

1. (0606-W 2009-Paper 1/1-Q6)

Set  $A$  is such that  $A = \{x : 3x^2 - 10x - 8 \leq 0\}$ .

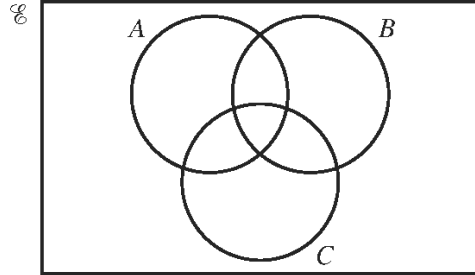
- (i) Find the set of values of  $x$  which define the set  $A$ . [3]

Set  $B$  is such that  $B = \{x : 7 - 2x \leq 1\}$ .

- (ii) Find the set of values of  $x$  which define the set  $A \cap B$ . [2]

2. (0606-S 2010-Paper 1/1-Q4)

(a)



- (i) Copy the Venn diagram above and shade the region that represents  $(A \cap B) \cup C$ . [1]
- (ii) Copy the Venn diagram above and shade the region that represents  $A' \cap B'$ . [1]
- (iii) Copy the Venn diagram above and shade the region that represents  $(A \cup B) \cap C$ . [1]
- (b) It is given that the universal set  $\mathcal{U} = \{x : 2 \leq x \leq 20, x \text{ is an integer}\}$ ,  
 $X = \{x : 4 < x < 15, x \text{ is an integer}\}$ ,  
 $Y = \{x : x \geq 9, x \text{ is an integer}\}$ ,  
 $Z = \{x : x \text{ is a multiple of } 5\}$ .
- (i) List the elements of  $X \cap Y$ . [1]
- (ii) List the elements of  $X \cup Y$ . [1]
- (iii) Find  $(X \cup Y)' \cap Z$ . [1]

3. (0606-W 2010-Paper 1/1-Q7)

(a) Sets  $A$  and  $B$  are such that

$$A = \{x : \sin x = 0.5 \text{ for } 0^\circ \leq x \leq 360^\circ\},$$

$$B = \{x : \cos (x - 30^\circ) = -0.5 \text{ for } 0^\circ \leq x \leq 360^\circ\}.$$

Find the elements of

- (i)  $A$ , [2]
- (ii)  $A \cup B$ . [2]
- (b) Set  $C$  is such that

$$C = \{x : \sec^2 3x = 1 \text{ for } 0^\circ \leq x \leq 180^\circ\}.$$

Find  $n(C)$ . [3]

4. (0606-W 2010-Paper 1/2-Q7)

(a) Sets  $A$  and  $B$  are such that

$$A = \{x : \sin x = 0.5 \text{ for } 0^\circ \leq x \leq 360^\circ\},$$

$$B = \{x : \cos (x - 30^\circ) = -0.5 \text{ for } 0^\circ \leq x \leq 360^\circ\}.$$

Find the elements of

(i)  $A$ , [2]

(ii)  $A \cup B$ . [2]

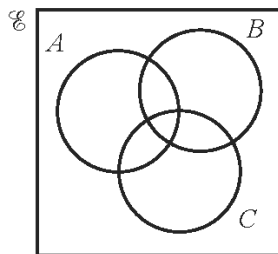
(b) Set  $C$  is such that

$$C = \{x : \sec^2 3x = 1 \text{ for } 0^\circ \leq x \leq 180^\circ\}.$$

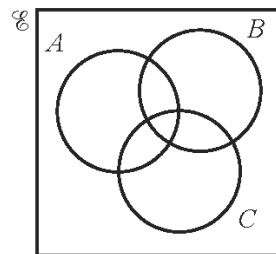
Find  $n(C)$ . [3]

5. (0606-S 2011-Paper 1/1-Q3)

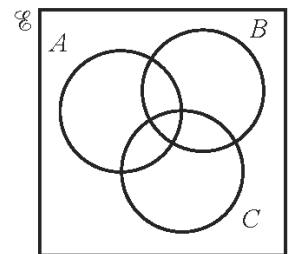
(a) Shade the region corresponding to the set given below each Venn diagram.



