| Name | Class |
|---|---|
| | |

MATHS TEACHER HUB

www.MathsTeacherHub.com

# Venn diagrams

## (9 – 1) Topic booklet

# Higher

**These questions have been collated from previous years GCSE Mathematics papers.**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

## Instructions

•Use **black** ink or ball-point pen.
•**Fill in the boxes** at the top of this page with your name, centre number and candidate number.
•Answer **all** questions.
•Answer the questions in the spaces provided
– *there may be more space than you need*.
•Diagrams are NOT accurately drawn, unless otherwise indicated.
•You must **show all your working out.**
•If the question is a **1H** question you are not allowed to use a calculator.
•If the question is a **2H** or a **3H** question, you may use a calculator to help you answer.

**Information**

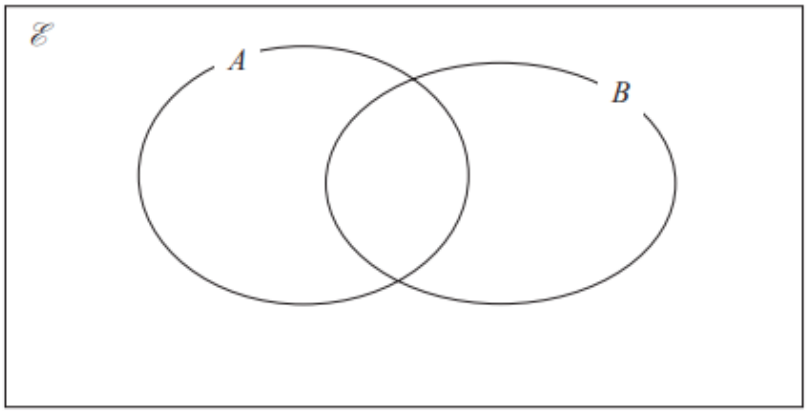
•The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question*.

**Advice**

•Read each question carefully before you start to answer it.
•Keep an eye on the time.
•Try to answer every question.
•Check your answers if you have time at the end.

**Answer ALL questions**
**Write your answers in the space provided.**
**You must write down all the stages in your working.**

**1** $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$A = \{1, 5, 6, 8, 9\}$
$B = \{2, 6, 9\}$




(a) Complete the Venn diagram to represent this information.

**(3)**

A number is chosen at random from the universal set $\mathscr{E}$.

(b) Find the probability that the number is in the set $A \cap B$

.....

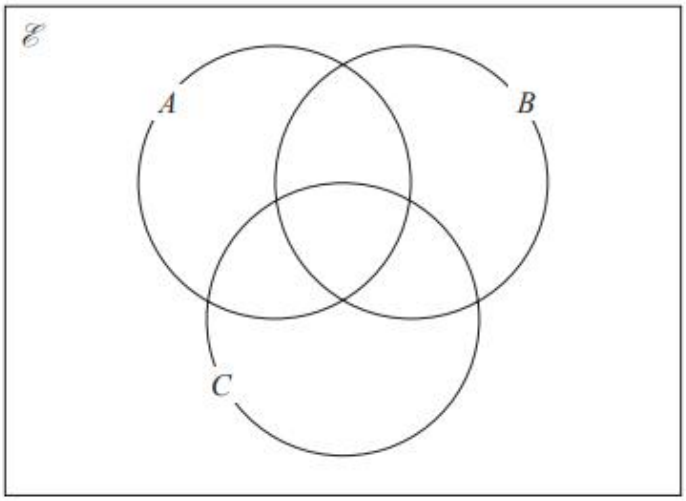
**(2)**



**(Total for Question 1 is 5 marks)**

**1** $\mathscr{E}$ = {even numbers between 1 and 25}
$A$ = {2, 8, 10, 14}
$B$ = {6, 8, 20}
$C$ = {8, 18, 20, 22}

(a) Complete the Venn diagram for this information.




**(4)**

A number is chosen at random from $\mathscr{E}$.

(b) Find the probability that the number is a member of $A \cap B$.

.....

