8   On the Venn diagrams shade the regions
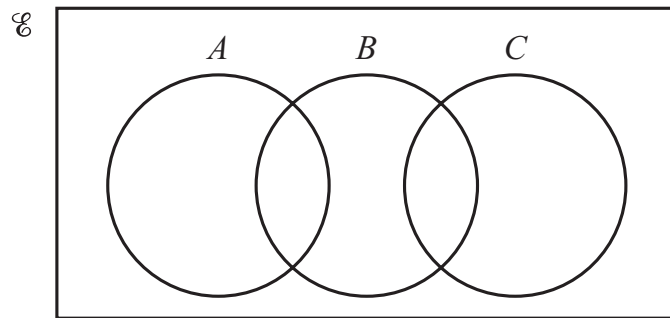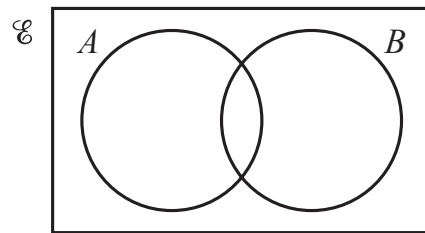
(a) $A' \cap C'$,

$\mathcal{E}$

A B C

(b) $(A \cup C) \cap B$.

$\mathcal{E}$

A B C
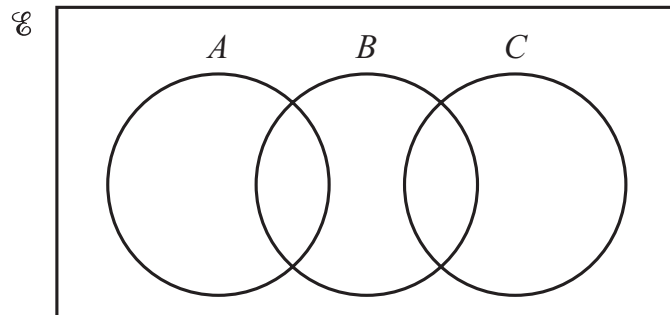
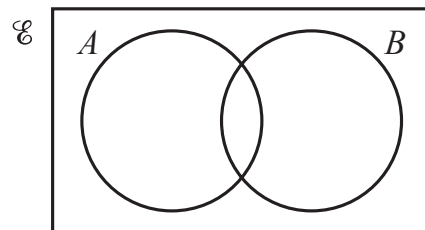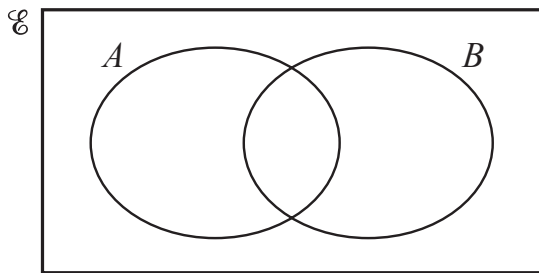**11** **(a)** Shade the region $A \cap B$.

(b) Shade the region $(A \cup B)'$.
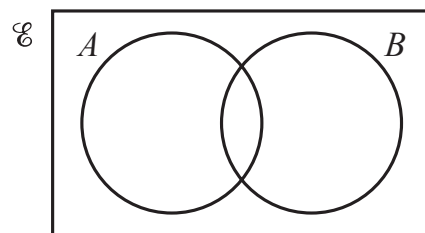
(c) Shade the complement of set B.

Shade the required region on each Venn diagram.

$\mathscr{E}$

A B

$A \cap B'$

$\mathscr{E}$

P Q

R
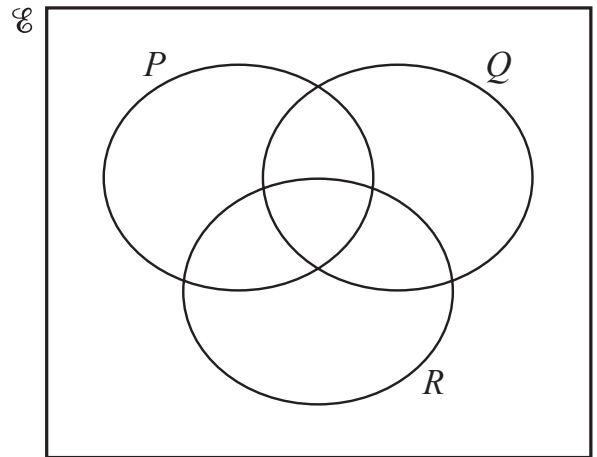
$(P \cup Q) \cap R'$

Shade the region required in each Venn Diagram.

