

CUEMATH

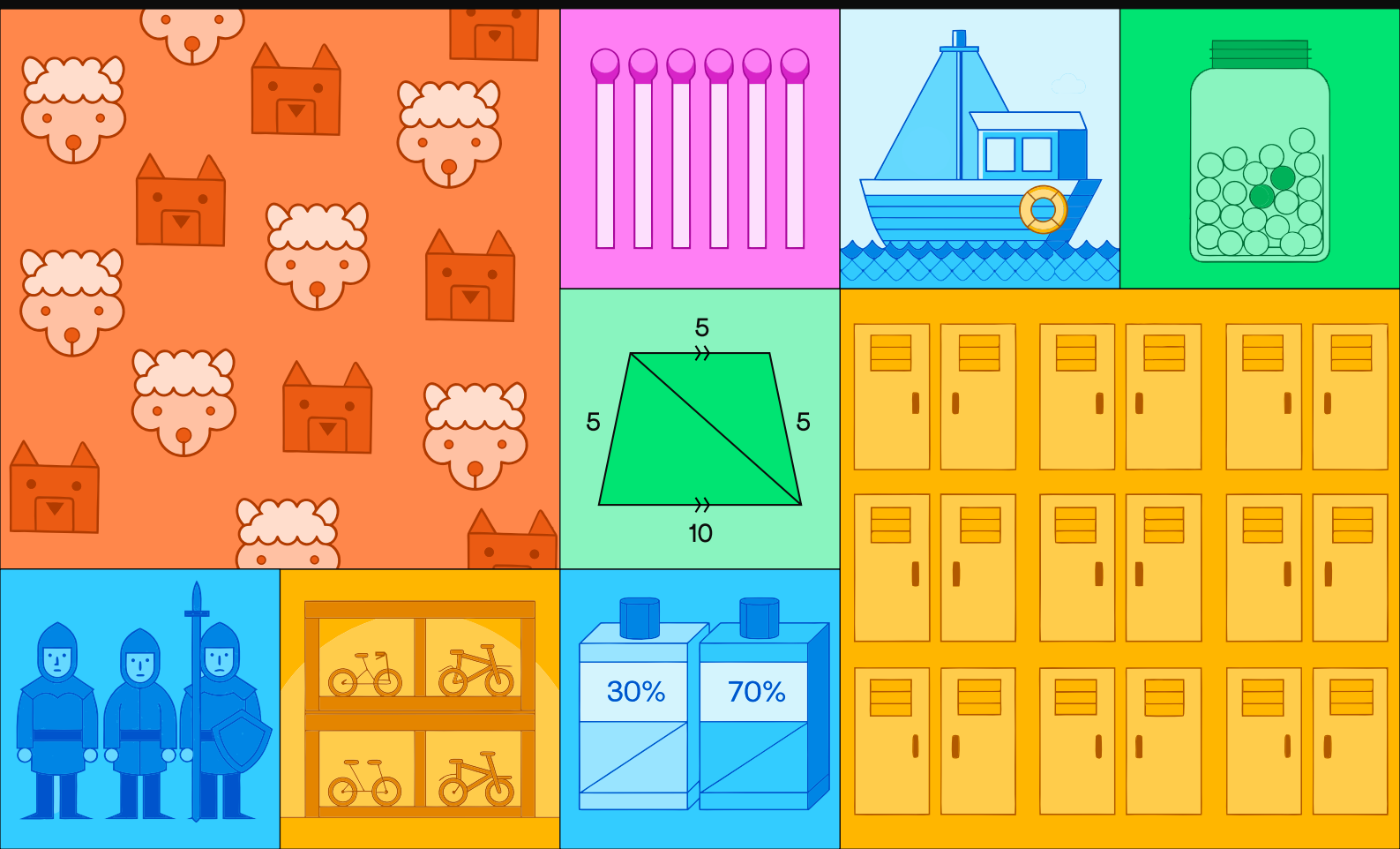
Rated 4.9+ on  Trustpilot

Make Your Child MathFit™ Through Puzzles

A Parent's Resource to
Building Math Reasoning

Manan Khurma
Founder, Cuemath

100 Selected Puzzles Inside



Index

1. Why Puzzles Make Kids MathFit	2
2. Puzzle-Solving At Cuemath	3
3. How To Use This Booklet	5
4. Very Easy Puzzles (Ages 6-8)	6
5. Easy Puzzles (Ages 7-9)	11
6. Medium Puzzles (Ages 8+)	16
7. Hard Puzzles (Ages 9+)	21
8. Very Hard Puzzles (Ages 10+)	26
9. Answers & Solutions	31
10. About Manan & Cuemath	50

Why Puzzles Make Kids MathFit

Dear Parent,

Every child is born curious. They love asking questions, spotting patterns, and solving little mysteries. This natural instinct - to figure things out - is the very foundation of mathematical thinking. And there is no better way to nurture this instinct than through **puzzles**.

At Cuemath, we believe that being “MathFit” is not so much about speed or memorization, as it is about **thinking flexibly, solving creatively, and enjoying the process**. Puzzles uniquely build these skills. They stretch a child’s mind in joyful ways, building problem-solving muscles that last a lifetime.

As Albert Einstein once said,

“It’s not that I’m so smart. It’s just that I stay with problems longer.”

When your child grapples with a puzzle - even if they struggle - they're learning how to persevere, how to think from multiple angles, and how to make logical connections. These are the very skills that not only make a child good at math, but good at life.

This booklet is a curated journey across levels of difficulty - from Very Easy to Very Hard - so you can discover puzzles suitable for your child’s age and challenge level. You don’t need to “teach” these puzzles. Sit with your child, enjoy the process, and encourage them to talk out loud as they think. That’s when real learning happens.

We created this resource not just to share puzzles, but to share a philosophy. **Math is not a subject to fear, but a playground for the mind.**

Let this booklet be your shared playground.

Warmly,

Manan Khurma

Founder, Cuemath

Puzzle-Solving At Cuemath

Where every class trains your child to think, not just calculate.

At Cuemath, we believe the best mathematicians aren't just fast calculators - they're deep thinkers. That's **why puzzle-solving is at the heart of the Cuemath learning experience.**

From the very first class, your child will start engaging with handpicked puzzles designed to stretch their mind and spark curiosity. These aren't just brain teasers for fun - they're tools for **developing reasoning, logic, and problem-solving skills** that will serve them for life.

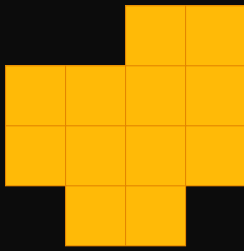
Puzzles In Every Class

Puzzle solving happens in every Cuemath tutoring session:

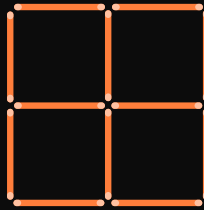
- **In every class**, your child's Cuemath tutor will present a puzzle chosen thoughtfully by our AI learning engine.
- The child will then **reflect on it independently**, or talk about it with you, siblings, or friends.
- In the next class, the tutor will **dive into your child's reasoning**, rewarding not the right answer, but the depth and clarity of thought.
- Over time, your child will **build powerful habits of mathematical thinking** - learning to persist, analyze, and discover.

Puzzles In Daily Practice

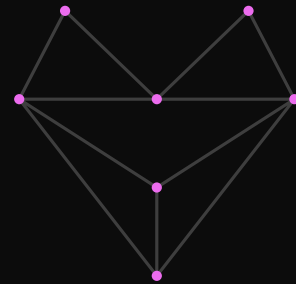
Our **Cuemath Practice App** offers daily puzzles that include all kinds of fun logical puzzles:



Divide this shape into 3 identical parts



Move 3 sticks to get 3 squares



Draw this pattern without lifting your hand

You can also play strategy games & mental math games on the app.

Our AI engine will auto-calibrate the level of these challenges to your child's current level of proficiency.



Scan To Download

By solving **thousands of math puzzles** during their Cuemath journey, your child will become truly MathFit - prepared for everything from school success to competitive exams and real-world challenges.

No other program integrates puzzles so deeply and purposefully. At Cuemath, we don't just teach math.

We shape math thinkers for life.

How To Use This Booklet

This booklet is not just a collection of puzzles - it's a toolkit to make your child MathFit: confident, curious, and resilient in mathematical thinking. Here's how to make the most of it:

★ Start Smart

Begin at the level where your child feels about 80% confident. This puts them in the “just right” challenge zone - not too easy, not overwhelming.

★ Think Aloud

Ask your child to explain their thinking out loud. It's not just about finding the answer—it's about understanding the why.

★ Encourage the Process

Celebrate creative approaches, not just correct answers. A “wrong” solution with great thinking is still a win!

★ Move Up Thoughtfully

When your child can solve about 15 out of 20 puzzles in a level confidently, they're ready to try the next level.

★ Shift the Language

Use empowering, curiosity-driven language to foster a growth mindset:

✗ “That’s wrong, try again.”

✓ “Interesting approach! What would happen if we tried...?”

✗ “Let me show you the right way.”

✓ “What clues does the puzzle give us? What do you notice?”

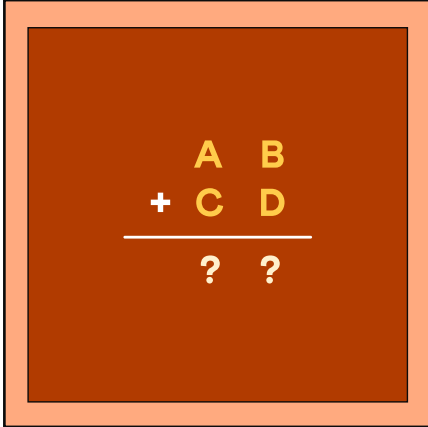
✗ “This should be easy for you.”

✓ “This puzzle is designed to make you think—let’s explore it together.”

Puzzles done right can build your child's math brain, spark joyful learning, and create powerful parent-child moments. Here's your chance to make math magical for your child!

Very Easy Puzzles

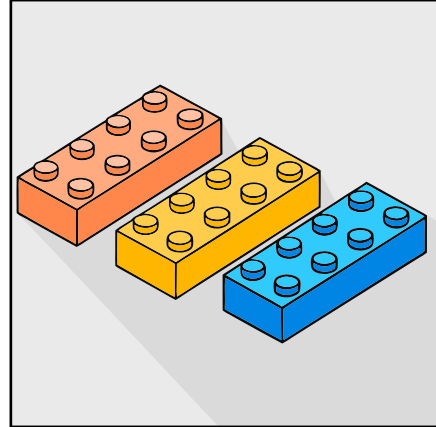
#A1



Use the digits 1, 2, 3, and 4 once each. Put them in place of A, B, C, and D to make two 2-digit numbers.

What is the smallest total you can get when you add them?

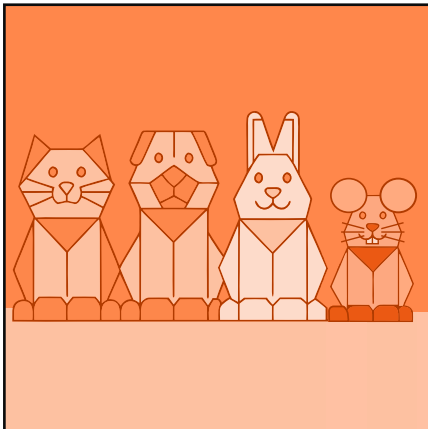
#A2



Can you make a tower with 2 red, 2 blue and 1 yellow blocks? Rules:

1. The yellow block must touch two blue blocks
2. Blue blocks cannot be at the top or bottom of the tower

#A3

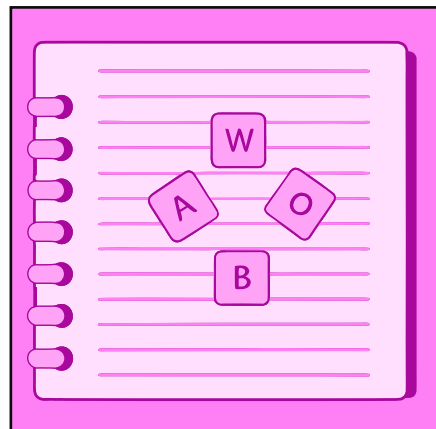


Four animals stand in a line

- Cat is not first.
- Dog is next to cat.
- Rabbit is at one end.
- Only mouse is between rabbit and dog.

What is the order?

#A4

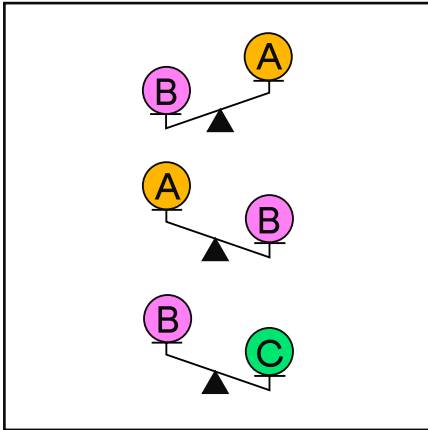


In a secret code, each letter is replaced by the letter that comes 2 places before it in the alphabet (A→Y, B→Z, C→A, etc.).

What does the coded message "AMSLR" say?

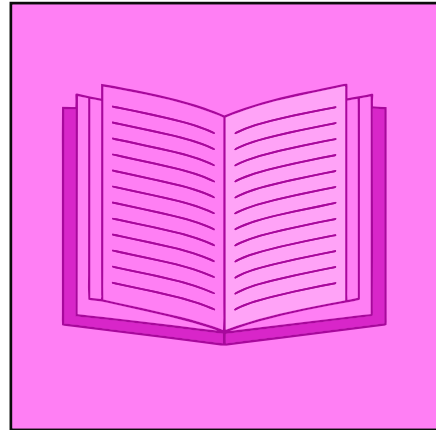
Very Easy Puzzles

#A5



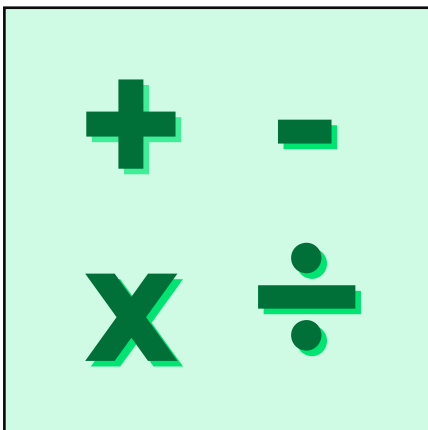
Among A, B and C, which one is the lightest?

#A6



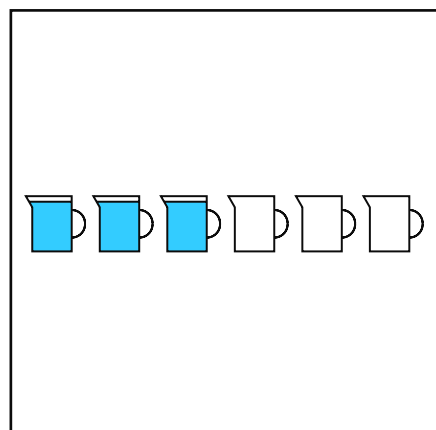
A book has pages numbered from 1 to 22.
How many times does the number 2 appear in the page numbers?

#A7



Change the operators to get a result of 0 instead of 10. You can use +, -, x or ÷ for any of the three operators. $4+3+2+1=10$

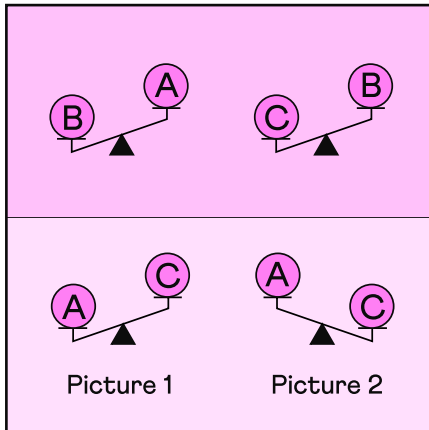
#A8



Move only 1 jug to make them alternate (full-empty-full-empty-full-empty).