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



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



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

[3]

(b) Given that  $P = \{p : \tan p = 1 \text{ for } 0^\circ \leq p \leq 540^\circ\}$ , find  $n(P)$ . [1]

6. (0606-W 2011-Paper 1/1-Q1)

- (a) Sets  $A$  and  $B$  are such that  $n(A) = 15$  and  $n(B) = 7$ . Find the greatest and least possible values of

(i)  $n(A \cap B)$ , [2]

(ii)  $n(A \cup B)$ . [2]

- (b) On a Venn diagram draw 3 sets  $P$ ,  $Q$  and  $R$  such that  
 $P \cap Q = \emptyset$  and  $P \cup R = P$ .

[2]

7. (0606-W 2011-Paper 1/3-Q4)

- (a) Sets  $A$  and  $B$  are such that  $n(A) = 11$ ,  $n(B) = 13$  and  $n(A \cup B) = 18$ .  
Find  $n(A \cap B)$ .

[2]

- (b) Sets  $\mathcal{C}$ ,  $X$  and  $Y$  are such that

$$\mathcal{C} = \{\theta: 0 \leq \theta \leq 2\pi\}, X = \{\theta: \sin \theta = -0.5\}, Y = \left\{\theta: \sec^2 \theta = \frac{4}{3}\right\}.$$

- (i) Find, in terms of  $\pi$ , the elements of the set  $X$ .

[1]

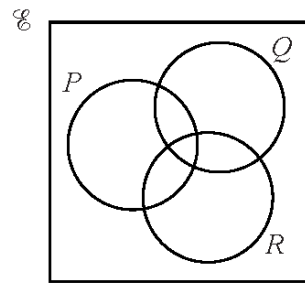
- (ii) Find, in terms of  $\pi$ , the elements of the set  $Y$ .

[2]

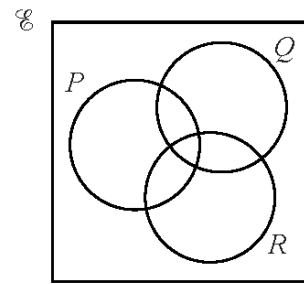
- (iii) Use set notation to describe the relationship between the sets  $X$  and  $Y$ .

[1]

- (a) On the Venn diagrams below, shade the region corresponding to the set given below each Venn diagram.



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



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

[2]

- (b) It is given that sets  $\mathcal{E}$ ,  $B$ ,  $S$  and  $F$  are such that

$$\mathcal{E} = \{\text{students in a school}\},$$

$$B = \{\text{students who are boys}\},$$

$$S = \{\text{students in the swimming team}\},$$

$$F = \{\text{students in the football team}\}.$$

Express each of the following statements in set notation.

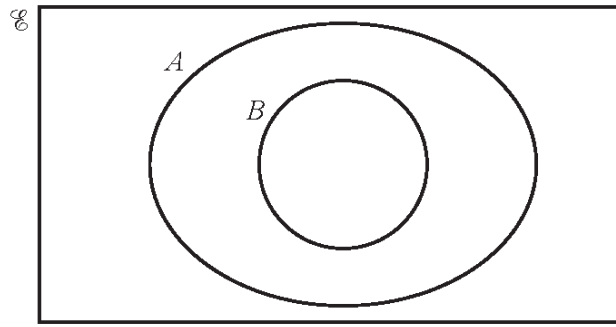
- (i) All students in the football team are boys.

[1]

- (ii) There are no students who are in both the swimming team and the football team.

[1]

9. (0606-S 2013-Paper 1/2-Q1)



The Venn diagram shows the universal set  $\mathcal{U}$ , the set  $A$  and the set  $B$ . Given that  $n(B) = 5$ ,  $n(A') = 10$  and  $n(\mathcal{U}) = 26$ , find

(i)  $n(A \cap B)$ , [1]

(ii)  $n(A)$ , [1]

(iii)  $n(B' \cap A)$ . [1]

10. (0606-W 2013-Paper 1/1-Q4)

The sets  $A$  and  $B$  are such that

$$A = \left\{x: \cos x = \frac{1}{2}, 0^\circ \leq x \leq 620^\circ\right\},$$

$$B = \left\{x: \tan x = \sqrt{3}, 0^\circ \leq x \leq 620^\circ\right\}.$$

(i) Find  $n(A)$ . [1]

(ii) Find  $n(B)$ . [1]

(iii) Find the elements of  $A \cup B$ . [1]

(iv) Find the elements of  $A \cap B$ . [1]

11. (0606-W 2013-Paper 1/2-Q4)

