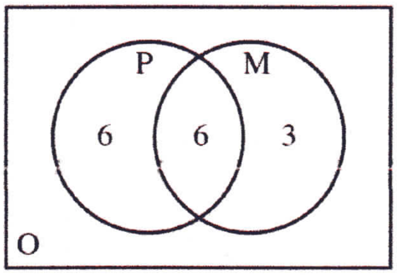
5 This Venn diagram shows the choices made by a group of 15 friends who were all keen to go to a particular movie, M, on Friday night and were also invited to a party, P, on Saturday night. What is the probability that a person chosen at random:

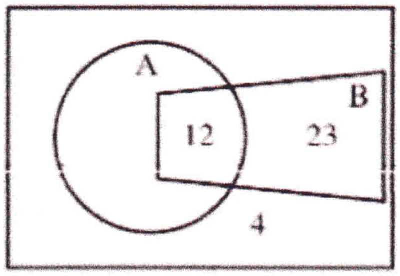


- **a** went to both party and movie?
- **b** went to the movie but not the party?
- **c** went to the party?
- **d** did not attend either movie or party?

a) $P(a) = \frac{6}{15} = \frac{2}{5}$ $P(b) = \frac{3}{15} = \frac{1}{5}$

$P(c) = \frac{6+6}{15} = \frac{12}{15} = \frac{4}{5}$ $P(d) = 0$

The Venn diagram contains a total of 40 members.
Find the probabilities:



a) P(B)
b) P(A)
c) P(not A)
d) P(B but not A)
e) P(neither B nor A)

$P(B) = \frac{12+23}{40} = \frac{35}{40} = \frac{7}{8}$

$P(A) = \frac{12}{40} = \frac{3}{10}$

$P(\text{not } A) = 1 - \frac{3}{10} = \frac{7}{10}$

d) $P(B, \text{ but not } A) = \frac{23}{40}$

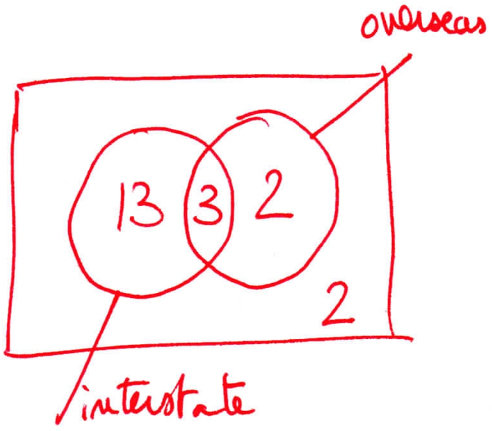
$P(\text{neither } B \text{ nor } A) = 4/40 = 1/10$

11 In a group of 20 families, 5 families took overseas holidays between 2006 and 2010. 16 of the families took interstate holidays within Australia during this time, and two families did not travel overseas nor interstate. Draw a Venn diagram to illustrate this information.

2 families did not travel interstate or overseas, so 18 did travel interstate, overseas, or both

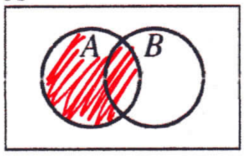
But $5 + 16 = 21$ so as $21 - 18 = 3$ there must be 3 families that travel both interstate and overseas.

Then $5 - 3 = 2$ and $16 - 3 = 13$

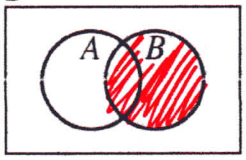


shade the region described by each of the following.

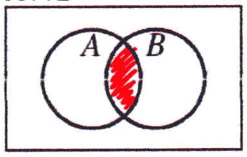
a A



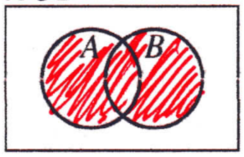
b B



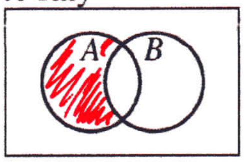
c $A \cap B$



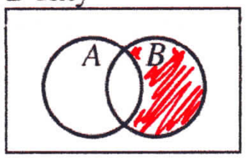
d $A \cup B$



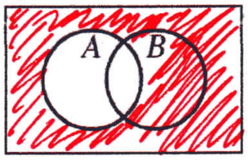
e A only



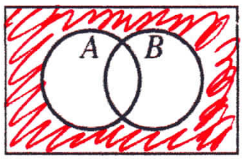
f B only



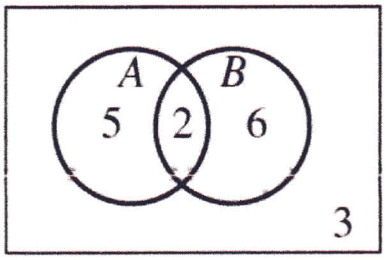
g $\overline{A}$



h neither A nor B



8 The Venn diagram shows the distribution of elements in two sets, A and B.



Find

1) n(A) $= 7$

2) n(B) $= 8$

3) n(B') $= 5 + 3 = 8$

4) n(A∪B) $= 7 + 6 = 13$

5) n(A∩B) $= 2$

6) n(A'∩B) $= 6$

7) n(A∩B') $= 5$

8) n(A'∩B') $= 3$

Find

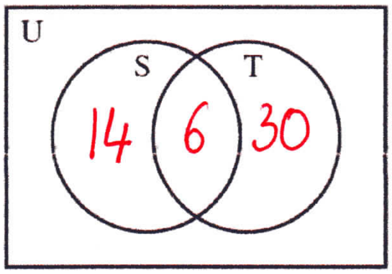
1) p(A∩B) $= \frac{n(A \cap B)}{\text{total}} = \frac{2}{16} = \frac{1}{8}$