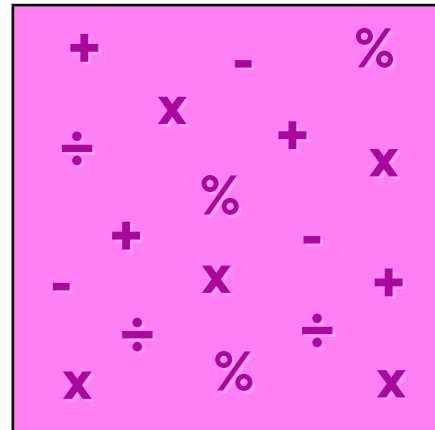
Very Easy Puzzles

#A9



Which picture is correct?

#A10

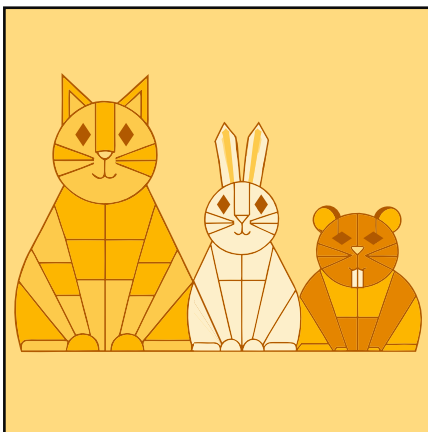


Can you make this equal to 1?

You can use +, -, x or ÷ for any of the three operators.

$$5 + 5 + 5 + 5 = 20$$

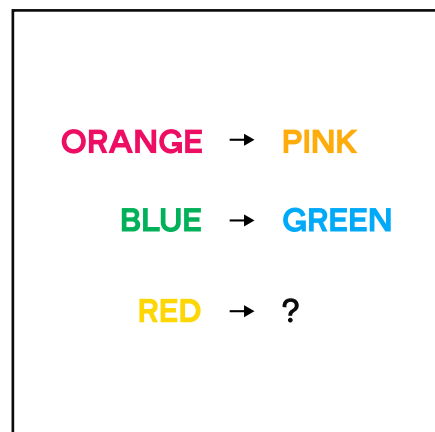
#A11



A magician has 3 hats: big, medium, and small. Each hat hides one animal: a rabbit, a cat, and a mouse. The biggest animal is in the smallest hat.

The smallest animal is not in the biggest hat. Where is each animal?

#A12



Which word is missing, and in what color should it be written?

Very Easy Puzzles

#A13



Ava, Jake, and Mia are talking about how many books they read last year.

- Jake read more books than Ava.
- Mia did not read the most or the fewest books.

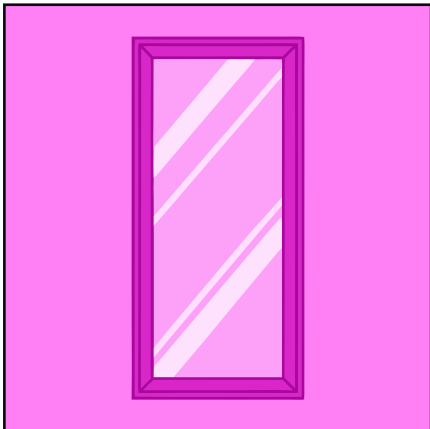
Who read the most books? Who read the fewest books?

#A14

$$\begin{array}{r} A \ A \ 6 \\ + \ A \ 5 \\ \hline A \ 7 \ 1 \end{array}$$

Find the value of A.

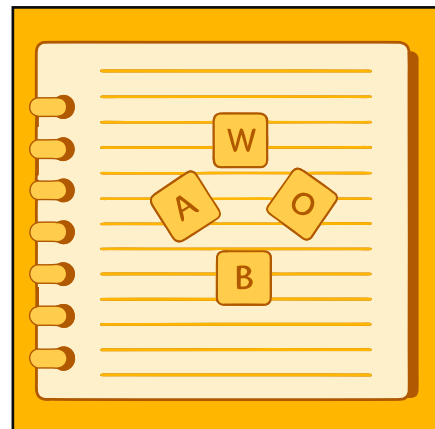
#A15



Look at these words:
BOX, WOW, MOM, DAD

Which words look the same in a mirror?

#A16

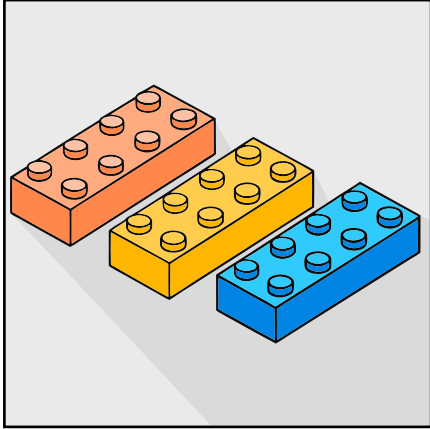


In a secret code, each letter is replaced by the letter that comes 4 places after it in the alphabet (A → E, B → F, etc.).

If Z wraps around to D, what does the coded message "WLETI" say?

Very Easy Puzzles

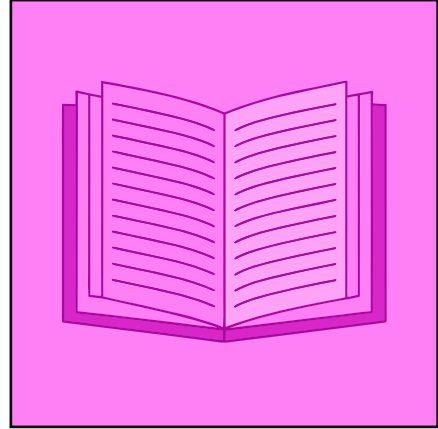
#A17



Can you make a tower using 2 red blocks, 2 blue blocks, and 1 yellow block? Rules:

- The tower must have blocks of the same color at both ends.
- Yellow blocks cannot be placed next to red blocks.

#A18



A book has 100 pages numbered from 1 to 100.

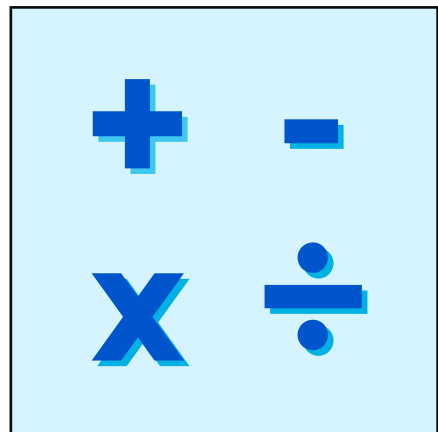
How many times does the digit 1 appear in the page numbers?

#A19

$$\begin{array}{r} B \quad 2 \\ + \quad B \quad B \\ + \quad 2 \quad B \\ \hline 8 \quad 8 \end{array}$$

Find the value of B.

#A20



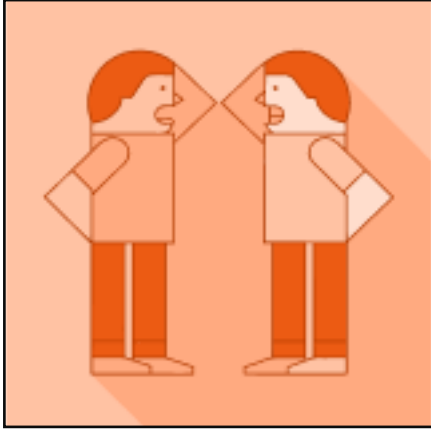
Change the operators to get a result of 0 instead of 10.

You can use +, -, ×, or ÷ for any of the three operators.

Original equation: $4 + 3 + 2 + 1 = 10$

Easy Puzzles

#B1

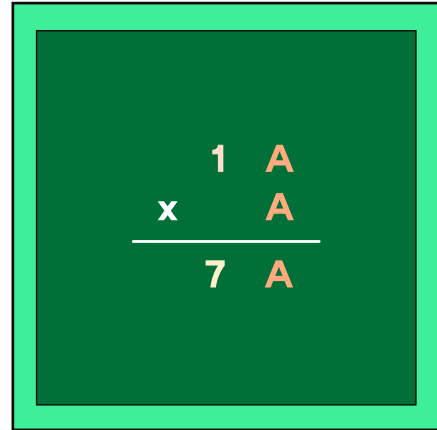


Alex and Bob each get a different 1-digit number from 0-9.

Bob says, "I don't know your number, but I know my number is smaller than yours!"

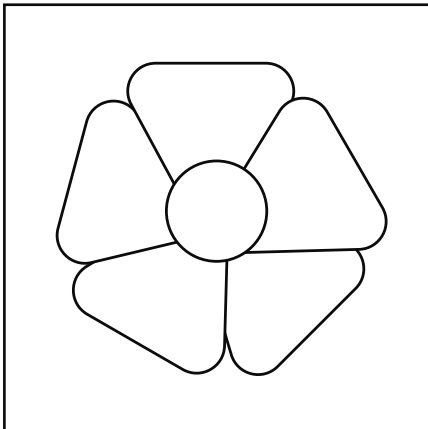
What could Bob's number be?

#B2



What is the value of A?

#B3

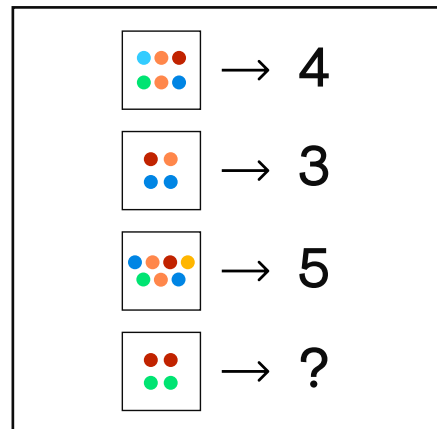


You want to color the flower.

If two parts are touching, they must be different colors.

What is the smallest number of colors you need to color the whole flower?

#B4



Find the missing Number.

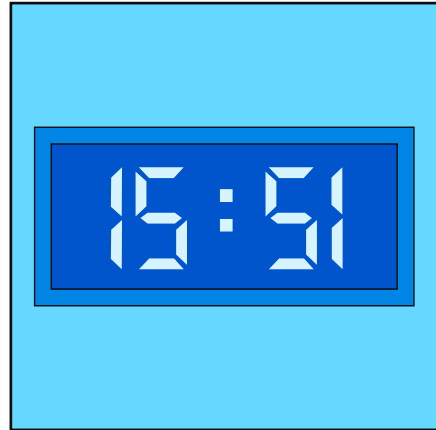
Easy Puzzles

#B5

$$\begin{array}{r} A \ B \\ + C \ D \\ \hline ? \ ? \ ? \end{array}$$

A, B, C and D are different digits (0-9). What is the maximum result of the following sum?

#B6



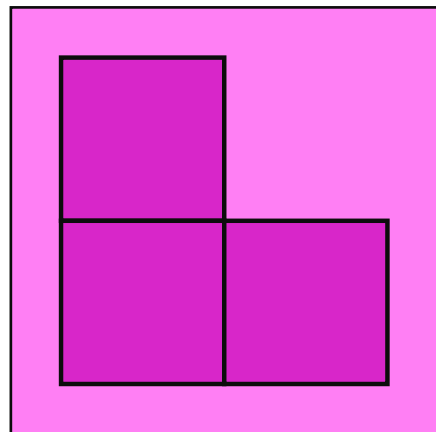
How often in a day does a digital clock display four identical digits? The picture shows a digital clock with exactly two identical digits.

#B7

$$\begin{array}{r} A \ B \\ - C \ D \\ \hline ? \end{array}$$

A, B, C, and D are different digits (0-9). The result of the difference shown is not negative. What is the smallest result we can get?

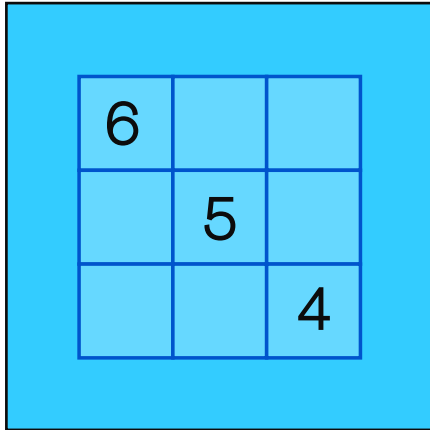
#B8



Divide this figure into 4 equal parts.

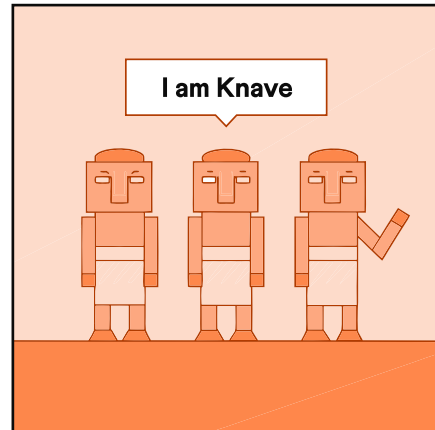
Easy Puzzles

#B9



Fill in the missing numbers in this magic square, where each row, column, and diagonal must add up to the same sum.

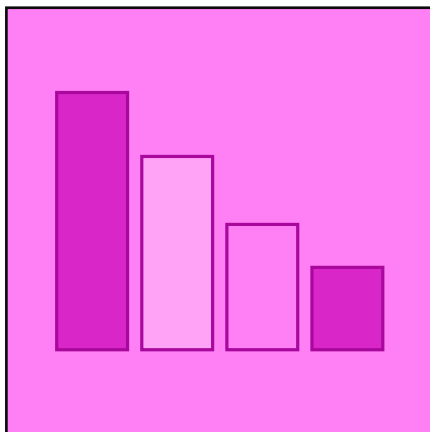
#B10



An island has knights who always tell the truth, knaves who always lie, and jokers who can do either.

What must this islander be?

#B11

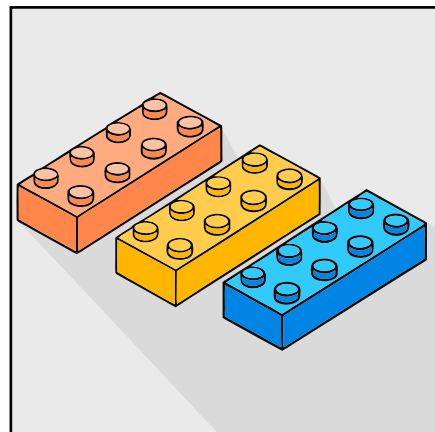


Amy, Ben, Charlie and Dave compare their heights.

- Amy is taller than Ben.
- Ben is taller than Charlie.
- Dave is not the shortest.

Who is the shortest?

#B12



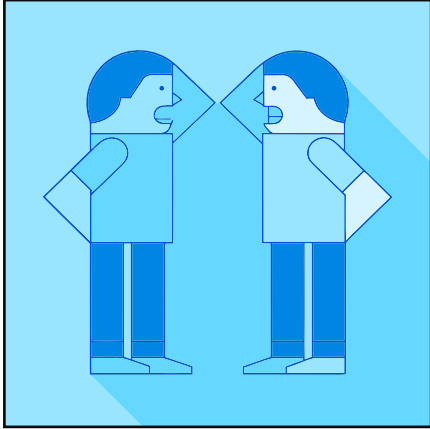
Can you make a tower with 2 red, 3 blue and 2 yellow blocks?

Rules: Blocks having the same color can't be next to each other.

Blue blocks can't be at the bottom or top of the tower.

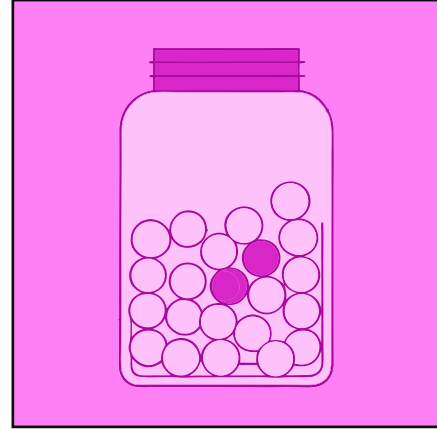
Easy Puzzles

#B13



Alex and Bob each have a different 1-digit number from 0 to 9.
Alex says, "I don't know your number, but I know my number is larger than yours!"
What could Alex's number be?

