Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Sets and Venn diagrams

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 and Paper 3

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 34

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 34 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

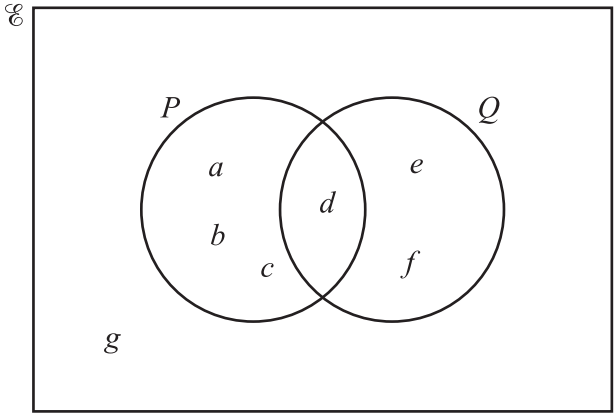
Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1



The Venn diagram shows the elements of the sets $\mathscr{E}$, P and Q.

Complete the statements.

(a) $P = \{$ ..... $\}$ [1]

(b) $n(P \cup Q) =$ ..... [1]

(a) Set notation and Venn diagrams (b) Set notation and Venn diagrams Click for more variations

1(a)	a, b, c, d	**1**	
1(b)	6	**1**	

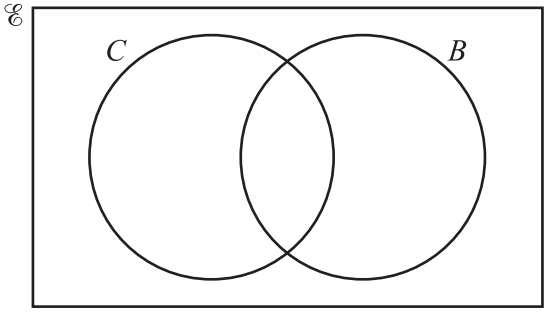
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2 There are 50 families in a village.

C = {families who own a car}
B = {families who own a bicycle}

23 families own a car.
10 families own a car and a bicycle.
6 families own no cars and no bicycles.

(a) Complete the Venn diagram.

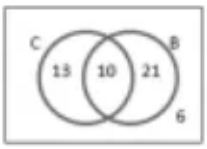


[2]

(b) Find $n(C \cup B)$.

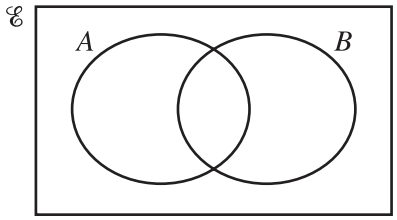
..... [1]

(a) Set notation and Venn diagrams (b) Set notation and Venn diagrams Click for more variations

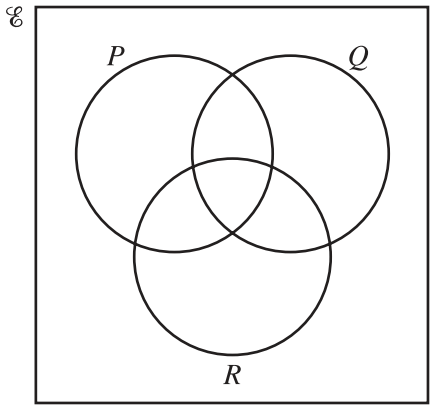
2(a)		**2**	**B1** for at least 2 figures in the correct places
2(b)	44	**1**	**FT** *their* 3 values from **(a)** or 50 – *their* 6, provided answer is between 0 and 50

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3 Shade the required region in each of the Venn diagrams.