$\mathcal{E}$

$B' \cap (A \cap C)$

$\mathcal{E}$
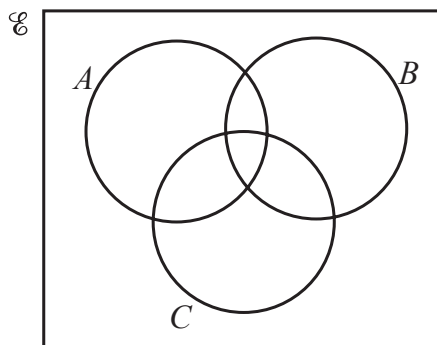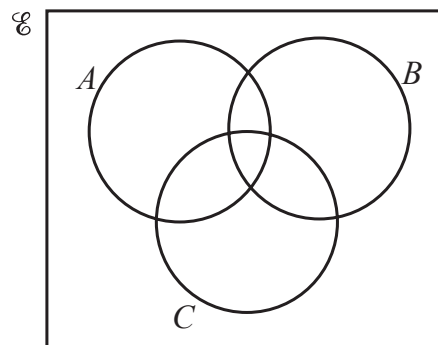
$B' \cap (A \cup C)$

20 The Venn diagram shows a universal set $\mathscr{E}$ and 3 sets A, B and C.

2, 4, 7, 3, 6 and 10 represent **numbers** of elements.

Find

(i) $n\,(A \cup B)$

....
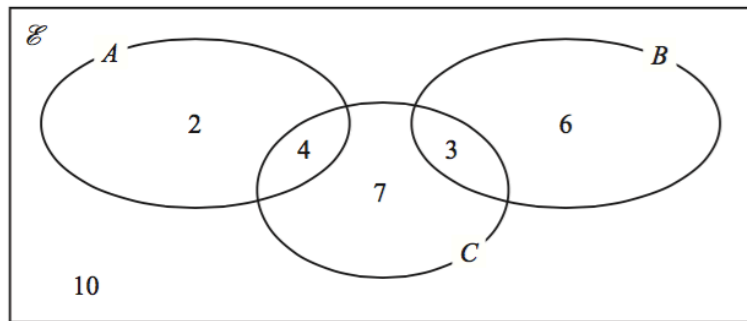
(ii) $n\,(B')$

....

(iii) $n\,(A \cap C')$

....

(iv) $n\,(B' \cap C')$

....

19.

The numbers are the **number** of elements in each part of the Venn Diagram.

(i) Find n(P)

....

(ii) Find n(Q')

....

(iii) Find n($P \cap Q \cap Q'$)

....

(iv) Find n($P' \cup Q'$)

....

20.

In the Venn diagram, 3, w, x and y represent the numbers of elements.

$n(\mathscr{E}) = 24$ $n(P') = 8$ $n((P \cap Q)') = 15$

(a) Find the value of   (i) w (ii) x (iii) y
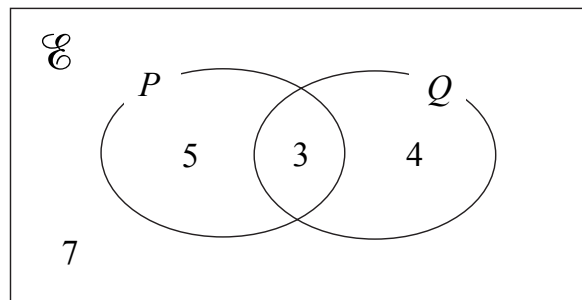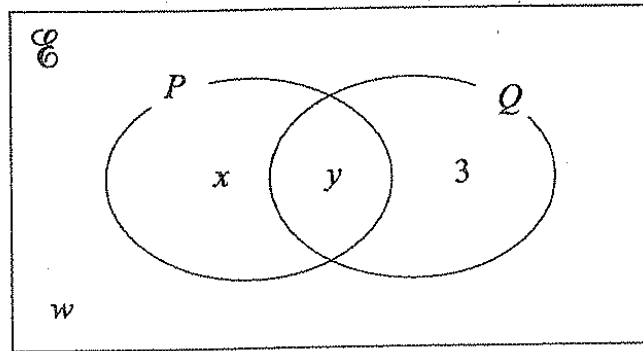
                                          (i) $w =$ ....

