Venn diagrams

Grade 4 | Worked solutions

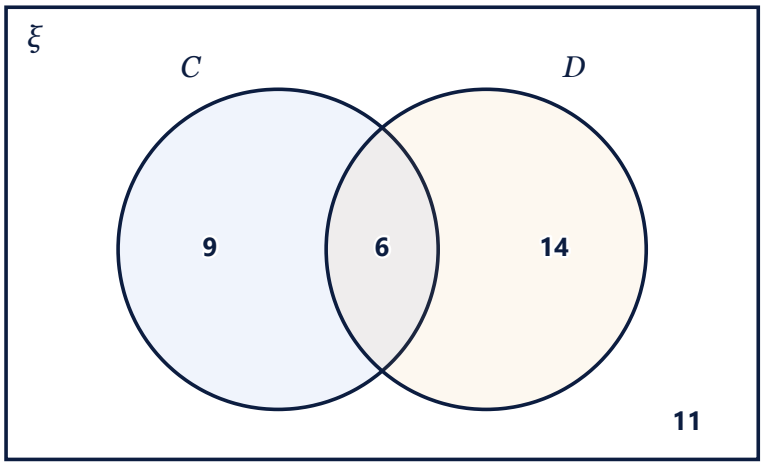
GCSE Statistics topic practice

1 The Venn diagram shows information about the pets owned by 40 students. C is the students who own a cat. D is the students who own a dog.

a. How many of the students own a dog? (1)

b. How many of the students own a cat or a dog or both? (1)

c. One of the students is chosen at random. Write down the probability that this student owns a cat but not a dog. (1)



(3 marks)

a)

$6 + 14 = 20$

20 students own a dog.

b)

$9 + 6 + 14 = 29$

29 students own a cat or a dog or both.

c)

9 of the 40 students are in C only

$P = \frac{9}{40}$

a) 20 b) 29 c) $\frac{9}{40}$

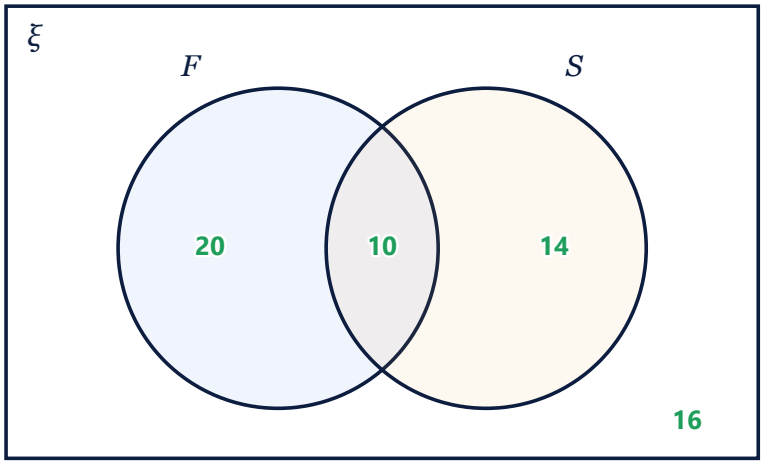
Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

2 A youth club has 60 members. 30 of the members play football (F). 24 of the members swim (S). 10 of the members do both.

a. Complete the Venn diagram. (2)

b. One member is chosen at random. Work out the probability that this member swims but does not play football. (1)

c. Work out the probability that a member chosen at random plays football or swims or does both. (1)



(4 marks)

a)

Start with the overlap, which is 10

Football only is 30 - 10 = 20

Swimming only is 24 - 10 = 14

Neither is 60 - (20 + 10 + 14) = 16

b)

$$P = \frac{14}{60} = \frac{7}{30}$$

c)

20 + 10 + 14 = 44 members are inside the circles

$$P = \frac{44}{60} = \frac{11}{15}$$

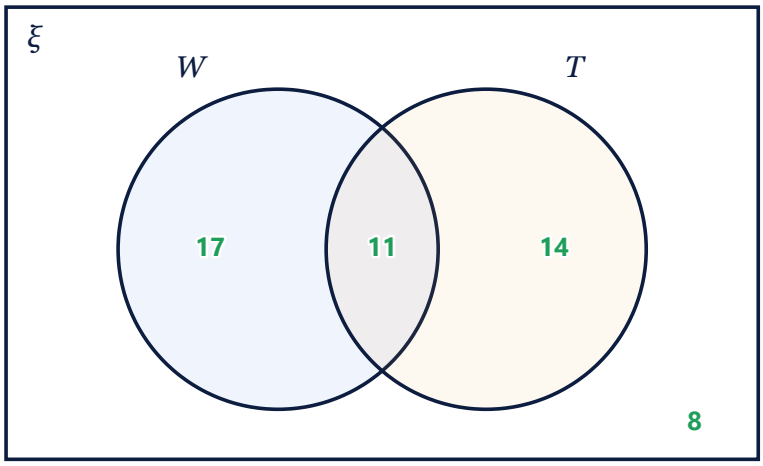
a) 20, 10, 14, 16 b) $\frac{7}{30}$ c) $\frac{11}{15}$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

3 50 people use a gym one evening. 28 of them use the weights (W). 25 of them use a treadmill (T). 8 of them use neither the weights nor a treadmill.

a. Complete the Venn diagram. (3)

b. One of the 50 people is chosen at random. Work out the probability that this person uses exactly one of the weights and a treadmill. (1)



(4 marks)

a)

People inside the circles

$50 - 8 = 42$

The overlap is counted twice

$28 + 25 = 53$

$53 - 42 = 11$

So 11 people use both.

