

## Year 10 Term 2 Homework

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|----------------------------|---------------------|
| <b>Student Name:</b> _____ | <b>Grade:</b> _____ |
| <b>Date:</b> _____         | <b>Score:</b> _____ |

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# 8 Year 10 Term 2 Week 8 Homework

## 8.1 Probability

### 8.1.1 Probability review

- The probability of an event, A, is given by the formula:

$$P(A) = \frac{\text{number of outcomes favourable to } A}{\text{total number of possible outcomes}}$$

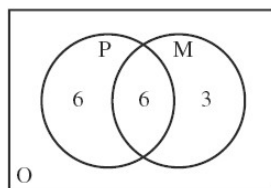
- The complement of E is an event which has all the outcomes that are not include in E.

$$P(\tilde{E}) = 1 - P(E)$$

- Venn diagrams provide a pictorial representation and are especially helpful where the numbers are large.

### Exercise 8.1.1

- This Venn diagram shows the choices made by a group of 15 friends who were all keen to go to a particular movie, M on Friday night and were also invited to a party, P, on Saturday night. What is the probability that a person chosen at random:



- went to both party and movie? \_\_\_\_\_
  - went to the movie but not the party? \_\_\_\_\_
  - went to the party? \_\_\_\_\_
  - did not attend either movie or party? \_\_\_\_\_
- A company produce boxes of individually wrapped chocolates. They intend each box to have 30 chocolates but suspect that the packing process is not entirely accurate, so they conduct a random sample of 100 boxes and check the contents. The table shows the results obtained. What is the probability of buying a box with:

|                      |    |    |    |    |
|----------------------|----|----|----|----|
| Number of chocolates | 28 | 29 | 30 | 31 |
| Number of boxes      | 3  | 15 | 72 | 10 |

- the correct number of chocolates? \_\_\_\_\_
- more than 30 chocolates? \_\_\_\_\_
- fewer chocolates than intended? \_\_\_\_\_

**8.1.2 Independent compound events**

- Two event A and B are independent if the result in ether event does not affect the outcome in the other event.
- **Product rule:** If A and B are two independent events, then the probability that the event A will occur, followed by event B, is given by:

$$P(AB) = P(A) \times P(B) \text{ Product rule}$$

**Example 8.1.1** George plays a game in which he draws a card from a normal pack of playing cards and rolls a die. He wins if the card is a heart and the die shows an even number. in the probability that George will win?

*Solution:* This is a two-stage event since there are two requirements for George to win.

The probability of getting a heart is  $P(\text{heart}) = \frac{1}{4}$  and the probability of rolling a even number is  $P(\text{even}) = \frac{1}{2}$ .

So the probability of both  $P(\text{heart, even}) = P(\text{heart}) \times P(\text{even}) = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

**Exercise 8.1.2**

1. A pair of regular dice, one white and the other cream, are rolled. What is the probability of:
  - (a) two 6s? \_\_\_\_\_
  - (b) a 1 and a 2 of either colour? \_\_\_\_\_
  - (c) a while 5 and a cream 6? \_\_\_\_\_
  - (d) the product of the numbers being less than 24? \_\_\_\_\_
2. David draws two cards at random one after another. He draws one card, replaces it, then draws a second card. What is the probability that:
  - (a) the cards are both diamond? \_\_\_\_\_
  - (b) one card is red and the other black? \_\_\_\_\_
  - (c) both cards are black? \_\_\_\_\_
  - (d) one card is red and the other is a club? \_\_\_\_\_
  - (e) at least one of the card is a heart? \_\_\_\_\_

**Exercise 8.1.3 Consolidation**

1. Anna creates a two-digit number by randomly selecting each digit from the numbers 1, 3, 5, 7 and 9. What is probability that the number is:

(a) 37 or 73? \_\_\_\_\_

(b) greater than 55? \_\_\_\_\_

(c) less than 35? \_\_\_\_\_

(d) divisible by 11? \_\_\_\_\_

2. Bob and Ken each have a regular pack of cards. Each of them selects a cards at random from their pack. Find the probability that:

(a) their cards are of different colours. \_\_\_\_\_

(b) Bob has an Ace and Ken has a heart. \_\_\_\_\_

(c) Bob has an Ace or 2 and Ken has a diamond.

\_\_\_\_\_

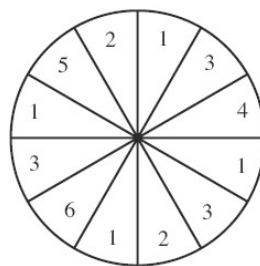
\_\_\_\_\_

(d) Bob has a King of heart and Ken has a heart.

\_\_\_\_\_

\_\_\_\_\_

3. The spinner illustrated is spun three times. What is the probability of:



(a) three 6s? \_\_\_\_\_

(b) 4, 5, 6 in that order? \_\_\_\_\_

(c) no 2s? \_\_\_\_\_

(d) at least two different scores? \_\_\_\_\_

**8.1.3 Dependent events****Example 8.1.2**

1. Two cards are dealt from a regular pack of cards. What is the probability that they are both heart?

**Solution:** The probability of two heart is  $\frac{13}{52} \times \frac{12}{51} = \frac{1}{17}$

2. A hand of five cards is dealt. What is the probability that they are red cards?

The probability of five red cards is  $\frac{26}{52} \times \frac{25}{51} \times \frac{24}{50} \times \frac{23}{49} \times \frac{22}{48} = \frac{253}{9996}$

**Exercise 8.1.4**

1. Linda has five cards labelled 0, 1, 2, 3 and 4. She chooses two cards at random and places them on her desk forming a number. Find the probability that the number formed is:

(a) 24. \_\_\_\_\_

(b) a two digit number. \_\_\_\_\_

(c) divisible by 5. \_\_\_\_\_

(d) greater than 24. \_\_\_\_\_

2. Emma has 48 books in her bookcase. If she has 15 novels, what is the probability that:

(a) both books chosen are novels? \_\_\_\_\_

(b) neither book is a novel? \_\_\_\_\_

(c) at least one of the books is a novel? \_\_\_\_\_

3. Find the probability of choosing two Aces from a standard pack of cards in two draws:

(a) with replacement. \_\_\_\_\_

(b) without replacement. \_\_\_\_\_

**8.1.4 Miscellaneous exercises****Exercise 8.1.5**

1. Three cards marked 5, 6 and 7 are placed in a hat. One card is drawn out and placed on a table. This is to be the tens digit of a two-digit number. Another card is then drawn out and placed beside the first card to complete the number.

(a) Draw a tree diagram to show the sample space of the experiment.

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(b) How many outcomes are in the sample space?

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(c) If the cards are drawn out at random, what is the chance of making the number 75?

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2. Three numbers are chosen at random from the number 1 to 100. Find the probability of :

(a) the first two both begin divisible by 5.

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(b) the first number is divisible by 8 and the second being even.

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(c) the three numbers are divisible by 3, 6, and 12 in any order.

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(d) two of the numbers being greater than 50.

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