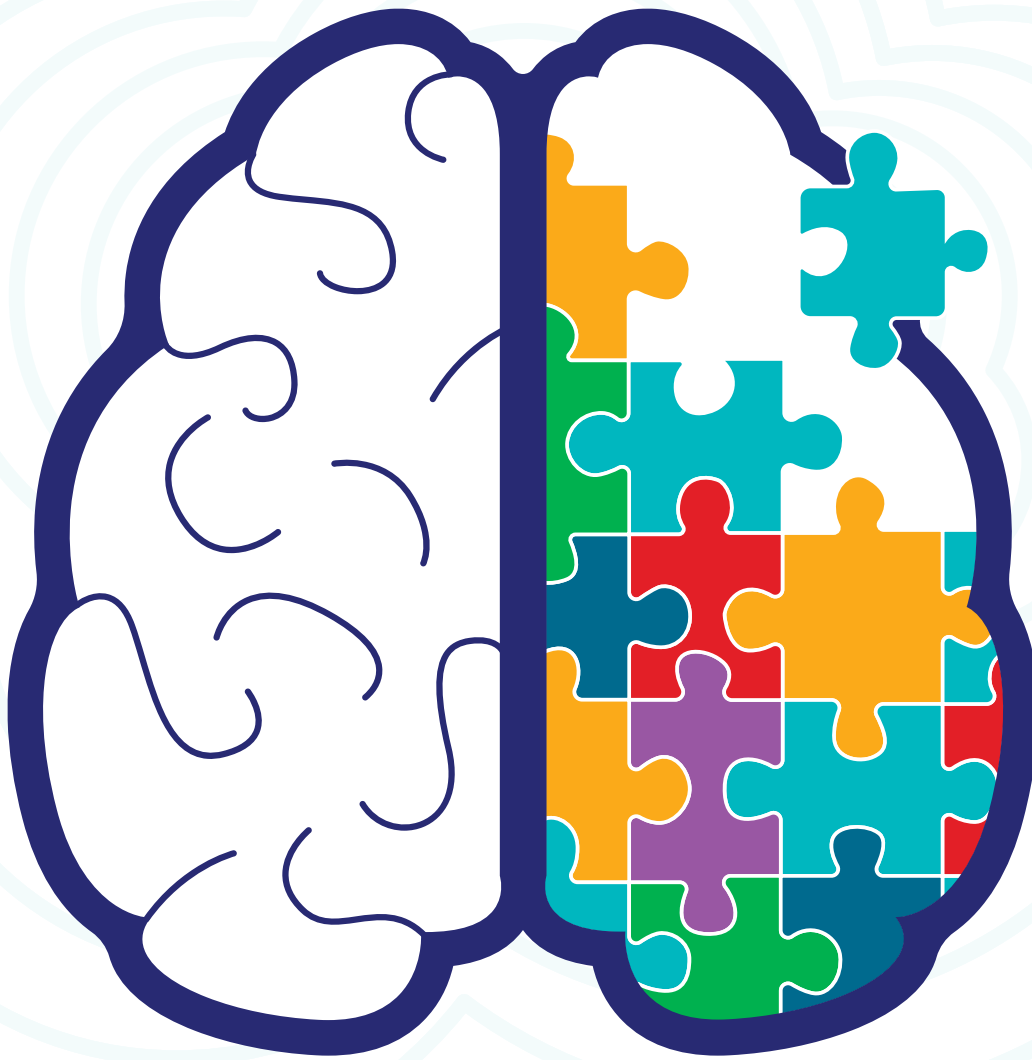


RAISING ORIGINAL THINKERS:

HOW PUZZLES TRAIN LOGICAL AND CREATIVE THINKING



Building the habits of adaptable, innovative thinkers.



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WELCOME TO BRAIN POWER MATH & PROBLEM SOLVING

At Brain Power, we believe math is a way of seeing the world. It helps students think clearly, solve complex problems, and approach challenges with both creativity and precision. We know these skills can be taught, because we have been teaching them for over 30 years.

Our Math and Problem Solving program is built on the belief that true mathematical thinking goes beyond memorization. Students learn how to simplify problems, reason logically, and apply their thinking in unfamiliar situations. Through puzzles, spatial reasoning, decoding activities, and real-world applications, we help students become agile, confident thinkers.

Our approach has been shaped by global experts, including leading academics, NASA engineers, and International Math Olympiad coaches. The result is a curriculum that is both rigorous and joyful, inspiring students to engage deeply with math in ways that fuel curiosity and long-term growth.

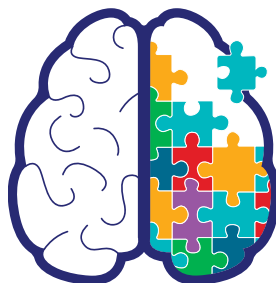
Our students have gone on to win national and international math competitions. More importantly, they bring their thinking skills into every field. Brain Power alumni are thriving in leading technology firms, research institutes, investment banks, and universities around the world. They consistently tell us that Brain Power shaped how they think, how they lead, and how they solve problems.

We're excited to have your family join our Math & Problem Solving program!