                                          (ii) $x =$ ....

                                          (iii) $y =$ ....

                                                                   (3)

(b) (i)   Find $n(P' \cap Q)$.

                                                                ....

(ii)   Find $n(P' \cup Q')$.

                                                                  ....

(iii) Find $n(P \cap Q \cap P')$.

                                                                  ....
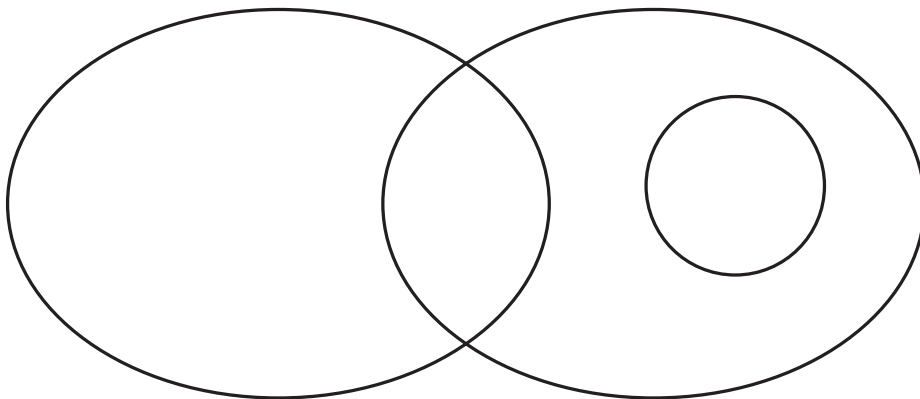
                                                                            (3)
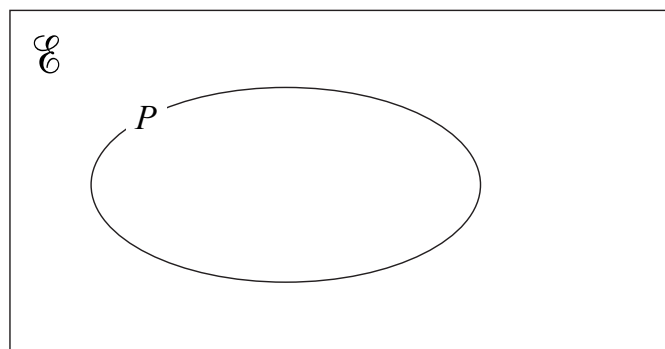
$Q = \{2, 4, 6, 8, 10\}$ and $R = \{5, 10, 15, 20\}$.
$15 \in P,$ $n(P) = 1$ and $P \cap Q = \emptyset.$

Label each set and complete the Venn diagram to show this information.

16.

Set P is shown on the Venn Diagram.
Two sets, Q and R, are such that

$$R \subset P$$

$$Q \cap R = \varnothing$$

$$P \cup Q = P$$

Complete the Venn Diagram to show set Q and set R.

A and *B* are sets.
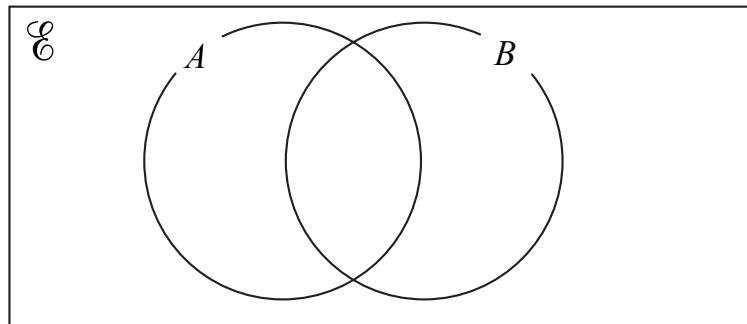Write the following sets in their simplest form.

(a) $A \cap A'$.

Answer(a) ....

(b) $A \cup A'$.

Answer(b) ....

(c) $(A \cap B) \cup (A \cap B')$.

11. The universal set, $\mathscr{E}$ = {Whole numbers}
    A = {Multiples of 5}
    B = {Multiples of 3}

    Sets A and B are represented by the circles in the Venn diagram.

   (a) (i) On the diagram, shade the region that represents the set $A \cap B'$.