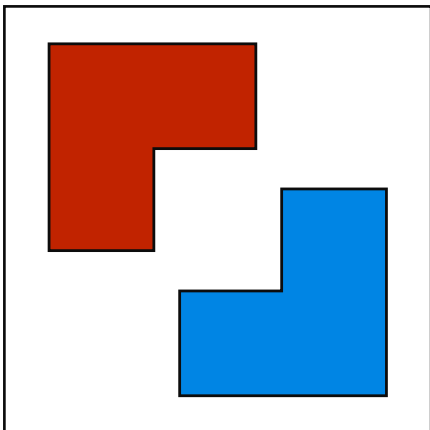
#B14



A jar contains 2 red marbles, 3 blue marbles, and 2 green marbles.

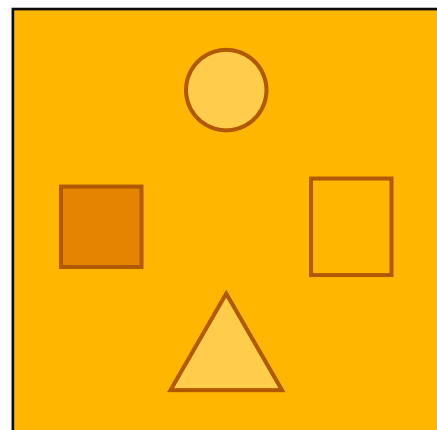
What is the smallest number of marbles you must pick to make sure you get at least one red marble?

#B15



Divide the red figure into 2 equal parts and the blue figure into 3 equal parts.

#B16



Emma has 4 shapes: a circle, a square, a triangle, and a rectangle. She lines them up following these rules:

- The square is not first or last.
- The circle is next to the triangle.
- The rectangle is at one end.

What is the order of the shapes?

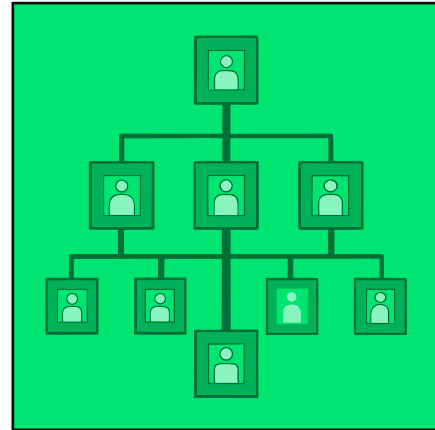
Easy Puzzles

#B17

$$\begin{array}{r} 7 \quad V \\ - \quad V \quad S \\ \hline V \quad 7 \end{array}$$

Find the value of V and S, where V and S are different digits.

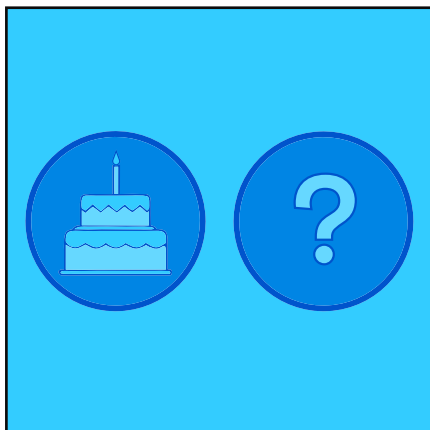
#B18



Mark says, "This woman's son is my son's father."

How is Mark related to the woman?

#B19



Two days ago, Kelly was 8 years old.
Next year, she will be 11 years old.
How is this possible?

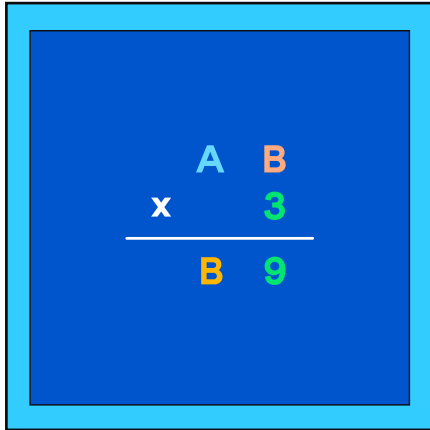
#B20

$$\begin{array}{r} 2 \quad X \\ + \quad X \quad 6 \\ \hline Y \quad 1 \end{array}$$

Find the value of X and Y?

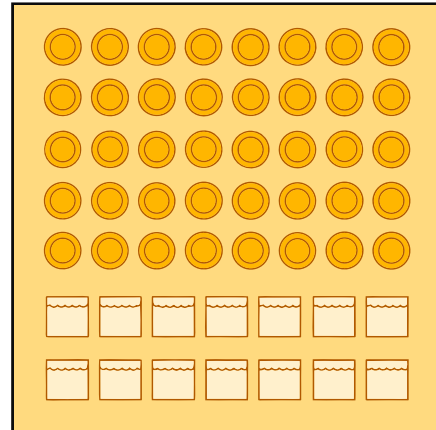
Medium Puzzles

#C1



A and B are different digits from 0-9. Find them.

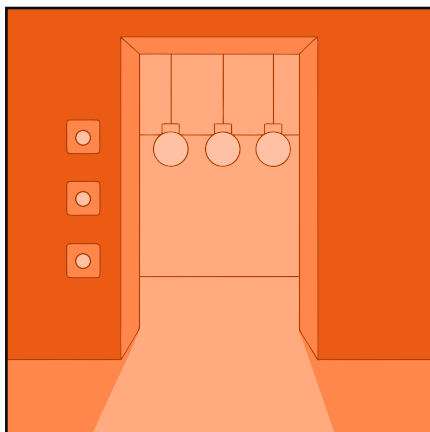
#C2



Sid has 10 pockets and 44 coins. He wants to put the coins in his pockets so that each pocket contains a unique number of coins.

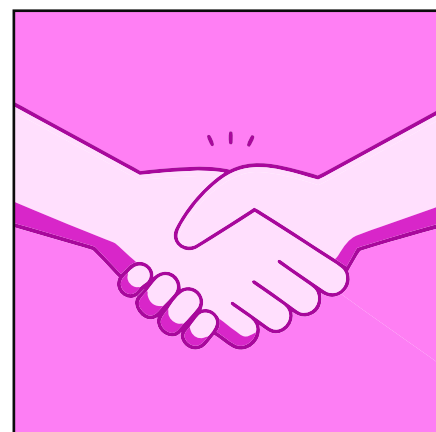
Can Sid do this? Why or why not?

#C3



You are outside a room with three switches on the wall. Inside the room are three light bulbs. You can flip the switches however you want, but once you enter the room, you cannot change the switches anymore. How can you determine which switch controls which light bulb by entering the room only once?

#C4



In a book club, everyone shakes hands with everyone else exactly once. If there are 10 handshakes total, how many people are in the book club?

Medium Puzzles

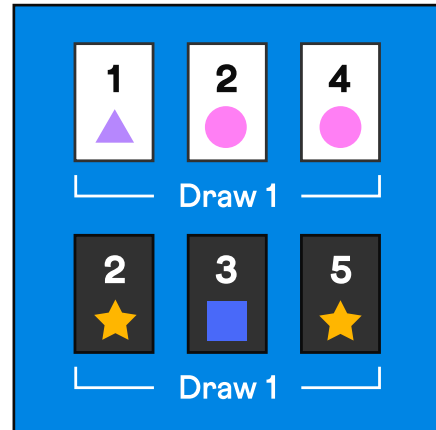
#C5



Every letter corresponds to a different digit, and 0 cannot be the first digit of a number.

Find the value of $C+A+R$.

#C6

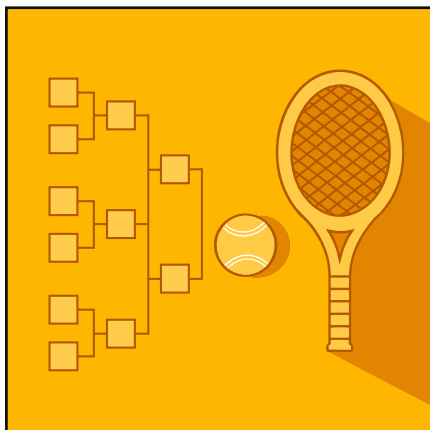


You pick one card from the white deck and one card from the black deck.

Which outcome is more likely to be met?

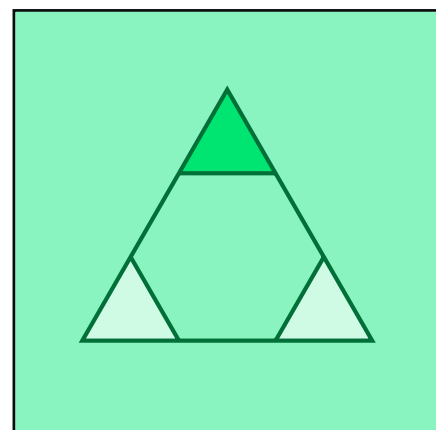
- A. Triangle (▲) and Square (■)
- B. Circle (●) and Star (★)

#C7



In a knockout tennis tournament with 127 players, how many matches must be played to determine the champion?

#C8

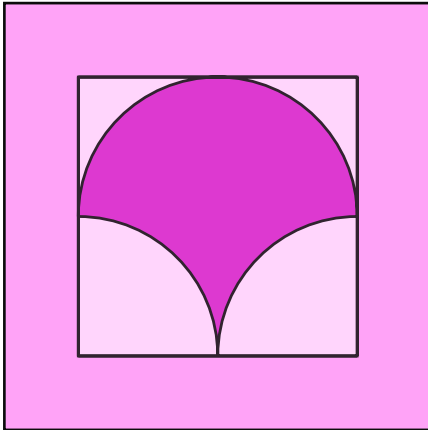


The hexagon in the figure above is a regular hexagon, and the large triangle has an area of 90 square units

What is the area of the green triangle?

Medium Puzzles

#C9



A square contains three circular arcs of the same radius.
How does the area of the shaded region compare to the total area of the unshaded regions?

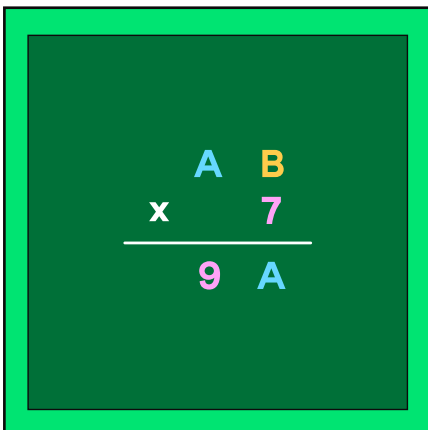
#C10



I have 100 balls to distribute into three boxes. In each round, I place 1 ball in Box A, 2 balls in Box B, and 3 balls in Box C. I repeat this pattern until all balls are distributed. Find:

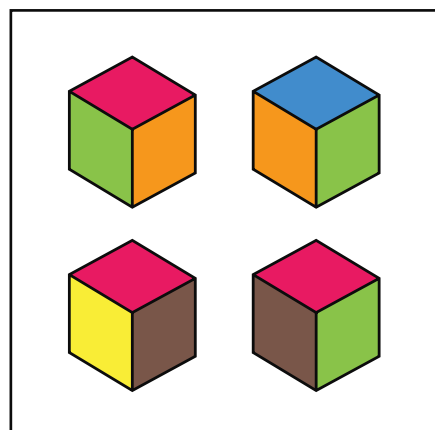
- Which box receives the last ball?
- How many balls end up in each box?

#C11



A and B are digits from 0-9. Find them.

#C12

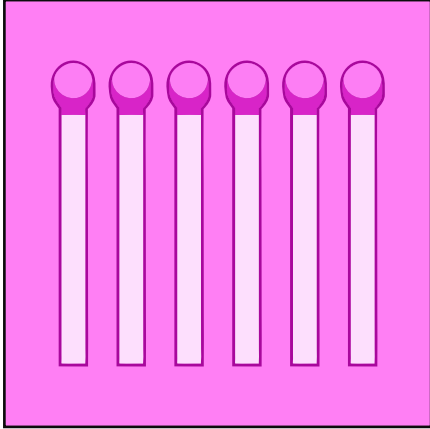


Different orientations of the same cube are shown.

What is the color of the face opposite the yellow face?

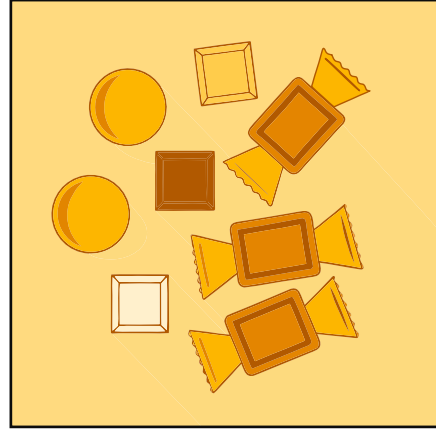
Medium Puzzles

#C13



Six matchsticks are arranged to form four equilateral triangles. How is this possible?

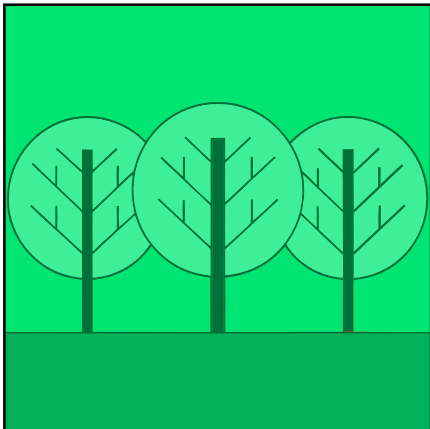
#C14



A shopkeeper sells 3 chocolates for \$10. If you return 3 wrappers, you get 1 chocolate for free.

How many chocolates can be bought for \$450?

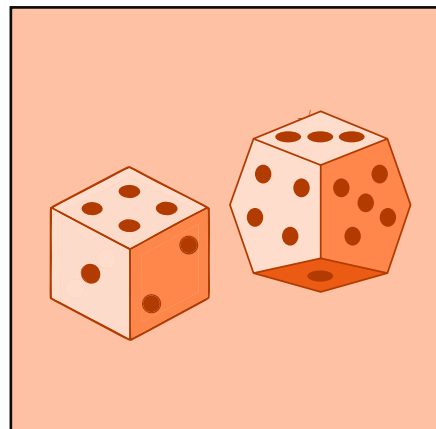
#C15



Trees are placed at equal distances along a road. The distance from the first tree to the hundredth tree is 495 meters.

Can you find the distance between any two adjacent trees?

#C16

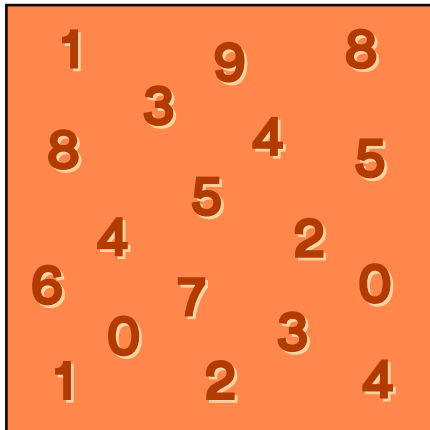


In which game are you more likely to get a total of 12?

1. Rolling a 12-sided fair die once.
2. Rolling a 6-sided fair die twice.
3. Both are equally likely.

Medium Puzzles

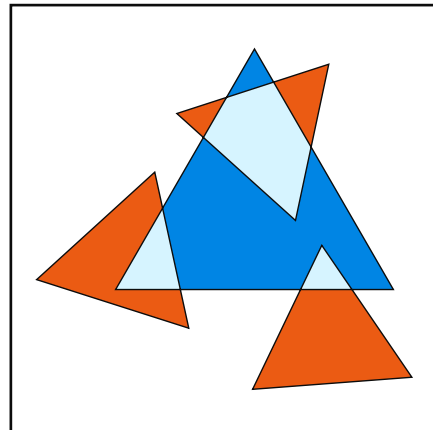
#C17



5 consecutive numbers sum to 25.

