

- 2** In a group of 105 students, 70 students passed Mathematics, 60 students passed History and 45 students passed Geography; 30 students passed Mathematics and History, 35 students passed History and Geography, 25 passed Mathematics and Geography, and 15 passed all three subjects.

Draw a Venn diagram to illustrate this information.

Find the number of students who

- a** passed at least one subject
 - b** passed exactly two subjects
 - c** passed Geography and failed Mathematics
 - d** passed all three subjects given that they passed two
 - e** failed Mathematics given that they passed History.
- 3** In a youth camp, each participant must take part in at least one of the following activities: chess, backgammon or dominoes. Of the total of 55 in the camp, 25 participants participated in chess, 24 in backgammon, and 30 in dominoes; 15 in both chess and backgammon, 10 in both backgammon and dominoes, 5 in both chess and dominoes, and 2 in all three events.



Draw a Venn diagram to show this information.

How many of the participants are not taking part in at least one activity?

Find the number of participants who

- a** take part in one activity only
 - b** take part in exactly two activities
 - c** do not take part in at least two activities
 - d** take part in chess, given that they take part in dominoes
 - e** take part in backgammon, given that they do not take part in dominoes.
- 4** Fatty's Delight sells chicken, duck, and barbecued pork rice. Of the 160 customers one day, 57 had chicken rice, 60 had duck rice and 48 had barbecued pork rice. 30 customers ordered chicken and duck rice, 25 ordered duck and barbecued pork rice, 35 ordered chicken and barbecued pork rice, and 20 ordered all three types.

Draw a Venn diagram to show these data.

Find the number of customers who

- a** ordered more than one type of rice
- b** did not order a rice dish from Fatty's Delight
- c** did not order chicken rice
- d** ordered duck rice and one other rice dish.

- 5** In a community center in Buona Vista there are 170 youths. Of these, 65 take up climbing, 65 bouldering and 50 swimming; 15 take up climbing and bouldering, 10 bouldering and swimming, and 5 swimming and climbing. 17 youths take up other activities.

Let x be the number of youths who take up all three activities.

Show the above information in a Venn diagram.

Show clearly the number in each separate region in terms of x .

Form an equation satisfied by x , and hence find its value.

Find the number of youths who

- a** take up one activity only
 - b** take up at least two activities
 - c** take part in fewer than two activities
 - d** take up bouldering given that they have already taken up climbing
 - e** take up one other activity given that they have already taken up swimming.
- 6** 65 elderly men failed a medical test because of defects in at least one of these organs: the heart, lungs or kidneys. 29 had heart disease, 28 lung disease and 31 kidney disease. 8 of them had both lung and heart diseases, 11 had lung and kidney diseases, while 12 had kidney and heart diseases.

Draw a Venn diagram to show this information. You will need to introduce a variable.

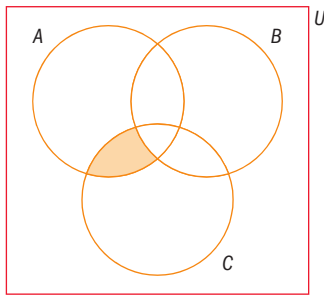
Find the number of men who

- a** suffer from all three diseases
 - b** suffer from at least two diseases
 - c** suffer from lung disease and exactly one other disease
 - d** suffer from heart disease and lung disease but not kidney disease
 - e** suffer from lung disease only.
- 7** Each of the 116 students in the Fourth Year of a school studies at least one of the subjects History, English and Art.
- Of the 50 students who study Art,
- 15 also study History and English,
 - 12 study neither History nor English, and
 - 17 study English but not History.
- Of the 66 students who do not study Art,
- 39 study both History and English,
 - x study History only, and
 - $2x$ study English only.

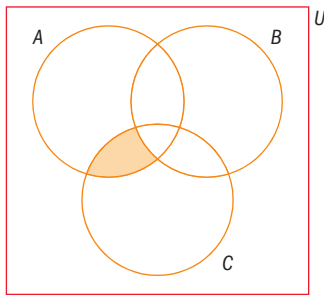
Draw a Venn diagram showing the number of students in each subset. Hence find

- a** the value of x
- b** the total number of students studying English.

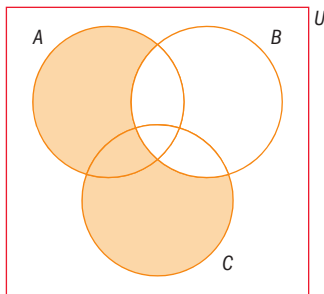
f
i



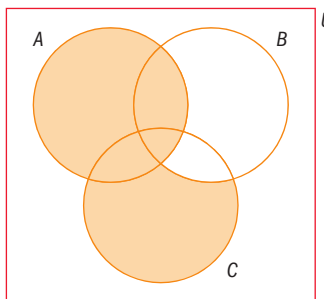
ii



g
i



ii



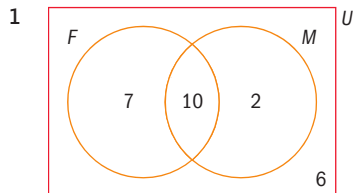
- 2 a $(A' \cup B') \cap C$
 b $A \cap (B' \cup C')$
 c $(A' \cap B') \cap C$
 d $A' \cap (B \cap C)$
 e $(A' \cap C) \cup B$
 f $A \cap (C' \cup B)'$
 g $A \cap (B \cup C)'$
 h $(A \cap C) \cup (A \cup (B \cup C))'$
 i $(A \cup B)' \cap C$
 j $A' \cap (B \cup C)'$