       (ii) Write down **three** members of the set $A \cap B'$.

       ...., ..., ...
                                                        (2)
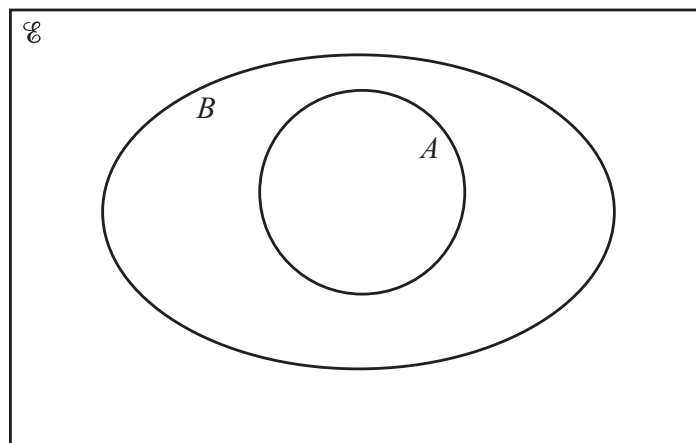
   C = {Multiples of 10}.

   (b) (i) On the diagram draw a circle to represent the set C.

       (ii) Write down **three** members of the set $A \cap B \cap C'$

       ...., ..., ...
                                                        (2)

11 $\mathscr{E}$ = {40, 41, 42, 43, 44, 45, 46, 47, 48, 49}
  A = {prime numbers}
  B = {odd numbers}

(a) Place the 10 numbers in the correct places on the Venn diagram.

[2]

(b) State the value of n$(B \cap A')$.

Answer(b) .... [1]

11 n(ℰ) = 21, n(A ∪ B) = 19, n(A ∩ B′) = 8 and n(A) = 12.
Complete the Venn diagram to show this information.

Answer ℰ

[3]

11 $\mathscr{E}$ = {40, 41, 42, 43, 44, 45, 46, 47, 48, 49}
   A = {prime numbers}
   B = {odd numbers}

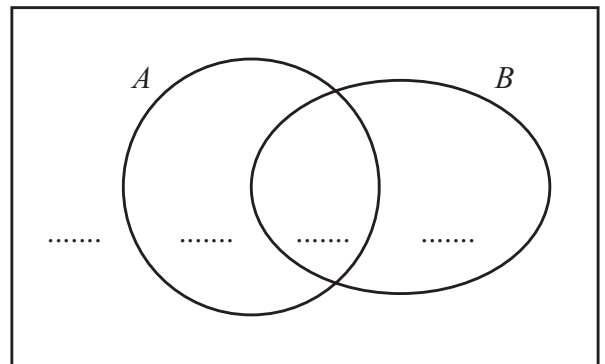**(a)** Place the 10 numbers in the correct places on the Venn diagram.

[2]
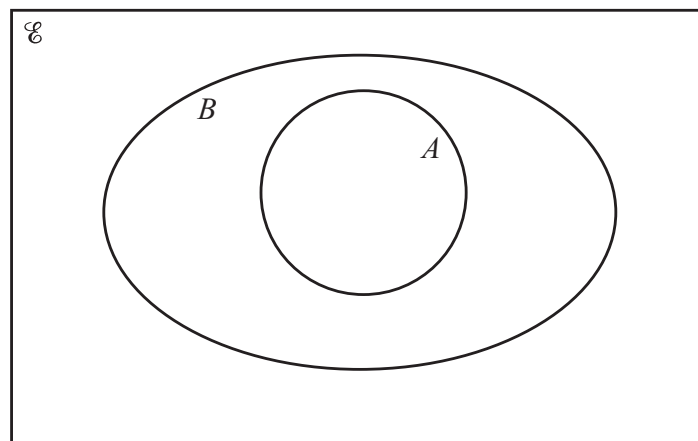
(b) State the value of $n(B \cap A')$.