What is their product?

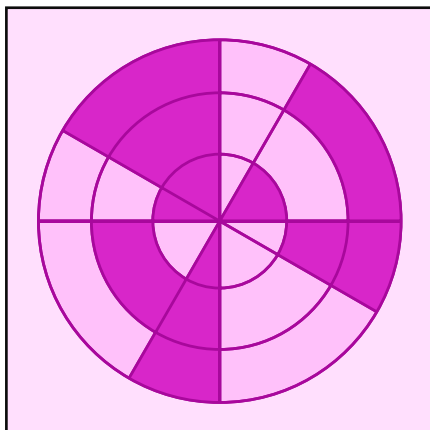
#C18



In the figure, the smaller red-outlined triangles each have area 3, and the larger blue-outlined triangle has area 9.

Which shaded area is larger, red or blue?

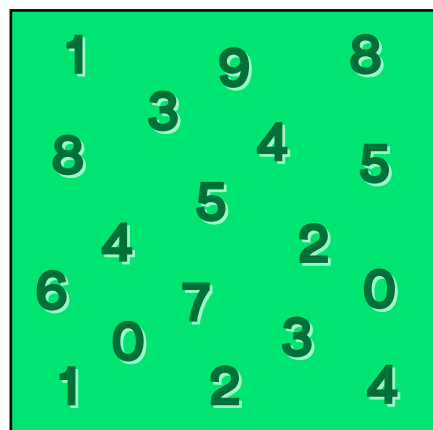
#C19



The figure shows 3 concentric circles with radii 1, 2 and 3 respectively with some area shaded.

What percentage of the larger circle's area is shaded?

#C20

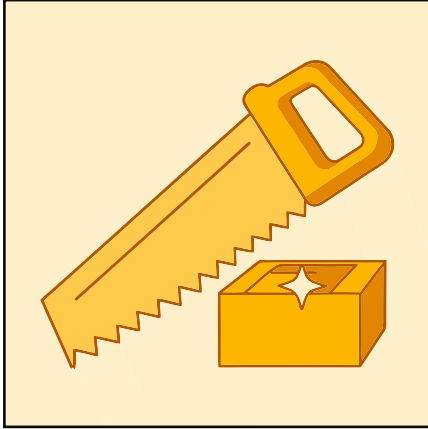


The product of the digits of a 2-digit number lies between 20 and 40 (not including these numbers). 46 is one such number as $4 \times 6 = 24$ which lies between 20 and 40.

Find the smallest and largest such numbers.

Hard Puzzles

#D1

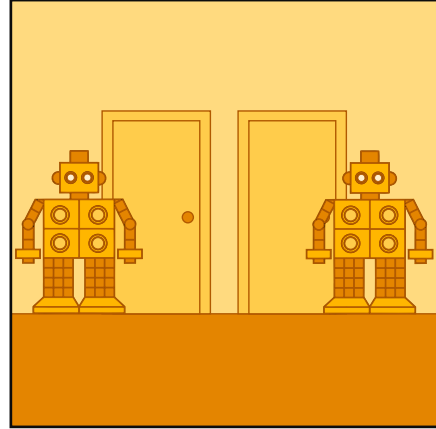


You are a king. You hire a worker for 7 days. You have one gold bar that is worth exactly 7 days' wages. The daily wage is the same for all 7 days.

You must pay the worker his exact wage at the end of each day. You can break this gold bar only twice.

How can you do this?

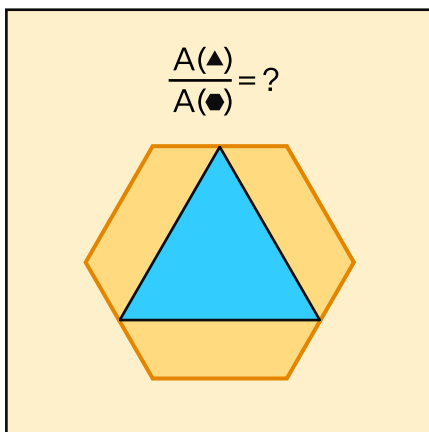
#D2



You're trapped in a room with two doors. One leads to freedom, one leads to prison. Two robots guard the doors - one always tells the truth, one always lies. You don't know which is which. You can ask one robot one question.

What question should you ask to find the freedom door?

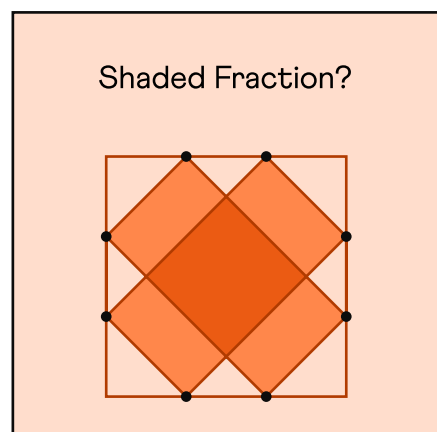
#D3



$$\frac{A(\blacktriangle)}{A(\bullet)} = ?$$

An equilateral triangle is inscribed in a regular hexagon as shown above. What fraction of the hexagon is shaded?

#D4

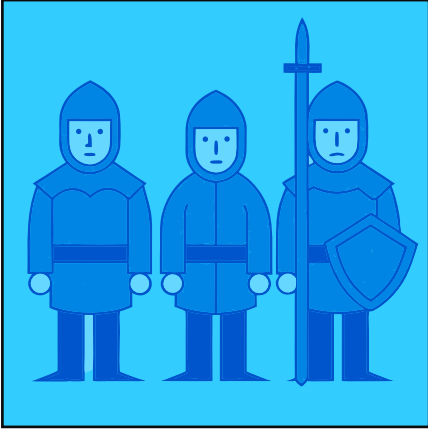


Shaded Fraction?

A square is divided by equally spaced points on its sides. Find the shaded fraction.

Hard Puzzles

#D5

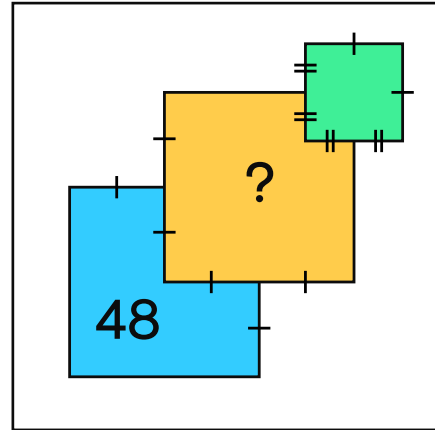


In a small kingdom, there are only two types of people: knights who always tell the truth, and knaves who always lie. You meet three people, A, B, and C.

- A says: "C is a knave"
- B says: "C is a knight"
- C says: "At least one of us is a knave"

What type is each person?

#D6



Look at the diagram with three squares. All the corners are right angles (90 degrees).

The blue area is 48 square units.

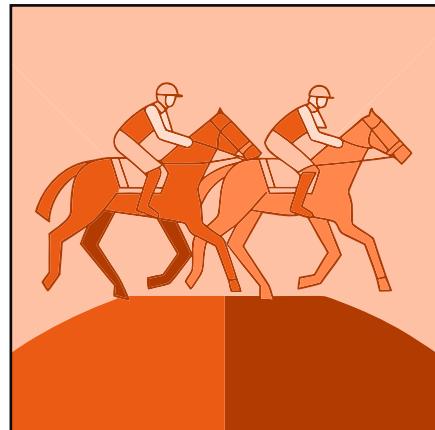
What is the orange area?

#D7



Cut a birthday cake into exactly 8 pieces using only 3 straight cuts. You cannot move any pieces of the cake while cutting.

#D8



A dying king wants to leave his kingdom to one of his two sons. He creates a race where the son whose horse finishes last wins the kingdom. The brothers wander around for weeks, neither wanting to finish first. A wise man gives them advice, and suddenly both brothers race toward the finish line.

What did the wise man say?

Hard Puzzles

#D9

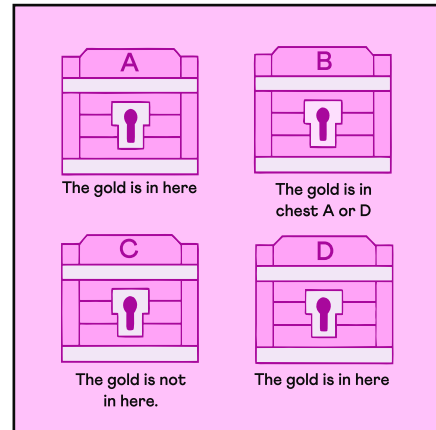


Troy has a secret 3-digit code for his bank locker. He left clues for his friend Mike to figure out the code. Can you help Mike crack the code?

The Clues:

- 246** - One number is correct and in the right position.
- 219** - One number is correct but in the wrong position.
- 602** - Two numbers are correct but both are in the wrong positions.
- 584** - No numbers are correct.
- 450** - One number is correct but in the wrong position.

#D10

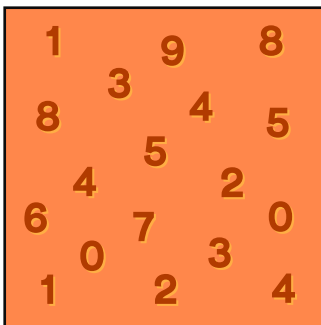


Only one chest has gold. Only one statement is true.

The chest with the gold and the one with the true statement don't have to be the same.

Can you find the chest with the gold?

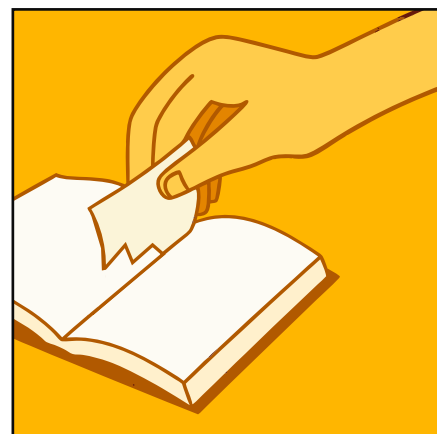
#D11



Find a 5 digit number whose digits (from left to right) satisfy the properties:
Its left-most digit counts the total number of 0s in it

- Its 2nd digit counts the total number of 1s in it
- Its 3rd digit counts the total number of 2s in it
- Its 4th digit counts the total number of 3s in it
- Its 5th digit counts the total number of 4s in it

#D12

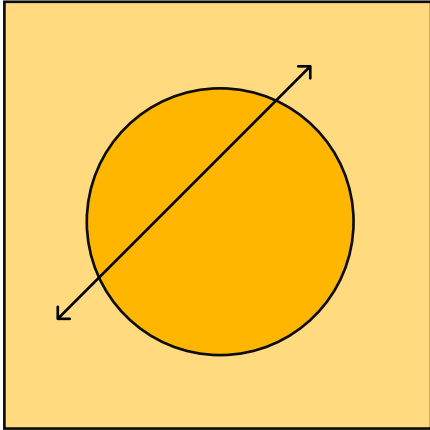


If 7 sheets are torn from a book, which of the following can be the sum of all the pages?

- 93
- 136
- 161
- 192

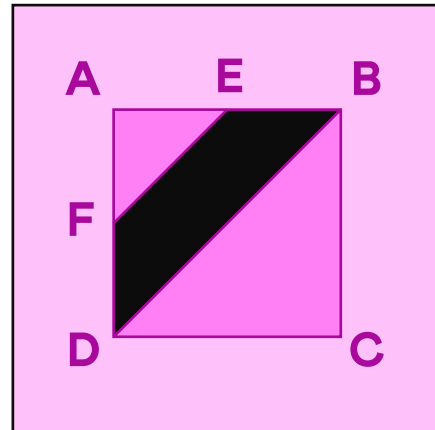
Hard Puzzles

#D13



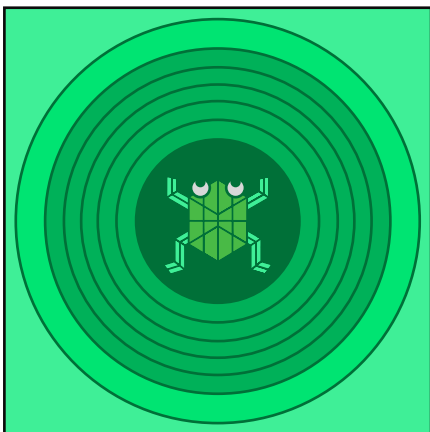
A line cuts a circle in 2 parts.
What's the maximum number of parts 4 lines can create?

#D14



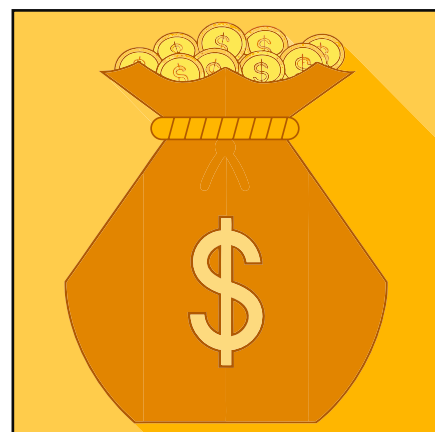
E and F are midpoints of sides AB and BC, respectively.
What is the area of the trapezoid EBDF?

#D15



A frog is at the bottom of a well that is 65 steps deep. Each day, it jumps up 7 steps but slides back 3 steps each night. How many days will it take for the frog to come out of the well?

#D16

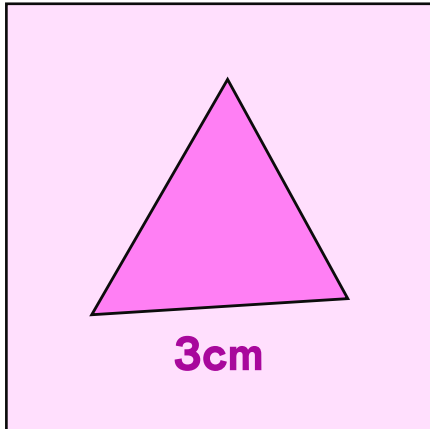


We have an infinite number of coins worth \$3 and \$7. Which of these amounts can be paid using these coins?

- A. \$8
- B. \$11
- C. All amounts greater \$10
- E. All amounts greater than \$12

Hard Puzzles

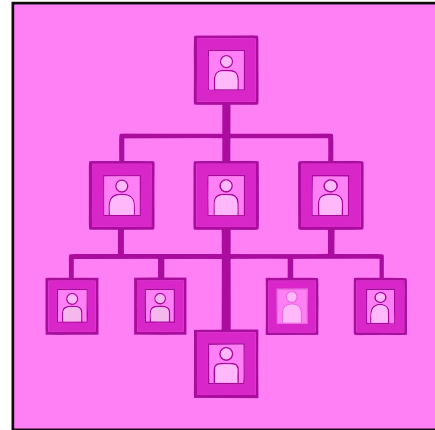
#D17



In a triangle, which is not equilateral, the sides (in cm) are integers. The only longest side is 3 cm.

What's the perimeter of the triangle?

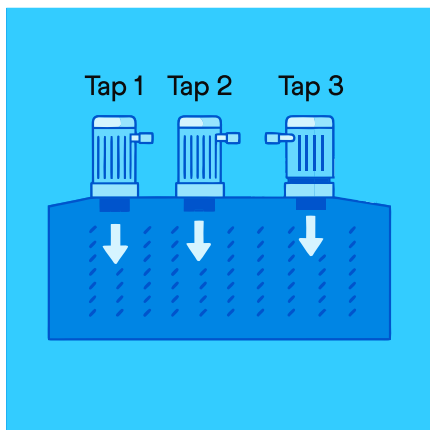
#D18



Alex visits his brother Peter who stays with their father Quenton, mother Sierra, and grandfather Rocky. Peter has two children, Becky and Charlie.