The sets  $A$  and  $B$  are such that

$$A = \left\{x: \cos x = \frac{1}{2}, 0^\circ \leq x \leq 620^\circ\right\},$$

$$B = \left\{x: \tan x = \sqrt{3}, 0^\circ \leq x \leq 620^\circ\right\}.$$

(i) Find  $n(A)$ . [1]

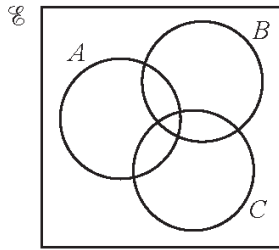
(ii) Find  $n(B)$ . [1]

(iii) Find the elements of  $A \cup B$ . [1]

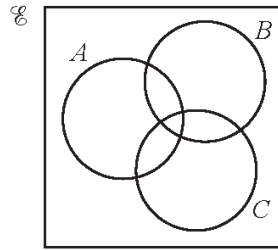
(iv) Find the elements of  $A \cap B$ . [1]



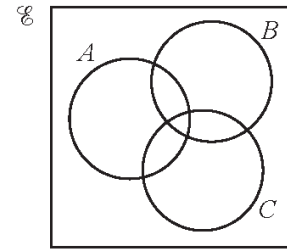
(a) On the Venn diagrams below, shade the regions indicated.



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



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



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

[3]

(b) Sets  $P$  and  $Q$  are such that

$$P = \{x: x^2 + 2x = 0\} \text{ and } Q = \{x: x^2 + 2x + 7 = 0\}, \text{ where } x \in \mathbb{R}.$$

(i) Find  $n(P)$ .

[1]

(ii) Find  $n(Q)$ .

[1]

13. (0606-W 2014-Paper 1/3-Q3)

The universal set  $\mathcal{E}$  is the set of real numbers. Sets  $A$ ,  $B$  and  $C$  are such that

$$A = \{x: x^2 + 5x + 6 = 0\},$$

$$B = \{x: (x-3)(x+2)(x+1) = 0\},$$

$$C = \{x: x^2 + x + 3 = 0\}.$$

- (i) State the value of each of  $n(A)$ ,  $n(B)$  and  $n(C)$ . [3]

$$n(A) =$$

$$n(B) =$$

$$n(C) =$$

- (ii) List the elements in the set  $A \cup B$ . [1]

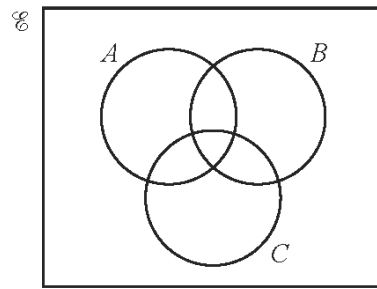
- (iii) List the elements in the set  $A \cap B$ . [1]

- (iv) Describe the set  $C'$ . [1]

14. (0606-W 2015-Paper 1/3-Q1)

On the Venn diagrams below, shade the regions indicated.

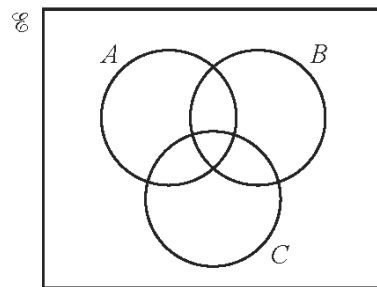
(i)



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

[1]

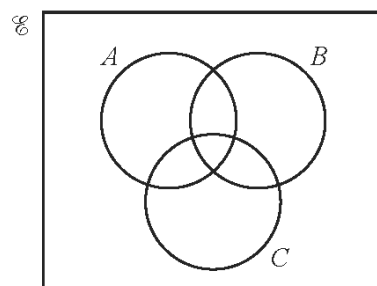
(ii)



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

[1]

(iii)



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

[1]

15. (0606-W 2015-Paper 1/1-Q6)

It is given that  $\mathcal{E} = \{x : 1 \leq x \leq 12, \text{ where } x \text{ is an integer}\}$  and that sets  $A$ ,  $B$ ,  $C$  and  $D$  are such that

$$A = \{\text{multiples of } 3\},$$

$$B = \{\text{prime numbers}\},$$

$$C = \{\text{odd integers}\},$$

$$D = \{\text{even integers}\}.$$

Write down the following sets in terms of their elements.

