SETS

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 62

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2015] Sets **[2 Marks]**

$S = \{c, h, i, n, a\}$ $V = \{i, t, a, l, y\}$

List the elements of the set

(i) $S \cap V$

$\{a, i\}$ A1

(ii) $S \cup V$

$\{c, h, i, n, a, t, l, y\}$

A1

2. [Edexcel, 2005] Sets **[4 Marks]**

A = {Prime numbers between 10 and 16} {11, 13}
B = {Multiples of 3 between 10 and 16} {12, 15}

(a) List the members of $A \cup B$.

A2

{11, 12, 13, 15}

(2)

(b) What is $A \cap B$?

ϕ A1

(1)

(c) Is it true that $11 \in B$?

NO

Explain your answer.

11 IS NOT A MULTIPLE OF 3 BETWEEN 10 AND 16. A1

(1)

3. [Edexcel, 2016] Sets **[3 Marks]**

$A = \{2, 4, 6, 8, 10, 12, 14\}$
$B = \{1, 3, 5, 7, 9, 11, 13\}$
$C = \{3, 6, 9, 12\}$

(a) List the members of the set

(i) $A \cap C$

$\{6, 12\}$ B1

(ii) $A \cup C$

$\{2, 4, 6, 8, 10, 12, 14, 3, 9\}$

(2) B1

(b) Explain why $A \cap B = \emptyset$

A AND B HAVE NO MEMBERS IN COMMON

B1 (1)

[OR EQUIVALENT]

4. [Edexcel, 2009] Sets **[3 Marks]**

(a) $S = \{1, 3, 5, 7\}$
$T = \{2, 3, 7, 11\}$

How many members are there in $S \cup T$?

{1, 2, 3, 5, 7, 11}

6 A1

(1)

(b) $U = \{3, 4, 5\}$
$U \cup V = \{1, 2, 3, 4, 5\}$

The set V has as few members as possible.
List the members of the set V.

{1, 2} A1

(1)

(c) $A = \{\text{Cats}\}$
$B = \{\text{Black animals}\}$

Describe the members of $A \cap B$.

{BLACK CATS}

A1

(1)

5. [Edexcel, 2013] Sets **[3 Marks]**

(a) A = {s, u, p, e, r}
B = {c, o, m, p, u, t, e, r}

List the members of the set

(i) $A \cap B$

{u, p, e, r} A1

(ii) $A \cup B$

{s, c, o, m, p, u, t, e, r} A1

(2)

(b) X = {prime numbers}
Y = {factors of 12} → {1, 2, 3, 4, 6, 12}

Is it true that $X \cap Y = \varnothing$?

Tick (✓) the appropriate box.

Yes	No
☐	☑

Explain your answer.

2 AND 3 ARE FACTORS OF 12 AND PRIME NUMBERS

A1 (1)

$\mathcal{E}$ = {**even** numbers less than 19} → {2, 4, 6, 8, 10, 12, 14, 16, 18}
M = {multiples of 3} → {6, 12, 18}
F = {factors of 12} → {1, 2, 3, 4, 6, 12}

(a) (i) Explain why it is **not** true that $9 \in M$.

9 IS NOT AN EVEN NUMBER A1
(ACCEPT "9 IS NOT IN THE UNIVERSAL SET)

(ii) List the members of M.

{6, 12, 18} A1

(2)

(b) List the members of $M \cap F$.

{6, 12} A2

(2)

7. [Edexcel, 2008] Sets **[3 Marks]**

$\mathscr{E}$ = {odd numbers}
A = {1, 5, 9, 13, 17}
B = {1, 9, 17, 25, 33}
C = {7, 11, 15}

(a) List the members of the set

(i) $A \cap B$,

{1, 9, 17} A1

(ii) $A \cup B$.