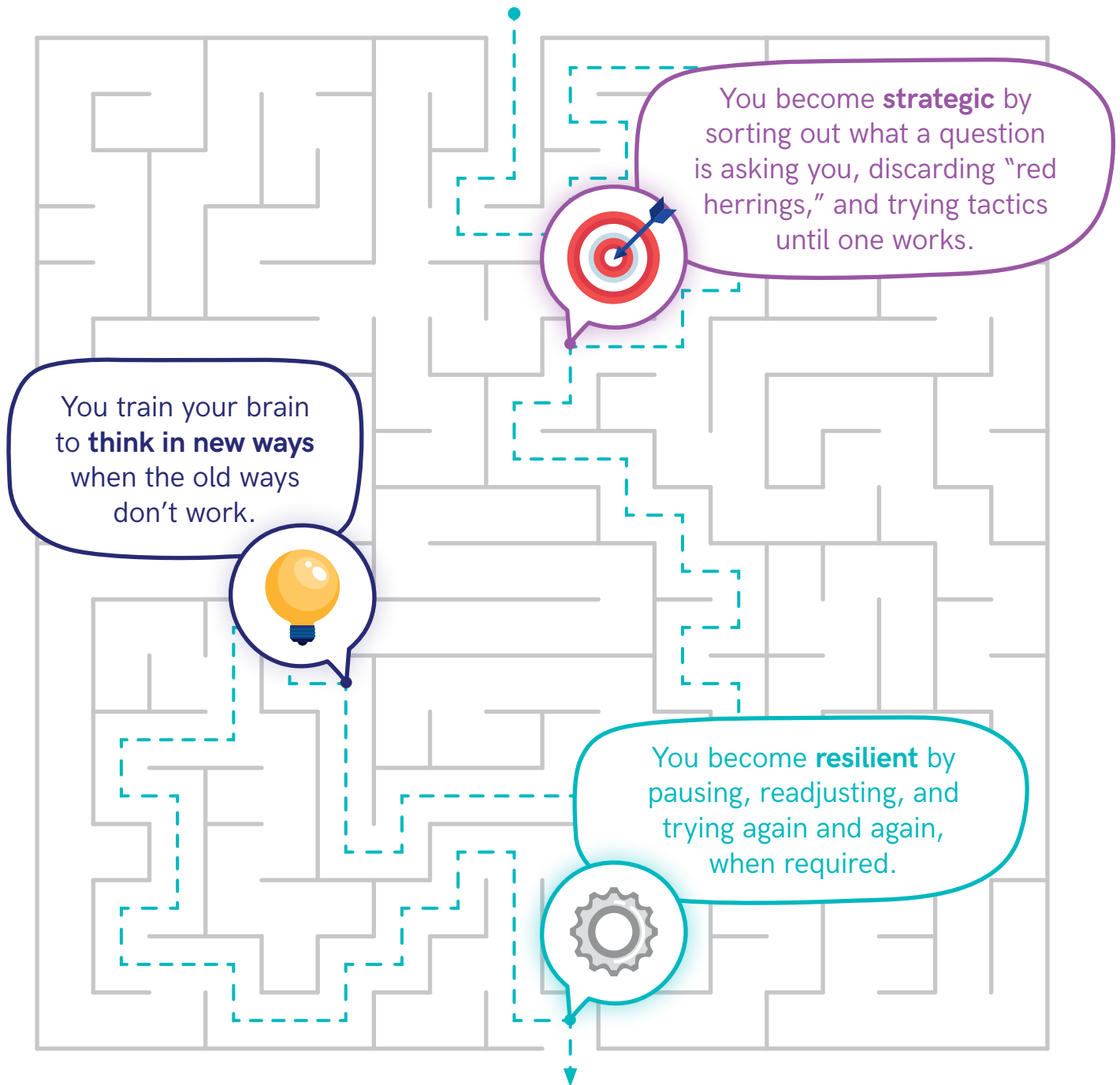
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In the following pages, you will find a collection of puzzles and challenges from our Math and Problem Solving program. We hope they spark discovery, conversation, and a deeper appreciation for the beauty of mathematical thinking.



HOW DO PUZZLES HELP TRAIN YOUR BRAIN?



HOW DO PUZZLES HELP DEVELOPMENT?

1. Sequencing Skills:

Sequencing forms a vital part of our understanding of math, language, and phonics. As a result, doing regular puzzles will help children achieve higher academic performance.

2. Decision-making Skills:

Playing with puzzles helps remove guessing the outcome of an action. Understanding why something occurs can help a child improve their decision-making skills.

3. Developing Patience and Attention to Detail:

Puzzles are a fun way to improve concentration. When concentrating on something for a long time, one develops a level of motivation once the puzzle has been finished! The sense of completion and eagerness to continue will help develop patience in children.

4. Visual Perception Skills:

Puzzles also help develop visual perception skills in young children. Differentiating between colours, shapes, and patterns, and matching them appropriately aids in visual discrimination. This skill is important for reading, writing, and recognizing objects and symbols.

5. Logical Reasoning Skills:

When working with mechanical puzzles, logical reasoning allows us to deduce the correct sequence, and arrive at the solution. The more puzzles you do, the more you improve your logical reasoning skills, which will help in various aspects of life!

6. Imagination:

You can stimulate your imagination and improve productivity by treating the puzzle as a mental workout.

7. Cognitive Challenge:

Solving jigsaw puzzles is a cognitively challenging activity, especially within the visuospatial cognitive domain.

You need to look at individual parts of a jigsaw puzzle, or the available spaces in a crossword puzzle and figure out how to fit the pieces or words into their space. If done regularly, this will improve your visual and spatial reasoning skills. Shape-oriented puzzles, like jigsaw puzzles, for example, can specifically help improve short-term memory. Recognizing patterns, particularly shapes and colours, can help the brain's spatial reasoning in the long term, too!

You utilize episodic memory to remember the shapes or pieces and are then forced to link concepts you haven't pictured together — this leads you to develop skills and think critically.

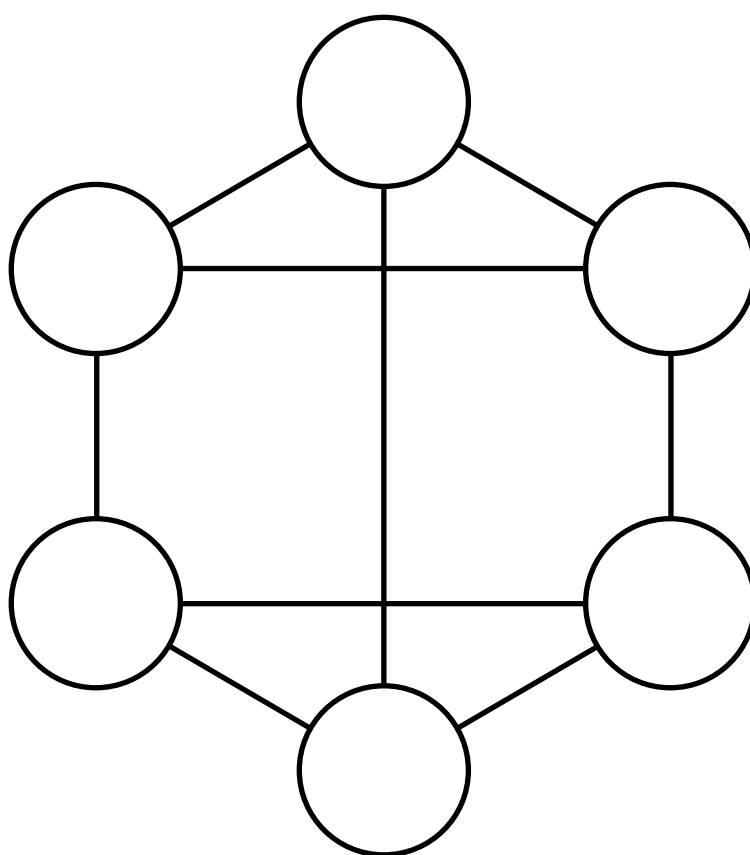
8. Spatial Awareness:

Puzzles promote spatial awareness, as children learn to navigate and fit pieces into the correct spots. Understanding spatial relationships and manipulating objects in space is an essential cognitive skill that supports activities such as reading maps, following instructions, and solving problems in geometry.

Puzzles help build resilience and concentration skills!

