

Outcomes, two-way tables and Venn diagrams

About 45 minutes No calculator 38 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/gcse-outcomes-two-way-tables-and-venn-diagrams/

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

A bag holds only red, blue and green counters. $P(\text{red}) = 0.45$ and $P(\text{blue}) = 0.3$. There are 280 counters in the bag. How many are green?

Answer

A2 Last lesson [2 marks]

Kofi throws a biased coin 50 times and it lands on heads 17 times. Lena throws the same one 150 times and it lands on heads 36 times. Use all of these results to estimate how many times it lands on heads in 1000 more goes.

Answer

- A3** From chapter 12 [2 marks]

Two similar shapes have matching sides 10 cm and 12 cm. The smaller shape has area 125 cm². Find the area of the larger shape.

Answer

A4 From chapter 3 [2 marks]

A line of best fit for temperature in degrees (x) and drinks sold (y) passes through (6, 73) and (16, 98). Use it to estimate y when $x = 10$.

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

In a group of 50 people, 31 have a laptop, 24 have a tablet and 13 have both. How many have neither?

Hint Put the 13 in the overlap of a Venn diagram first, then fill in the rest.

- B1** Of 64 students, 37 study art, 29 study music and 11 study both. Work out $P(\text{a student chosen at random studies neither})$. [3 marks]

Answer

EXAMPLE 2

$P(A) = 0.4$, $P(B) = 0.35$ and
 $P(A \text{ and } B) = 0.1$. Work out $P(A \text{ or } B)$.

Hint Adding $P(A)$ and $P(B)$ counts the overlap twice, so take it away once.

B2 $P(A) = 0.7$, $P(A \text{ or } B) = 0.85$ [2 marks]
 and $P(A \text{ and } B) = 0.25$. Work
 out $P(B)$.

Answer

c Practice

C1 A bag holds red, white and blue [2 marks]
 counters only. $P(\text{red}) = 0.2$ and
 $P(\text{white})$ is three times $P(\text{blue})$.
 Work out $P(\text{blue})$.

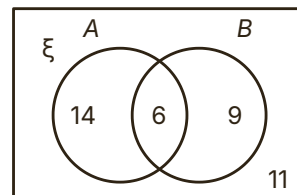
Answer

C2 $P(A) = 0.55$, $P(B) = 0.3$ and [2 marks]
 $P(A \text{ and } B) = 0.15$. Work out
 $P(\text{neither } A \text{ nor } B)$.

Answer

C3 A card is taken from cards [2 marks]
 numbered 1 to 20. A : a multiple
 of 6. B : a prime number. Are A
 and B mutually exclusive? Give
 a reason.

C4 The Venn diagram shows [2 marks]
 numbers of people. One is
 chosen at random. Work out
 $P(\text{exactly one of } A \text{ and } B)$.

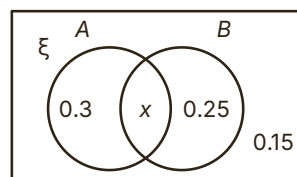


Answer

C5 ξ is the whole numbers from 1 to [2 marks]
 24. A is the factors of 24 and B
 is the even numbers. A number
 is chosen at random from ξ .
 Work out $P(A \cup B)$.

Answer

C6 The Venn diagram shows [2 marks]
 probabilities. Work out $P(B)$.



Answer

D Exam-style questions

- D1** Ravi says, " $P(\text{rain}) = 0.6$ and $P(\text{wind}) = 0.5$, so $P(\text{rain or wind}) = 0.6 + 0.5 = 1.1$." [3 marks]
- $P(\text{rain and wind}) = 0.35$. Explain why Ravi is wrong, and work out $P(\text{rain or wind})$.

Answer

- D2** 90 people at a concert are asked whether they bought a T-shirt. 52 of the people are adults and the rest are children. 19 of the adults and 23 of the children bought a T-shirt.

	T-shirt	No T-shirt	Total
Adults	19		52
Children	23		
Total			90

- (a) Complete the two-way table. [2 marks]
- (b) A person is chosen at random. Work out the probability that they are a child who did not buy a T-shirt. [2 marks]

Answer

- (c) One of the people who bought a T-shirt is chosen at random. Work out the probability that this person is an adult. [2 marks]

Answer

Total for D2: 6 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** A club has 60 members. The number who play only chess is twice the number who play chess and cards. The number who play only cards is 3 more than the number who play both. 9 play neither. A chess player is chosen at random. Work out the probability that they also play cards. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1 Hint 1** Call the number who play both x and fill in a Venn diagram.
- Hint 2** $2x + x + (x + 3) + 9 = 60$.
- Hint 3** $4x = 48$, so $x = 12$. Chess players: $24 + 12 = 36$, so the probability is $\frac{12}{36} = \frac{1}{3}$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can use the fact that the probabilities of all the outcomes add to 1. ○ ○ ○

I can read a two-way table or Venn diagram and use the addition rule. ○ ○ ○