Charlie's son Tango loves playing with Quenton. How is Tango related to Quenton?

#D19

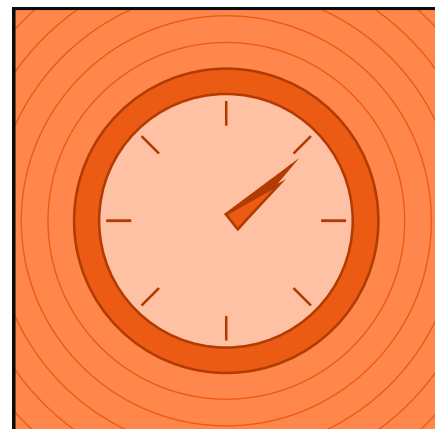


A tank has three taps.

The first tap takes 2 hours to fill the tank, the second tap takes 3 hours, and the last one takes 6 hours.

How long will it take to fill the tank using all three taps at once?

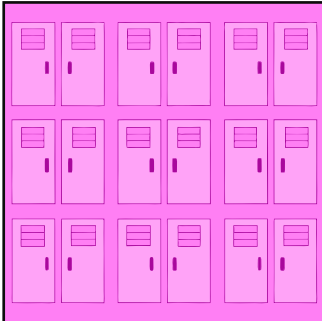
#D20



In a 12-hour period, how many times do the hour and minute hands overlap?

Very Hard Puzzles

#E1



A school has 100 lockers, all starting closed. 100 students take turns opening or closing lockers.

- The first student toggles every locker (opens all of them).
- The second student toggles every 2nd locker (2, 4, 6, ...).
- The third toggles every 3rd locker (3, 6, 9, ...), and so on.
- After all 100 students have taken their turn, which lockers will be open?

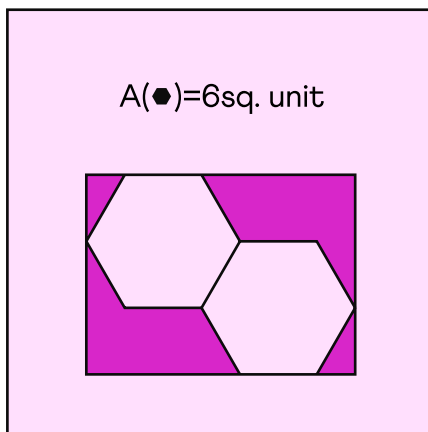
#E2



Jack, Samson, and Christo work at a software company. They want to know their average salary. But no one wants to tell the others their actual salary.

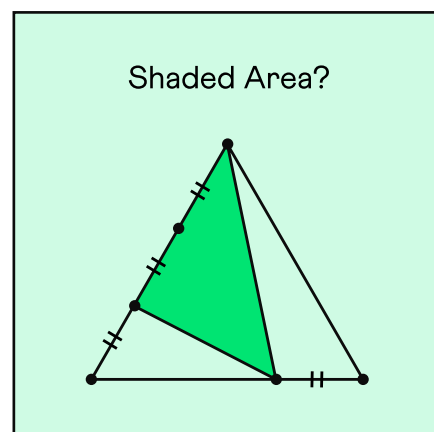
How can they find the average salary without anyone revealing their real salary?

#E3



Two regular hexagons of area 6 sq. in are placed inside a rectangle as shown above. What's the shaded area?

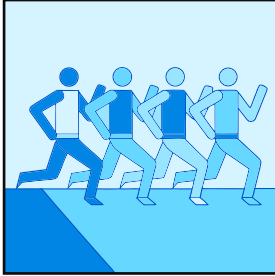
#E4



An equilateral triangle is divided as shown above. Find the shaded area.

Very Hard Puzzles

#E5



Four runners (A, B, C, and D) finish a race in 1st through 4th places. The runners in 1st and 4th places make true claims, while the runners in 2nd and 3rd places make false claims.

- A — "I finished the race after C."
- B — "I am the 3rd place runner."
- C — "I am not the 4th place runner."
- D — "I finished the race before B."

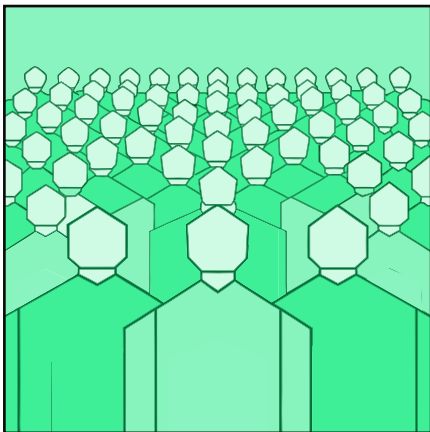
How many places apart did runners A and C finish?

#E6



Stella puts two coins in a box. One coin has heads on both sides. The other coin is normal with heads on one side and tails on the other. Mary picks one coin and looks at one side. She says "It is heads." What is the probability that the other side is also heads? [If you think the answer is $\frac{1}{2}$, then think again!]

#E7

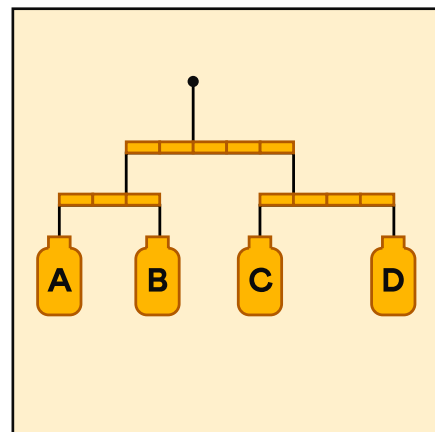


There are 55 students in a Grade 7 class. Is it certain that at least two students must have their birthdays in the same week of the year?

You do not need to identify specific students or birthdays.

Just say whether it must be true or not, and explain why.

#E8



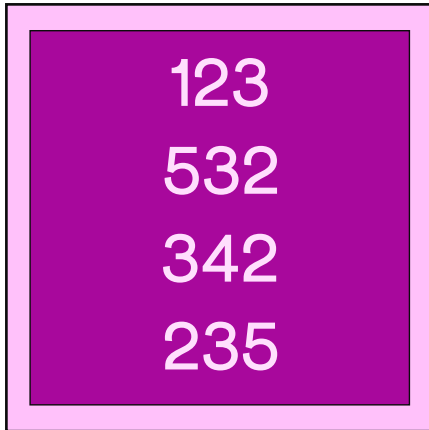
The mobile has:

- Four yellow jars labeled A, B, C, and D
- Bars connecting them that can rotate
- The entire mobile is perfectly balanced and not tipping to any side
- Each jar has some weight (none are empty)

Which jar is the heaviest?

Very Hard Puzzles

#E9

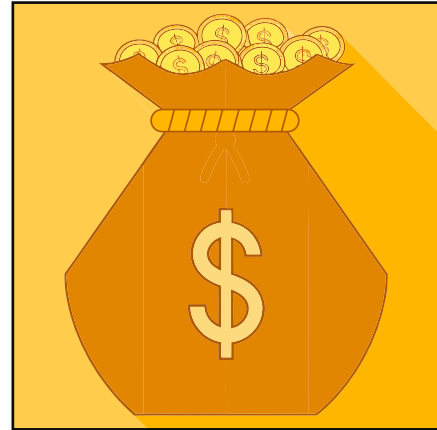


There is a three-digit code where only the digits 1 through 5 are possible.

Each of the numbers above has exactly one digit correct, and in none of the cases is the correct digit in the correct place.

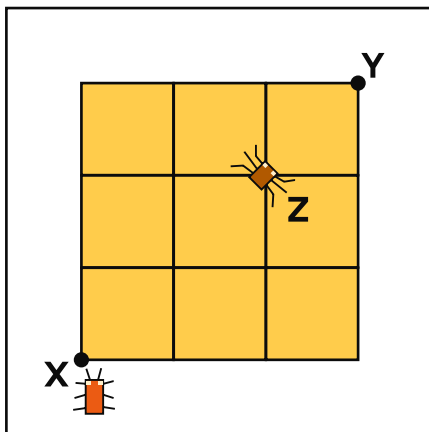
Crack the 3-digit code.

#E10



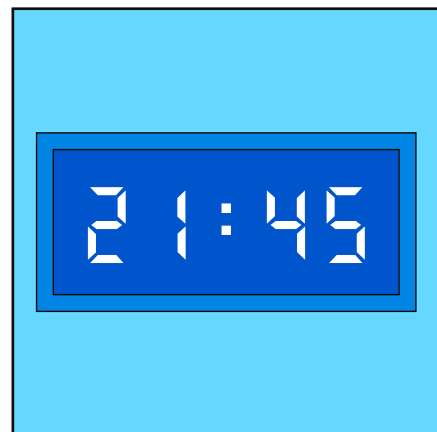
Maxwell has 1023 one-dollar coins. He puts them in 10 bags so he can make any amount from \$1 to \$1000 by choosing the right bags. How many coins go in each bag?

#E11



An insect can move only 1 unit at a time, either up or right along a grid. In how many ways can the insect travel from its starting point X to the top-right corner Y, if it needs to avoid the spider at Z?

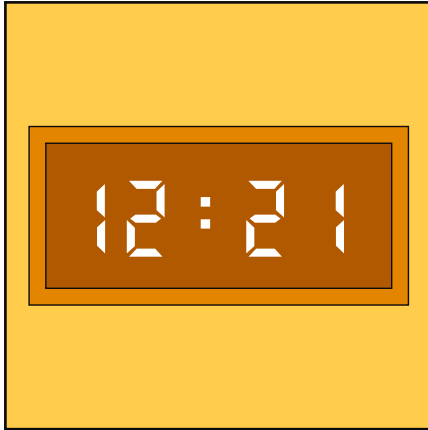
#E12



On a digital clock showing 24-hour time, find the number of times 5 appears?

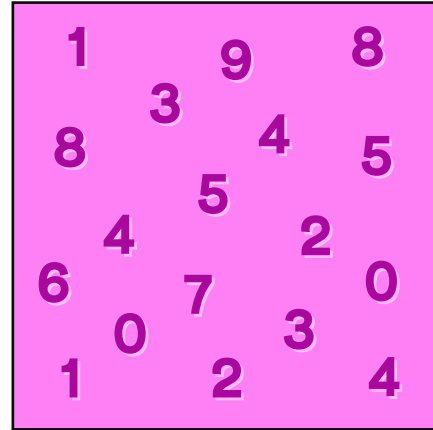
Very Hard Puzzles

#E13



On a 24-hour digital clock, how many “symmetrical times” occur during the day?
(they read the same - left to right OR right to left)

#E14

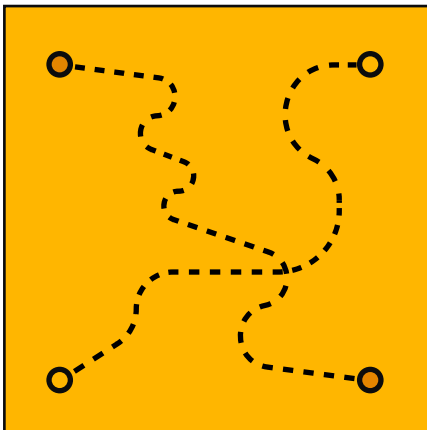


When Yunji added all the integers from 1 to 9, she mistakenly left out a number.

Her incorrect sum turned out to be a square number.

What number did Yunji leave out?

#E15



Roy can travel from Lincoln to Omaha in 4 different ways and from Omaha to Des Moines in 3 different ways.

How many different round trips can Roy make from Lincoln to Des Moines that pass through Omaha in both directions?

#E16

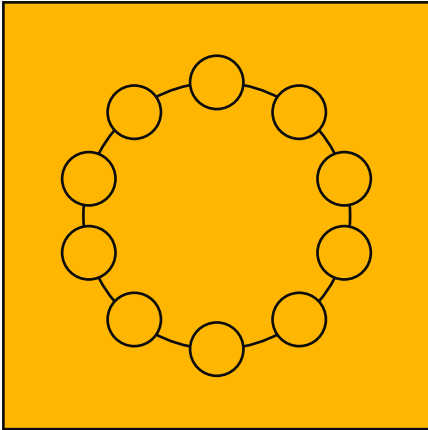


You have 9 coins that look identical, but one of them is slightly heavier.

How many minimum weighings on a balance scale would you need to find the heavier coin?

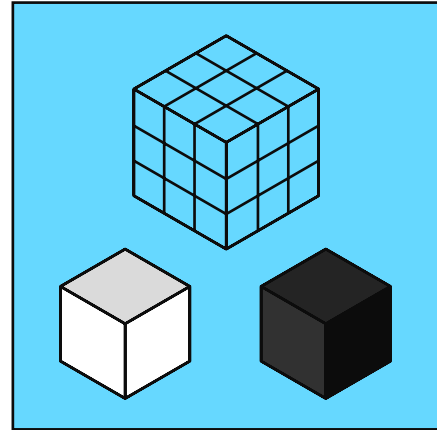
Very Hard Puzzles

#E17



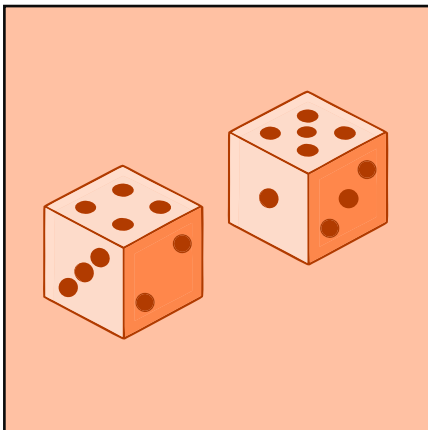
Polly has 15 cards numbered from 1 to 15. She places 10 of them in a circle so that the sum of any two adjacent numbers is a multiple of 3. Which 5 numbers does Polly NOT use?

#E18



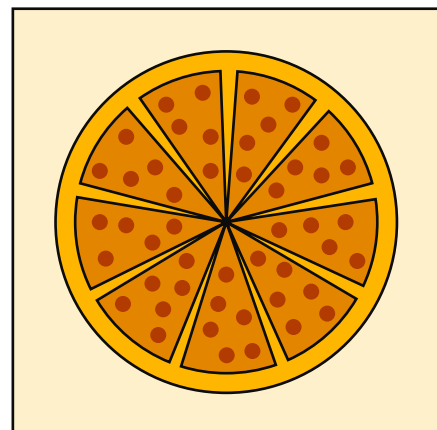
Sammy has some black and some white unit cubes. She uses 27 of them to build a $3 \times 3 \times 3$ cube. She wants exactly one third of the surface to be black. If A is the smallest possible number of black cubes that she can use and B the biggest possible number, what is the value of $B - A$?

#E19



Divy rolled an ordinary die 24 times. All numbers from 1 to 6 were rolled at least once. The number 1 was rolled more often than any other number. She then added all numbers that were rolled. What is the biggest number she could have obtained in this way?

#E20



A man cuts a pizza into 10 pieces of equal size. After he has eaten one piece, he rearranges the remaining pieces, so that the gaps between the pieces are all equally big. What is the angle in each gap?

Answers & Solutions

Very Easy Puzzles

A1

To make the smallest total, we should keep the tens digits as small as possible.

So we take 1 and 2 as the tens digits.

That gives numbers 13 and 24.

Now add them: $13 + 24 = 37$

Smallest total = 37

A5

Scale 1: A is lighter than B.

Scale 2: A is lighter than B.

Scale 3: B is lighter than C.

Since B is lighter than C,
and A is lighter than B.

A will be lighter than C.

Therefore, A is the lightest.

A2

The Yellow block touches 2 blue blocks -
meaning the arrangement must have
Blue-Yellow-Blue.

The tower cannot have Blue at any end,
so both ends must have Red blocks.

So the final solution is: Red-Blue-Yellow-
Blue-Red

A6

The digit 2 appears 6 times: once on
pages 2, 12, 20, and 21, and twice on
page 22.

