

6.8

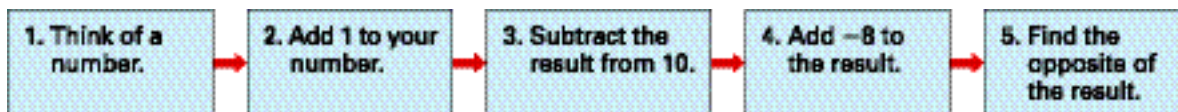
Solve Problems by Working Backwards

▶ GOAL

Use the strategy of working backwards to solve problems.

Learn about the Math

Meagan played a number trick with Yoshi.
She told him to follow these steps:



Yoshi said that his result was -7 .

Meagan said, “I think your number was -6 .”

? How did Meagan know Yoshi's number?

1 Understand the Problem

Yoshi wants to know how Meagan determined his number from his result.

2 Make a Plan

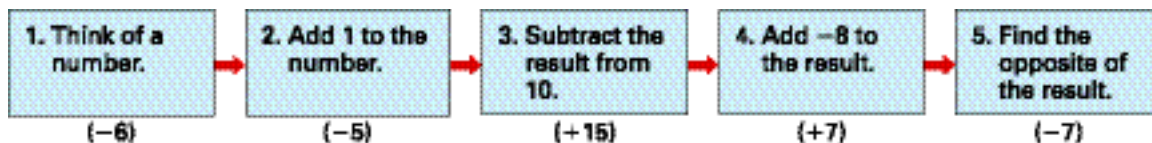
Yoshi realizes that he needs to start with the result and work backwards through the steps to find the original number.

3 Carry Out the Plan

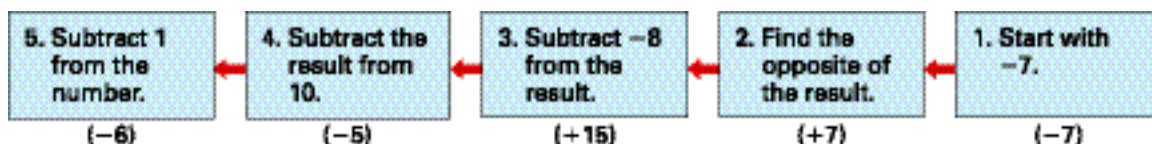
Yoshi goes through the steps in two ways:

- He completes the original steps in order.
- He works backwards from the result.

Original Steps



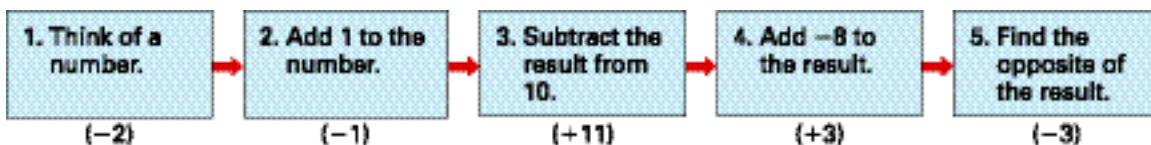
Working Backwards



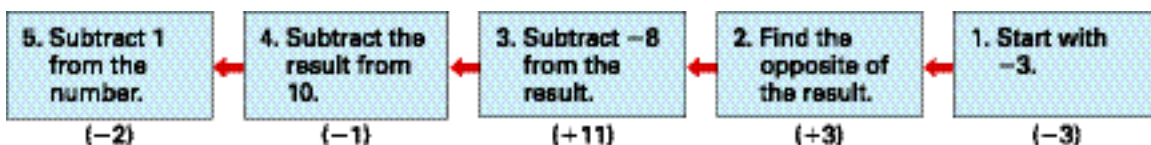
4 Look Back

Yoshi checks to see if this method works with -2 as the number.

Original Steps



Working Backwards



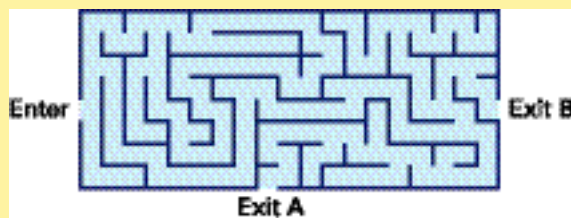
Reflecting

1. How does working backwards help to solve Meagan's number trick?
2. Is working backwards the only way to solve this problem? Explain.

Work with the Math

Example: Working backwards

Find the shorter path through this maze.



Fawn's Solution

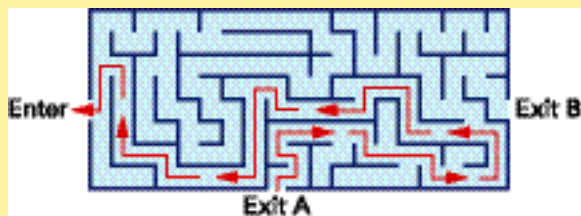
1 Understand the Problem

I need to find a path from Enter to Exit without backtracking or hitting any dead ends. There are two possible exits.

2 Make a Plan

Exit A looks closer to Enter, so I'll start at Exit A and follow the path backwards.

3 Carry Out the Plan



Exit B is on the path from Exit A, so Exit B is closer.

4 Look Back

By reversing the arrows, I see that Enter to Exit B is the shorter path.

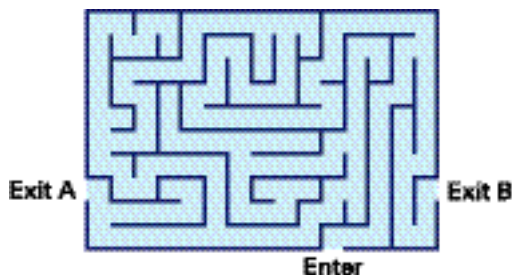


A Checking

3. Try Meagan's trick using other numbers. Is there a quick way to find the original number? Explain how it works.
4. Use Meagan's trick. Write the steps, in order, to find the original number.
 - Subtract 7.
 - Add -9 .
 - Find the opposite.
 - Subtract from 12.
 - The answer is $+10$.

B Practising

5. Find the original number. State the steps, in order, that you will use.
 - Add -31 .
 - Subtract -9 .
 - Add 18.
 - Subtract from 12.
 - The answer is -12 .
6. Make up a number trick that gives you the original number if you subtract 3 from the result. Your trick must have at least 4 steps.
7. Make up a number trick that always ends with the original number. Your trick must have at least three steps. One step must involve using an opposite.
8. a) Find the shorter path through the maze.



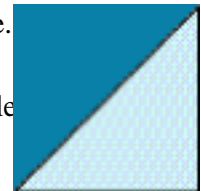
- b) Explain whether working backwards is an efficient strategy to use.

9. Lloyd is lifting weights over a nine week training period. Every week, he lifts 2 kg more than he lifted the previous week. During the ninth week, he lifts 80 kg. How much was he lifting during his first week?

10. On Monday, Heidi bought some grapes. Each day, she ate half of them. On Friday, only eight grapes were left. How many grapes did Heidi buy?
11. During a clothing sale, the price goes down by half each day an item is not sold. If an item costs \$2.50 after 8 days, what was the original price?

12. Romona takes a shape and cuts away half of it five times. The following triangle is what remains.

- a) Draw the original shape.
- b) Draw a polygon that is symmetric. With a single line, divide it into two identical pieces.



13. Make up a problem you can solve by working backwards. Show how to solve it.
14. Consider the following diagram. Find a way to move the discs from the first post, as shown, to the third post.

- The discs on the third post must increase in size from top to bottom.
- You cannot place a larger disc on top of a smaller disc.
- You can use all three posts.

