Student Text *UNIT 10 Logic and Venn Diagrams* Answers to Exercises

10.1 Logic Puzzles

1.

	Dog	*Cat*	*Bird*
Jade	×	×	✓
Billy	✓	×	×
Kate	×	✓	×

Jade : *Bird*
Billy : *Dog*
Kate : *Cat*

2.

	Swimming	*Tennis*	*Football*
Katie	×	×	✓
John	×	✓	×
Jodie	✓	×	×

Katie : *Football*
John : *Tennis*
Jodie : *Swimming*

3. Carl : *Curry goat with potato fries and peas*
Adam : *Baked fish with rice and beans*

4.

	Red	*Blue*	*White*	*Black*
Amanda	×	✓	×	×
Joe	×	×	×	✓
Alex	×	×	✓	×
Zoe	✓	×	×	×

Amanda : *Blue*
Joe : *Black*
Alex : *White*
Zoe : *Red*

5.

	Billy	*John*	*Finlay*	*Jim*
Mrs Brown	×	×	✓	×
Mrs Green	×	✓	×	×
Mrs Black	✓	×	×	×
Mrs White	×	×	×	✓

Mrs Brown : *Finlay*
Mrs Green : *John*
Mrs Black : *Billy*
Mrs White : *Jim*

6. Ist : *Leah*
2nd : *Nadida*
3rd : *Alice*
4th : *Anna*

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10.2 Two Way Tables

1. (a) 40 (b) 42 (c) 20 (d) 70
   (e) York United FC; more happy fans
2. (a) 5 (b) 10 (c) 3 (d) 33
3. (a) 5 (b) 11 (c) Purple
4. (a)

	Less than 4 kg	*4 kg or more*
Boys	64	26
Girls	76	14

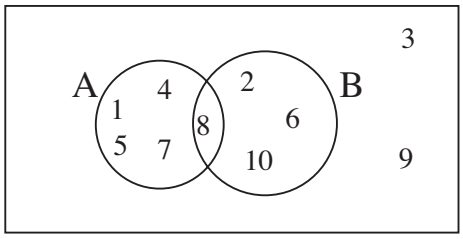
   (b) 76
5. (a) 40
   (b) You do not know how many had, for example, only goats and caged birds.
   (c)

	Only goats	*Only cows*
Caged birds	12	4
No caged birds	6	18

   (d) 6

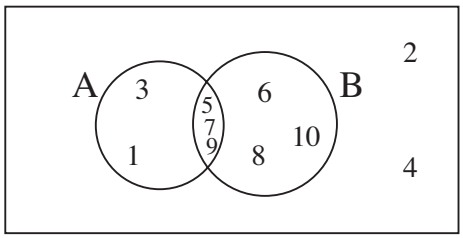
10.3 Sets and Venn Diagrams

1. (a)



   (b) { 8 }

2. (a)



   (b) { 1, 3, 5, 6, 7, 8, 9, 10 }
3. (a) A = { 2, 4, 6, 8, 10, 12 }
   (b) B = { 4, 8, 12 }
   (c) A = even numbers up to 12
   B = multiples of 4, 4 × table, up to 12
   (d) { 1, 3, 5, 7, 9, 11 }

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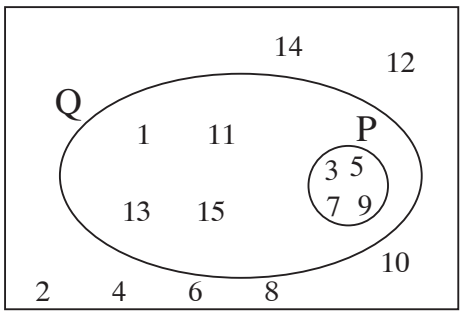
10.3

4. (a)



(b) { 3, 5, 7, 9 }

5. (a) E = { 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 }

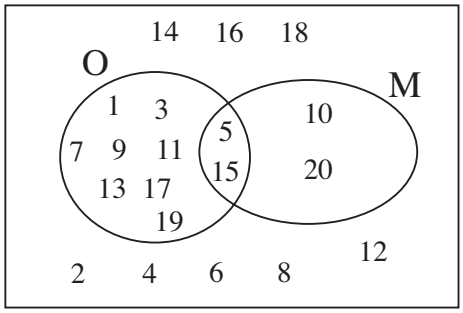
(b) S = { 1, 4, 9, 16 }

(c) E = even numbers up to 20

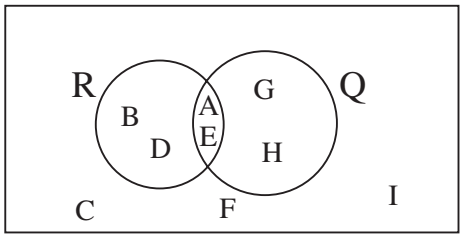
S = square numbers up to 20

(d) { 1, 2, 4, 6, 8, 9, 10, 12, 14, 16, 18, 20 }

6.