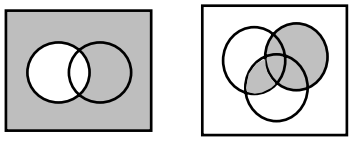
A'



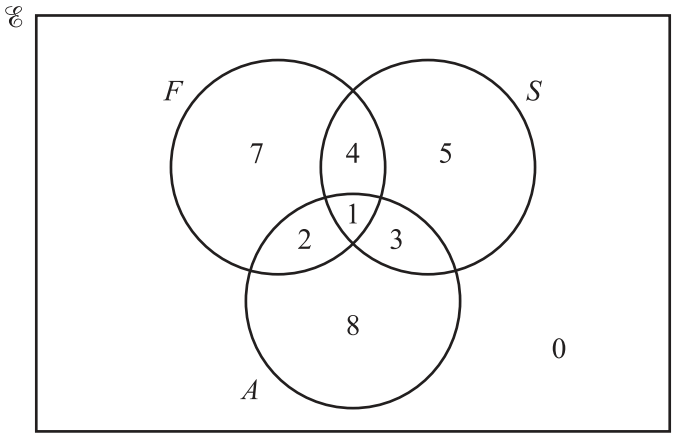
$(P \cap R) \cup Q$

[2]

Set notation and Venn diagrams Click for more variations

3		**2**	**B1** for one correct

4 The Venn diagram shows the number of students who study French (F), Spanish (S) and Arabic (A).



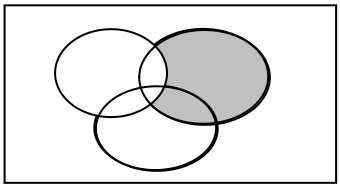
(a) Find $n(A \cup (F \cap S))$.

Answer(a) ..... [1]

(b) On the Venn diagram, shade the region $F' \cap S$. [1]

(a) Set theory (b) Set notation and Venn diagrams Click for more variations

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4	**(a)**	18	**1**	
	(b)		**1**	

5 $\mathscr{E} = \{x: 1 \leqslant x \leqslant 20\}$
$E =$ {even numbers}
$M =$ {multiples of 5}

(a) Find $\mathrm{n}(M)$.

..... [1]

(b) Find the elements in the set $E \cap M$.

..... [1]

(c) $y \notin E$.

Write down a possible value of y.

..... [1]

(a) Set notation and Venn diagrams (b) Set notation and Venn diagrams (c) Set notation and Venn diagrams

Click for more variations

5(a)	4 cao	**1**	
5(b)	10, 20	**1**	
5(c)	An odd number or decimal in the range $1 \leqslant x \leqslant 20$	**1**	

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6 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$P = \{\text{odd numbers}\}$
$Q = \{\text{multiples of 3}\}$
$R = \{\text{square numbers}\}$

(a) Find $P \cap Q \cap R$.

{ ..... } [1]

(b) **(i)** Find $Q \cup R$.

{ ..... } [1]

(ii) Find $\text{n}\left(P \cap (Q \cup R)'\right)$.

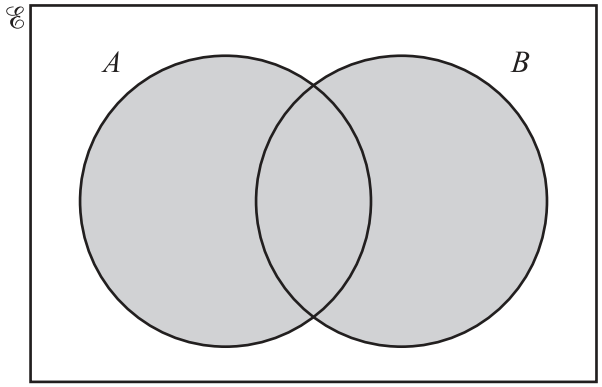
..... [1]

(a) Set theory (b)(i) Set notation and Venn diagrams (b)(ii) Set theory Click for more variations

