Logic Puzzles

Level Guidance

Appropriate Strategies for Logic Puzzles
• Identify the given facts and prioritise them
• Look for any relationships and patterns in the information given
• Use one piece of information at a time and see what effect it has, then keep one fixed and test the other
• Choose and use a recording system to organise the given information
• Check that the answer meets all the criteria

The following logic problems are all written around the same context and become progressively more complex allowing children to show higher levels of achievement. It is acceptable for children to manipulate appropriate resources to support their thinking. Written recording will develop as they progress through the levels.

The Lunchbox Problem

a) 3 different coloured lunchboxes are in a line. Can you arrange them in the correct order?

Green is not on the left	Blue is on the right of green
Green is on the right of red	

b)4 lunchboxes are in a row: one blue, one red, one yellow and one green. Can you work out the order?

Green is not next to yellow	Red is on the right of yellow
Blue is between 2 colours	Blue is not next to yellow

c)There are 5 different coloured lunchboxes in a row on the table .
Use the clues to work out the order of the lunchboxes.

There are two lunchboxes between the red and blue lunchboxes	The green lunchbox is next to the white lunchbox
The green lunchbox is on the left of the blue lunchbox	There are three lunchboxes between the yellow and the blue lunchboxes

d)There are 5 different coloured lunchboxes. Can you work out who owns which one?

Chloe's lunchbox is not white or blue		Dan has not brought the green lunchbox today
The first letter of Billy's name is the same as the first letter of the colour of his lunchbox	Emma's lunchbox is yellow	Amy's lunchbox is either red or yellow

e)There are 5 different coloured lunchboxes in a row on a table, work out the order of the lunchboxes and the name of the owner.

Amy's lunchbox is not yellow	Chloe's blue lunchbox is on one end of the line
Dan's lunchbox is between Amy's and Billy's	Emma's green lunchbox is next to Chloe's
Amy's lunchbox is in the middle and is not white	Billy's lunchbox is last in the line and is not red or yellow

f)The 5 lunchboxes are lined up in this order on the table

Green, Red, Yellow, Blue, White

Work out who owns which lunchbox and what they have brought for lunch. (type of sandwich and piece of fruit)

The owner of the yellow lunchbox has a jam sandwich	Chloe does not like tuna, ham or jam sandwiches	Emma's lunchbox is green and she has a pear for lunch
Chloe's lunchbox is not red or blue	Dan has an apple in his lunchbox	Billy will be eating a jam sandwich and a banana today
The cheese sandwich is in the blue lunchbox with the orange	The lunchbox next to Amy's has a peach in it	Emma does not eat ham or egg sandwiches

g)The lunchboxes are lined up in this order on the table

Blue, Yellow, Red, White, Green

Work out who owns which lunchbox and what they have brought for lunch. (type of sandwich, piece of fruit and drink)

Emma has a red lunchbox	Amy's lunchbox is at the end and she has a banana and a drink of lemonade for lunch	Dan only drinks water but does not like pears
Billy's lunchbox is next to Emma's, he always eats cheese sandwiches for lunch	The blue lunchbox has a drink of milk and a peach in it	Emma does not like pears or apples
The person who drinks water owns the lunchbox between the lunchboxes containing the cola and lemonade drinks	Chloe does not like egg, tuna or jam sandwiches	The ham sandwich is in the lunchbox next to the one containing squash
The tuna sandwich is in the lunchbox between the lunchboxes containing the egg and jam sandwiches	The jam sandwich is in the same lunchbox as the banana	There is an orange in one of the boxes

h)Lunchbox Riddle

1. Amy, Billy, Chloe, Dan and Emma each own a lunchbox. The lunchboxes are standing in a straight line in the dining hall.
2. Each lunchbox is a different colour.
3. Each lunchbox contains a sandwich, a drink and a piece of fruit.
4. Each child has a different sandwich, a different drink and a different piece of fruit.

The question is 'Who has a pear for lunch?'

