



4.4.1.1 Problem Solving

- 1) There are three boxes containing vegetables. One contains onions, one contains carrots and one contains onions and carrots. The three boxes have been labelled. One is labelled “onions”, one is labelled “carrots” and the other is labelled “onions and carrots”. You know that all three have been labelled incorrectly.

Describe how you can work out what each box actually contains by taking just **one** vegetable out of **one** box, without looking inside any of the boxes.

[2 marks]

- Take a vegetable from the box labelled “onions and carrots”;
- If it is an onion then the box labelled "onions" contains carrots and the box labelled "carrots" contains onions and carrots. If it is a carrot then the box labelled "carrots" contains onions and the box labelled "onions" contains carrots and onions;

- 2) The famous detective John Stout was called in to solve a perplexing murder mystery. He determined the following facts.

- A Nathan, the murdered man, was killed by a blow on the head.
- B Either Suzanne or Martin was in the dining room at the time of the murder.
- C If Peter was in the kitchen at the time of the murder, then Ian killed Nathan using poison.
- D If Suzanne was in the dining room at the time of the murder, then Steve killed Nathan.
- E If Peter was not in the kitchen at the time of the murder, then Martin was not in the dining room when the murder was committed.
- F If Martin was in the dining room at the time the murder was committed, then Paul killed Nathan.
- G If Kevin was in the hall at the time of the murder, then Suzanne killed Nathan by a blow to the neck with a saucepan..

- a) Who murdered Nathan?

[1 mark]

- Steve

- b) Explain how you know your answer to a) is correct.

[2 marks]

- Nathan was not killed with poison (rule a);
- therefore Peter was not in the kitchen (rule c);
- therefore Martin was not in the dining room (rule e);
- therefore Suzanne was in the dining room (rule b);
- therefore Steve murdered Nathan (rule d).





3) **Figure 1** shows a logic puzzle.

Figure 1

Which one of these six statements is correct?

Statement 1: All of the statements below are correct.

Statement 2: None of the statements below are correct.

Statement 3: All of the statements above are correct.

Statement 4: Exactly one of the statements above is correct.

Statement 5: None of the statements above are correct.

Statement 6: None of the statements above are correct.

a) Explain why Statement 1 is not correct.

[1 mark]

- Statement 1 can't be correct because it means Statement 5 / Statement 6 is true which means Statement 1 is false;
- Statement 1 can't be correct because it would mean Statement 2 is correct which would mean all of the other statements have to be both correct and incorrect;
- Statement 1 can't be correct because it would mean Statement 4 is correct which means that Statements 2 and 3 have to be both correct and incorrect;
- Questions says only one of the statements is true so Statement 1 can't be true as that means more than one statement would be true;

b) Which one of the six statements in **Figure 1** is correct?

[1 mark]

- **Statement 5**

c) For **two** statements other than Statement 1 and your answer to Question **b)**, explain why those statements are not correct.

[2 marks]

- Statement 3 can't be correct because Statement 1 is false; Statement 3 can't be correct because the question says only one of the statements is correct;
- Statement 3 can't be correct because that would mean Statement 2 would be a contradiction as this would mean Statement 3 would have to be incorrect;





- If Statement 2 is true then Statement 4 has to be false. As Statements 1 and 3 are false for Statement 4 to be false Statement 2 has to be false as well (otherwise one of the above would be true). This is a contradiction so Statement 2 can't be true;
 - Statements 1, 2 and 3 are false so Statement 4 is false;
 - If Statement 6 is true then 5 has to be false implying at least one of Statements 1 to 4 have to be true but they are all false so Statement 6 has to be false;
-

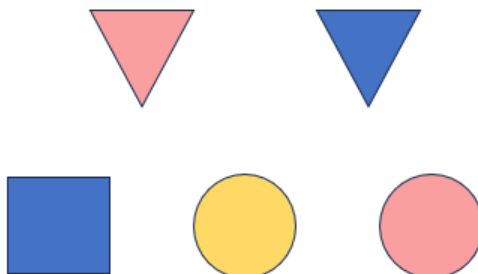




4) Figure 2 shows a logic puzzle.

Figure 2

The following five coloured shapes are placed on a table.



Tabitha secretly chooses one of the coloured shapes and:

- tells Walter the colour of the shape she has chosen (pink, yellow or blue)
- tells Lionel the type of shape she has chosen (triangle, circle or square).

Lionel and Walter both know what coloured shapes are on the table.

Lionel knows that Walter has been told the colour chosen by Tabitha.

Walter knows that Lionel has been told the type of shape chosen by Tabitha.

They do not know what the other has been told.

Tabitha first asks Walter and Lionel if they know which coloured shape she has chosen. They both answer at the same time and say “No”.

Tabitha then asks them again if they know which coloured shape she has chosen. They both answer at the same time and say “No” again.

Tabitha asks them a third time if they know which coloured shape she has chosen and they both answer at the same time and say “Yes”.

- a) After they have both replied to Tabitha’s first question, what does Lionel now know about Tabitha’s choice because Walter said “No”?

[1 mark]

- The colour is not yellow // the chosen shape was not the yellow circle // the colour is blue or pink;





- b) After they have both replied to Tabitha's first question, what does Walter now know about Tabitha's choice because Lionel said "No"?

[1 mark]

- The shape is not a square // the chosen shape was not the blue square // the shape is a triangle or circle;
-

- c) Which coloured shape had Tabitha chosen?

[1 mark]

- Pink triangle;
-





- 5) In question parts **a)** and **b)** two statements are given followed by two conclusions numbered 1 and 2.

You must assume the two statements given in each question are true.

Read the statements and then decide which of the given conclusions logically follows from the two given statements.

a)

Statements: All programmers work at night.
Nobody who works at night earns lots of money.

Conclusion 1: All programmers earn lots of money.

Conclusion 2: Some night workers are programmers.

Give answer: **A** If only **Conclusion 1** follows.
B If only **Conclusion 2** follows.
C If neither **Conclusion 1** nor **Conclusion 2** follows.
D If both **Conclusion 1** and **Conclusion 2** follow.

[1 mark]

• **B**

b)

Statements: Some aardvarks are computing professors.
All computing professors love Java.

Conclusion 1: All aardvarks love Java.

Conclusion 2: All computing professors are aardvarks.

Give answer: **A** If only **Conclusion 1** follows.
B If only **Conclusion 2** follows.
C If neither **Conclusion 1** nor **Conclusion 2** follows.
D If both **Conclusion 1** and **Conclusion 2** follow.

[1 mark]

• **C**