(i)  $A \cap B$  [1]

(ii)  $A \cup C$  [1]

(iii)  $A' \cap C$  [1]

(iv)  $(D \cup B)'$  [1]

(v) Write down a set  $E$  such that  $E \subset D$ . [1]

16. (0606-W 2015-Paper 1/2-Q6)

It is given that  $\mathcal{E} = \{x : 1 \leq x \leq 12, \text{ where } x \text{ is an integer}\}$  and that sets  $A, B, C$  and  $D$  are such that

$$A = \{\text{multiples of } 3\},$$

$$B = \{\text{prime numbers}\},$$

$$C = \{\text{odd integers}\},$$

$$D = \{\text{even integers}\}.$$

Write down the following sets in terms of their elements.

(i)  $A \cap B$  [1]

(ii)  $A \cup C$  [1]

(iii)  $A' \cap C$  [1]

(iv)  $(D \cup B)'$  [1]

(v) Write down a set  $E$  such that  $E \subset D$ . [1]

- (a) The universal set  $\mathcal{U}$  is the set of real numbers and sets  $X$ ,  $Y$  and  $Z$  are such that

$$X = \{\text{integer multiples of } 5\},$$

$$Y = \{\text{integer multiples of } 10\},$$

$$Z = \{\pi, \sqrt{2}, e\}.$$

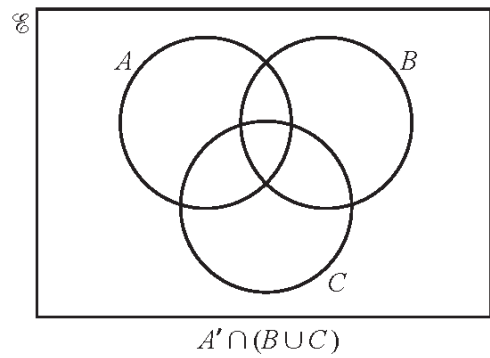
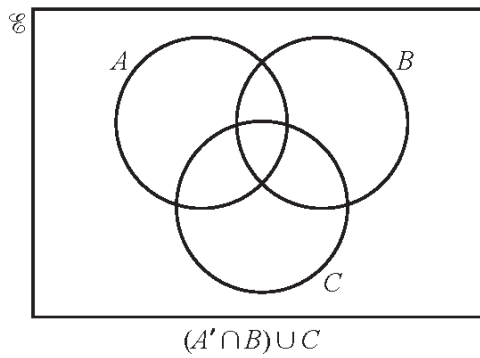
Use set notation to complete the two statements below.

$$Y \dots\dots\dots X$$

$$Y \cap Z = \dots\dots\dots$$

[2]

- (b) On each of the Venn diagrams below, shade the region indicated.



[2]

18. (0606-W 2016-Paper 1/1-Q1)

(a) Sets  $\mathcal{C}$ ,  $A$  and  $B$  are such that

$$n(\mathcal{C}) = 26, \quad n(A \cap B') = 7, \quad n(A \cap B) = 3 \quad \text{and} \quad n(B) = 15.$$

Using a Venn diagram, or otherwise, find

(i)  $n(A)$ , [1]

(ii)  $n(A \cup B)$ , [1]

(iii)  $n(A \cup B)'$ . [1]

(b) It is given that  $\mathcal{C} = \{x : 0 < x < 30\}$ ,  $P = \{\text{multiples of } 5\}$ ,  $Q = \{\text{multiples of } 6\}$  and  $R = \{\text{multiples of } 2\}$ . Use set notation to complete the following statements.

(i)  $Q \dots\dots\dots R$ , [1]

(ii)  $P \cap Q = \dots\dots\dots$  [1]

- (a) Sets  $\mathcal{E}$ ,  $A$  and  $B$  are such that

$$n(\mathcal{E}) = 26, \quad n(A \cap B') = 7, \quad n(A \cap B) = 3 \quad \text{and} \quad n(B) = 15.$$

Using a Venn diagram, or otherwise, find

(i)  $n(A)$ , [1]

(ii)  $n(A \cup B)$ , [1]

(iii)  $n(A \cup B)'$ . [1]

- (b) It is given that  $\mathcal{E} = \{x : 0 < x < 30\}$ ,  $P = \{\text{multiples of } 5\}$ ,  $Q = \{\text{multiples of } 6\}$  and  $R = \{\text{multiples of } 2\}$ . Use set notation to complete the following statements.