PROBLEM 1

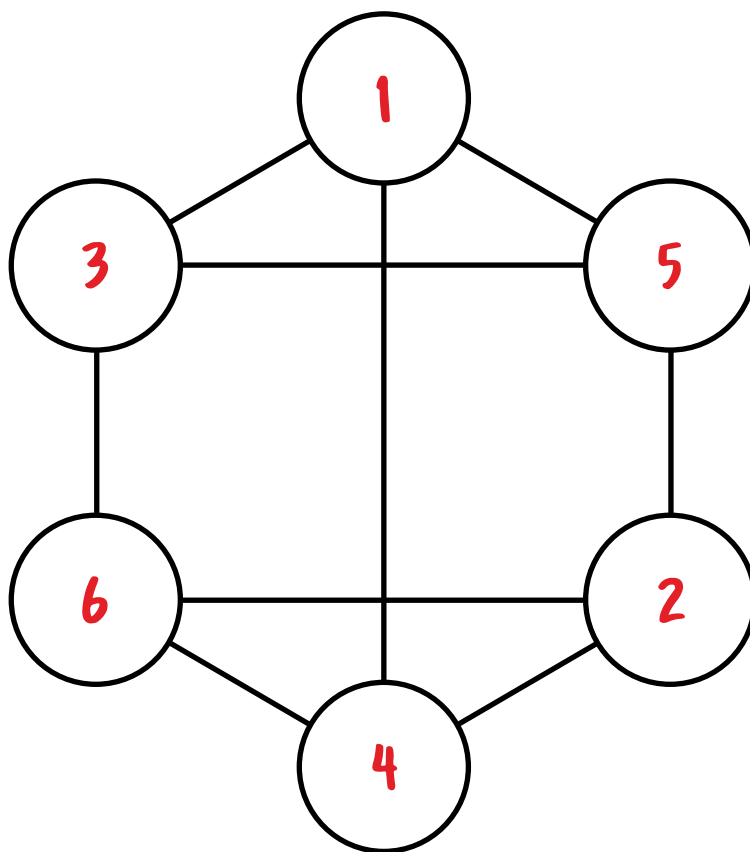
Use each of the numbers 1-6 only once. Write one in each circle so that consecutive numbers (numbers that follow each other) are **not joined**. For example, 3 must not be joined to 2 or 4.



1 2 3 4 5 6

Solution to Problem 1

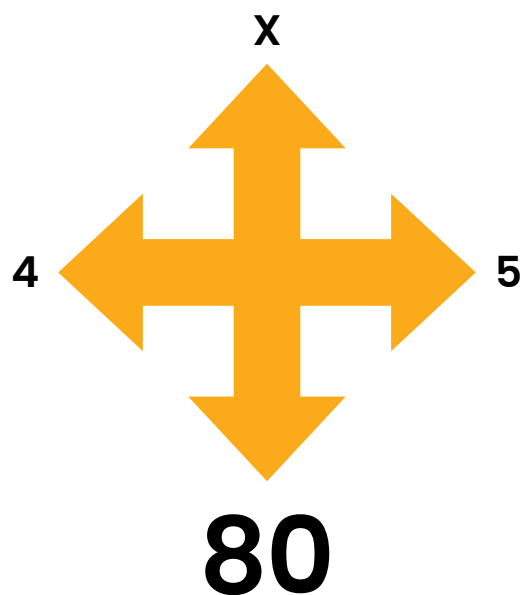
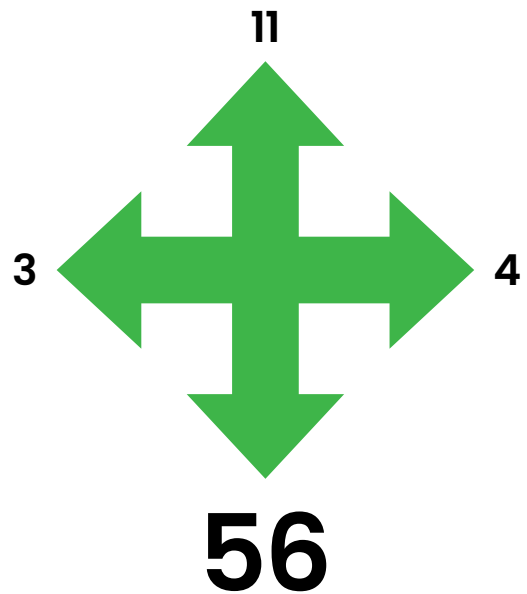
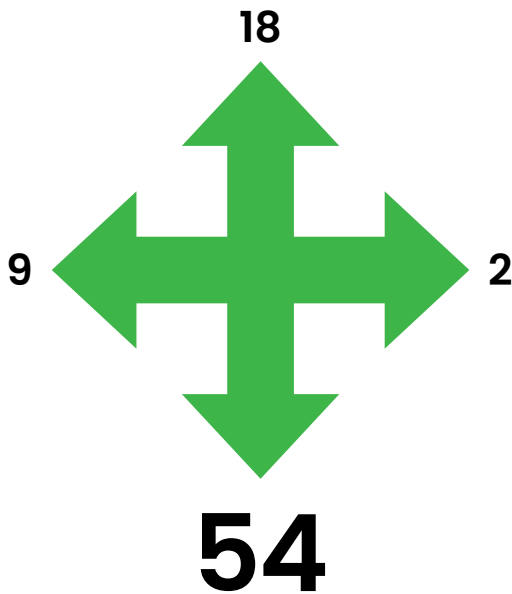
There are many possible arrangements! Here is one option:



~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ ~~6~~

PROBLEM 2

Use the pattern to find the value of x.



Solution to Problem 2

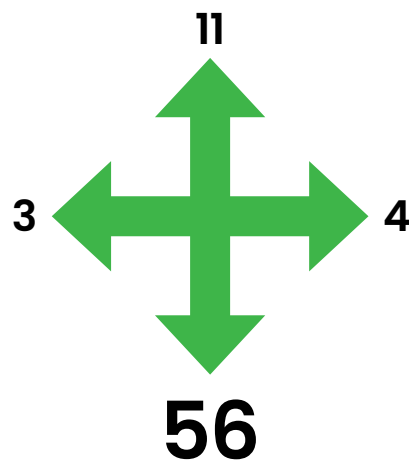
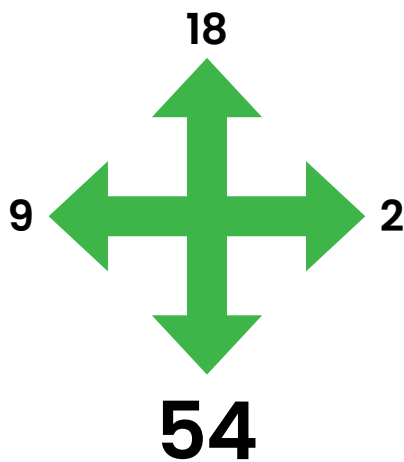
Let's look at the two complete examples and try to find the pattern!

To get the number on the bottom, we must **add** together the **top** and **left** number, then **multiply** it by the number on the **right**.