A7

$$4 - 3 - 2 + 1 = 0$$

A3

Since only Mouse is between Dog and
Rabbit, their order must be Dog-Mouse-
Rabbit or Rabbit-Mouse-Dog.

As Cat is next to Dog, their order must
be Cat-Dog-Mouse-Rabbit or Rabbit-
Mouse-Dog-Cat.

But Cat is not first. So the order must be
Rabbit-Mouse-Dog-Cat.

A8

Fill the 5th jug using the 2nd mug.

This gives: Full-Empty-Full-Empty-
Full-Empty. The alternating pattern is
complete.

A4

To decode, we will count forward 2
letters for each letter in the message.
This gives us the answer as "COUNT."

A9

The first seesaw shows $B > A$ (B is
heavier than A).

The second seesaw shows $C > B$ (C is
heavier than B).

So, using transitive reasoning, $C > B > A$,
which means $C > A$.

C is heavier than A, so C will be on the
lower side. Picture 2 is correct.

Answers & Solutions

Very Easy Puzzles

# A10 There can be multiple solutions: $5 - 5 + 5 \div 5 = 0 + 1 = 1$ $5 \div 5 + 5 - 5 = 1 + 0 = 1$	# A16 "SHAPE"
# A11 The cat is in the small hat, the rabbit is in the medium hat, and the mouse is in the big hat.	# A17 Red – Blue – Yellow – Blue – Red
# A12 The text and color are swapped. The final pair should be: RED → YELLOW (with YELLOW written in red)	# A18 Units Place: The digit 1 appears in the units place of these numbers: 1, 11, 21, 31, 41, 51, 61, 71, 81, 91. This is a total of 10 times. Tens Place: The digit 1 appears in the tens place of these numbers: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19. This is a total of 10 times. Hundreds Place: The digit 1 appears in the hundreds place only in the number 100. This is a total of 1 time. Total Count = 21
# A13 Most books: Jake Least books: Ava	
# A14 Units: $6 + 5 = 11$. Write 1, carry 1. Tens: $A + A + 1$(from carry) must end in 7. $2A + 1 = 7 \rightarrow 2A = 6 \rightarrow A = 3.$ Check: $336 + 35 = 371$. This matches A71.	
# A15 WOW and MOM. These are palindromes that use letters that look similar when reflected.	# A19 In the ones column, we have the sum $2 + B + B$, and this sum ends in 8. This means B can be 3 or 8, because: $2 + 3 + 3 = 8$ $2 + 8 + 8 = 18$ If $B = 8$, the sum becomes $82 + 88 + 28$, which is larger than the given result of 88. Therefore, B must be 3.
	# A20 $4 - 3 - 2 + 1 = 0$

Answers & Solutions

Easy Puzzles

B1

Bob is confident his number is smaller than Alex's, even though he does not know Alex's number.

That can only be true if Bob's number is the smallest one-digit number, which is 0.

B2

$A \times A$ resulting in A happens for $A=1, 5$ and 6 .

If we check for these numbers, we find that $A=5$ is the only one that works. Thus, $A=5$.

B3

Each petal touches two other petals, and all petals touch the center.

To color the petals without repeats, we need 3 colors.

Since the center touches every petal, it needs a new color.

So, we need 4 colors.

B4

Count the different colors in each box, not the total counters. Box 4 has two colors: red and green. So, the missing number is 2.

B5

In order to make the result as large as possible, we should make the tens place digits as large as possible.

Let's say $A = 9$ and $C = 8$.

The remaining digits should also be maximized, so let's have $B = 7$ and $D = 6$, giving the sum: $97 + 86 = 183$.

Note that $96 + 87$ also gives the same sum: 183.

B6

The identical digit can be 0. 00:00 is midnight. The identical digit can be 1. 11:11 is 11 hours 11 minutes in the morning. It can be 2 as 22:22 is 10 hours, 22 minutes at night. Any other time, however, is not possible. 33:33 doesn't make sense as there are only 24 hours in a day. So, it works 3 times.

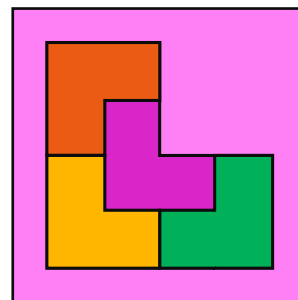
B7

We cannot get 0 because all four digits must be different (that would make the two numbers equal). As A, B, C, D are distinct, D must be 9, making $B=0$. There is a carry-over from the unit's place making $C+1=A$.

Taking $C=1$, we get $A=2$

With $A=2, B=0, C=1, D=9$, we get: $20-19=1$ making 1 the smallest possible (non-negative) difference. Note that we can get the same difference using other values of A and C as well: $30-29=1$, $40-39=1$, etc.

B8



B9

6	1	8
7	5	3
2	9	4

or

6	7	2
1	5	9
8	3	4

Answers & Solutions

Easy Puzzles

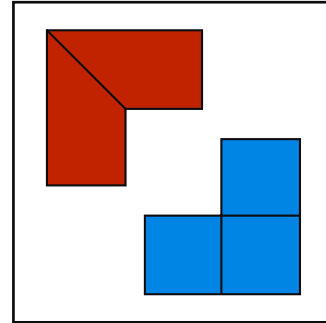
B10

A Knight cannot say that he is a knave because that would be a lie.

A knave cannot say that he is a knave because that would be true.

Therefore, the only person who can say this sentence is a joker.

B15



B11

Charlie is the shortest.

B16

Multiple arrangements are possible, some are shown.

B12

Multiple solutions exist. 2 are given below:

- Red-Blue-Yellow-Blue-Red-Blue-Yellow
- Yellow-Blue-Yellow-Blue-Red-Blue-Red

B17

In the tens column, $7 - V = V$ is impossible without borrowing. This means we borrowed from the 7, making it a 6. The equation becomes $6 - V = V$, which simplifies to $2V = 6$. Thus, $V = 3$.

In the units column, we borrowed, so the equation is $10 + V - S = 7$. Substitute $V = 3$ to get $13 - S = 7$. Solving for S gives us $S = 6$.

B13

Alex is confident that his number is larger than Bob's, even without knowing Bob's number. The only way this can be true is if Alex's number is the largest 1-digit number, which is 9.

B18

Mark is the son of the woman.

B14

The worst-case scenario is picking all the blue and green marbles first. There are 3 blue and 2 green marbles, which makes 5 marbles. After picking these, only red marbles are left. So the next marble you pick will definitely be red.

Therefore, you need to pick at least 6 marbles to be sure you get a red marble.

B19

This scenario is only possible if we are at the very beginning of a new year, and Kelly's birthday is at the very end of the year (for example, December 31st).

The timeline is as follows:

Today's date: January 1

Two days ago (December 30): Kelly was still 8

Answers & Solutions

Easy Puzzles

Yesterday (December 31): Kelly turned 9

Later this year (December 31): Kelly will turn 10

Next year (December 31 of next year):
Kelly will turn 11

B20

$X=5$ and $Y=8$

Final equation is $25+56=81$

Answers & Solutions

Medium Puzzles

C1

$A=1$ and $B=3$

$B \times 3$ resulting in a 9 is only possible if $B = 3$

If $B=3$ then the result is $B9=39 = 3 \times 13$.
And so $AB=13$ which means $A=1$

C4

With n people, there are $n(n-1)/2$ handshakes.

Here, $n(n-1)/2 = 10$

$n = 5$ people

C2

Step 1: Find the smallest unique numbers for 10 pockets. If each pocket must have a different number of coins, the smallest numbers we can use are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Step 2: Add up the minimum coins needed. $0 + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$ coins

Step 3: Compare with what Sid has. Sid has 44 coins, but he needs at least 45 coins. $44 < 45$

Step 4: Check if using larger numbers helps. If we use any number larger than the ones above (like using 10 instead of 9), we would need even more coins, not fewer.

So, Sid cannot do it. He needs at least 45 coins, but he only has 44.

C5

This puzzle is equivalent to $3 \times \text{CAR} = \text{RRR}$. For R to remain the same digit when multiplied by 3 (in the units place), R must be either 0 or 5.

Since R appears as the first digit of RRR, and 0 cannot be the first digit, R must be 5.

Therefore, $\text{RRR} = 555$, and $3 \times \text{CAR} = 555$.

This means $\text{CAR} = 555 \div 3 = 185$.

So $C = 1$, $A = 8$, and $R = 5$, giving us $C + A + R = 1 + 8 + 5 = 14$.

C3

Turn on switch #1 for 10 minutes, then turn it off.

Turn on switch #2 and leave it on.

Leave switch #3 off the entire time.

Enter the room and examine the bulbs:

The bulb that is on is controlled by switch #2

The bulb that is off but warm is controlled by switch #1

The bulb that is off and cool is controlled by switch #3

C6

Option B (Circle (○) and Star (★)) is more likely because it can happen in 4 ways compared to option A, which can happen in only 1 way.

C7

In a knockout tournament, every match eliminates exactly 1 player.

Start: 127 players

End: 1 champion

Players eliminated: $127 - 1 = 126$

So, the number of matches needed = 126

Answers & Solutions

Medium Puzzles

C8

The large triangle has an area of 90 square units. This large triangle can be divided into 9 smaller triangles of equal area.

The green triangle's area = $90 \times (1/9) = 10$ square units.

C11

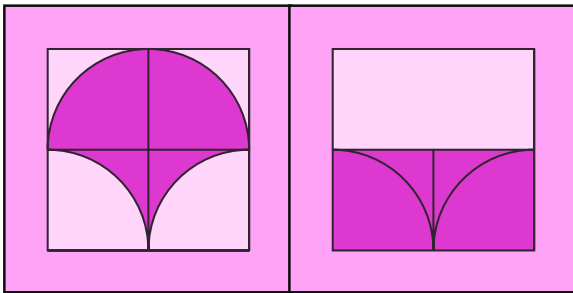
A must be 1; otherwise, the product $AB \times 7$ would be a 3-digit number.

The result $9A$ is therefore 91, which equals 7×13 .

Thus, $A = 1$ and $B = 3$.

C9

We can divide the square into quarters, and then shift the quarter-circles. Then, we see that the shaded part and the unshaded parts are equal:



C12

Based on the cubes provided, the color opposite of yellow is green.

By comparing the two cubes in the bottom row, both of which have a red and brown face visible, we can see that yellow is in the position where green is on the other cube.

C10

In each complete round, we use $1 + 2 + 3 = 6$ balls.

With 100 balls, we can complete 16 full rounds using $16 \times 6 = 96$ balls.

This leaves $100 - 96 = 4$ balls remaining.

Following the pattern with the remaining 4 balls:

- 1 ball goes to box-A (ball #97)
- 2 balls go to box-B (balls #98 and #99)
- The last ball (#100) goes to box-C

Therefore:

(a) The last ball goes into box-C.

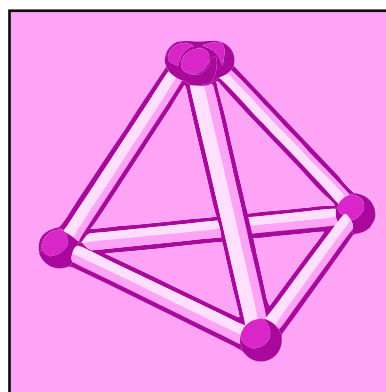
(b) Box-A contains $16 + 1 = 17$ balls

Box-B contains $16 \times 2 + 2 = 34$ balls

Box-C contains $16 \times 3 + 1 = 49$ balls

C13

Arrange the six matchsticks to form a tetrahedron (a triangular pyramid), which has four triangular faces and six edges.



C14

For \$450, you can buy 135 chocolates.

The 135 chocolates give you 135 wrappers to exchange.

$135 \text{ wrappers} \div 3 = 45$ free chocolates (from 1st exchange)

Answers & Solutions

Medium Puzzles

45 wrappers $\div$ 3 = 15 free chocolates
(from 2nd exchange)

15 wrappers $\div$ 3 = 5 free chocolates
(from 3rd exchange)

5 wrappers $\div$ 3 = 1 free chocolate (with 2
wrappers left over)

Total Chocolates = $135 + 45 + 15 + 5 + 1$
 $+ 1 = 202$

C15

Between 100 trees, there are 99 spaces
(one less than the number of trees).

Since the trees are equally spaced, each
space has the same length.

The total distance of 495 meters spans
all 99 spaces.

Therefore, the distance between
adjacent trees is $495 \div 99 = 5$ meters.

C16

For the 12-sided die, the probability of
rolling a 12 = $1/12$

For rolling a 6-sided die twice, the
probability of the sum being 12 = $1/36$

Since $1/12 > 1/36$, you are more likely to
get a 12 by rolling a 12-sided die once
than by rolling a 6-sided die twice.

C17

Since the numbers are consecutive,
their average is the middle number.

$$25 \div 5 = 5$$

The middle number is 5.

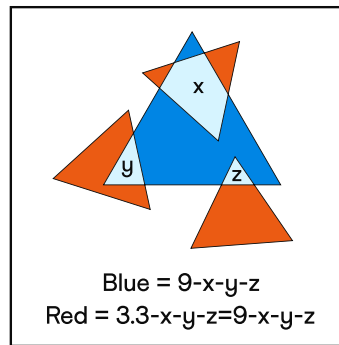
The five consecutive numbers are 3, 4,
5, 6, and 7.

$$3 \times 4 \times 5 \times 6 \times 7 = 2520$$

C18

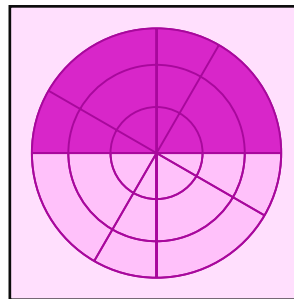
Therefore,

Area of red region = Area of blue region



C19

After moving the shaded parts to their
symmetrically located counterparts
which have the same areas, we get the
following figure:



As half of the circle is shaded, the
shaded percentage is 50%

C20

To find the smallest number, start with
the lowest possible tens digit that can
work. With a tens digit of 3, you need a
ones digit of 7 to get a product of 21,
which is between 20 and 40.

To find the largest number, start with the
highest possible tens digit. With a tens
digit of 9, you need a ones digit of 4 to
get a product of 36, which is between 20
and 40.

Answers & Solutions

Hard Puzzles

D1

Break the gold bar: Cut it into 3 pieces of sizes 1, 2, and 4.

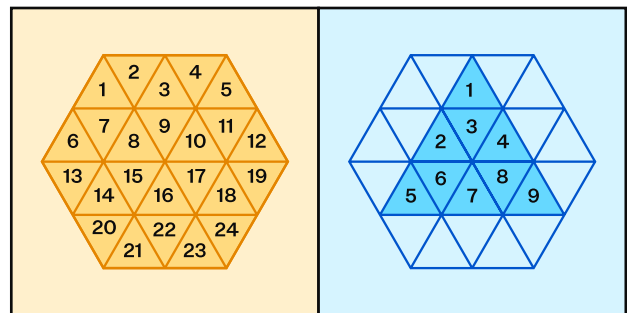
- **Day 1:** Give the worker piece 1. Worker has: 1
- **Day 2:** Give piece 2, take back piece 1. Worker has: 2
- **Day 3:** Give piece 1 back to the worker. Worker has: $1 + 2 = 3$
- **Day 4:** Give piece 4, take back pieces 1 and 2. Worker has: 4
- **Day 5:** Give piece 1 to the worker. Worker has: $4 + 1 = 5$
- **Day 6:** Give piece 2, take back piece 1. Worker has: $4 + 2 = 6$
- **Day 7:** Give piece 1 to the worker. Worker has: $4 + 2 + 1 = 7$

By using pieces of sizes 1, 2, and 4, you can make any number from 1 to 7 by adding and subtracting these pieces.

Step 2: See the result. Both robots end up pointing you to the prison door!

Step 3: Make your choice. Choose the opposite door from what they tell you.

D3



Divide the hexagon into smaller, identical parts. There are a total of 24 identical triangles formed and 9 of these triangles are covered by the shaded region. So, the shaded fraction of the hexagon is equal to $9/24$ or $3/8$.

