Set Notation

1)   𝓔 = {x: x is an integer and 1 ⩽ x ⩽ 15}
A = {factors of 12}   B = {prime numbers}   C = {odd numbers}
List the sets:
(a) A'   (b) B'   (c) A ∩ B'   (d) A' ∩ B
(e) A' ∩ C '   (f) (A ∩ C)'   (g) (A ∪ C)'   (h) A' ∪ C '
(i) A' ∩ (B ∪ C)   (j) A ∪ (B' ∩ C ') (k) (A ∪ B') ∩ C '

2) 𝓔 = {students in Year 10}
    X = {students taking Textiles}   Y = {students taking Spanish}
    Z = {students in 10G}

Describe the members of each of the following sets:
(a) X ∩ Y   (b) X ∪ Y   (c) X ∩ Z   (d) (X ∪ Y) ∩ Z
(e) X ∩ Y'   (f) (X ∩ Y)'   (g) X' ∩ Z   (h) X ∩ Y ∩ Z'
(i) (X ∪ Y) ∩ Z'   (j) (X ∪ Y)' ∩ Z   (k) (X' ∩ Y) ∪ Z

3) Draw a Venn diagram showing the sets defined in question 1.

4) 𝓔 = {x: x is an integer and 1 ⩽ x ⩽ 12}
A = {factors of 9}   B = {prime numbers}   C = {even numbers}

(a) Write down the sets A ∩ B, A ∩ C, B ∩ C, and A ∩ B ∩ C
(b) Draw a Venn diagram illustrating these sets, positioning the circles carefully.

5)   𝓔 = {x: x is an integer and 1 ⩽ x ⩽ 10}
    A = {1,2,3}   B = {1,2,3,4,5,6}   C = {1,4,5,8,9}

(a) Write down the sets A ∩ B, A ∩ C, B ∩ C, and A ∩ B ∩ C
(b) Draw a Venn diagram illustrating these sets, positioning the circles carefully.

6)   𝓔 = {x: x is an integer and 1 ⩽ x ⩽ 10}
   A = {prime numbers}   B = {square numbers}   C = {multiples of 5}

(a) Write down the sets A ∩ B, A ∩ C, B ∩ C, and A ∩ B ∩ C
(b) Draw a Venn diagram illustrating these sets, positioning the circles carefully.

Set Notation – Answers

1)
(a) A' = {5,7,8,9,10,11,13,14,15}   (b) B' = {1,4,6,8,9,10,12,14,15}
(c) A ∩ B' = {1,4,6,12}   (d) A' ∩ B = {5,7,11,13}
(e) A' ∩ C ' = {8,10,14}   (f) (A ∩ C)' = {2,4,5,6,7,8,9,10,11,12,13,14,15}
(g) (A ∪ C)' = {8,10,14}   (h) A' ∪ C ' = {2,4,5,6,7,8,9,10,11,12,13,14,15}
(i) A' ∩ (B ∪ C) = {5,7,9,11,13,15}   (j) A ∪ (B' ∩ C ') = {1,2,3,4,6,8,10,12,14}
(k) (A ∪ B') ∩ C ' = {2,4,6,8,10,12,14}