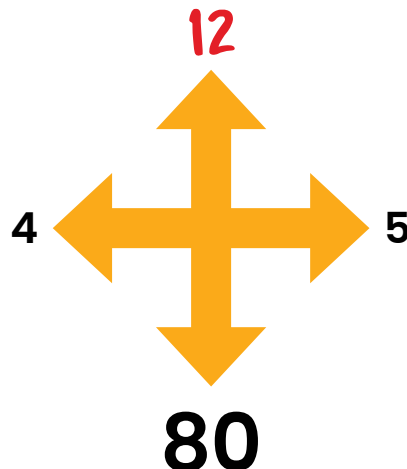
Example:

$$18 + 9 = 27 \text{ then } 27 \times 2 = 54$$

$$11 + 3 = 14 \text{ then } 14 \times 4 = 56$$

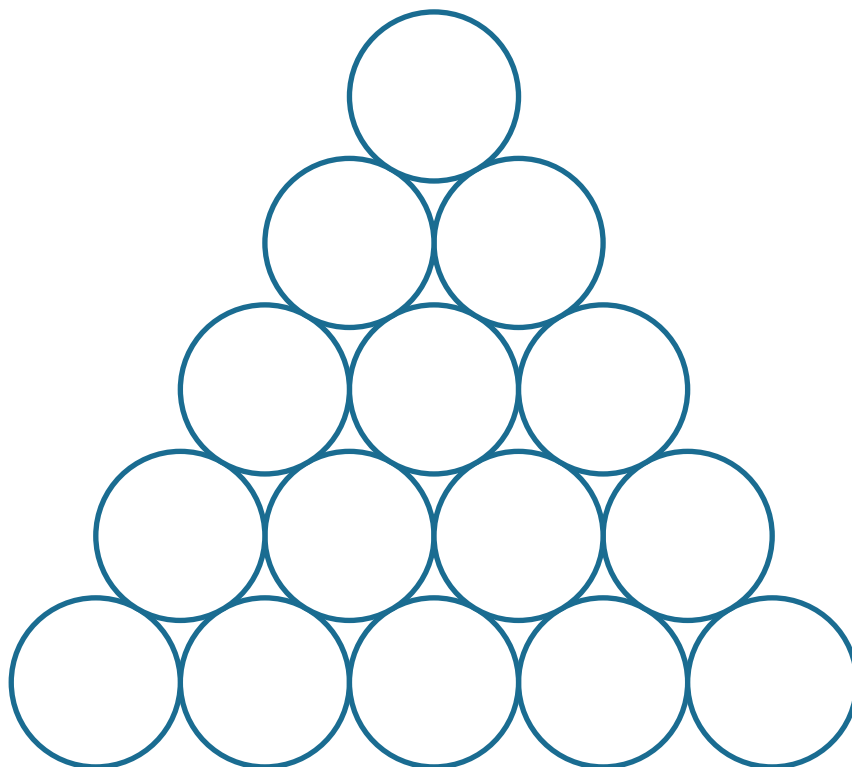


To find x , think: what number plus 4, then multiplied by 5, gives 80?
Since $(12 + 4) \times 5 = 80$, then $x = 12$.

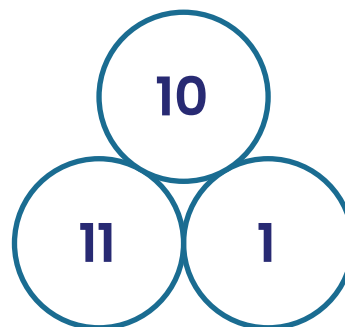


PROBLEM 3

Arrange the numbers 1-15 in the triangular pattern such that **each number in the pattern is equal to the difference between the two numbers below it.**



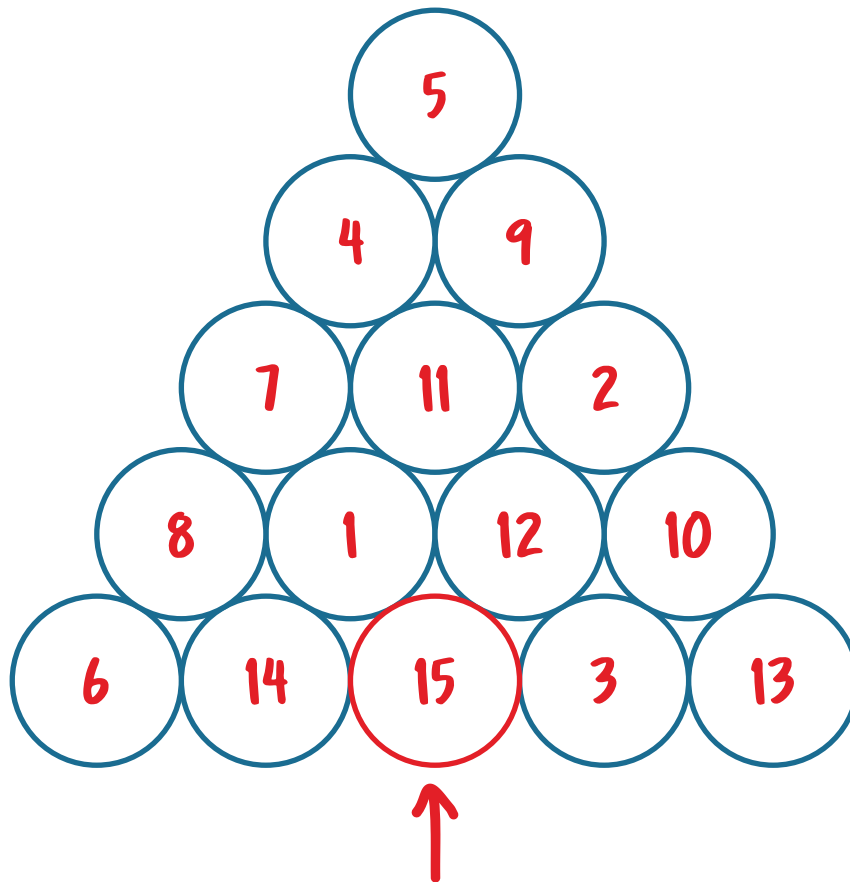
For example, if you have a 1 and 11 beside each other, there needs to be a 10 in the circle above them because $11 - 1 = 10$



Think about where the number 15 should go!

Solution to Problem 3

There are many possible answers! Here is one possibility:



Since you can only use the numbers 1-15, no two numbers can give you a difference of 15 so we must put it on the bottom row of the triangle.

PROBLEM 4

What number can replace the green star, blue square and yellow circles to make each equation true?

$$\star + \star = \square + \square + \square$$

$$\square + \square + \square = \bigcirc + \bigcirc + \bigcirc + \bigcirc$$

$$\star + \star + \bigcirc + \bigcirc = 32$$

Solution to Problem 4

There are many different approaches to this question! You can use algebra, or guess and check! Find a method that works for you!

Hints to consider before you start solving:

2 stars = 3 squares, therefore the green star must be a multiple of 2 (2, 4, 6, 8, 10, 12,...) and the blue square must be a multiple of 3 (3, 6, 9, 12, 15,...)