{1, 5, 9, 13, 17, 25, 33} A1 (2)

(b) Explain why $A \cap C = \varnothing$

NO MEMBERS OF A ARE ALSO MEMBERS OF C A1 (1)

8. [Edexcel, 2013] Sets **[3 Marks]**

$\mathscr{E}$ = {even numbers}
A = {2, 4, 6, 8, 10}

(a) B is a set such that $A \cap B = \{4, 8\}$
The set B has 3 members.

List the members of one possible set B.

ANY EVEN NUMBER OTHER THAN 2, 6, 10

{4, 8, 12}

(2) A2

(b) C is a set such that $A \cap C = \emptyset$
The set C has 3 members.

List the members of one possible set C.

ANY THREE EVEN NUMBERS > 10

{12, 14, 16}

(1) A1

$\mathscr{E}$ = {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}
A = {odd numbers} → {3, 5, 7, 9, 11}
P = {prime numbers} → {2, 3, 5, 7, 11}

List the members of the set

(i) $A \cap P$,

{3, 5, 7, 11} A1

(ii) $A \cup P$.

A1

{2, 3, 5, 7, 9, 11}

10. [Edexcel, 2015] Sets **[3 Marks]**

$\mathscr{E}$ = {positive whole numbers less than 19}
A = {odd numbers} → {1, 3, 5, 7, 9, 11, 13, 15, 17}
B = {multiples of 5} → {5, 10, 15}
C = {multiples of 4} → {4, 8, 12, 16}

(a) List the members of the set

(i) $A \cap B$

A1
{5, 15}

(ii) $B \cup C$

{4, 5, 8, 10, 12, 15, 16}

(2) A1

D = {prime numbers} → {2, 3, 5, 7, 11, 13, 17}

(b) Is it true that $B \cap D = \varnothing$?

Tick (✓) the appropriate box.

Yes	No
☐	☑

Explain your answer.

BECAUSE '5' IS IN BOTH SETS B AND D

A1

(1)

11. [Edexcel, 2014] Sets **[2 Marks]**

$\mathscr{E}$ = {even numbers} $\{2, 4, 6, 8, \ldots\}$
A = {factors of 8} $\{1, 2, 4, 8\}$
B = {factors of 20} $\{1, 2, 4, 5, 10, 20\}$

List the members of $A \cap B$

$\{2, 4\}$

A2

12. [Edexcel, 2012] Sets **[4 Marks]**

(a) $\mathscr{E}$ = {Students in Year 12}
G = {Students who study German}
F = {Students who study French}
M = {Students who study Maths}

(i) $G \cap M = \emptyset$

Use this information to write a statement about the students who study German in Year 12

NO STUDENTS STUDY BOTH GERMAN AND MATHS IN YEAR 12. (A1)

(ii) Preety is a student in Year 12
Preety $\notin F$.

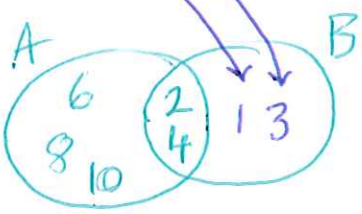
Use this information to write a statement about Preety.

PREETY DOES NOT STUDY FRENCH (A1)

(2)

(b) A = {2, 4, 6, 8, 10}
$A \cap B$ = {2, 4}
$A \cup B$ = {1, 2, 3, 4, 6, 8, 10}

List all the members of set B.



B = {1, 2, 3, 4} (A2)

(2)

13. [Edexcel, 2010] Sets **[4 Marks]**

(a) $A = \{2, 3, 4, 5\}$

$B = \{4, 5, 6, 7\}$

(i) List the members of $A \cap B$.

A1 $\{4, 5\}$

(ii) How many members are in $A \cup B$?

$\{2, 3, 4, 5, 6, 7\}$ → 6 A1

(2)

(b) $\mathcal{E} = \{3, 4, 5, 6, 7\}$
$P = \{3, 4, 5\}$
Two other sets, Q and R, each contain exactly three members.
$P \cap Q = \{3, 4\}$
$P \cap R = \{3, 4\}$
Set Q is not the same as set R.