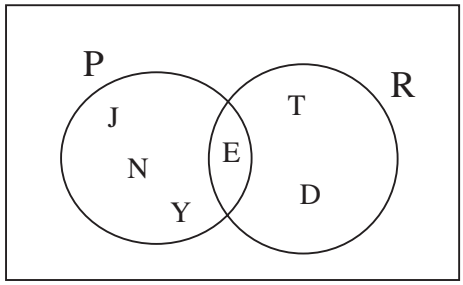


7. (a)

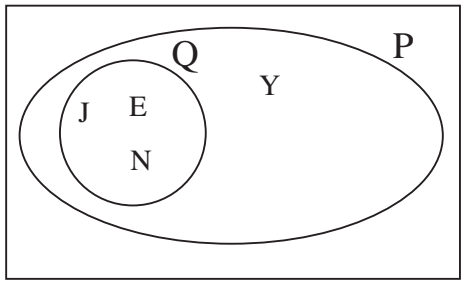


(b) { A, E } (c) { B, D } (d) { C, F, I }

8. (a)



(b)



(c) Union = {D, E, J, N, T, Y }

(d) Intersection = { E }

9. (a) C (b) B (c) B (d) A

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10.4 Set Notation

1. (a) $A \cap B = \{ 6 \}$

   (b) $A \cup B = \{ 2, 3, 4, 6, 8, 9 \}$

   (c) $A' = \{ 1, 3, 5, 7, 9, 10 \}$

   (d) $B' = \{ 1, 2, 4, 5, 7, 8, 10 \}$

   (e) $A' \cap B' = \{ 1, 5, 7, 10 \}$

   (f) $A' \cup B' = \{ 1, 2, 3, 4, 5, 7, 8, 9, 10 \}$

2. (a) $A \cap B = \{ 21 \}$

   (b) $(A \cap B)' = \{ 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 \}$

   (c) $A \cup B = \{ 12, 14, 15, 18, 21 \}$

   (d) $A' = \{ 10, 11, 12, 13, 15, 16, 17, 18, 19, 20 \}$

   (e) $B' = \{ 10, 11, 13, 14, 16, 17, 19, 20 \}$

   (f) $A' \cap B' = \{ 10, 11, 13, 16, 17, 19, 20 \}$

   (g) $A' \cap B = \{ 12, 15, 18 \}$

3. (a) $A \cap B = \{ 1, 10 \}$

   (b) $A \cap C = \{ 3, 6 \}$

   (c) $B \cap C = \varnothing$

   (d) $A \cup B = \{ 1, 3, 5, 6, 10 \}$

   (e) $A \cup C = \{ 1, 3, 6, 9, 10, 12 \}$

   (f) $C' = \{ 1, 2, 4, 5, 7, 8, 10, 11 \}$

   (g) $A \cap C' = \{ 1, 10 \}$

   (h) $B' = \{ 2, 3, 4, 6, 7, 8, 9, 11, 12 \}$

   (i) $B' \cup C' = \{ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 \} = \boldsymbol{U}$

   (j) $A \cap B \cap C = \varnothing$

   (k) $A \cup B \cup C = \{ 1, 3, 5, 6, 9, 10, 12 \}$

4. (i) A is the set of even numbers: B is the set of multiples of 3

   (ii) $A \cap B = \{ 6 \}$

   This is the set of numbers that are even multiples of 3.

   (iii) 3

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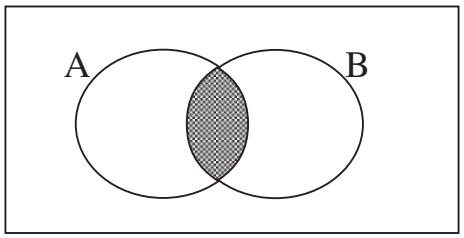
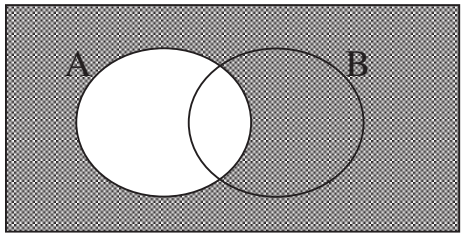
10.4

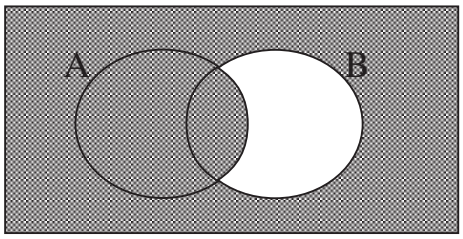
5. (a)