$28 - 11 = 17$

$25 - 11 = 14$

Weights only is 17 and treadmill only is 14

b)

$17 + 14 = 31$

$P = \frac{31}{50}$

a) 17, 11, 14, 8 b) $\frac{31}{50}$

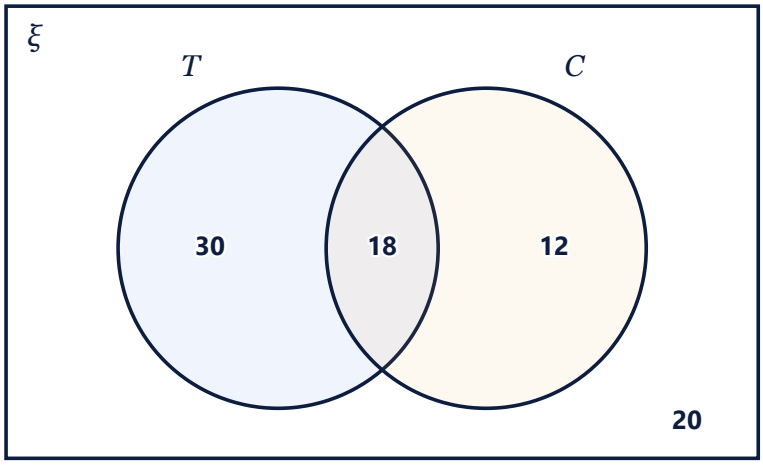
Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

4 The Venn diagram shows information about what 80 customers bought at a cafe. T is the customers who bought tea. C is the customers who bought cake.

a. One customer is chosen at random. Work out the probability that this customer bought tea. (1)

b. Work out the probability that a customer chosen at random bought tea or cake but not both. (1)

c. The owner says, "More than half of the customers who bought cake also bought tea." Is the owner correct? You must show your working. (2)



(4 marks)

a)

$30 + 18 = 48$

$P(\text{tea}) = \frac{48}{80}$

$= \frac{3}{5}$

48 of the 80 customers bought tea.

b)

$30 + 12 = 42$

$P = \frac{42}{80}$

$= \frac{21}{40}$

42 customers bought only one of them.

c)

Customers who bought cake

$18 + 12 = 30$

18 of these 30 also bought tea.

$\frac{18}{30} \times 100 = 60\%$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

Yes. 60% is more than half.

a) $\frac{3}{5}$ b) $\frac{21}{40}$ c) yes, 18 out of 30 is 60%

5 A teacher asks a sample of 60 Year 10 students which languages they study. The two-way table shows the results.

	Studies Spanish	Does not study Spanish
Studies French	9	21
Does not study French	18	12

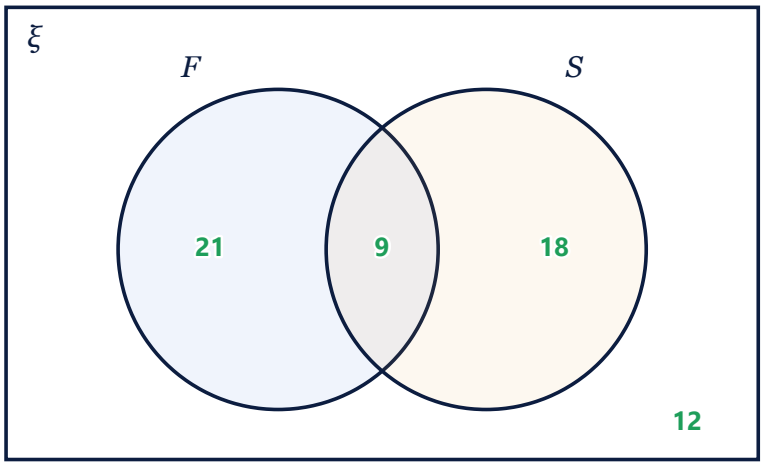
F is the students who study French. S is the students who study Spanish.

a. Complete the Venn diagram. (2)

b. One of the 60 students is chosen at random. Work out the probability that this student studies only one of the two languages. (1)

c. There are 240 students in Year 10. Work out an estimate for the number of Year 10 students who study both French and Spanish. (1)

d. Write down one assumption you made in part (c). (1)



(5 marks)

a)

Both languages is 9, so 9 goes in the overlap.

French only is 21 and Spanish only is 18

Neither is 12, which goes outside the circles.

b)

$21 + 18 = 39$

$p = \frac{39}{60}$

$= \frac{13}{20}$

39 students study only one language.

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

c)

$$\frac{9}{60} \times 240 = 36$$

About 36 students study both.

d)

The sample of 60 is representative of all the Year 10 students.

a) 21, 9, 18, 12 b) $\frac{13}{20}$ c) 36 d) representative sample

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.