(i) Write down the members of a possible set Q.

A1 $\{3, 4, 6\}$

(ii) Write down the members of a possible set R.

A1 $\{3, 4, 7\}$

(2)

CAN BE OTHER WAY ROUND

14. [Edexcel, 2007] Sets **[4 Marks]**

(a) $A = \{1, 2, 3, 4\}$
$B = \{2, 4, 6, 8\}$

Write down the members of $A \cup B$.

A2

{1, 2, 3, 4, 6, 8}

(2)

(b) $\mathcal{E} = \{\text{Positive integers less than } 10\}$ → {1, 2, 3, ..., 9}
$P = \{3, 4, 5, 6, 7, 8\}$
$P \cap Q = \emptyset$

Write down all the possible members of Q.

A2

1, 2 and 9

(2)

15. [Edexcel, 2010] Sets **[4 Marks]**

$\mathcal{E}$ = {Clothes}
A = {Mr Smith's clothes}
B = {Hats}
C = {Mrs Koshi's hats}

(a) (i) Describe the members of the set $A \cap B$

MR SMITH'S HATS

(ii) How many members has the set $A \cap C$?

0

(2)

(b)

A	B	C	$\mathcal{E}$	$\in$	$\emptyset$	$\cap$	$\cup$

Use a letter or symbol from the box to make each of the following a true statement.

(i) $B \cup C =$ B

(ii) Mr Smith's favourite shirt $\in$ A

(2)

$\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8\}$
$P = \{2, 3, 5, 7\}$

(a) List the members of P'

A1

$\{1, 4, 6, 8\}$

(1)

The set Q satisfies both the conditions $Q \subset P$ **and** $n(Q) = 3$

(b) List the members of **one** set Q which satisfies both these conditions.

A2

$\{2, 3, 5\}$

ALSO $\{2, 3, 7\}$ or $\{3, 5, 7\}$ or $\{2, 5, 7\}$

(2)

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

(a) List the members of $A \cup B$

B1
{1, 2, 3, 4, 5, 6, 7, 9}
(1)

C is a set such that $A \cap C = \{4, 5\}$
The set C has 4 members.

(b) List the members of one possible set C

{4, 5, ANY TWO OTHERS NOT IN A}

[ALSO {4, 5, 7, 9} {4, 5, 7, 10} {4, 5, 8, 9} ETC.

B1 A1
{4, 5, 7, 8}
(2)

18. [Edexcel, 2014] Sets **[3 Marks]**

$\mathscr{E}$ = {positive whole numbers **less than** 13}
A = {even numbers} → {2, 4, 6, 8, 10, 12}
B = {multiples of 3} → {3, 6, 9, 12}
C = {prime numbers} → {2, 3, 5, 7, 11}

(a) List the members of the set

(i) $A \cap B$

{6, 12} A1

(ii) $B \cup C$

{2, 3, 5, 6, 7, 9, 11, 12} A1

(2)

(b) Is it true that $14 \in A$?

Tick (✓) the appropriate box.

Yes	No
☐	☑

Explain your answer.

THE UNIVERSAL SET ONLY HAS NUMBERS LESS THAN 13 A1
(ANY EQUIVALENT STATEMENT]

(1)

19. [Edexcel, 2015] Sets **[5 Marks]**

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

A = {even numbers} – {2, 4, 6, 8, 10}

B = {multiples of 3} – {3, 6, 9}

(a) List the members of set B.

A1

{3, 6, 9}

(1)

(b) Find $A \cup B$

A1

{2, 3, 4, 6, 8, 9, 10}

(1)

(c) Find $A \cap B$

A1

{6}

(1)

x is a member of $\mathscr{E}$

$x \in B$

$x \notin A$

(d) What are the possible values of x?

A1 A1

3 OR 9

(2)

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Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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