Facts:

- Amy has a red lunchbox.
- Dan has a banana for lunch.
- Billy only drinks squash.
- The green lunchbox is on the left of the white lunchbox.
- The green lunchbox's owner drinks lemonade.
- The person who eats tuna sandwiches has a peach.
- The owner of the yellow lunchbox has a ham sandwich.
- The lunchbox in the middle contains milk.
- The first lunchbox belongs to Emma.
- The lunchbox with the egg sandwich is next to the one with the orange.
- The apple is in the lunchbox next to the one with the ham sandwich.
- The owner of the cheese sandwich has cola to drink.
- Chloe only eats jam sandwiches.
- Emma's lunchbox is next to the blue one.
- The water-drinker's box is next to the egg-eater's box.

Answers

a) Red	Green	Blue

b) Yellow	Red	Blue	Green

c) Yellow	Red	White	Green	Blue

d)Amy – Red
Billy – Blue
Chloe – Green
Dan - White
Emma – Yellow

e) Blue	Green	Red	Yellow	White
Chloe	Emma	Amy	Dan	Billy

f) Green	Red	Yellow	Blue	White
Emma	Dan	Billy	Amy	Chloe
Tuna	Ham	Jam	Cheese	Egg
Pear	Apple	Banana	Orange	Pear

g) Blue	Yellow	Red	White	Green
Chloe	Billy	Emma	Dan	Amy
Ham	Cheese	Egg	Tuna	Jam
Milk	Squash	Cola	Water	Lemonade
Peach	Pear	Orange	Apple	Banana

h) Yellow	Blue	Red	Green	White
Emma	Billy	Amy	Chloe	Dan
Ham	Egg	Tuna	Jam	Cheese
Water	Squash	Milk	Lemonade	Cola
Orange	Apple	Peach	Pear	Banana

Chloe has the PEAR!

Linked Problems:

Use the contexts below to construct similar logic problems. You could use the same statements as the lunch box problems but change the relevant details.

- Position of toys on a set of shelves
- Matching names and nicknames
- Matching pets and their owners
- Matching football teams and football fans
- Order of children winning a race

Add extra criteria to increase the level of difficulty e.g who owns the toys; colour of football strip; which colour top are the children wearing and which house do they represent?

Lunchbox problem
Level Guidance

The following statements are for guidance only and should be used to give a 'best fit' level. Children can still achieve a level without necessarily reaching a final solution to the problem.
These statements can also indicate next steps for children and teachers in the development of problem solving skills.

Level 1 (problems of the complexity of a and b)

- Be able to respond to given facts (through manipulation of appropriate resources)
- Be able to interpret a 'not' statement
- Solution shown with practical resources only
- Able to use everyday language to talk about their work
- Check solution with adult support

Level 2 (problems of the complexity of c)

- Aware that facts can be used in any order (limited number of facts)
- Be able to identify links between 2 given facts
- Pictorial record made from practical resources
- Explain approach to problem orally with some evidence of reasoning
- Check solution meets all criteria – possibly after adult suggestion

Level 3 (problems of the complexity of d)

- Able to justify why a particular fact was used first or not chosen from a greater range of facts.
- Be able to identify links between 2 or more facts which may be given or deduced
- Use appropriate diagrams and symbols to represent their work or complete a two way table structured by an adult.
- Explain approach to problem orally supported by written jottings with some evidence of reasoning
- Independently check that solution meets all criteria

Level 4 (problems of the complexity of e and f)

- Can explain why a starting point was chosen and prioritise some other clues.
- Continually review information to make further links between facts
- Decide on a system to organise recording of thinking and solution eg. ordered lists or 2 way tables
- Explain strategies used both orally and in written form
- Use one piece of information at a time and see what effect it has on the remainder of the problem.
- Independently check that solution meets all criteria for more complex problems

Level 5 (problems of the complexity of g, Level 5/6 able to solve problem h)

- Can identify and prioritise given facts in increasingly complex problems i.e problem g.
- Use of mathematical reasoning to eliminate/select possibilities
- Independent use of own method of recording which can be interpreted by others
- Explain their reasoning and approach to the problem with clarity and confidence both orally and in writing.
- Work systematically through the problem, using one piece of information at a time and seeing what effect it has on the remainder of the problem.
- Independently check that solution meets all criteria for problems of increasing complexity