3 squares is equal to both 2 stars and 4 circles, therefore the value of one yellow circle must be half of the value of a green star

Answer:  = 12  = 8  = 6

$$\text{star} + \text{star} = \text{square} + \text{square} + \text{square}$$

$$12 + 12 = 8 + 8 + 8$$

$$\text{square} + \text{square} + \text{square} = \text{circle} + \text{circle} + \text{circle} + \text{circle}$$

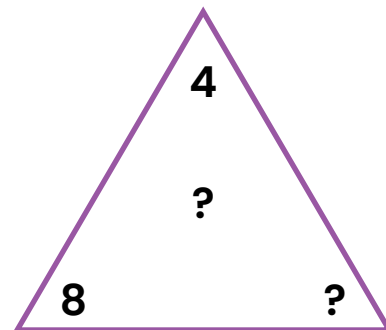
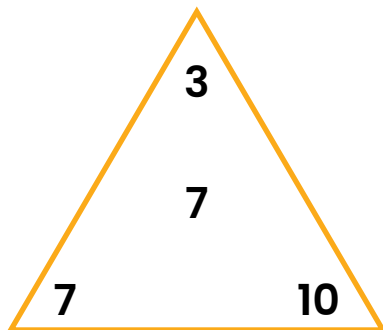
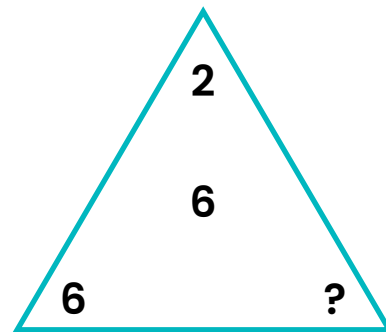
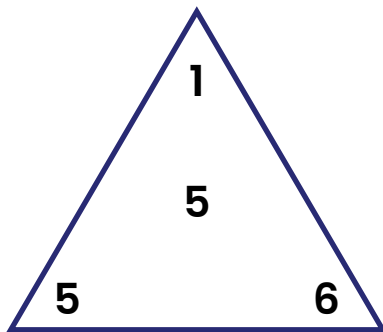
$$8 + 8 + 8 = 6 + 6 + 6 + 6$$

$$\text{star} + \text{star} + \text{circle} + \text{circle} = 32$$

$$12 + 8 + 6 + 6 = 32$$

PROBLEM 5

The numbers in each triangle follow the same pattern.
Which numbers should replace the question marks?

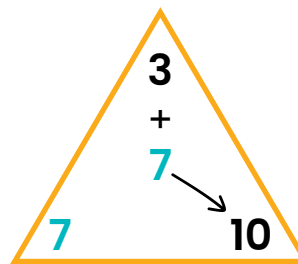
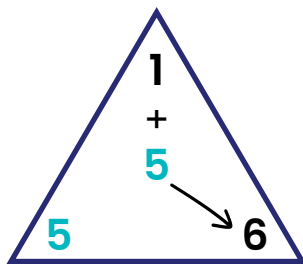


Solution to Problem 5

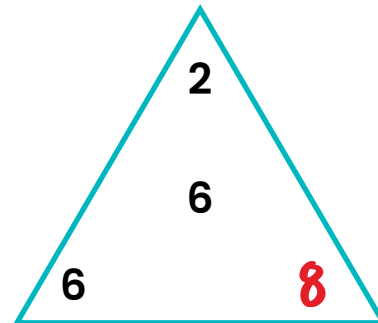
Let's look at the two complete triangles to see if we can figure out a pattern:

The **middle number** is always the same as the **bottom left** number.

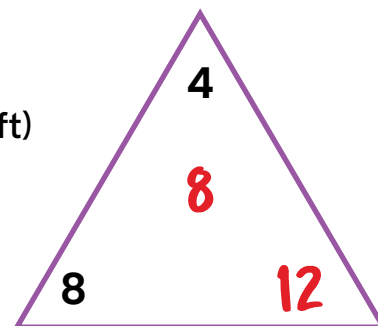
The **bottom right** number is the **sum** of the **middle** and **top** number.



Middle = 6
Top = 2
Bottom right = $6 + 2 = 8$

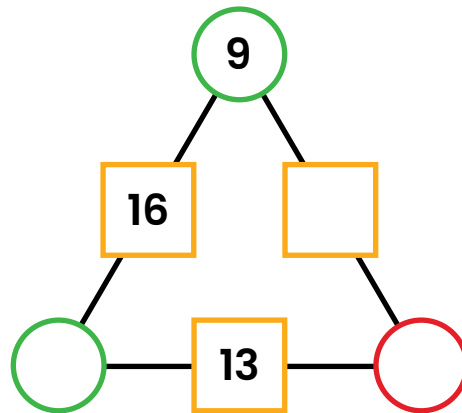
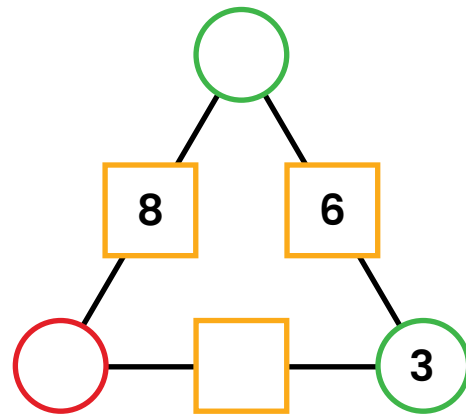
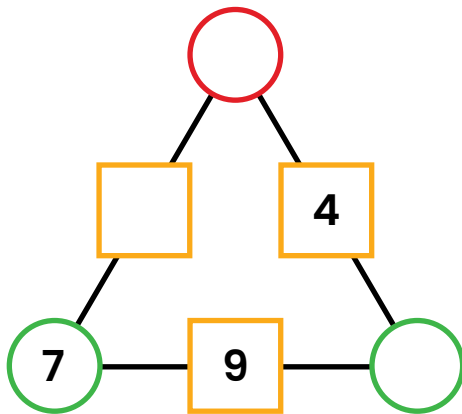


Middle = 8 (same as bottom left)
Top = 4
Bottom right = $8 + 4 = 12$



PROBLEM 6

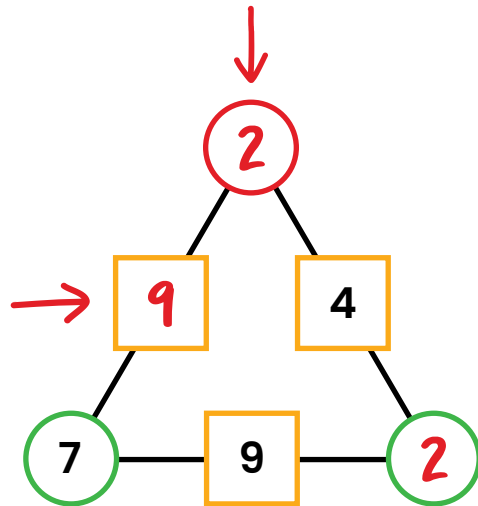
Solve the arithmagon puzzles below. The squares in the middle are equal to the sum of the 2 circles that they are between.



