or column) that matches the given condition, then find the fraction who also satisfy A.

1. The condition is "has a job", so restrict to the "Has a job" row. There are 30 students with a job. 2. Of those 30, the number who also play sport is 18. 3. P(plays sport mid has a job) = 18/30 = ⅗

**Answer:** ⅗

**Question 5**

**Key idea:** Use a 6 × 6 array of the 36 equally likely outcomes.

1. Sum 10: (4, 6), (5, 5), (6, 4), so 3/36 = 1/12 2. Sum 2, 3 or 4: 1 + 2 + 3 = 6 outcomes, so 6/36 = ⅙

**Answer:** (a) 1/12 (b) ⅙

**Question 6**

**Key idea:** Use a tree diagram and the conditional probability formula P(F mid J) = (P(F ∩ J))/(P(J)).

1. Define events: F = studies French, J = studies Japanese. Set up the known probabilities: P(F) = 0.6, P(F') = 0.4, P(J mid F) = 0.4, P(J mid F') = 0.25. 2. Find the probability of each path that leads to Japanese:\ P(F ∩ J) = 0.6 × 0.4 = 0.24  P(F' ∩ J) = 0.4 × 0.25 = 0.10  3. Find the total probability of studying Japanese:\ P(J) = 0.24 + 0.10 = 0.34 4. Apply the conditional probability formula:\ P(F mid J) = (P(F ∩ J))/(P(J)) = (0.24)/(0.34) = 12/17 ≈ 0.71

**Answer:** 0.71

**Question 7**

**Key idea:** For independent events, Pr(A ∩ B) = Pr(A) × Pr(B).

1. Pr(A ∩ B) = 0.6 × 0.25 = 0.15 2. Pr(A ∪ B) = 0.6 + 0.25 - 0.15 = 0.7

**Answer:** (a) 0.15 (b) 0.7

**Question 8**

**Key idea:** List the favourable outcomes carefully, counting any number that appears in both lists only once.

**(a)** 1. Primes from 1 to 10: 2, 3, 5, 7. That is 4 outcomes. 2. Pr(prime) = 4/10 = ⅖

**(b)** 1. Even: 2, 4, 6, 8, 10. Multiples of 3: 3, 6, 9. 2. Combined, without repeating 6: 2, 3, 4, 6, 8, 9, 10. That is 7 outcomes. 3. Pr = 7/10

**Answer:** (a) ⅖ (b) 7/10

**Question 9**

**Key idea:** Add the relevant regions and divide by the total number of outcomes.

1. Total: 12 + 5 + 8 + 15 = 40.

**(a)** 1. n(A) = 12 + 5 = 17, so Pr(A) = 17/40.

**(b)** 1. n(A ∪ B) = 12 + 5 + 8 = 25, so Pr(A ∪ B) = 25/40 = ⅝.

**(c)** 1. A ∩ B' is "in A but not B", which is A only: 12. 2. Pr(A ∩ B') = 12/40 = 3/10

**(d)** 1. A' ∩ B' is "in neither": 15. 2. Pr(A' ∩ B') = 15/40 = ⅜

**Answer:** (a) 17/40 (b) ⅝ (c) 3/10 (d) ⅜

**Question 10**

**Key idea:** Rearrange the addition rule: Pr(A ∩ B) = Pr(A) + Pr(B) - Pr(A ∪ B).

1. Pr(A ∩ B) = 0.5 + 0.6 - 0.8 2. = 0.3

**Answer:** 0.3