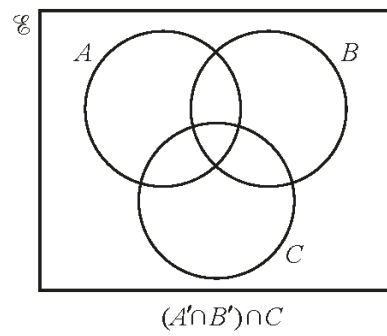
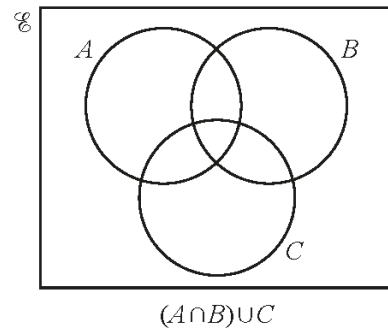
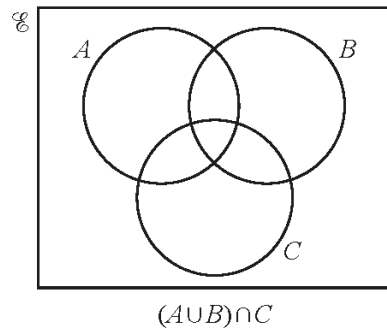
(i)  $Q \dots\dots\dots R$ , [1]

(ii)  $P \cap Q = \dots\dots\dots$  [1]



20. (0606-S 2017-Paper 1/2-Q1)

On each of the Venn diagrams below, shade the region which represents the given set.

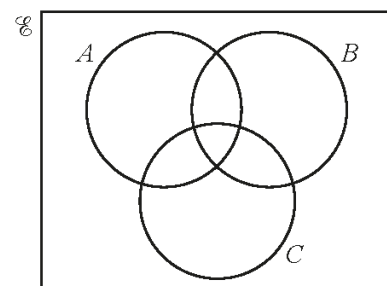


[3]

21. (0606-S 2017-Paper 1/3-Q1)

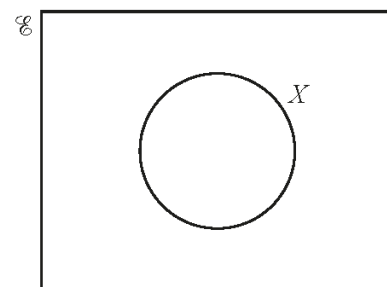
(a) On the Venn diagram below, shade the region which represents  $(A \cap B') \cup (C \cap B')$ .

[1]



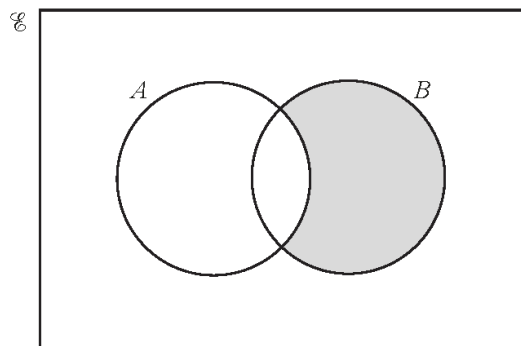
(b) Complete the Venn diagram below to show the sets  $Y$  and  $Z$  such that  $Z \subset X \subset Y$ .

[1]



Express in set notation the shaded regions shown in the Venn diagrams below.

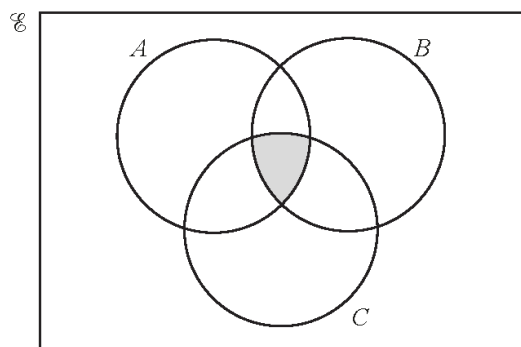
(i)



.....

[1]

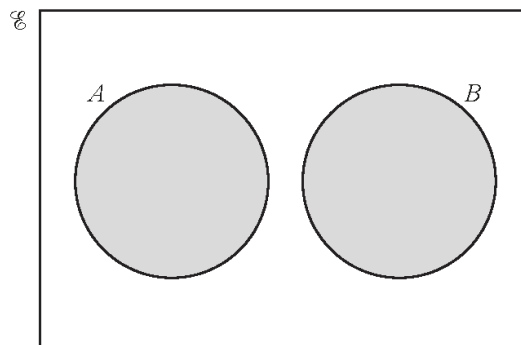
(ii)



.....