D2

The Question: "If I asked the other robot which door leads to freedom, which door would it point to?"

Step 1: If you ask the truth-telling robot:

The truth-teller knows the lying robot would point to the prison door

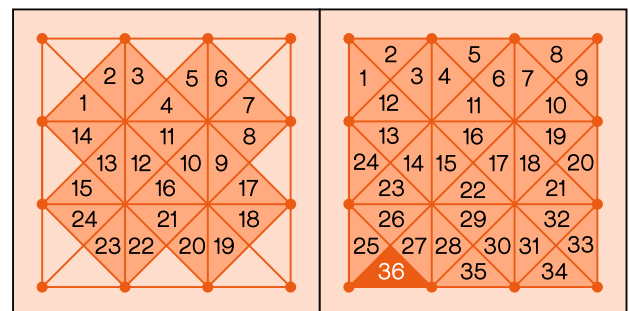
The truth-teller honestly tells you the liar would point to the prison door

If you ask the lying robot:

The liar knows the truth-teller would point to the freedom door

But the liar lies, so it tells you the truth-teller would point to the prison door

D4



Divide the square by joining the directly opposite points, diagonals and its boundary. The square is now divided into 36 identical triangles, out of which 24 form the shaded region. Hence, the shaded fraction of the square is $24/36$ or $4/6$.

Answers & Solutions

Hard Puzzles

D5

A is a knave, B is a knight, and C is a knight.

Reasoning:

A's statement and B's statement are opposites. C can only be a knight or a knave. This means one of A and B must be a knave.

Therefore, C's statement is true, making C a knight.

Checking A's and B's statements, B is a knight and A must be a knave.

Three 2×2 squares (area 4 each)

Adding up the orange region:

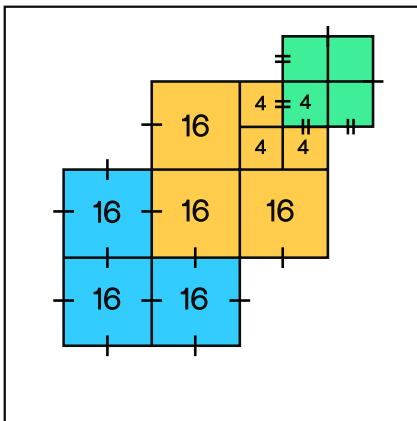
Large squares: $3 \times 16 = 48$

Small squares: $3 \times 4 = 12$

Total orange area = $48 + 12 = 60$

Therefore, the area of the orange region is 60 square units.

D6



First, let's look at the blue region. It has an area of 48.

The blue region consists of 3 equal squares.

Each square must have area $48 \div 3 = 16$

So each square has side length 4 (since $4^2 = 16$)

Now, we can determine the sizes of other squares:

The blue squares are 4×4 (area 16)

Looking at the orange region, it has:

Three 4×4 squares (area 16 each)

D7

The key is to use three-dimensional thinking:

Make the first two cuts as you normally would to divide the cake into 4 equal parts. Then, make the third cut horizontally through the center of the cake (as if you were slicing the cake into top and bottom layers). This way, all 4 pieces are split in half, creating 8 pieces in total.



D8

The wise man said: "Switch horses!"

Both brothers now race as fast as possible to the finish line, each trying to make his brother's horse come first!

Answers & Solutions

Hard Puzzles

D9

Step 1: Look at clue 4 (5 8 4) - "No numbers are correct" This means 5, 8, and 4 are NOT in the code at all. Cross them out!

Step 2: Look at clue 5 (4 5 0) - "One number is correct but in wrong position" Since 4 and 5 are not in the code, the number 0 must be in the code, but not in the 3rd position.

Step 3: Look at clue 1 (2 4 6) - "One number is correct and in right position" Since 4 is not in the code, either 2 is in position 1 OR 6 is in position 3.

Step 4: Look at clue 3 (6 0 2) - "Two numbers are correct but in wrong positions" We know 0 is in the code. So exactly one more number from {6, 2} is also in the code.

Step 5: Test the possibilities:

- If 2 were in position 1, then from clue 3, both 0 and 6 would be in the code but misplaced. But 0 can't be in position 2 or 3 (from the clues), so it would have to be in position 1 - but 2 is already there! This doesn't work.
- So 6 must be in position 3, and from clue 3, both 0 and 2 are in the code but misplaced. Wait - if 2 is in the code, then we'd have three numbers (0, 2, 6) but clue 3 says only two are correct. So 2 is NOT in the code.

Step 6: From clue 2 (2 1 9) - "One number is correct but in wrong position" Since 2 is not in the code, either 1 or 9 must be in the code but misplaced from their positions.

Step 7: Put it together:

0 is in the code (not in positions 2 or 3, so must be in position 1)

6 is in the code (in position 3)

From clue 2, since 9 is in position 3 but 6 is already there, 9 must be in position 2

The code is: **0 9 6**

D10

If either statement A or D is true, then statement B is also true making two true statements. So, A and D are both false.

If statement B is true then either statement A or D is also true, making two true statements. So, B is false.

Therefore statement C is true, meaning the gold is in one of boxes A, B or D. But since statements A and D are false, the gold must be in chest B.

D11

Answer: 21200

The number has 5 digits, so no digit can be greater than 5.

It can't use 5 (would force all others to be 0) or 4 (would require a '1' in the last digit, which is impossible).

Thus, the last digit must be 0.

If the first digit were 3, we'd get 300X0, but no value of X works.

So the first digit is 2 → number looks like 2AB00.

A and B must be nonzero; if A=1, we get 21200, which fits the rule.

Answers & Solutions

Hard Puzzles

D12

Answer: 161

Each sheet is made of 2 pages which will have consecutive page numbers. So, one of them will be even and the other will be odd. For 7 sheets, that would be a total of 14 numbers, 7 odd and 7 even.

When we add 7 odds, we get an odd number n , and 7 evens will give an even number m . Adding m and n , we will get an odd number. So, the final result must be odd.

Now, the minimum possible sum would be when the first 7 sheets, having page numbers from 1 to 14 are torn. That's $1 + 2 + 3 + \dots + 13 + 14 = 105$.

The only number in the options which is greater than odd and no less than 105 is 161. You can verify that it's the sum of 14 page numbers starting from 5.

D13

Answer: **11 regions**

1 line divides a circle into **2 regions**.

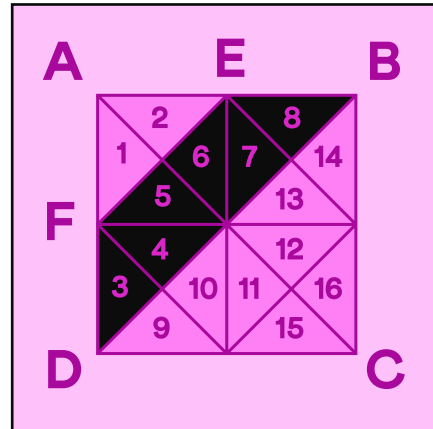
With the **2nd line**, we should draw it so it intersects the first line. As it goes from the circle $\rightarrow$ first line $\rightarrow$ circle, it passes through **2 regions**, splitting each into two. That adds 2 more regions, making a total of **4**.

The **3rd line** should intersect both existing lines. As it goes circle $\rightarrow$ line 1 $\rightarrow$ line 2 $\rightarrow$ circle, it passes through **3 regions**, dividing each. That adds 3 more, for a total of **7**.

The **4th line**, drawn to intersect all 3 existing lines, will pass through **4 regions**, splitting each into two.. That adds 4 more, giving a total of **11 regions**.

D14

We can divide the figure in 16 equal triangles. The trapezium covers 6 of them. So it's area is $6/16$ sq. units.



D15

The frog will take 16 days.

On the first day the frog jumps 7 steps, but slips back 3, so it's at the 4th step. Similarly on the 2nd day, it's on 8th step, 3rd day 12th step and so on. On the 15th day, frog must be on the 60th step. But on the 16th day, it will jump 7 steps during the day and it will be out of the well.

D16

All amounts greater than 12 can be paid using \$3 and \$7.

Eg:

$$12 = 3+3+3+3$$

$$13 = 3+3+7$$

$$14 = 7+7$$

$$15 = 3+3+3+3+3$$

And every other number can be written in the form $3n + 7m$. But we cannot make 8 or 11 for any values of m and n .

Answers & Solutions

Hard Puzzles

D17

For a triangle, the sum of any two sides must be greater than the third side.

The longest side is 3 cm, and since the triangle is not equilateral, the other two sides must be smaller than 3, so they can only be 1 or 2.

If the sides are 3, 2, and 2: check $\rightarrow 2+2$ is greater than 3, and $3+2$ is greater than 2. So this works.

If the sides are 3, 2, and 1: $2+1$ equals 3, which does not make a proper triangle.

If the sides are 3, 1, and 1: $1+1$ is less than 3, so not possible.

So the only triangle is with sides 3, 2, and 2, and the perimeter is **7 cm**.

D20

At 12:00, the hands are together.

After that, the minute hand moves faster and catches up with the hour hand once every hour, but not exactly on the hour — a little later each time.

So between 12:00 and just before the next 12:00, the hands will meet once in each hour from 1 o'clock through 11 o'clock.

That makes 11 overlaps in total in a 12-hour period.

D18

Quenton is Tango's **great grandfather**.

Tango's father $\rightarrow$ Charlie

Charlie's father $\rightarrow$ Peter

Peter's father $\rightarrow$ Quenton

D19

The first tap fills the whole tank in 2 hours $\rightarrow$ in 1 hour it fills half the tank.

The second tap fills the whole tank in 3 hours $\rightarrow$ in 1 hour it fills one-third of the tank.

The third tap fills the whole tank in 6 hours $\rightarrow$ in 1 hour it fills one-sixth of the tank.

Now add them up:

$$\frac{1}{2} + \frac{1}{3} + \frac{1}{6} = 1 \text{ whole tank.}$$

So, together, they fill the tank in 1 hour.

Answers & Solutions

Very Hard Puzzles

E1

The lockers that remain open are numbers 1, 4, 9, 16, 25, 36, 49, 64, 81, and 100 - all perfect squares.

A locker will be toggled by each of its factors (including 1 and itself)

For example, locker 12 is toggled by students 1, 2, 3, 4, 6, and 12

A locker will end up open if it's toggled an odd number of times

Only perfect square numbers have an odd number of factors

This is because factors normally come in pairs (e.g., for 12: 1×12 , 2×6 , 3×4)

Perfect squares have one extra factor as one number pairs with itself (e.g., for 16: 1×16 , 2×8 , 4×4)

E2

Step 1: Jack picks a secret number. He adds it to his salary and tells the result to Samson.

Step 2: Samson adds his own salary to Jack's number and passes the new total to Christo.

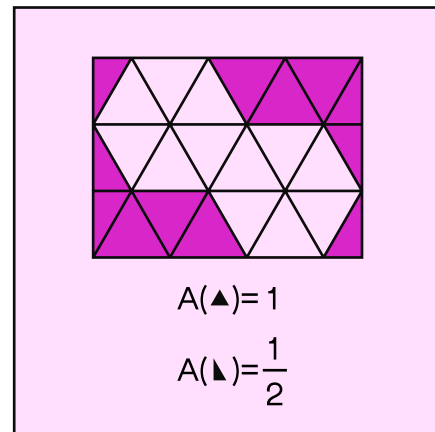
Step 3: Christo adds his salary to the total and announces the final number to everyone.

Step 4: Jack subtracts his secret number from the total, and divides it by 3 to get the average salary.

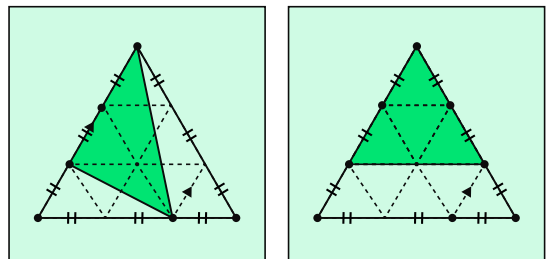
Why it works: The secret number hides everyone's real salary during the process. Only when they remove it at the end do they get the true average.

E3

The whole figure can be divided into equilateral triangles as shown above. Each hexagon is made up of 6 such triangles, so the area of one triangle is 1 sq. unit. Counting the orange triangles, the shaded area comes out to be 9 sq. units.



E4



Divide each side of the triangle into three equal parts. By joining the points as shown, the triangle is split into smaller equilateral triangles. Notice that the shaded region also forms a triangle lying between two parallel lines.

Triangles that share the same base and lie between the same parallel lines have equal areas, so moving this vertex anywhere along this line does not change the area.

So, the shaded area covers 4 parts out of the 9 smaller parts of the equilateral triangle. Hence, the shaded fraction is $\frac{4}{9}$.

Answers & Solutions

Very Hard Puzzles

E5

C's statement "I am not the 4th place runner" must be true, as 1st and 4th place runners tell the truth.

Therefore, C must be in 1st place (as 4th place is ruled out by C's statement). A's statement "I finished the race after C" would be true only if A finished after C.

Since C is in 1st place, this statement is true for all other positions. Since 1st and 4th places tell the truth, A must be in 4th place. Therefore, A is in 4th place and C is in 1st place, so they are $4 - 1 = 3$ places apart.

E7

There are 52 weeks in a year.

There are 55 students in the class.

If each student had a birthday in a different week, only 52 students could have unique birthday weeks.

But we have 55 students, which is more than 52.

So, at least 2 students must share a birthday week.

Final Answer: Yes, at least two students must have their birthdays in the same week.

E6

Step 1: Count all the possible sides Mary could look at.

Double-headed coin: Side 1 (heads), Side 2 (heads)

Normal coin: Side 3 (heads), Side 4 (tails)

Total: 4 sides

Step 2: Since Mary saw heads, she must have looked at Side 1, 2, or 3. She couldn't have looked at Side 4 (tails).

Step 3: Find the probability for each case. If Mary looked at:

- Side 1 (from double-headed coin) → other side is heads
- Side 2 (from double-headed coin) → other side is heads
- Side 3 (from normal coin) → other side is tails

Step 4: Calculate the probability. Out of 3 equally likely cases where she saw heads, 2 cases have heads on the other side.

Probability = $2/3$

E8

For a mobile to be balanced, the "weight $\times$ distance" must be equal on both sides of each suspension point.

1. Looking at the bottom-left bar with jars A and B: For this bar to be balanced, we can determine that
 - $B = 2A$
 - This means jar B is twice as heavy as jar A
2. For the bottom-right bar with jars C and D:
 - The balanced condition tells us that $C = 3D$
 - This means jar C is three times as heavy as jar D
3. For the top horizontal bar to balance:
 - The torques on both sides must be equal
 - This gives us the equation: $2(A+B) = 3(C+D)$
4. Substituting what we know:
 - $2(A+2A) = 3(3D+D)$
 - $2(3A) = 3(4D)$
 - $6A = 12D$
 - $A = 2D$

Answers & Solutions

Very Hard Puzzles

5. Now we can express all weights in terms of D:

- $A = 2D$
- $B = 2A = 4D$
- $C = 3D$
- $D = D$

6. Comparing the weights:
 $D < A < C < B$

Therefore, jar B is the heaviest.

E9



2 and 3 both can be seen in all the codes given, and they have always been on either the 1st, 2nd or 3rd place, and as we know the digits are never in the correct place, 2 and 3 are obviously not correct.

This means 1, 4 and 5 are correct because in one or the other code these digits are present with 2 and 3, and as 2 and 3 are incorrect the only correct digit could be the remaining digit which is either 1, 4 and 5 in the respective code. Now if we see the codes, 5 has been in the 1st and 3rd place, so it should be actually in the 2nd place. 1 is seen in the 1st place, so it should actually be in the 3rd place as 2nd place is of 5. So 4 should be in the remaining place that is 1st.

So the code is 451.