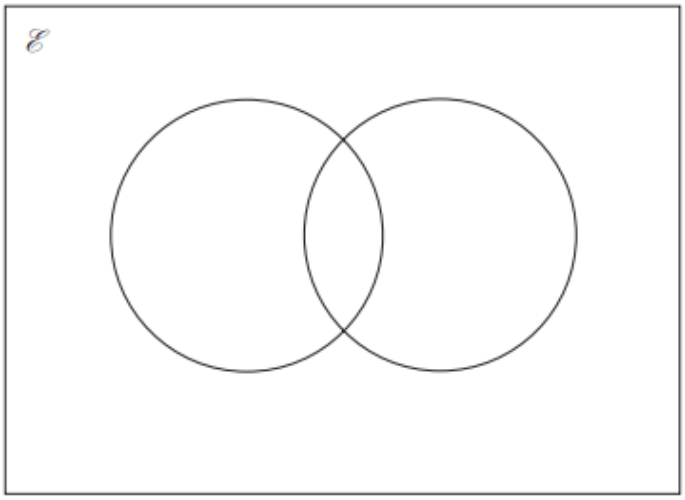
**(2)**



**(Total for Question 1 is 6 marks)**

**1** $\mathscr{E}$ = {odd numbers less than 30}
$A$ = {3, 9, 15, 21, 27}
$B$ = {5, 15, 25}

(a) Complete the Venn diagram to represent this information.




**(4)**

A number is chosen at random from the universal set, $\mathscr{E}$.

(b) What is the probability that the number is in the set $A \cup B$?

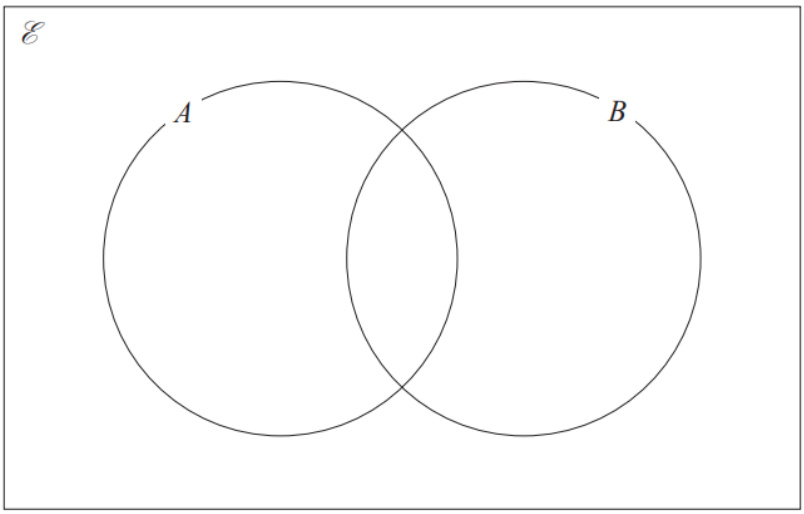
.....

**(2)**

June 2017 – Paper 3H **(Total for Question 1 is 6 marks)**

**2** $\mathscr{E}$ = {even numbers less than 19}
$A$ = {6, 12, 18}
$B$ = {2, 6, 14, 18}

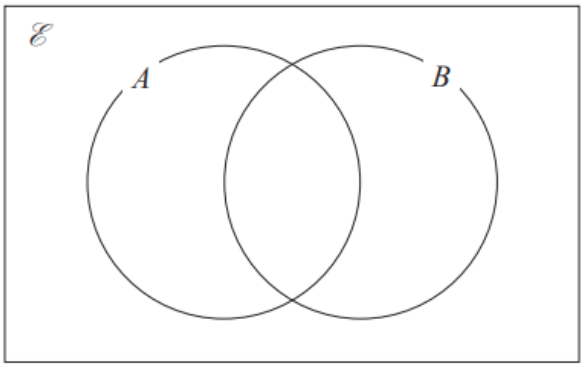
Complete the Venn diagram for this information.




November 2021 – Paper 1H **(Total for Question 2 is 3 marks)**

**2** $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$A = \{\text{even numbers}\}$
$B = \{\text{factors of } 10\}$

(a) Complete the Venn diagram for this information.




**(3)**

A number is chosen at random from the universal set, $\mathscr{E}$

(b) Find the probability that this number is in the set $A \cap B$

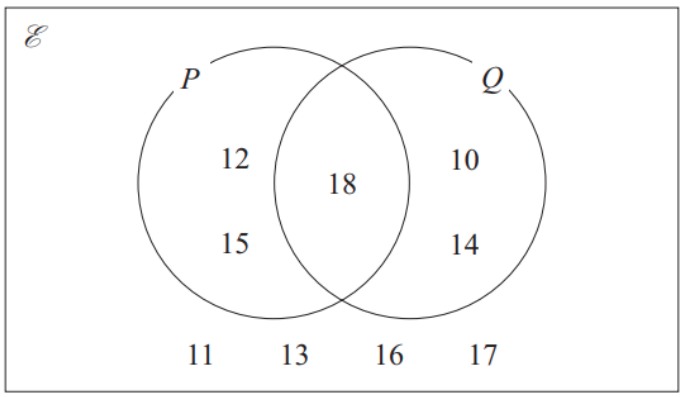
.....

**(2)**



**(Total for Question 2 is 5 marks)**

**4** Here is a Venn diagram.




(a) Write down the numbers that are in set $P'$

.....