Solution to Problem 6

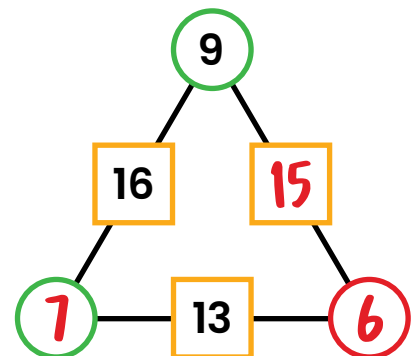
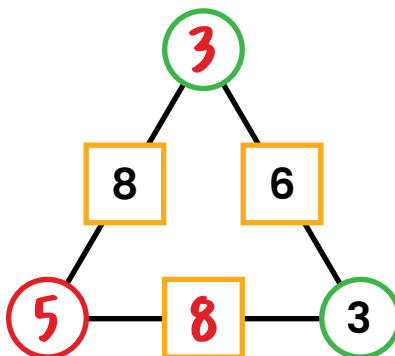
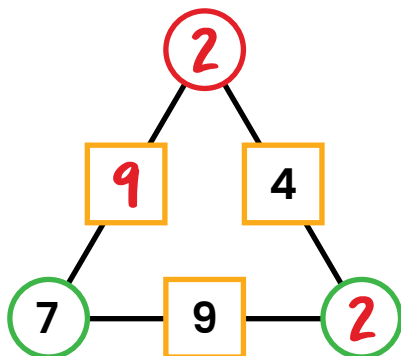
2. Now, we have to fill in the red circle! Think about what number must be added to 2 to make 4. $4 - 2 = 2$, so write a 2 in the red circle at the top!

3. To check your answer, make sure that all sides of the triangles work. $2 + 7 = 9$ so we solved correctly!



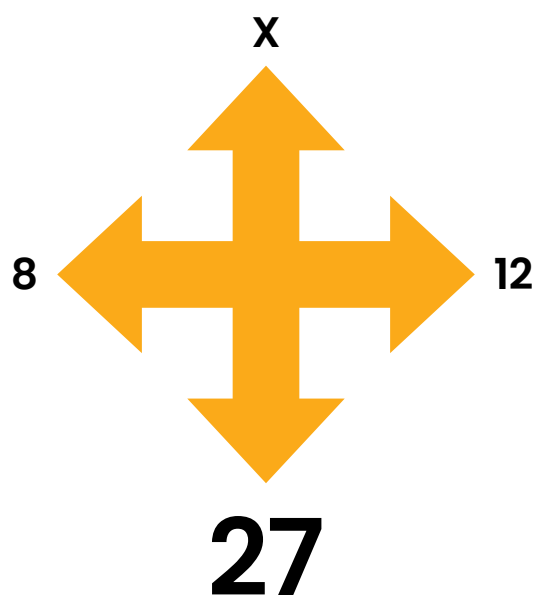
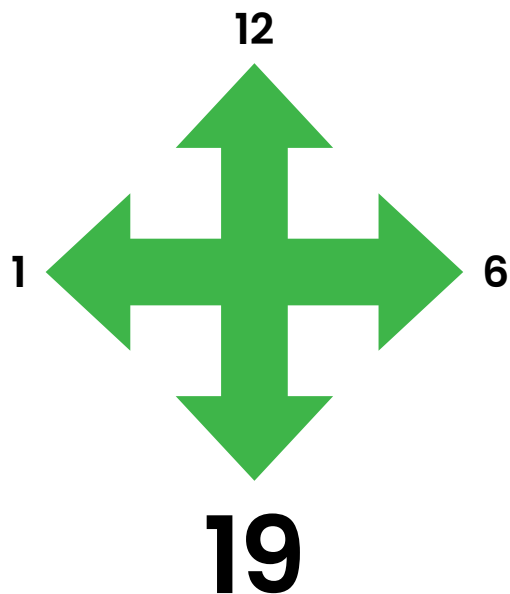
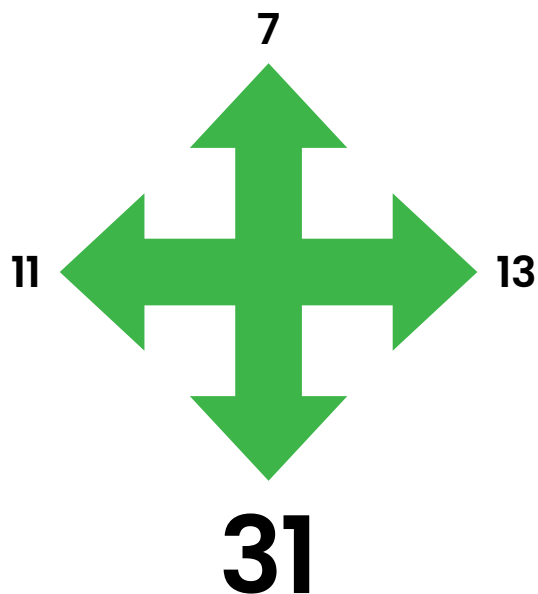
1. To solve the first triangle, think about what number you need to add to 7 to make 9. $9 - 7 = 2$, so write in a 2 in the green circle on the bottom right.

Here is the full solution for all three triangles:



PROBLEM 7

Use the pattern to find the value of x.



Solution to Problem 7

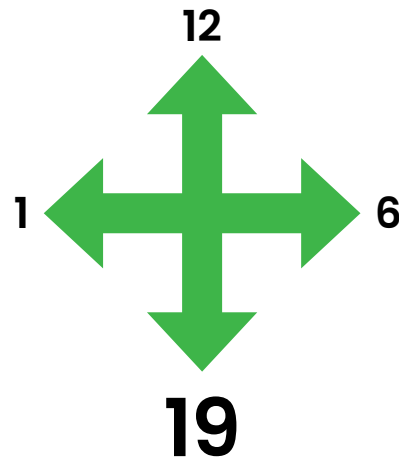
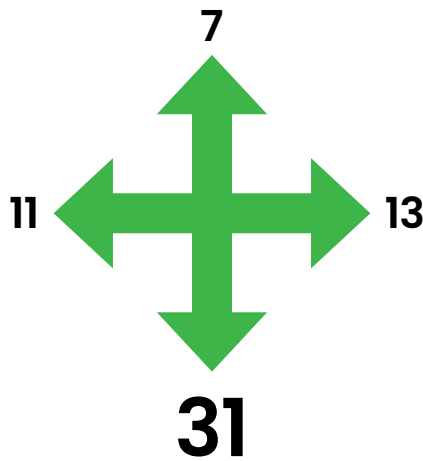
To find x , we must first find the pattern that relates the numbers in each diamond. This pattern has to apply to both of the completed diamonds.

In this case, you add the **top**, **right**, and **left** numbers to get the **bottom** number.