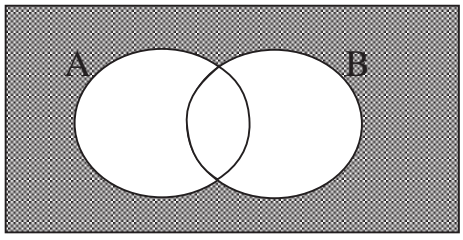
(b)



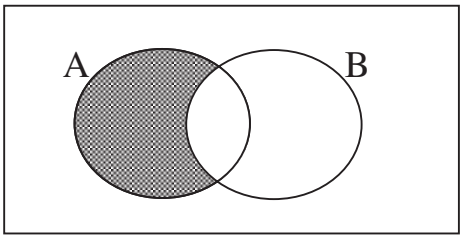
(c)



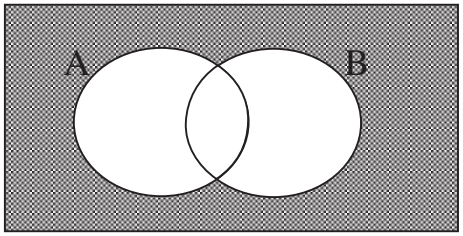
(d)



(e)



(f)

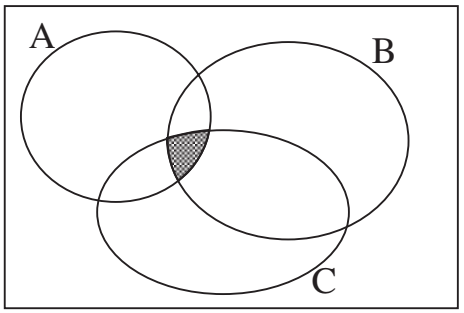


6. (a) $A \cup B$ (b) D' (c) $A \cup B$
   (d) $P \cap Q'$ (e) J (f) $(K \cap L)'$ or $K' \cup L'$

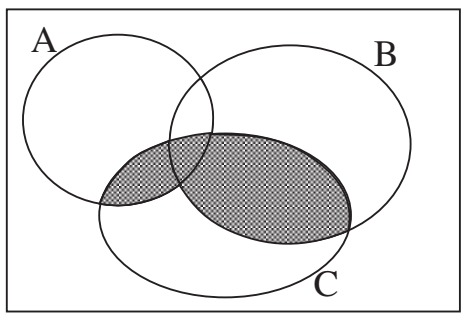
7. (a) True (b) False (c) True
   (d) False (e) True (f) False
   (g) True

8. (a) True (b) False $A \subset C$
   (c) True (d) False $A \cap C = \{ a, c, e \}$
   (e) True (f) True
   (g) False $A \cap B' = A$

9. (a)



(b)



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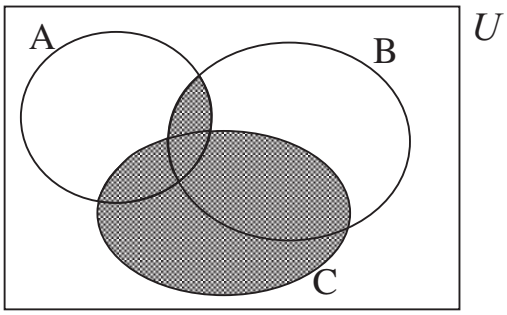
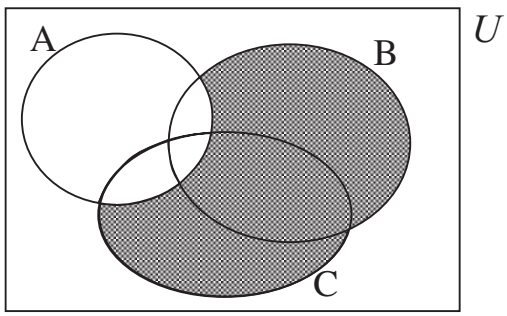
10.4

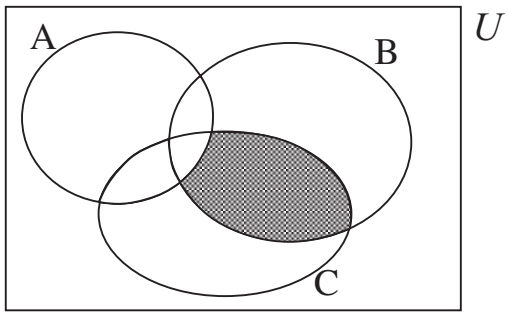
(c)



