

Conditional probability

About 50 minutes No calculator 42 marks

Hints online, answers free with an account:
mathswariz.uk/worksheets/gcse-conditional-probability/

Date _____

A Do Now

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

- A1** Needed today [2 marks] **A2** From chapter 18 [2 marks]
- A bag holds 6 red and 2 blue counters. A counter is taken at random and replaced, then a second counter is taken. Find the probability that the two counters are different colours.
- A histogram has a bar for $0 < x \leq 30$ with frequency density 1.3 and a bar for $30 < x \leq 60$ with frequency density 1.9. How many values are in $0 < x \leq 60$?

Answer

Answer

- A3** From chapter 11 [2 marks] **A4** From chapter 4 [2 marks]
- Find the distance between the points $(-2, -2)$ and $(-17, 6)$.
- Each term of a sequence is the sum of the two terms before it. The 3rd term is 22 and the 5th term is 58. Find the 2nd term.

Answer

Answer

B Example, then your turn

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

EXAMPLE 1

The table shows the snacks bought by some cinema customers. Given that a customer is a child, work out the probability that they bought popcorn.

	Popcorn	Nachos	None
Adult	18	12	15
Child	27	9	9

Hint "Given that the customer is a child" means only the child row counts. There are $27 + 9 + 9 = 45$ children.

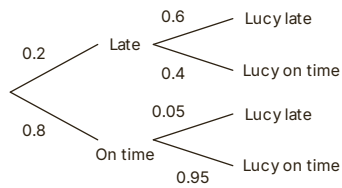
- B1** The table shows the tickets bought by some train passengers. Given that a passenger travels in the evening, work out the probability that they have a return ticket. [2 marks]

	Single	Return
Morning	28	22
Evening	19	41

Answer

EXAMPLE 2

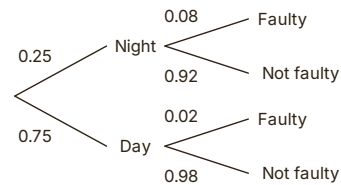
The tree diagram shows the probability that Lucy's train is late, and the probability that Lucy is late for work. Given that Lucy is late, work out the probability that the train was late.



Hint Lucy is late on two paths: $0.2 \times 0.6 = 0.12$ and $0.8 \times 0.05 = 0.04$. Only the first has a late train.

B2 The tree diagram shows the probability that a bulb is made on a factory's night shift, and the probability that it is faulty. [3 marks]

A faulty bulb is picked at random. Work out the probability that it was made at night.



Answer

c Practice

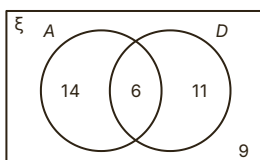
- C3** Two fair dice are thrown. Given that the total score is 8, work out the probability that one of the dice shows a 6. [2 marks]

Answer

- C4** A club has 75 members, 40 of them adults. An adult swims with probability 0.35, and 20 children swim. A swimmer is picked at random. Work out $P(\text{adult})$. [3 marks]

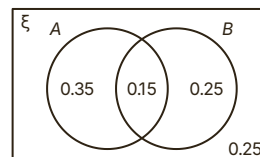
Answer

- C1** The Venn diagram shows how many students take art (A) and drama (D). A student who takes exactly one of them is picked at random. Work out $P(\text{drama})$. [2 marks]



Answer

- C2** The Venn diagram shows probabilities. Given that B does NOT happen, work out the probability that A happens. [2 marks]



Answer

- C5

The table shows who sings in a choir. Is being in the choir independent of being a girl? Show how you decide.

[2 marks]
- C6

A bag holds 6 red and 4 blue counters. Two counters are taken at random without replacement. Given that the second counter is blue, work out the probability that the first was red.

[3 marks]

	Choir	Not choir
Girls	18	27
Boys	12	23

Answer

D Exam-style questions

- D1

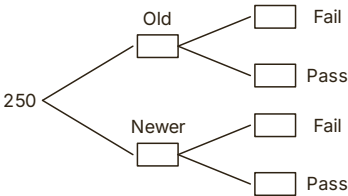
The table shows how some students travel to school. Zara says, "The probability that a Year 10 student cycles is the same as the probability that a cyclist is in Year 10." Show that Zara is wrong.

[3 marks]

	Cycles	Does not cycle
Year 10	18	42
Year 11	12	38

- D2

A garage tests 250 cars. 40% of them are more than 10 years old (old). 35% of the old cars fail the test. 12% of the newer cars fail the test.



- (a)

Complete the frequency tree.

[2 marks]
- (b)

A car that fails the test is picked at random. Work out the probability that it is old.

[2 marks]

Answer

- (c)

One of the 250 cars is picked at random. Work out the probability that it is old and fails the test.

[1 mark]

Answer

Total for D2: 5 marks

- D3** $P(A) = 0.4$ and $P(B) = 0.35$. The probability that B happens, given that A happens, is 0.3. Work out the probability that A happens, given that B happens. [3 marks]

Answer

E Extension

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

- E1** A bag holds 4 red, 3 blue and 2 green counters. Two counters are taken at random without replacement. Given that the two counters are the same colour, work out the probability that both are red. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** First work out the probability that both are red, both blue and both green.
- Hint 2** $P(\text{both red}) = \frac{4}{9} \times \frac{3}{8} = \frac{12}{72}$. The same colour happens on three of the paths.
- Hint 3** Divide $P(\text{both red})$ by $P(\text{same colour})$.

How did it go?

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

- I can restrict to the group "given that" names. ☐ ☐ ☐
- I can find $P(A | B)$ from a tree or a Venn diagram. ☐ ☐ ☐
- I can tell $P(A | B)$ from $P(B | A)$. ☐ ☐ ☐