E10

Maxwell should use powers of 2 for each bag:

The distribution:

- Bag 1: 1 coin
- Bag 2: 2 coins
- Bag 3: 4 coins
- Bag 4: 8 coins
- Bag 5: 16 coins
- Bag 6: 32 coins
- Bag 7: 64 coins
- Bag 8: 128 coins
- Bag 9: 256 coins
- Bag 10: 512 coins

Why this works:

- Total coins: $1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 = 1023$
- Any amount from \$1 to \$1000 can be made by choosing the right combination of bags

Examples:

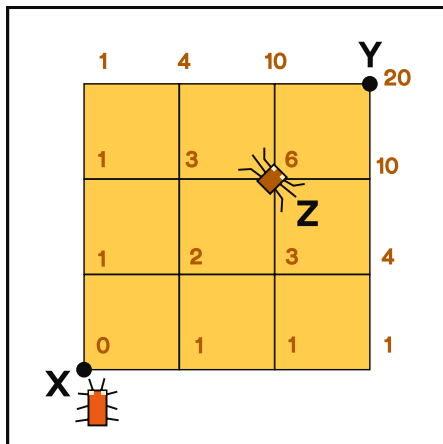
- \$5: Take bags 1 and 3 ($1 + 4 = 5$ coins)
- \$100: Take bags 3, 6, 7 ($4 + 32 + 64 = 100$ coins)
- \$1000: Take bags 4, 6, 7, 8, 9, 10 ($8 + 32 + 64 + 128 + 256 + 512 = 1000$ coins)

This system works because every natural number can be written as a unique sum of powers of 2.

Answers & Solutions

Very Hard Puzzles

- the ways to reach the point directly below, and
 - the ways to reach the point directly to the left.
3. If we fill the grid with these counts, we find there are 20 total paths from X to Y.
4. Now check the restriction: the path must not pass through point Z.
- From $X \rightarrow Z$, there are 6 ways.
 - From $Z \rightarrow Y$, there are 2 ways (either UR = Up then Right, or RU = Right then Up).
 - So, total paths that pass through Z = $6 \times 2 = 12$.
5. Therefore, the valid paths (those that avoid Z) = $20 - 12 = 8$.



E12

Answer: The digit 5 occurs 504 times.

In each hour, the minutes go from 01 to 60. At the ones place, the digit 5 appears 6 times (05, 15, 25, 35, 45, 55). At the tens place the digit 5 appears 10 times. (from 50 to 59). So, in each hour the digit 5 appears **16 times (6+10) in the minutes**.

So, in 24 hours, that's a total of $24 \times 16 = 384$ times.

Now, apart from the minutes, on the hours - the digit 5 appears when the time is of the form **05:xx** or **15:xx**. In each of these, it occurs 60 times - once for every minute. (05:00 to 05:59, and 15:00 to 15:59). So, for these hours, we have a total of $60 \times 2 = 120$ times.

Combining both the minutes and hours occurrences, we get a total of **384 + 120 = 504 times**.

E13

Answer: In a day, symmetrical times occur 70 times.

In each hour from 0:00 to 9:00, where the hours are single digit (ignoring the initial 0 in these hours), there are 6 symmetrical times:

- 0:00, 0:10, 0:20, 0:30, 0:40, and 0:50
- 1:01, 1:11, 1:21, 1:31, 1:41 and 1:51

and so on.

So, for all these 10 hours from 0:00 to 9:00, we have a total of 10×6 or **60 such times**.

For the 2-digit hours, there can be only either one or no such time:

- 10:01 ✓
- 11:11 ✓
- 12:21 ✓
- 13:31 ✓
- 14:41 ✓
- 15:51 ✓
- 16:61, 17:71,19:91 ✗ - No such time exists
- 20:02 ✓
- 21:12 ✓
- 22:22 ✓
- 23:32 ✓

So, a total of **10 such times**.

Combining all, we have $60 + 10$ or **70 symmetrical times**.

Answers & Solutions

Very Hard Puzzles

E14

9

Total of numbers 1 through 9 is 45.

If she skips one number, the wrong total is 45 minus that number.

We're told her wrong total is a perfect square (like 36, 25, 16, 9, 4, 1).

Only one of these makes sense: $45 - 9 = 36$ (a square).

So the missing number is **9**.

If one side is heavier → the heavier coin is in that group of 3.

If they balance → the heavier coin is among the remaining 3.

Now you only have 3 coins left. Second weighing: compare 1 vs 1.

If one side is heavier → that's the coin.

If they balance → the heavier one is the leftover coin.

So you always find the heavier coin in 2 weighings.

E15

1. To go from Lincoln to Omaha, Roy has 4 choices.
2. To go from Omaha to Des Moines, he has 3 choices.
 - So for the trip from Lincoln all the way to Des Moines (via Omaha), there are $4 \times 3 = 12$ ways.
3. For the return trip (Des Moines → Omaha → Lincoln):

From Des Moines to Omaha: 3 choices.

From Omaha to Lincoln: 4 choices.

So the return has $3 \times 4 = 12$ ways.

4. To make a full round trip, we multiply the going ways and the return ways:
 - **$12 \times 12 = 144$ ways.**

Final Answer: **144 different round trips.**

E17

Answer: 3, 6, 9, 12, 15

Reason: If two neighbors must add to a multiple of 3, then any multiple of 3 can only sit next to another multiple of 3. With only five multiples of 3 available, you can't make a 10-card circle that way. So you must avoid all multiples of 3, and use the other ten numbers (which can alternate to make every neighbor-sum a multiple of 3).

E18

The big cube is 3 by 3 by 3, so it has 27 small cubes. On the outside, each of the 6 faces shows a 3 by 3 square, which is 9 small squares. Altogether that makes $6 \times 9 = 54$ little faces on the surface.

Sammy wants exactly one third of the surface to be black. One third of 54 is 18, so she needs 18 black faces showing.

To use the fewest cubes: choose the cubes that show the most faces. Each corner cube shows 3 faces. If we paint 6 corner cubes black, that gives $6 \times 3 = 18$ black faces. That uses 6 cubes, so the smallest possible number A is 6.

E16

With a balance, the best strategy is to split coins into groups.

For 9 coins, first weighing: compare 3 vs 3.

Answers & Solutions

Very Hard Puzzles

To use the most cubes: choose cubes that show the fewest faces. Each face-center cube shows 1 face. First paint all 6 face-center cubes (6 black faces). Then paint 6 edge cubes, each showing 2 faces, which adds 12 more black faces. Now we have exactly 18 black faces and we've used 12 cubes. Finally, we can also paint the hidden middle cube inside (it shows no faces but still counts). That gives a total of 13 black cubes. So the largest possible number B is 13.

Therefore, the difference
 $B - A = 13 - 6 = 7$.

Final Answer: 7

E19

90

She rolled 24 times, each face 1–6 shows up at least once, and 1 appears more often than any other.

To make the total as big as possible, keep the counts of low numbers tiny and put as many rolls as allowed on 6, then 5, while keeping “1” the most frequent.

Best arrangement is:

1 appears 7 times (most),

6 appears 6 times,

5 appears 6 times,

4 appears 3 times,

3 appears 1 time,

2 appears 1 time.

(All faces appear at least once; 1 is strictly the most.)

Sum = $7 \times 1 + 6 \times 6 + 6 \times 5 + 3 \times 4 + 1 \times 3 + 1 \times 2$
= 90

E20

A circle has 360 degrees.

When the pizza is cut into 10 equal slices, each slice takes 36 degrees.

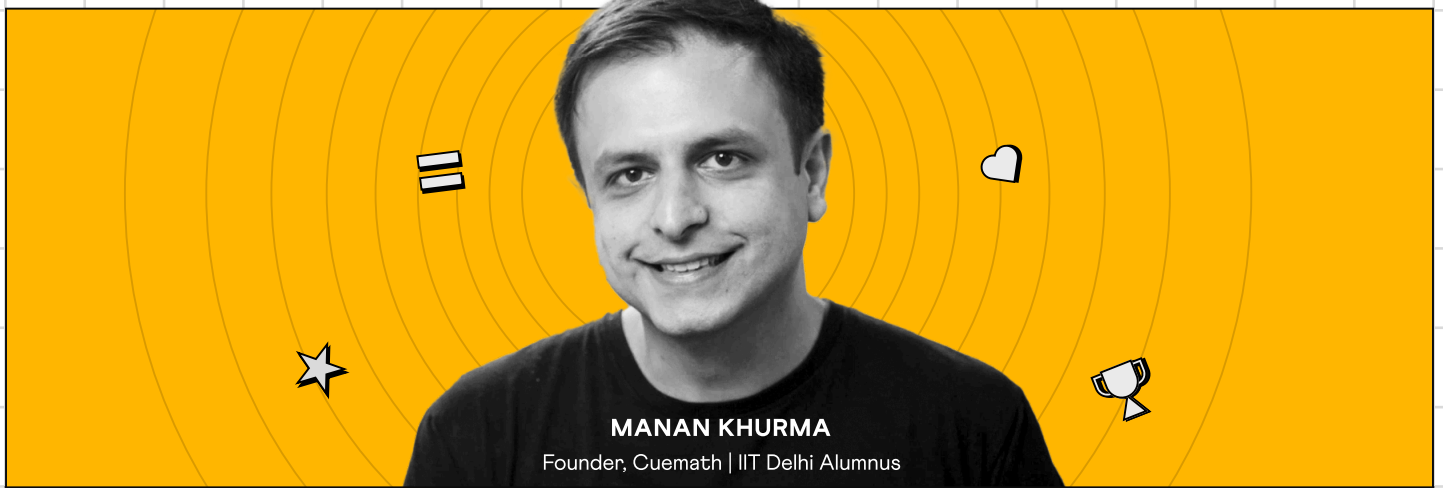
After eating one slice, 9 slices are left, so they cover 36×9 or 324 degrees altogether.

That means there are 36 degrees of empty space left.

If the 9 slices are spread out evenly, the 36 degrees is divided into 9 equal gaps.

So each gap is 4 degrees.

Final Answer: 4 degrees.



About Me

My love affair with mathematics began in childhood. Where many of my friends saw scary numbers and formulas, I saw patterns, puzzles, and infinite possibility. For me, math wasn't just a subject - it was a way of thinking that unlocked everything else.

This mathematical fluency carried me to the Indian Institute of Technology, Delhi, one of India's most prestigious institutions. But more importantly, it gave me something invaluable: the confidence to approach any problem with logic and creativity.

I founded Cuemath on December 22, 2013 - the birthday of the great Indian mathematician Srinivas Ramanujan and India's National Mathematics Day. The symbolism was intentional. I wanted to honor the latent mathematical genius in every child.

My Mission

For 11 years, I've dedicated my life to one belief: every child has mathematical genius within them. Not just some children. Not just gifted children. Every child.

The problem isn't that children can't learn mathematics. The problem is how mathematics is taught. When children memorize without understanding, they develop math anxiety. When they understand deeply, they develop math confidence.

My life's work is simple: make every child MathFit and shape the next generation for success in an AI-driven world.

About Cuemath

Cuemath is the world's highest-rated online math tutoring platform. We have served 200,000+ students across 80+ countries with 4,000+ expert tutors.

How Cuemath Works

We offer 1:1 live online tutoring sessions with expert tutors and a proprietary platform that offers complete personalisation of curriculum and lots of math-focused learning tools.



Our Difference

- **The Cuemath Way:** We create productive struggle in every session, keeping children in the optimal learning zone
- **1:1 Personalization:** Every child gets exactly what they need at exactly the right level
- **Expert Tutors:** Carefully selected for both mathematical expertise and the ability to connect with young minds
- **Proven Results:** 4.9+ rating on Trustpilot with exceptional outcomes in school performance and beyond

Our Promise

We don't really promise to make your child a human calculator. We also think getting good grades at school is a very low bar, because your child is capable of much more.

What we do promise is something deeper: **mathematical fitness that will serve them for life.**

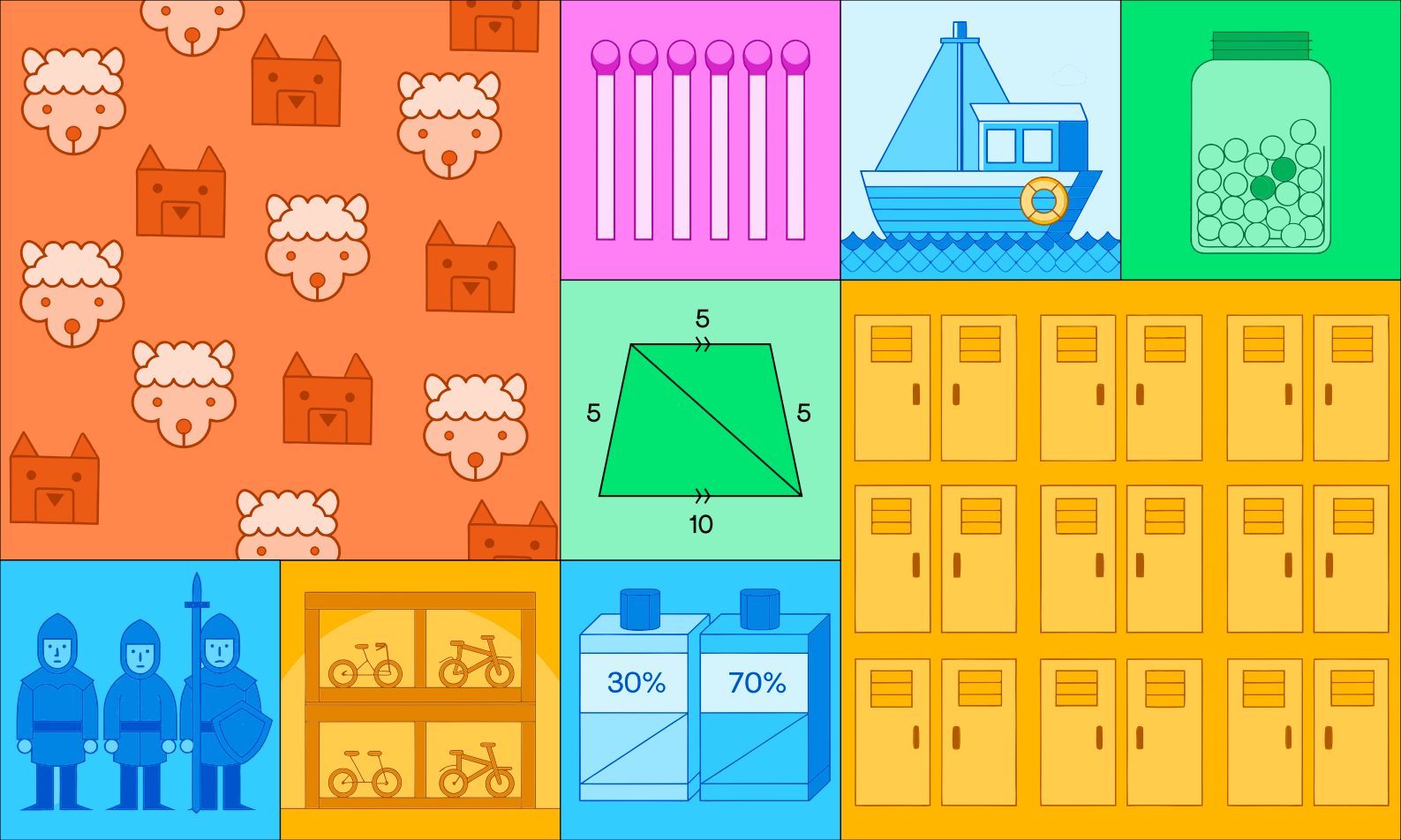
When your child is MathFit, they won't just solve math problems - they will build the confidence and competence to solve all kinds of problems throughout their life

Join the MathFit Revolution

Tens of thousands of families worldwide have chosen Cuemath to unlock their child's mathematical potential. Our students don't just improve their grades - they transform their very relationship with math and become confident thinkers for life.

Ready to make your child MathFit?

Visit www.cuemath.com to begin your child's MathFit journey today.



There are two kinds of people in the world.

Those who are MathFit.

And those who aren't.

Who will your child be?