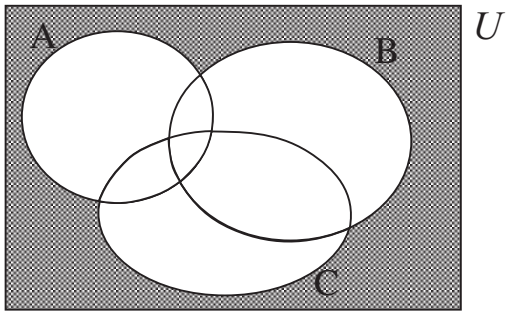
(d)



(e)



(f)



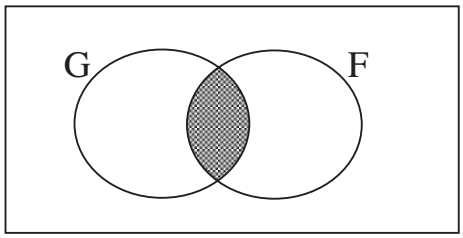
10. (a) $(A \cup B)' \cap C$ (b) $A \cup B \cup C$

(c) $B \cap A' \cap C'$ (d) $A \cap B$

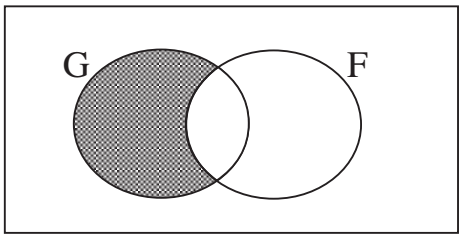
(e) $A \cup B \cup C$ (f) $(A \cap C) \cap B'$

10.5 Logic Problems and Venn Diagrams

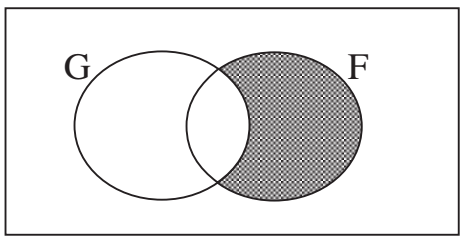
1. 1 member of the family plays only football.
2. 2 hamburgers have only ketchup.
3. (a)



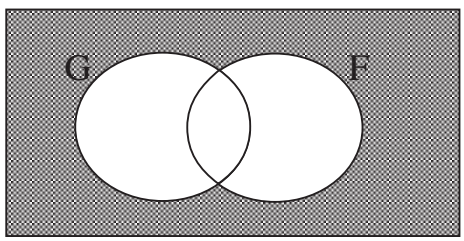
(b)



(c)



(d)



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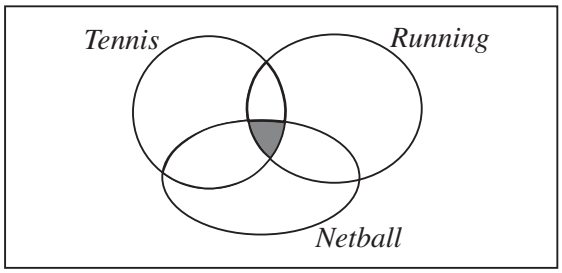
10.5

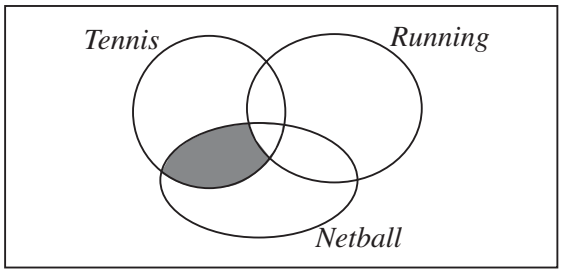
4. 8 pupils like pancakes and maple syrup.
5. (a) 18 cars (b) 12 cars (c) 16 cars
6. 2 blue pens do not work.
7. (a) 14 children are eating sausages and fries.
   (b) 3 children are eating sausages without fries.
   (c) 12 children are eating only fries .

Questions 8 and 9 involve situations that will require Venn diagrams or situations involving 3 sets.

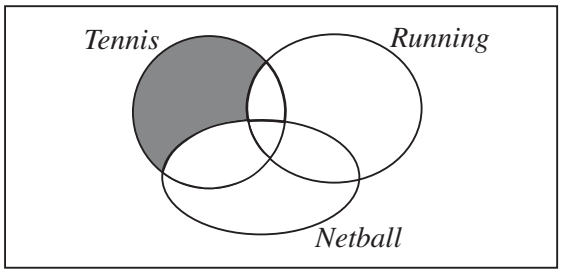
8. (a)



(b)



(c)



9. (a) 10
   (b) Art : 15
   Chess : 19
   Drama : 20