

The juggler puzzle

Samuel Loyd was born in 1841 and died in 1911. He was a very famous puzzle maker who invented thousands of puzzles in his lifetime. Here is one of his puzzles:

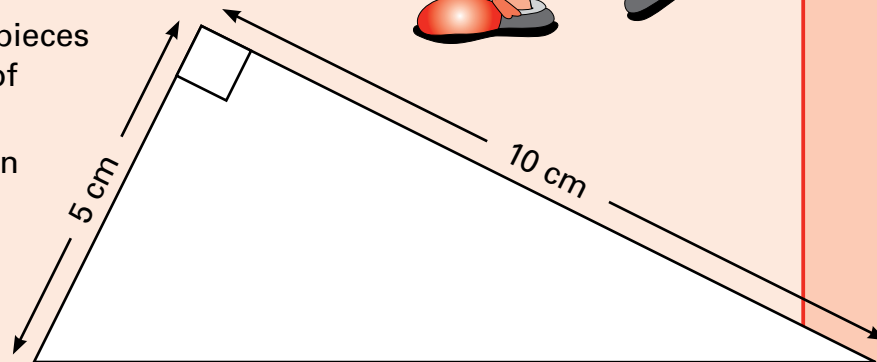
After juggling with five triangular pieces of cardboard, the clown cuts one of them into two pieces.

He then puts the six pieces down in such a way that they fit together and make a perfect square.

Two sides of the right angled triangles measure 5cm and 10cm as shown.

Draw five triangles onto paper or card and cut them out. (You can trace the triangle above to help you.)

Find out how to cut the fifth triangle into two pieces so that all six pieces will make a square.



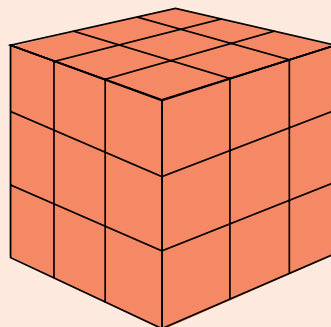
Cubes

Imagine a $3 \times 3 \times 3$ cube.

What is the smallest number of cuts you can make to break it into 27 $1 \times 1 \times 1$ cubes?

Draw a sketch to show where you would make the cuts.

A cut may go through multiple pieces.



Remember to take your homework to school to show your teacher, then you can take it home and play the games again.

Shape, decimals and calculating

OCEAN
MATHS

Name

The games and activities on this homework sheet will help your child practise:

- developing problem solving skills
- place value strategies
- 3D visualisation

Learning is far more successful if it's fun, so be enthusiastic and help your child enjoy the maths. The homework sheets always involve mathematical activities, games and puzzles to be shared. The emphasis is on enjoyment, exploration and discovery.

Numbers, totals and squares

Take any whole number less than 1000 and add the squares of the digits to get a new number. Repeat the process with this new number. Keep going until your answer only has one digit.

example

the number **3 4 1**

becomes $3^2 + 4^2 + 1^2$

which is $9 + 16 + 1 = \mathbf{26}$

becomes $2^2 + 6^2$

which is $4 + 36 = \mathbf{40}$

becomes $4^2 + 0^2$

which is $16 + 0 = \mathbf{16}$

..... and so on until your answer is a single digit number

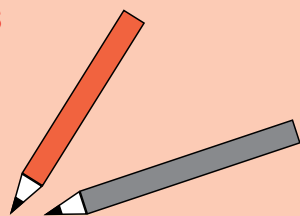
Choose other numbers less than 1000 and, each time, repeat the process above. Show some examples and write what you found.