Answer(b) .... [1]

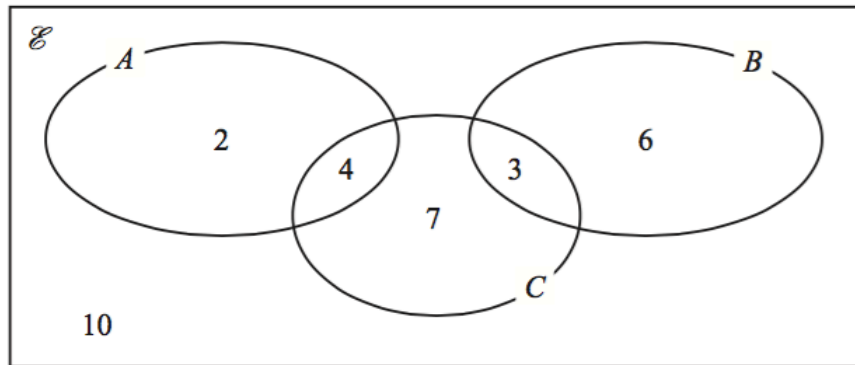**11** Write each of these four numbers in the correct place in the Venn Diagram below.

$$2.6, \quad \frac{4}{17}, \quad \sqrt{12}, \quad \sqrt{\frac{112}{7}}$$
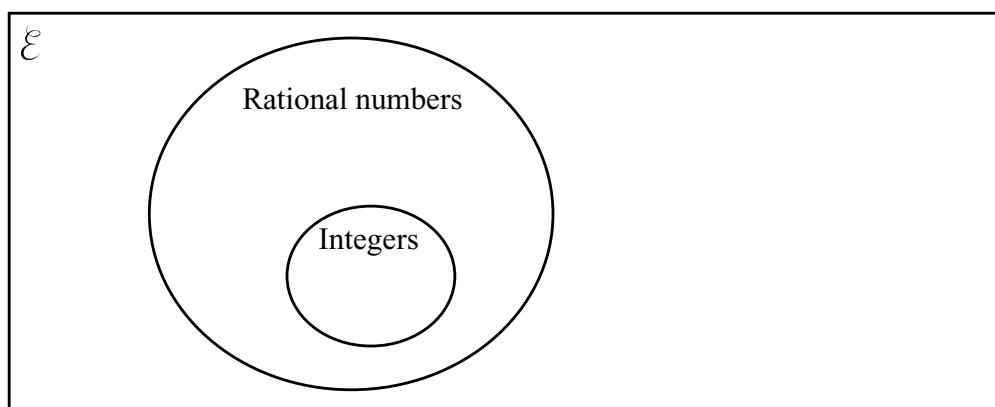
[4]

20 The Venn diagram shows a universal set $\mathcal{E}$ and 3 sets A, B and C.

2, 4, 7, 3, 6 and 10 represent **numbers** of elements.

Find

(i) $n(A \cup B)$

....

(ii) $n(B')$

....

(iii) $n(A \cap C')$

....

(iv) $n(B' \cap C')$

....

22 In a survey of 60 cars, 25 use diesel, 20 use liquid hydrogen and 22 use electricity.

No cars use all three fuels and 14 cars use both diesel and electricity.

There are 8 cars which use diesel only, 15 cars which use liquid hydrogen only and 6 cars which use electricity only.

In the Venn diagram below

$\mathscr{E}$ = {cars in the survey},
D = {cars which use diesel},
L = {cars which use liquid hydrogen},
E = {cars which use electricity}.
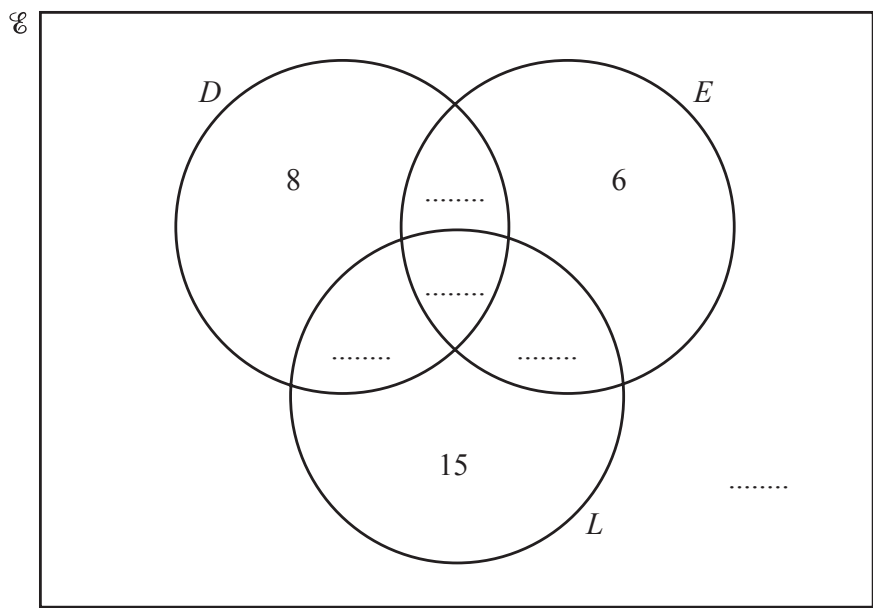
(a) Use the information above to fill in the five missing numbers in the Venn diagram. [4]