**(1)**

A number is chosen at random from the universal set, $\mathscr{E}$

(b) Find the probability that this number is in the set $P \cup Q$

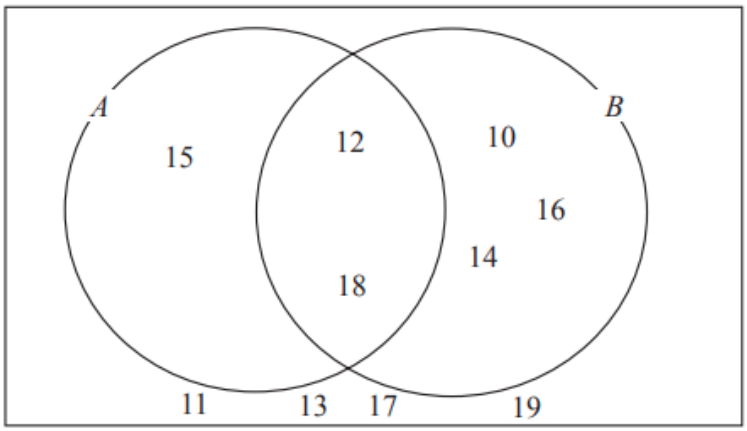
.....

**(2)**



**(Total for Question 4 is 3 marks)**

**5** Here is a Venn diagram.




(a) Write down the numbers that are in set

(i) $A \cup B$

.....

(ii) $A \cap B$

.....

**(2)**

One of the numbers in the diagram is chosen at random.

(b) Find the probability that the number is in set $A'$

.....

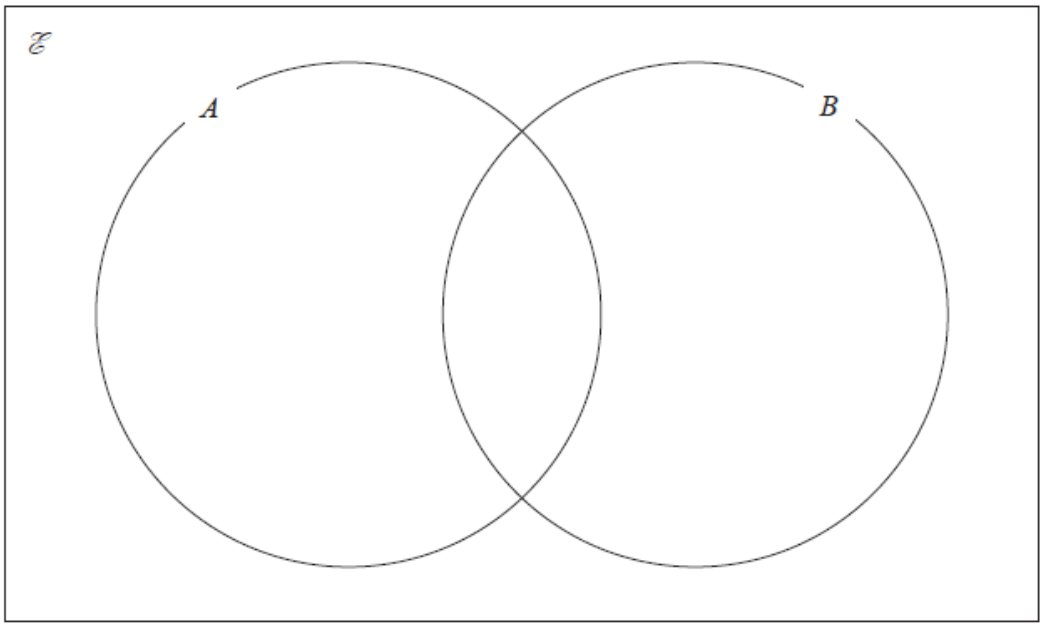
**(2)**



**(Total for Question 5 is 4 marks)**

**5** $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$A = \{\text{odd numbers}\}$
$B = \{\text{square numbers}\}$

(a) Complete the Venn diagram for this information.




**(3)**

A number is chosen at random from the universal set $\mathscr{E}$

(b) Find the probability that this number is in the set $B'$

.....

**(2)**



**(Total for Question 5 is 5 marks)**

**12** Sami asked 50 people which drinks they liked from tea, coffee and milk.

All 50 people like at least one of the drinks
19 people like all three drinks.
16 people like tea and coffee but do **not** like milk.
21 people like coffee and milk.
24 people like tea and milk.
40 people like coffee.
1 person likes only milk.

Sami selects at random one of the 50 people.

(a) Work out the probability that this person likes tea.

.....

**(4)**

(b) Given that the person selected at random from the 50 people likes tea, find the probability that this person also likes exactly one other drink.