- 3 a 1 b 3 c 4
 d 2 e 7 f 6
 g 5 h 8
 4 a 1, 2, 4 b 3, 6, 7
 c 1, 4, 7 d 2, 5, 6
 e 3, 4, 7 f 2, 6, 8
 g 2, 3, 6 h 4, 7, 8

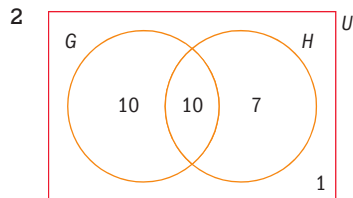
Exercise 8G

- 1 6 2 14 3 21
 4 21 5 13 6 11
 7 7 8 6 9 14

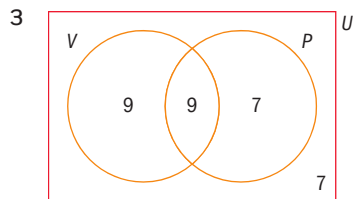
Exercise 8H



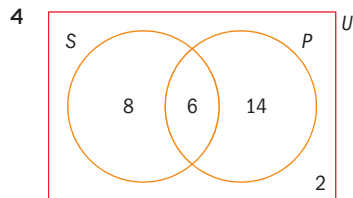
- a 7 b 19 c 6 d 15



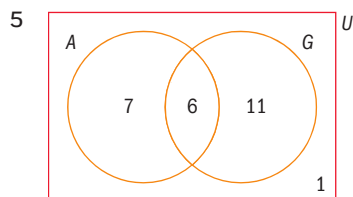
- a 28 b 11 c 10 d 17



- a 9 b 14 c 7 d 16



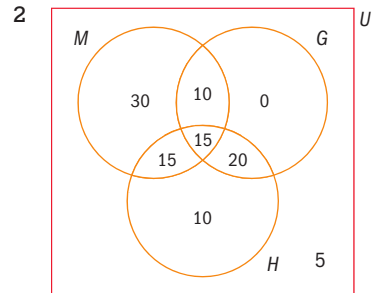
- a 6 b 22 c 8



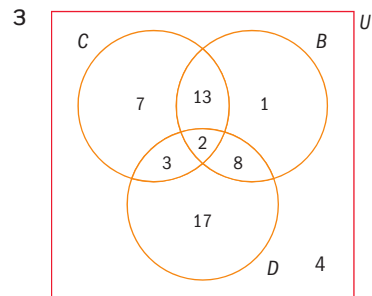
- a 6 b 11 c 24

Exercise 8I

- 1 a 70 b 70 c 55
 d 25 e 25 f 75
 g 70 h 35 i 55
 j 25 k 45

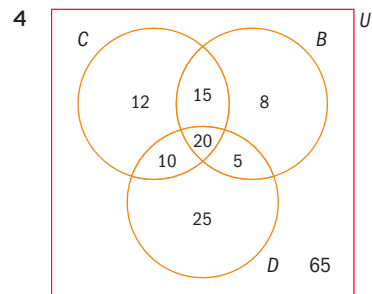


- a 100 b 45 c 20
 d 15 e 30

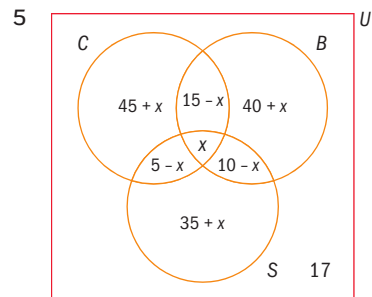


4 are not fulfilling their responsibilities.

