

Combining two events

About 50 minutes No calculator 45 marks

Hints online, answers free with an account:
mathswariz.uk/worksheets/gcse-combining-two-events/

Date _____

A Do Now

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

A1 Needed today

[2 marks]

There are 27 people. 16 like football, 15 like tennis and 2 like neither. A person who likes tennis is chosen at random. Find the probability that they also like football.

Answer

A2From chapter 3

[2 marks]

The line of best fit for temperature in degrees (x) and ice creams sold (y) has equation $y = 2x + 24$. Estimate x when $y = 76$.

Answer

A3 From chapter 15

[2 marks]

The equation $x^2 + 5x = 25$ has a solution between 3 and 4. By working out $x^2 + 5x$ when $x = 3.5$, decide whether it is between 3 and 3.5 or between 3.5 and 4.

Answer

A4From chapter 17

[2 marks]

Write $x^2 + x - 4$ in the form $(x + p)^2 + q$.

Answer

B Example, then your turn

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

EXAMPLE 1

A spinner lands on red, blue, green or yellow. $P(\text{red}) = 0.26$ and $P(\text{blue}) = 0.33$. Work out the probability that it lands on green or yellow.

Hint It can only land on one colour, so the four probabilities add to 1. Green or yellow is everything that is not red or blue.

B1

A bag holds red, white, black and yellow counters. A counter is taken at random. [2 marks]

$P(\text{red}) = 0.18$, $P(\text{white}) = 0.27$ and $P(\text{black}) = 0.4$. Work out the probability that it is red or yellow.

Answer

EXAMPLE 2

$P(A) = 0.5$, $P(B) = 0.35$ and $P(A \text{ and } B) = 0.2$.
Work out $P(A \text{ or } B)$.

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

- B2** $P(A) = 0.42$, $P(B) = 0.36$ and $P(A \text{ and } B) = 0.18$. Work out the probability that neither A nor B happens. [2 marks]

Answer

C Practice

- C1** A fair dice is thrown. Work out the probability that the score is even or greater than 4. [2 marks]

Answer

- C2** $P(A) = 0.65$ and $P(B) = 0.5$. The probability that neither A nor B happens is 0.15. Work out $P(A \text{ and } B)$. [3 marks]

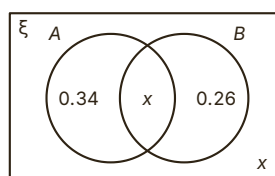
Answer

- C3** A spinner lands on red, blue, green or yellow. The table shows some of the probabilities. Work out the probability that it lands on green or yellow. [3 marks]

Colour	Probability
Red	0.15
Blue	x
Green	$2x$
Yellow	0.25

Answer

- C4** The Venn diagram shows probabilities. Work out $P(B)$. [3 marks]



Answer

- C5** A card is taken at random from 24 cards numbered 1 to 24. Explain why "a multiple of 4" and "a multiple of 6" are not mutually exclusive. Then work out the probability that the card is a multiple of 4 or a multiple of 6. [3 marks]

Answer

- C6** Spinner P is numbered 1, 2 and 3. Spinner Q is numbered 1 to 5. Both are fair and both are spun. List the outcomes, then work out the probability that the two numbers add up to 6. [2 marks]

Answer

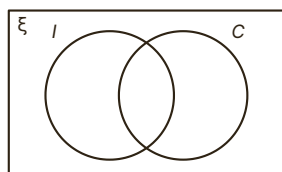
D Exam-style questions

- D1** A card is taken at random from an ordinary pack of 52 playing cards. Noah says, "The probability that it is a king or a heart is $\frac{4}{52} + \frac{13}{52} = \frac{17}{52}$." Explain what Noah has done wrong, and work out the correct probability. Give your answer in its simplest form. [3 marks]

Answer

- D2** In a game, spinner P (numbered 1, 2 and 3) and spinner Q (numbered 1 to 5) are both spun and the two numbers are multiplied. Kai wins if the answer is odd. Lily wins if it is even. Kai says, "The game is fair, because odd and even numbers are equally likely." Is Kai right? You must show your working. [4 marks]

- D3** There are 80 students in a year group. 34 of them play an instrument and 25 sing in the choir. 11 do both. In the Venn diagram, I is the students who play an instrument and C is the students in the choir.



- (a) Complete the Venn diagram. How many of the students do neither? [2 marks]

Answer

- (b) A student is chosen at random. Work out the probability that the student plays an instrument or sings in the choir. Give your answer in its simplest form. [2 marks]

Answer

- (c) A student is chosen at random. Work out the probability that the student does exactly one of the two. [2 marks]

Answer

Total for D3: 6 marks

E Extension

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

- E1** 120 people at a leisure centre were asked what they do there. 72 of them swim and 54 use the gym. Some may do both, and some may do neither. One of the 120 is chosen at random. Work out the smallest possible probability that this person both swims and uses the gym. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Draw a Venn diagram. Where should people go to make the overlap as small as possible?
- Hint 2** The overlap is smallest when nobody does neither: then the two circles hold all 120 people.
- Hint 3** $72 + 54 = 126$, which is 6 more than 120, so at least 6 people do both.

How did it go?

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

I can add the probabilities of outcomes that cannot happen together. ☐ ☐ ☐

I can use $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$. ☐ ☐

I can list a sample space and count from it. ☐ ☐ ☐