Example:

$$7 + 11 + 13 = 31$$

$$12 + 1 + 6 = 19$$



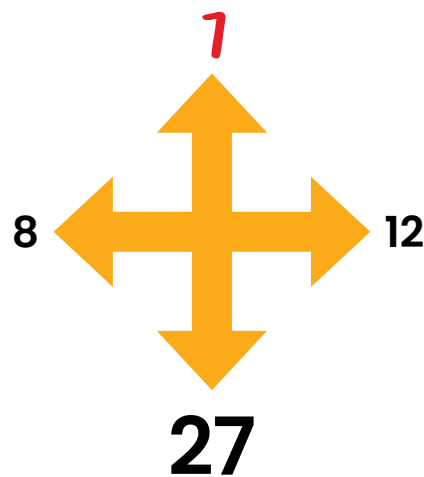
To solve for x , we know that:

$$x + 8 + 12 = 27$$

$$x + 20 = 27$$

$$x = 27 - 20$$

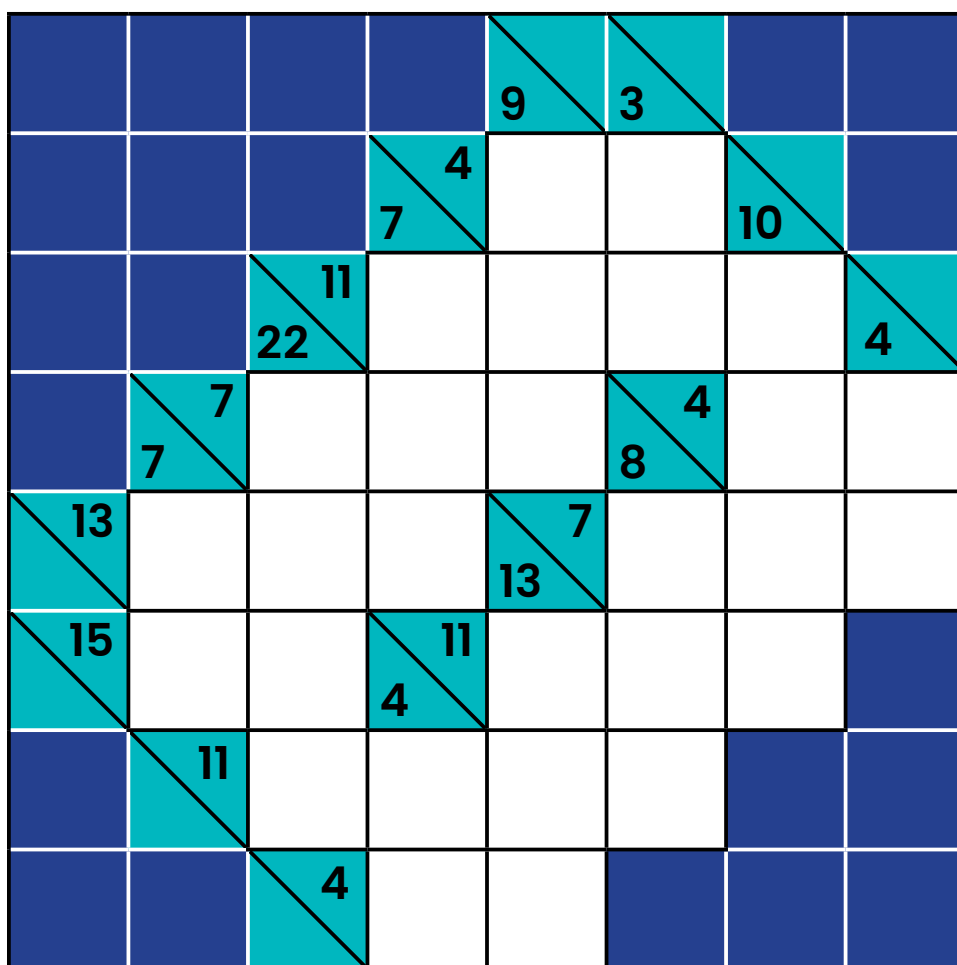
$$x = 7$$



PROBLEM 8

This is a **kakuro puzzle**. Can you place a number from one to nine in each white square so that each "run" of horizontal or vertical white squares adds up to the numbers given to the left or the top of that "run?"

You can't repeat any number within a "run."



Example: you could form a total of 4 with $1 + 3$, but not with $2 + 2$.

Solution to Problem 8

				9	3		
			7 4	3	1	10	
		11 22	1	5	2	3	4
	7 7	4	2	1	8 4	1	3
13	1	8	4	13 7	2	4	1
15	6	9	4 11	8	1	2	
	11	1	3	2	5		
		4	1	3			

PROBLEM 9

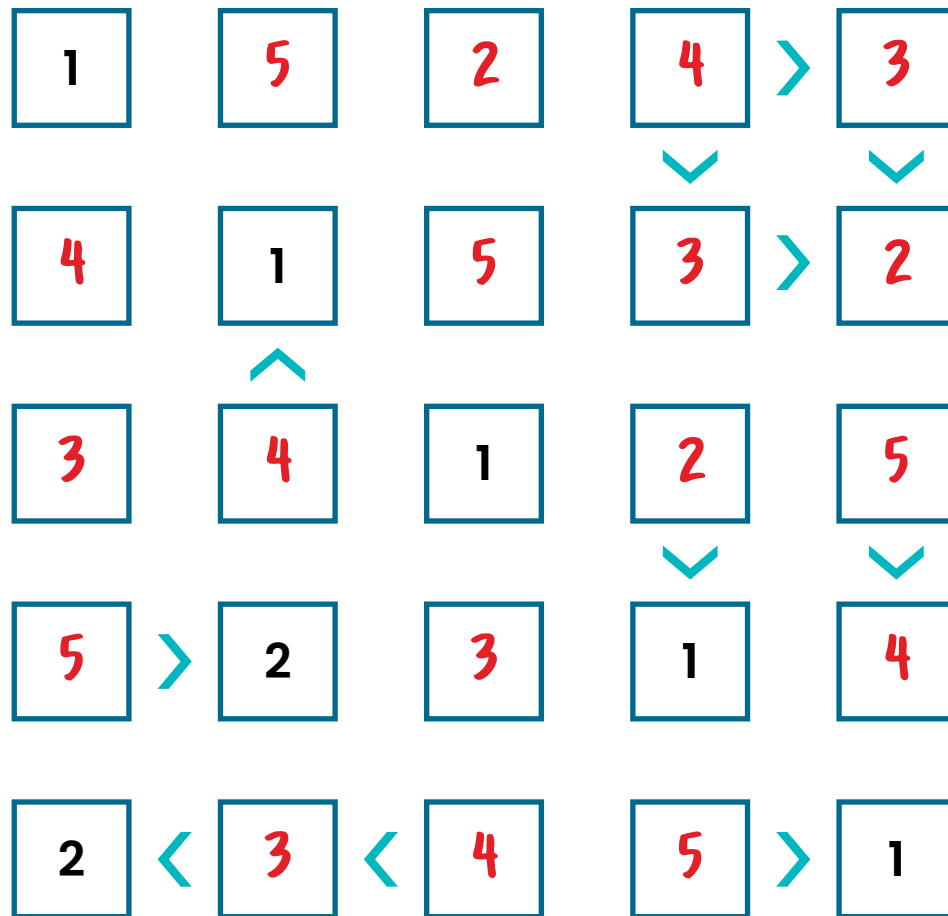
Solve this **Futoshiki puzzle** by placing a number from 1 to 5 in each empty square, so that no number repeats in any row or column. You must also follow the 'greater than' signs – there are arrows that tell you which is the larger number in some pairs of squares. The arrow always points to the smaller number.