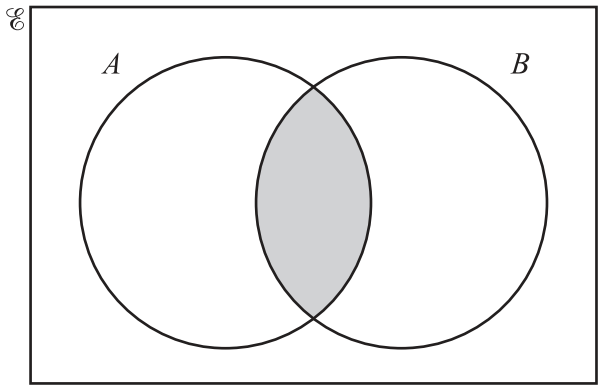
6(a)	9	**1**	
6(b)(i)	1, 3, 4, 6, 9	**1**	
6(b)(ii)	2	**1**	**FT** 5 – numbers of odds in **(b)(i)**

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7 **(a)** Use set notation to describe the shaded region in each Venn diagram.



.....

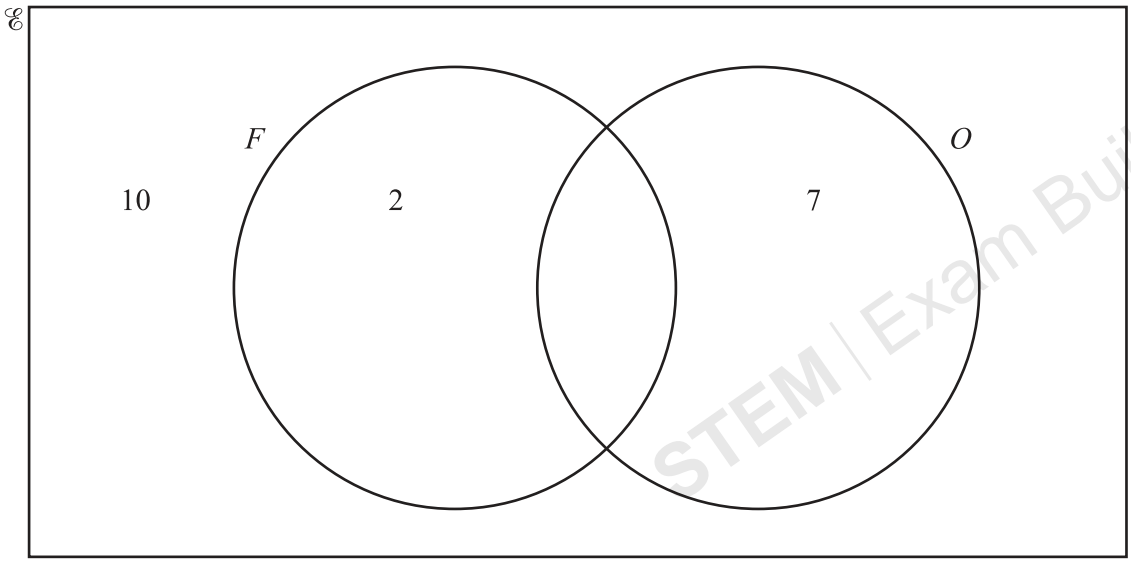


.....

[2]

(b) $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 15\}$
$F = \{x : x \text{ is a factor of } 12\}$
$O = \{x : x \text{ is an odd number}\}$

(i) Complete the Venn diagram to show the elements of these sets.



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[2]

(ii) Write down one number that is in set O, but not in set F.

..... [1]

(iii) Find $n(F \cup O)$.

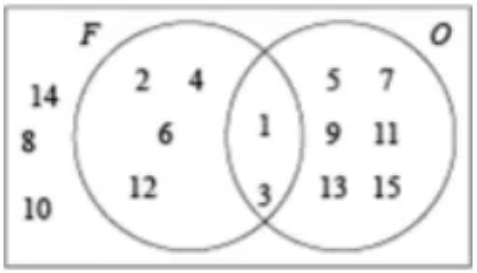
..... [1]

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

Work out the probability that this number is in set O.