- a 25 b 24 c 29
 d 5 e 14

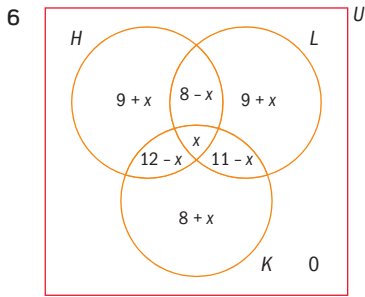


- a 50 b 65
 c 103 d 15

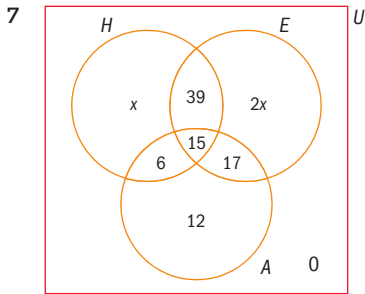


$x = 3$

- a 129 b 24 c 146
 d 15 e 9



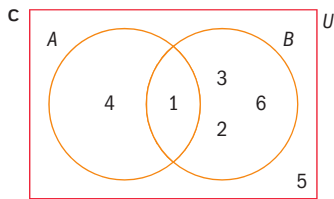
- a 8 b 15 c 3
d 0 e 17



- a $x=9$ b 89

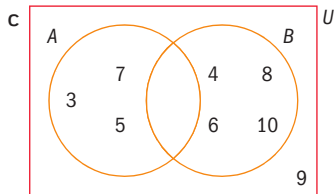
Exercise 8J

- 1 a {1, 4}
b {1, 2, 3, 6}



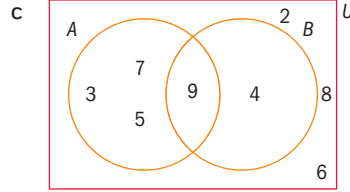
- d $\frac{2}{6}$ e $\frac{4}{6}$ f $\frac{4}{6}$
g $\frac{1}{6}$ h $\frac{5}{6}$

- 2 a {3, 5, 7} b {4, 6, 8, 10}



- d $\frac{3}{8}$ e $\frac{4}{8}$ f $\frac{5}{8}$
g $\frac{4}{8}$ h 0 i $\frac{7}{8}$
l $\frac{1}{8}$ m 1

- 3 a {3, 5, 7, 9}
b {4, 9}



- d $\frac{4}{8}$ e $\frac{2}{8}$ f $\frac{1}{8}$ g $\frac{5}{8}$

- 4 a {HH, HT, TH, TT}

- b $\frac{1}{4}, \frac{1}{2}, \frac{1}{4}$

- 5 a {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

- b $\frac{1}{8}, \frac{3}{8}, \frac{3}{8}, \frac{1}{8}$

- 6 a $\frac{1}{16}$ b $\frac{1}{16}$ c $\frac{4}{16}$ d $\frac{4}{16}$

- e $1 - \left(\frac{1}{16} + \frac{4}{16} + \frac{4}{16} + \frac{1}{16} \right) = \frac{6}{16}$

- f {HHHH, HHHT, HHHT, HTHH, HHTT, HTHT, HTTH, HTTT, THHH, THHT, THTH, THTT, TTHH, THTT, TTHT, TTHT, TTTT}

Exercise 8K

- 1 a $\frac{23}{40}$ b $\frac{5}{40}$ c $\frac{5}{40}$

- d $\frac{15}{20}$ e $\frac{8}{23}$ f $\frac{8}{23}$

- 2 a $\frac{14}{30}$ b $\frac{8}{30}$ c $\frac{6}{10}$

- d $\frac{8}{20}$ e $\frac{4}{16}$ f 0

- 3 a $\frac{8}{17}$ b $\frac{2}{17}$ c $\frac{8}{17}$

- d $\frac{7}{9}$ e 0 f 1

- 4 a $\frac{12}{34}$ b $\frac{16}{34}$ c $\frac{28}{34}$

- d $\frac{12}{22}$ e $\frac{6}{18}$ f $\frac{10}{22}$

- 5 a $\frac{13}{24}$ b $\frac{4}{24}$ c $\frac{8}{24}$

- d $\frac{17}{24}$ e $\frac{7}{24}$ f $\frac{12}{24}$

- g $\frac{9}{24}$

- 6 a $\frac{5}{22}$ b $\frac{18}{22}$

- c $\frac{10}{15}$ d $\frac{3}{8}$

- 7 a $\frac{12}{28}$ b $\frac{4}{13}$ c $\frac{4}{16}$

- d $\frac{3}{28}$ e $\frac{12}{21}$

- 8 a $\frac{12}{27}$ b $\frac{12}{20}$ c $\frac{7}{19}$

- d $\frac{2}{7}$ e $\frac{12}{17}$

Exercise 8L

- 1 $A \cap B = \{1\}$

- 2 $A \cap B = \emptyset$, so A and B are mutually exclusive

- 3 $A \cap B = \{2\}$

- 4 $A \cap B = \emptyset$, so A and B are mutually exclusive

- 5 $A \cap B = \{9\}$

- 6 $A \cap B = \emptyset$, so A and B are mutually exclusive

- 7 $A \cap B = \{6\}$

- 8 $A \cap B = \emptyset$, so A and B are mutually exclusive

Exercise 8M

- 1 Not independent

- 2 Independent

- 3 Not independent

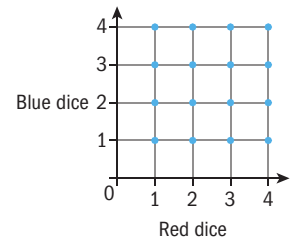
- 4 Independent events

- 5 Not independent events

- 6 Not independent events

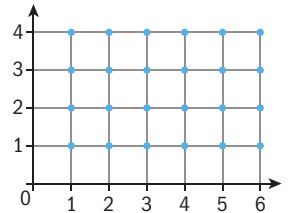
Exercise 8N

- 1



- a $\frac{3}{8}$ b $\frac{3}{8}$ c $\frac{1}{4}$ d $\frac{9}{16}$

- 2



- a $\frac{6}{24}$ b $\frac{13}{24}$ c $\frac{6}{24}$

- d $\frac{11}{24}$ e $\frac{4}{24}$