[1]

(iii)



.....

[1]

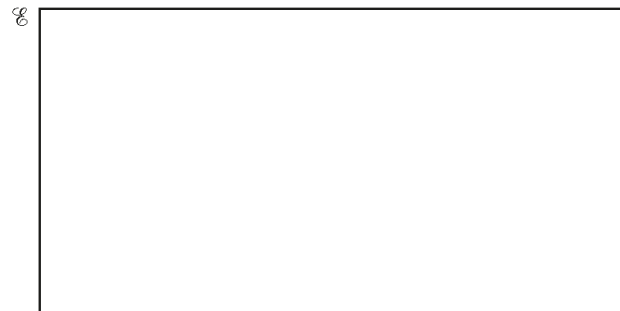
23. (0606-W 2017-Paper 1/2-Q1)

- (i) On the Venn diagram below, draw sets  $X$  and  $Y$  such that  $n(X \cap Y) = 0$ .



[1]

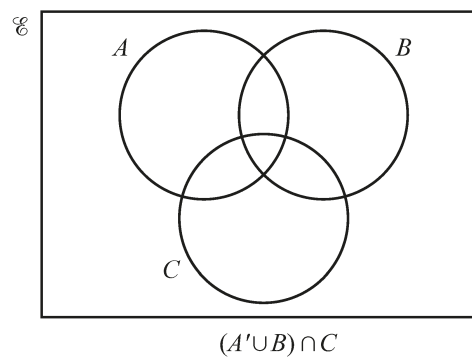
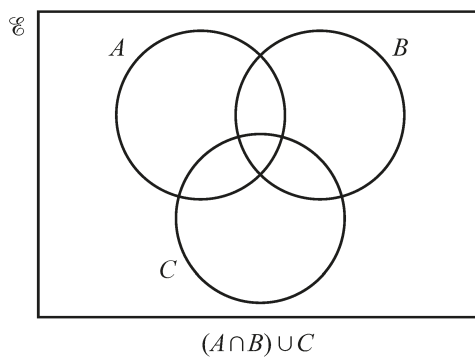
- (ii) On the Venn diagram below, draw sets  $A$ ,  $B$  and  $C$  such that  $C \subset (A \cup B)'$ .



[2]

24. (0606-S 2019-Paper 1/1-Q1)

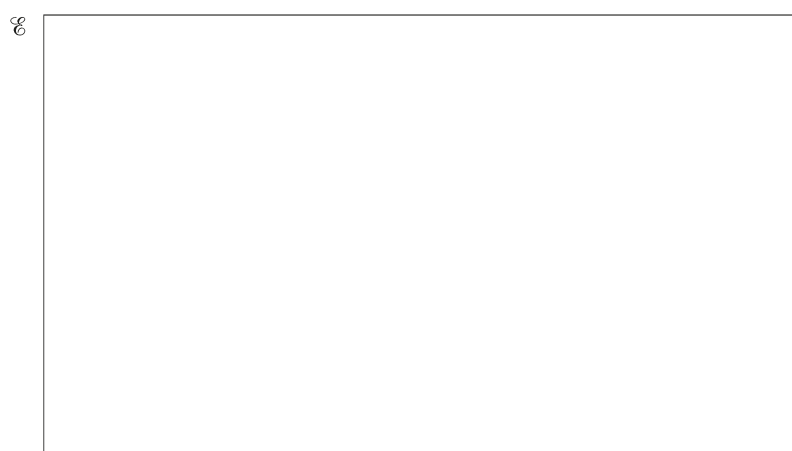
(a) On the Venn diagrams below, shade the region indicated.



[2]

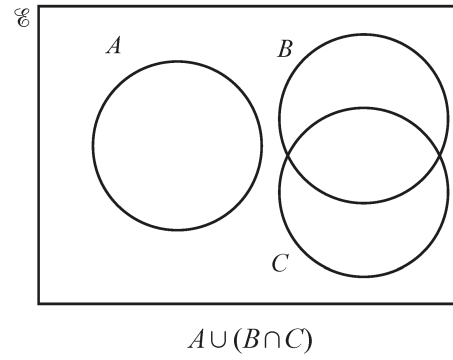
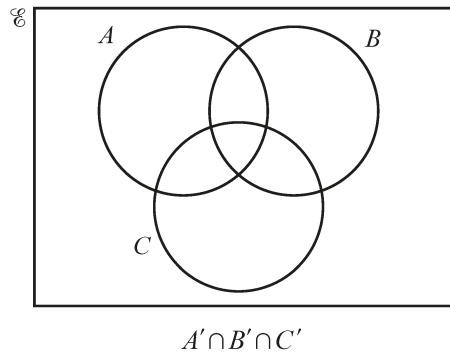
(b) On the Venn diagram below, draw sets  $P$ ,  $Q$  and  $R$  such that

$$P \subset R, Q \subset R \text{ and } P \cap Q = \emptyset.$$



[2]

(a) On the Venn diagrams below, shade the region indicated.