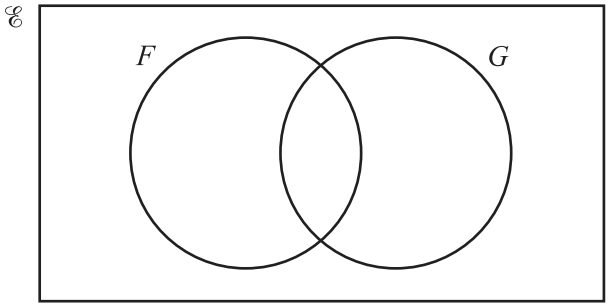
..... [1]

(a) Set notation and Venn diagrams (b)(i) Set notation and Venn diagrams (b)(ii) Set notation and Venn diagrams (b)(iii) Set notation and Venn diagrams (b)(iv) Basic probability Click for more variations

7(a)	$A \cup B$ $A \cap B$	**2**	**B1** for each
7(b)(i)		**2**	**B1** for 2 or 3 correctly completed regions
7(b)(ii)	One of 5, 7, 9, 11, 13, 15	**1**	**FT** *their* Venn diagram
7(b)(iii)	12	**1**	**FT** *their* Venn diagram
7(b)(iv)	$\frac{8}{15}$ oe	**1**	**FT** *their* Venn diagram

STEM | EX

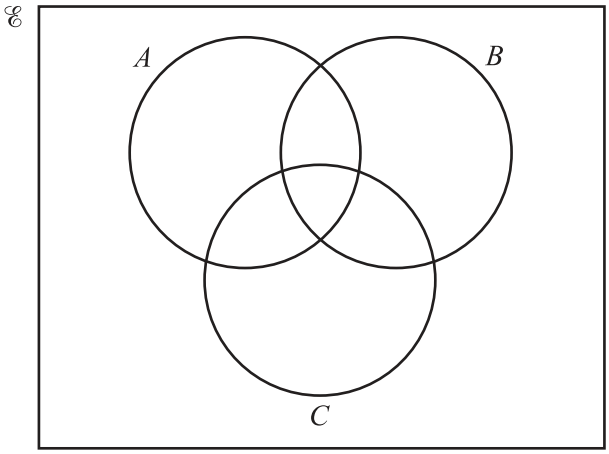
8 **(a)** In this Venn diagram, shade the region $F \cup G'$.



[1]

(b) $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$A = \{x: x \text{ is an odd number}\}$
$B = \{x: x \text{ is a square number}\}$
$C = \{x: x \text{ is a multiple of 3}\}$

(i) Write all the elements of $\mathscr{E}$ in the Venn diagram below.



[2]

(ii) Another number is included in the set $\mathscr{E}$.
This number is in the region $A' \cap B \cap C$.

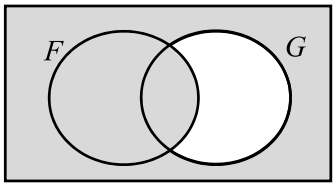
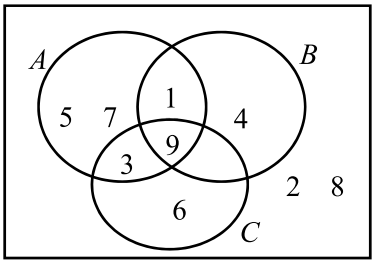
Write down a possible value for this number.

..... [1]

(a) Set notation and Venn diagrams (b)(i) Set notation and Venn diagrams (b)(ii) Set notation and Venn diagrams

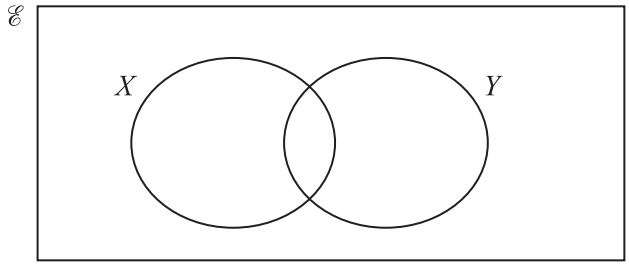
Click for more variations

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8(a)		**1**	
8(b)(i)		**2**	**B1** for four out of the eight regions correct
8(b)(ii)	Any even square number that is also a multiple of 3	**1**	