3)
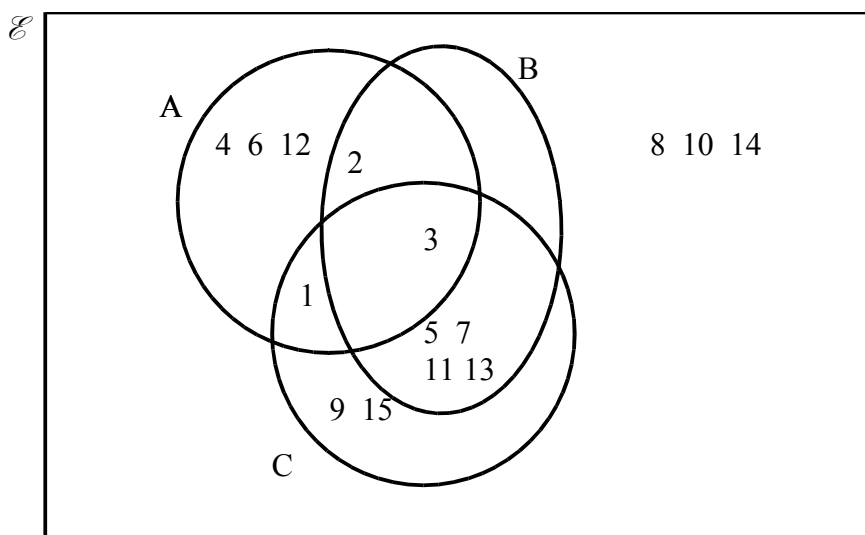
2) $\mathscr{E}$ = {students in Year 10}
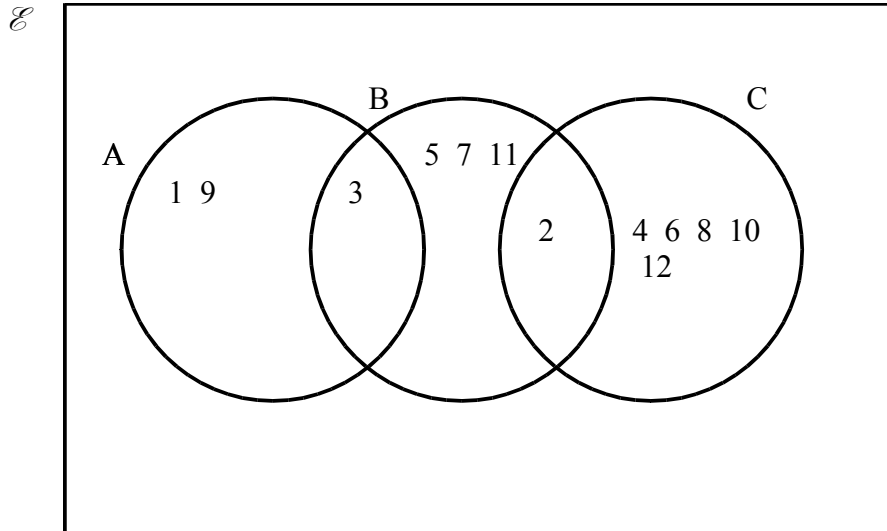X = {students taking Textiles}   Y = {students taking Spanish}   Z = {students in 10G}

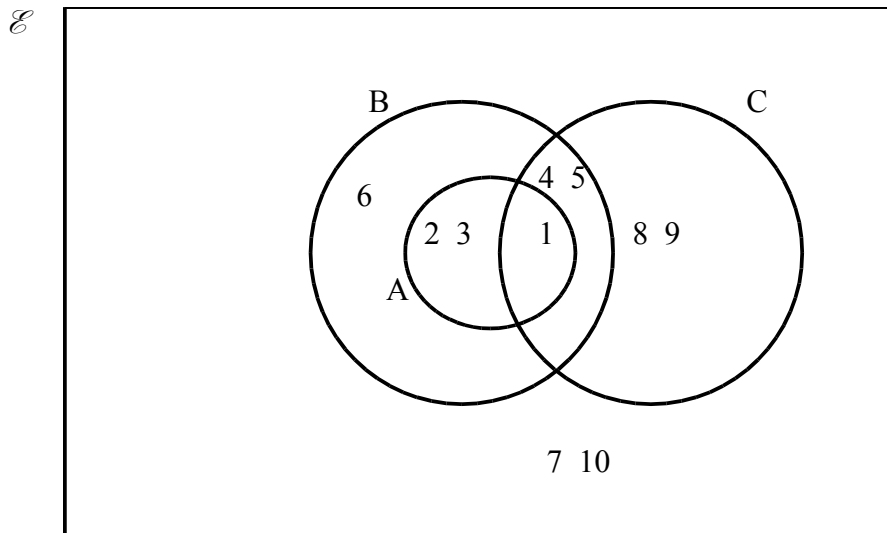Describe the members of each of the following sets:
(a) X ∩ Y = {students in Year 10 who take Textiles and Spanish}
(b) X ∪ Y = {students in Year 10 who take Textiles or Spanish (or both)}
(c) X ∩ Z = {students in 10G who take Textiles}
(d) (X ∪ Y) ∩ Z = {students in 10G who take Textiles or Spanish (or both)}
(e) X ∩ Y' = {students in Year 10 who take Textiles but not Spanish}
(f) (X ∩ Y)' = {students in Year 10 who do not take both Textiles and Spanish}
(g) X' ∩ Z = {students in 10G who do not take Textiles}
(h) X ∩ Y ∩ Z' = { students in Year 10 who take Textiles and Spanish and are not in 10G
(i) (X ∪ Y) ∩ Z' = {students in Year 10 who take either Textiles or Spanish and are not in 10G
(j) (X ∪ Y)' ∩ Z = {students in 10G who do not take Textiles or Spanish}
(k) (X' ∩ Y) ∪ Z = {students in Year 10 who either take Spanish but not Textiles, or are in 10G

4)

$\mathscr{E}$

A B C

1 9

3

5 7 11

2

4 6 8 10
12

5)

$\mathscr{E}$

B C

6

4 5

2 3

1

8 9

A

7 10

6)

$\mathscr{E}$

A B

2 3 7

5

10

1 4 9

C

6 8