.....

**(2)**



**(Total for Question 12 is 6 marks)**

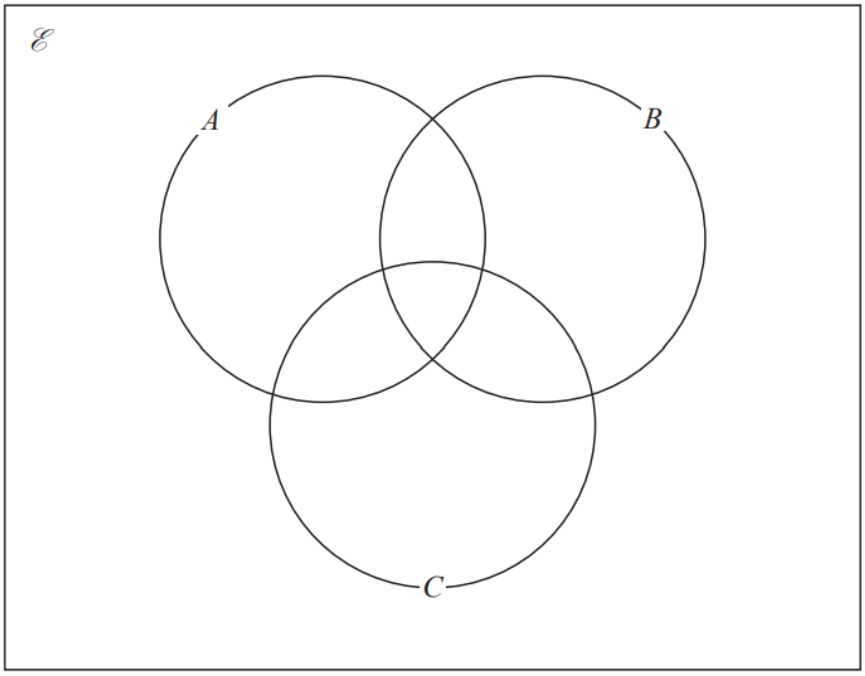
**16** A shop manager wants to advertise special offers on social media platforms.

The manager asks 100 customers which of type $A$, type $B$ or type $C$ they use.

Of these customers,

4 use all three types
16 do not use any of type $A$, type $B$ or type $C$
8 use both type $A$ and type $B$, but not type $C$
14 use both type $B$ and type $C$
62 in total use type $A$
all 20 who use type $C$ also use at least one of type $A$ and type $B$.

(a) Complete the Venn diagram for this information.




**(4)**

One of the customers is chosen at random.

Given that this customer uses type $A$,

(b) find the probability that this customer also uses type $B$.

.....

**(2)**

**(Total for Question 16 is 6 marks)**

**20** 50 people were asked if they speak French or German or Spanish.

Of these people,

31 speak French
2 speak French, German and Spanish
4 speak French and Spanish but not German
7 speak German and Spanish
8 do not speak any of the languages
all 10 people who speak German speak at least one other language

Two of the 50 people are chosen at random.

Work out the probability that they both only speak Spanish.

.....

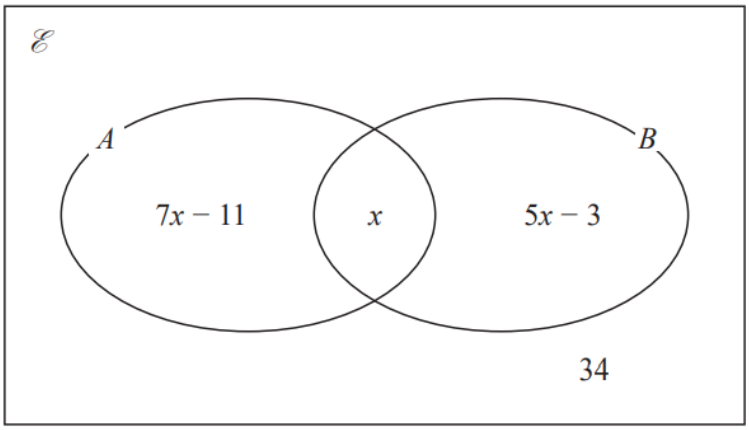


**(Total for Question 20 is 5 marks)**

**21** Vicky has a collection of medals.

The Venn diagram gives information about the number of medals in her collection where

$\mathscr{E}$ = {all medals}
$A$ = {English medals}
$B$ = {gold medals}




Vicky is going to take at random a medal from her collection.

Vicky is going to take at random a medal from her collection.

Given that the medal is gold, the probability that the medal is English is $\frac{2}{11}$

Work out the number of medals in Vicky's collection.

.....



**(Total for Question 21 is 4 marks)**