2) p(A') $= \frac{9}{16}$

3) P(A∩B') $= \frac{5}{16}$

10 Using the information in this Venn diagram find the probabilities $P(T)$, $P(S)$, $P(S$ and $T)$.
Total number in S and/or $T = 50$

$n(T) = 36$
$n(S) = 20.$ > total 56



So there must be 6 in the intersection

$P(T) = \frac{36}{50}$ $P(S) = \frac{20}{50}$ $P(S \cap T) = \frac{6}{50}$

3. The two-way table gives some information about how 100 children travelled to school one day.

	Walk	Car	Other	Total
Boy	15	25	14	54
Girl	22	8	16	46
Total	37	33	30	100

a) Complete the two-way table.

b) One of the children is picked at random. Write down the probability that this child walked to school that day.

$P(\text{child walk to school that day}) = \frac{37}{100}$

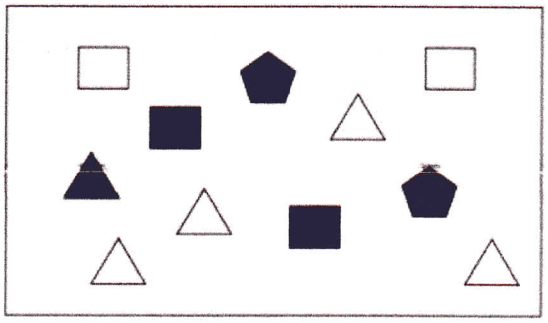
c) One of the girls is picked at random. Work out the probability that this girl did not walk to school that day.

There are 46 girls

$P(\text{girl did not walk to school that day}) = \frac{8+16}{46} = \frac{24}{46} = \frac{12}{23}$

4. The diagram shows some 3-sided, 4-sided and 5-sided shapes.

The shapes are black or white.



(a) Complete the two-way table. (

	Black	White	Total
3-sided shape	1	4	5
4-sided shape	2	2	4
5-sided shape	2	0	2
Total	5	6	11

Ed takes a shape at random. Write down the probability the shape is white and 3-sided.

$P(\text{shape is white and 3-sided}) = \frac{4}{11}$

10. 56 students were asked if they watched tennis yesterday.
20 of the students are boys.
17 girls watched tennis yesterday.
32 students did not watch tennis yesterday

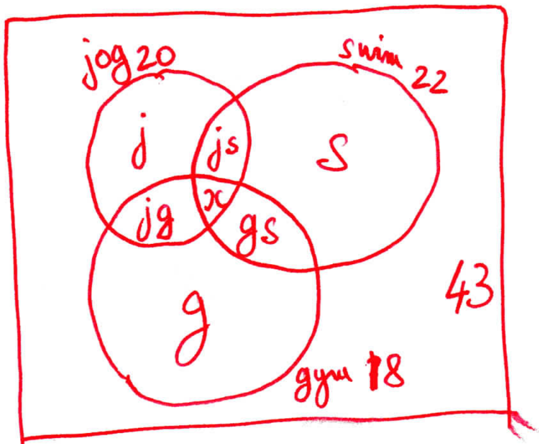
	Watched	didn't	
BOYS	7	13	20
GIRLS	17	19	36
	24	32	56

One of these students is to be chosen at random.

Write down the probability that the student chosen will be a boy who watched tennis yesterday.
Give your answer as a fraction in its simplest form.

$$P(\text{boy who watched tennis}) = \frac{7}{56} = \frac{1}{8}$$

A group of 80 people was surveyed about their approaches to keeping fit. It was found that 20 jog, 22 swim and 18 go to the gym. Further questioning found that 10 people both jog and swim, 11 people both jog and go to the gym, and 6 people both swim and go to the gym. Finally, 43 people do none of these activities. Draw a VENN diagram summarising this information, and then find how many of the people do all three activities.



$80 - 43 = 37$ do sport.

$$j + s + g + js + jg + gs + x = 37$$

Equation ①

But:
$$\begin{cases} j + js + \overbrace{jg + x}^{11} = 20 & (\text{jog}) \\ s + gs + \overbrace{js + x}^{10} = 22 & (\text{swim}) \\ g + jg + \overbrace{gs + x}^{6} = 18 & (\text{gym}) \end{cases}$$

Adding the three, we obtain:

$$(j + js + 11) + (s + gs + 10) + (g + jg + 6) = 60$$

or
$$j + js + s + gs + g + jg = 60 - 11 - 10 - 6 = 33$$

Equation ②

Subtracting ① of ②, we obtain: $\boxed{x = 4}$