Dots and boxes

a game for 2 players

You need

- a pencil each

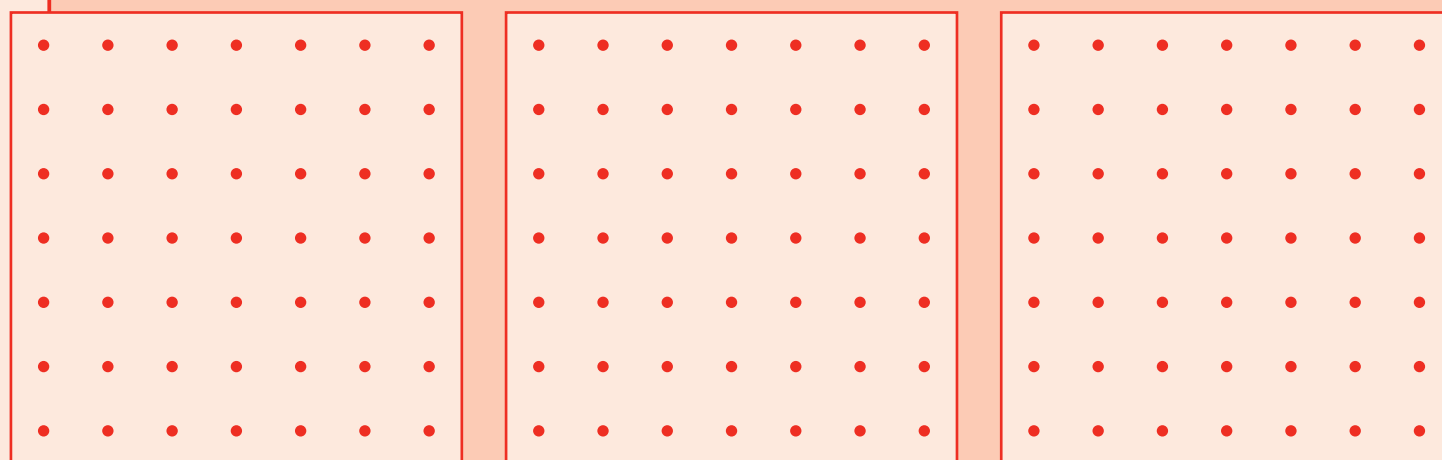


Remember to read the instructions before you play the game

Dots and boxes is a pencil and paper game for two players first published in 1889 by Edouard Lucas who was a French mathematician.

Before you start

- choose one of the three grids to play on
- decide which player goes first



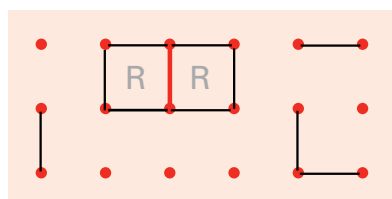
Take turns to

- join two adjacent dots with a horizontal or vertical line
- Each time a player completes the fourth side of a 1×1 box they write their initials in the box.
- The game ends when no more lines can be drawn.
- The winner of the game is the player with the most boxes.

Can you find a strategy that means you are more likely to win every time?

Sample game

Here Rita completes two boxes with her line:



Play the game three times to find the overall winner.

Other things to try

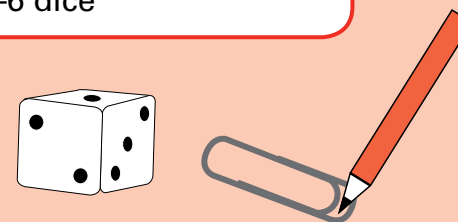
- Try playing dots and boxes on a different grid (for example triangular or hexagonal).
- Dots and boxes can also be called 'strings and coins'. This game is played on squared paper where a coin is in each square. Players take turns to 'cut' a string (one edge of the square). When a cut leaves a coin with no strings, the player takes the coin and has another turn. The winner is the player who has the most money at the end of the game.

The decimal game

a game for 2 players

You need

- pencil and a paper clip
- 1–6 dice



Before you start

- decide who is Player 1 and who is Player 2
- each player draws a decimal point in one of their squares
- spin the spinner to show the target number for this game

Player 1

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

Player 2

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

Take turns to

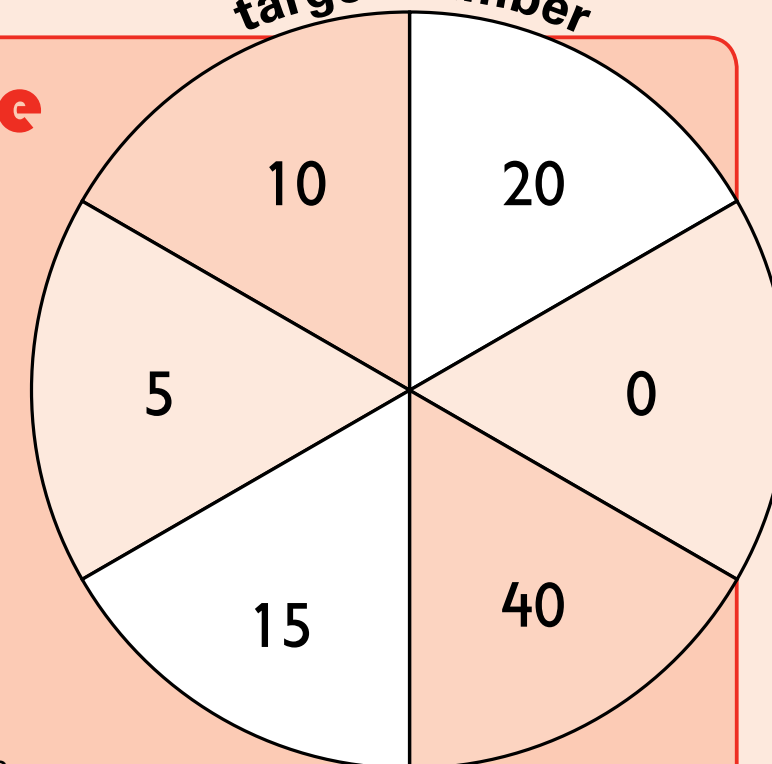
- throw the dice
 - write that number in one of your squares
- Keep taking turns until each player has a number with three digits and a decimal point.
- The winner is the player whose number is closest to the target number.
- Play the game once more.

Do you have an overall winner yet? If not play a final game but this time a player can write their number in any square (theirs or the other player's).

Other things to try

- Play the game again, but this time the winner is the player whose number is furthest away from the target number.

target number



Think about why some cells are more significant than others.

I played the games

with _____

Signed _____