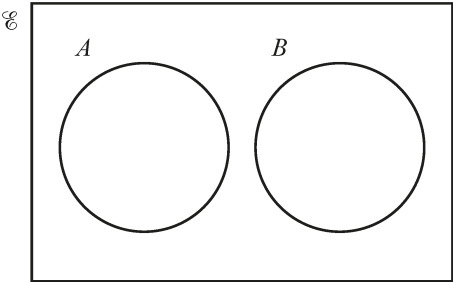
[2]

- (b)
- $$\mathcal{E} = \{x : 0^\circ \leq x \leq 360^\circ\}$$
- $$P = \{x : \cos 2x = 0.5\}$$
- $$Q = \{x : \sin x = 0.5\}$$

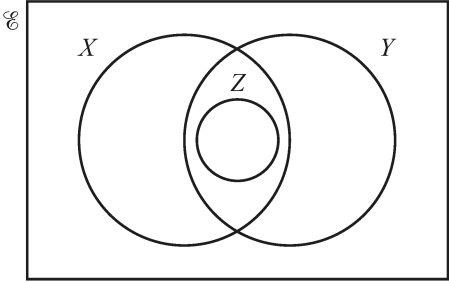
Find  $P \cap Q$ .

[3]

Describe, using set notation, the relationship between the sets shown in each of the Venn diagrams below.



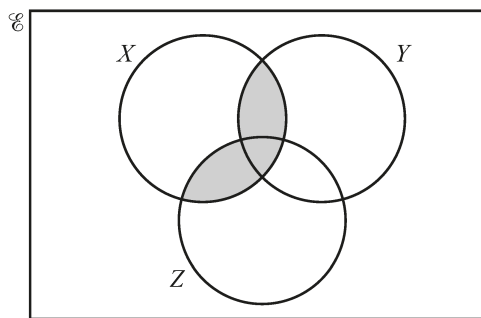
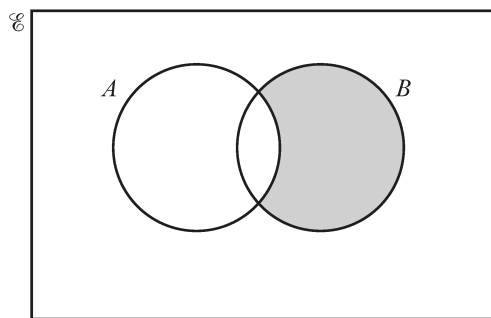
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27. (0606-W 2019-Paper 1/1-Q1)

Using set notation, describe the regions shaded on the Venn diagrams below.



[2]

28. (0606-W 2019-Paper 1/3-Q1)

In a group of 145 students, the numbers studying mathematics, physics and chemistry are given below. All students study at least one of the three subjects.

$x$  students study all 3 subjects

24 students study both mathematics and chemistry

23 students study both physics and chemistry

28 students study both mathematics and physics

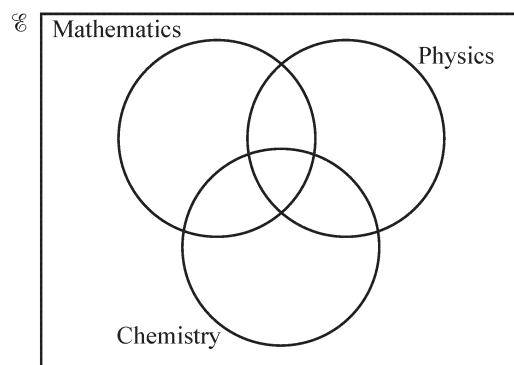
50 students study chemistry

75 students study physics

80 students study mathematics

(i) Using the Venn diagram, find the value of  $x$ .

[4]



(ii) Find the number of students who study mathematics only.

[1]