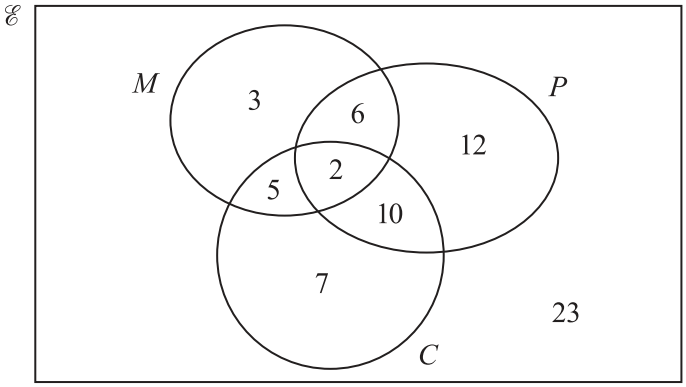
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9 **(a)** In the Venn diagram, shade $X' \cap Y$.



[1]

(b) The Venn diagram below shows information about the number of gardeners who grow melons (M), potatoes (P) and carrots (C).



(i) A gardener is chosen at random from the gardeners who grow melons.

Find the probability that this gardener does not grow carrots.

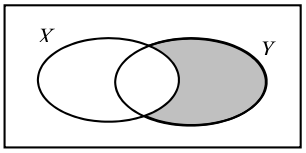
..... [2]

(ii) Find $n((M \cap P) \cup C')$.

..... [1]

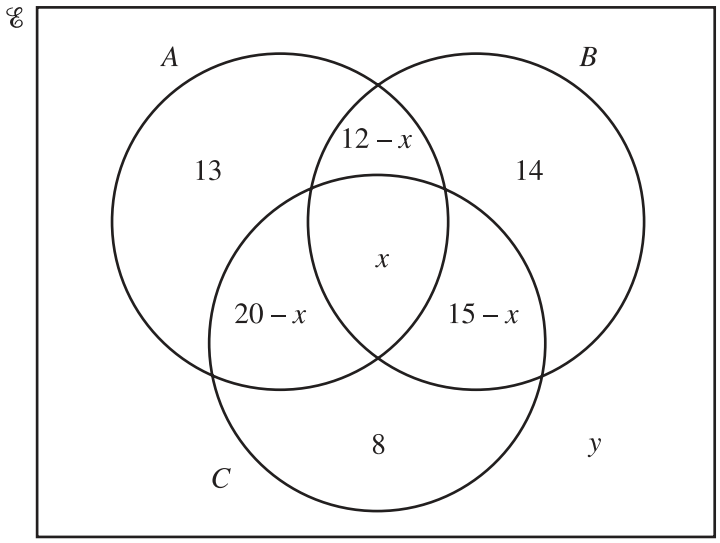
(a) Set notation and Venn diagrams (b)(i) Tree diagrams, tables and Venn diagrams (b)(ii) Set theory

Click for more variations

9(a)		**1**	
9(b)(i)	$\frac{9}{16}$ oe	**2**	**B1** for $\frac{9}{k}$ or $\frac{k}{16}$ provided fraction is less than 1
9(b)(ii)	46	**1**	

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10



The Venn diagram shows the number of elements in sets A, B and C.

(a) $n(A \cup B \cup C) = 74$

Find x.

Answer(a) $x =$ ..... [2]

(b) $n(\mathscr{E}) = 100$

Find y.

Answer(b) $y =$ ..... [1]

(c) Find the value of $n((A \cup B)' \cap C)$.

Answer(c) ..... [1]

(a) Set notation and Venn diagrams (b) Set notation and Venn diagrams (c) Set theory

Click for more variations

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10	**(a)**	4	**2**	**M1** for attempt at sum of all numeric and x terms equated to 74
	(b)	26	**1FT**	=18 + 2 × their (a)
	(c)	8	**1**	

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