1				>	
	1			>	
		1			
	2		1		
2					1

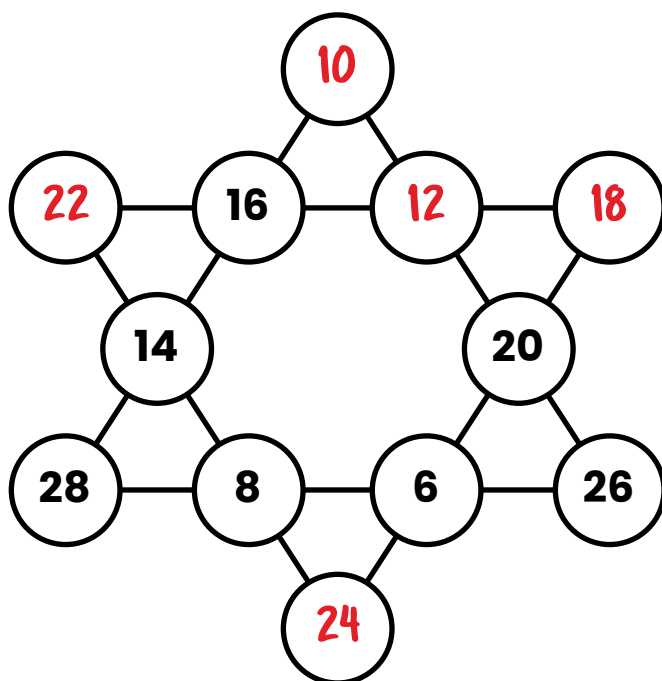
Arrows indicating constraints:

- Row 1: Arrow from column 4 to column 5 (points to the smaller number).
- Row 2: Arrow from column 4 to column 5 (points to the smaller number).
- Row 3: Arrow from column 2 to column 1 (points to the smaller number).
- Row 4: Arrow from column 4 to column 3 (points to the smaller number).
- Row 4: Arrow from column 5 to column 4 (points to the smaller number).
- Row 5: Arrow from column 2 to column 1 (points to the smaller number).
- Row 5: Arrow from column 3 to column 2 (points to the smaller number).
- Row 5: Arrow from column 5 to column 4 (points to the smaller number).

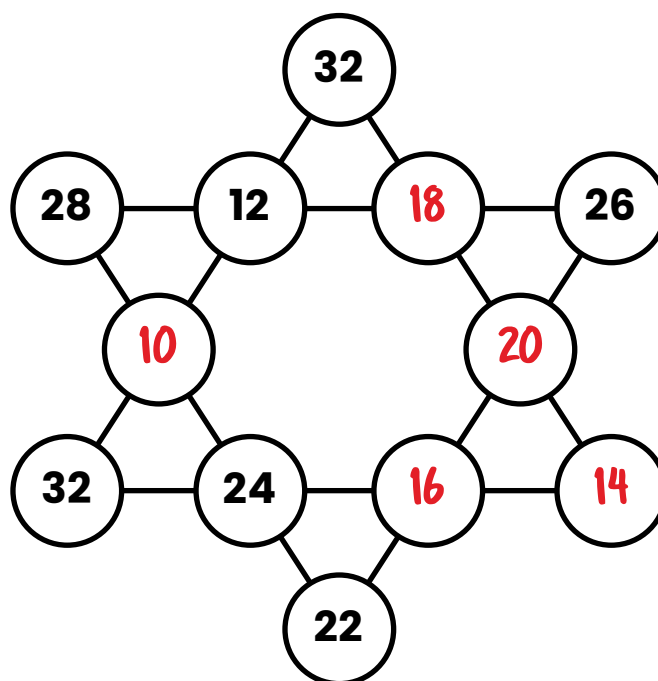
Solution to Problem 9



Solution to problem 10

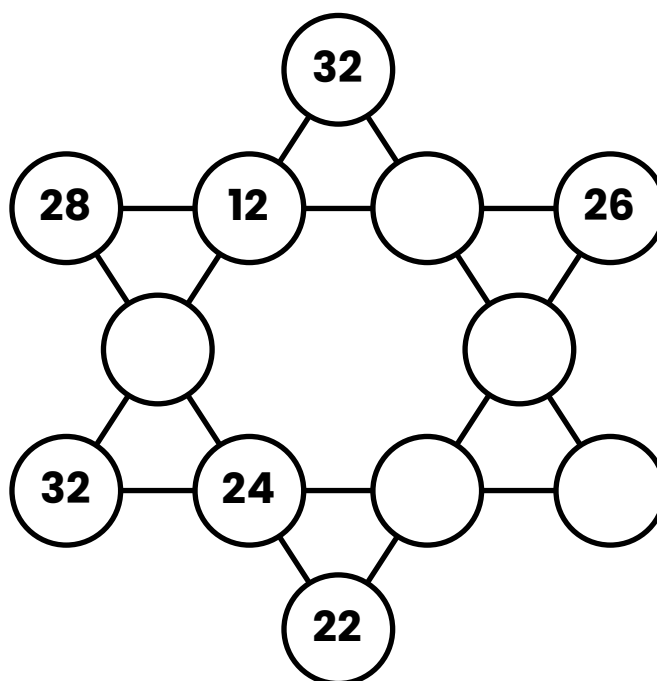
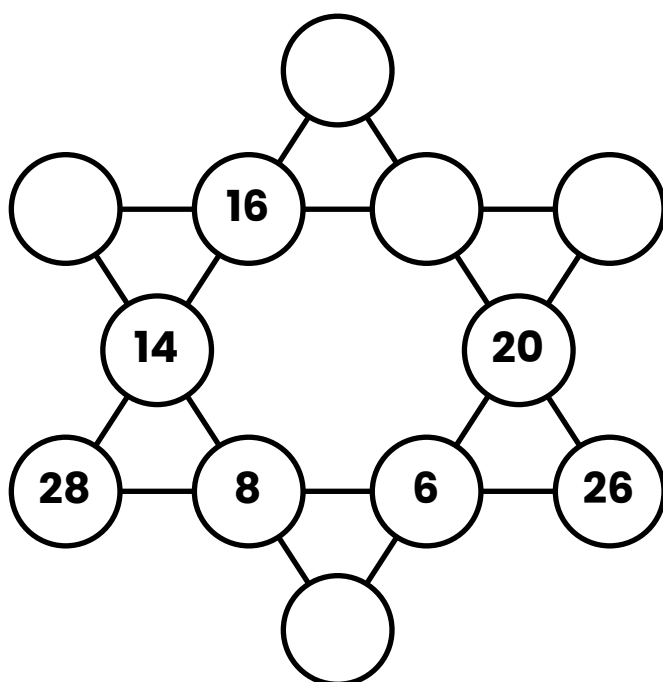


Magic number: **84**



PROBLEM 10

Provide the missing numbers in the star and find the magic number. All lines within the star must add to the same magic number and no number can be used more than once.



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