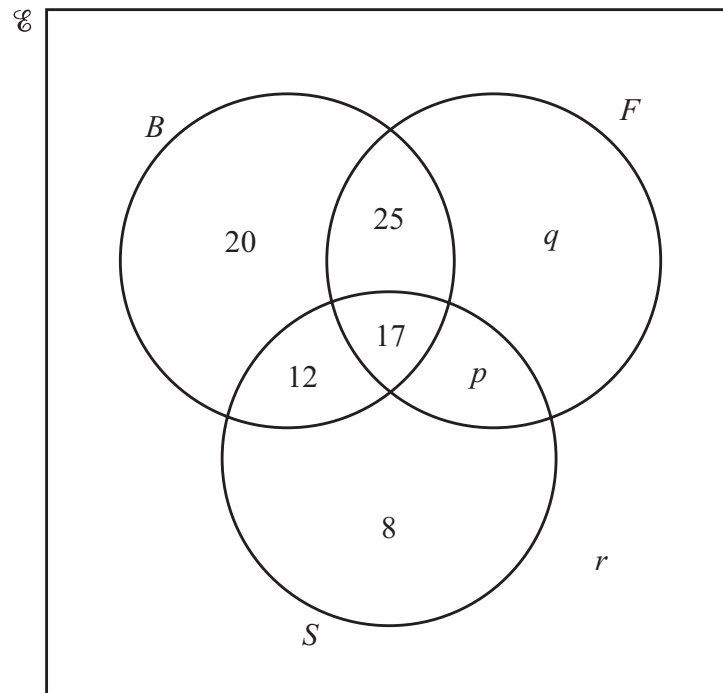**(b)** Find the number of cars which use diesel but not electricity.

Answer(b) .... [1]

(c) Find n($D' \cap (E \cup L)$).

Answer(c) .... [1]

In a survey, 100 students are asked if they like basketball (*B*), football (*F*) and swimming (*S*).

The Venn diagram shows the results.

42 students like swimming.

40 students like exactly one sport.

(a) Find the values of *p*, *q* and *r*.

(b) How many students like

  (i) all three sports,

  (ii) basketball and swimming but not football?

(c) Find

  (i) n(*B'*),

  (ii) n(($B \cup F$)$\cap S'$).

(d) One student is chosen at random from the 100 students.
Find the probability that the student

  (i) only likes swimming,

  (ii) likes basketball but not swimming.

(e) Two students are chosen at random from those who like basketball.

Find the probability that they each like exactly one other sport.

(a) All 24 students in a class are asked whether they like football and whether they like basketball. Some of the results are shown in the Venn diagram below.
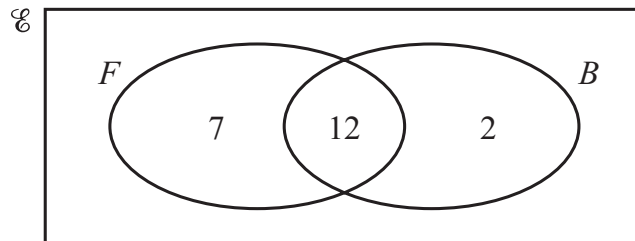
$\mathscr{E}$ = {students in the class}.
F = {students who like football}.
B = {students who like basketball}.

(i) How many students like both sports?

(ii) How many students do not like either sport?

(iii) Write down the value of n($F \cup B$).

(iv) Write down the value of n($F' \cap B$).

(v) A student from the class is selected at random.
What is the probability that this student likes basketball?

(vi) A student who likes football is selected at random.
What is the probability that this student likes basketball?

(b) Two students are selected at random from a group of 10 boys and 12 girls.
Find the probability that

(i) they are both girls,

(ii) one is a boy and one is a girl.