

“The highest form of research is essentially play.” *N. V. Scarfe*

“Play is our brain’s favourite way of learning.” *Diane Ackerman*

“Do not keep children to their studies by compulsion but by play.” *Plato*

“Almost all creativity involves purposeful play.” *Abraham Maslow*

“We don’t stop playing because we grow old; we grow old because we stop playing.” *George Bernard Shaw*



Playful Pedagogy: Why Games Matter in Post-16 Maths

Lowest unique number

- Choose a positive integer and write it down without showing anyone else.
- The winner will be the person who chose the lowest number that nobody else has chosen.
- If every chosen number appears more than once, we will have another round.

“What books are to reading,
play is to mathematics...
when students play, they
learn more deeply”

Math Games Short List

“What books are to reading, play is to mathematics.”
-Dan Finkel, mathforlove.com

We all want to support kids in developing their math skills, but how can we actually do it?
A play-based approach is our best friend.

Inviting kids to play games means quality family time, building math skills without stress.

Supporting your kids through math games

- **Let kids do the work!**

The more kids do, the more they learn. Avoid explaining how to solve a puzzle or what the right move in a game is. Only give hints if they'll keep kids engaged longer. Giving away the answer ruins the game.

- **Play Along!**

Show your kids that you're having as much fun as they are! They'll follow your lead. Show them how play and math go together.

- **Have fun first!**

The most important lesson we can teach kids about math is that it's fun and empowering. If you or your kids are not having fun, take a break.

A lot of games involve mathematical thinking, and are worth playing.

The classics include a lot of great games for math: Chess, Go, Backgammon, Checkers, Chinese Checkers, Yahtzee, Pente, Connect 4, Sorry, Othello, poker, Mastermind, and so on.

These games are all fantastic for encouraging math thinking. They're also quite well known.

For some you may not have heard of, see the other side of this page.

What factors influence how we learn maths?

Based on meta-analysis by Professor Bert De Smedt

Maths-specific factors	General factors
Numerical magnitude processing	Executive functions
Mathematical vocabulary	Language
Mathematics anxiety	Spatial skills
Home mathematics environment	Fluid reasoning

GCSE Maths

Assessment objectives and weightings

AO1

50%

Use and apply
standard
techniques



AO2

25%

Reason,
interpret and
communicate
mathematically



AO3

25%

Solve problems
within
mathematical
and in other
contexts



Factors and Multiples

This is a game for two players.

The first player chooses a positive even number that is less than 50 and crosses it out on the grid.

The second player chooses a number to cross out. The number must be a factor or multiple of the first number.

Players continue to take it in turns to cross out numbers, at each stage choosing a number that is a factor or multiple of the number just crossed out by the other player.

The first person who is unable to cross out a number loses.



Reflections

What maths did you use?
Any other skills?

Was there chance to reason,
problem-solve or communicate
mathematically?

Were there opportunities for
assessment?

Where else could you take
the activity?

Games, puzzles and competitions

How often do you play games, puzzles and competitions in your classroom?

If not, why not?

What stops you?

Barriers to games and puzzles

- Not enough time to play: *“we have 8 months to get through the course!”*
- Too much planning and preparation time
- Lack of structure, seen as messing about
- Students think it’s a waste of time
- What are they learning?
- SLT won’t see the benefit

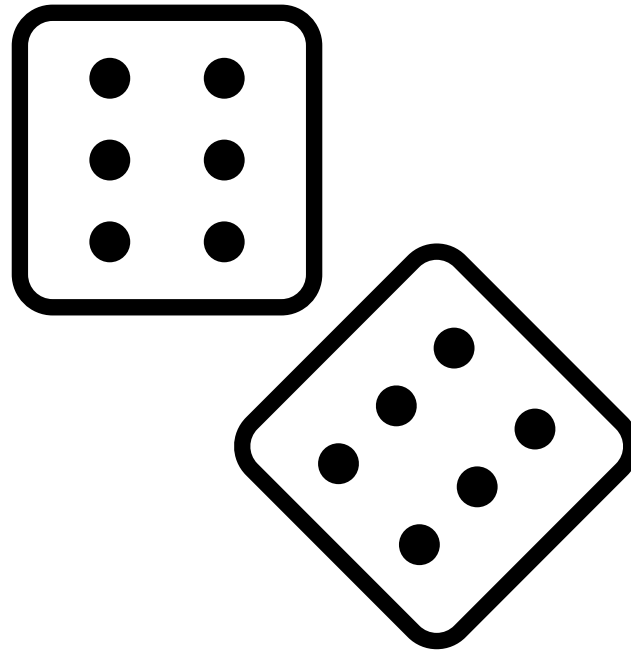


Benefits of games and puzzles

- Students must discuss and to discuss, they must think
- Creates a positive and happy memories of maths
- Helps with number nimbleness
- Supports assessment objectives
 - ✓ AO1: Use and apply standard techniques
 - ✓ AO2: Reason, interpret and communicate mathematically
 - ✓ AO3: Solve problems within mathematics and in other contexts
- Supports underpinning skills
- Supports making connections
- Supports language development



Dice games

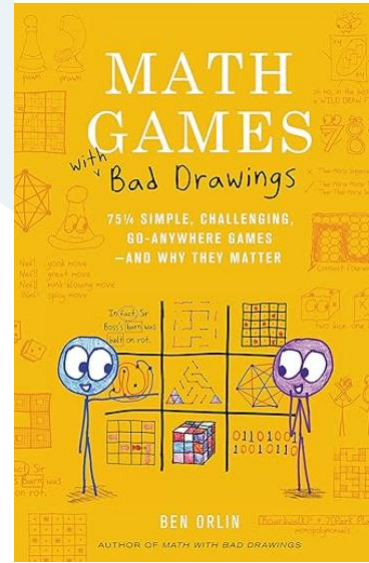


33 to 99

One player, the leader for the round, calls out a target number, anywhere from 33 to 99. Then the leader rolls the five dice and starts the timer.

Each player tries to achieve the target number by combining the five dice via the four operations. You must use each dice precisely once. Brackets are allowed.

When the timer goes off, compare your results. Whoever got closest to the target, without going over, scores zero for the round. Everyone else subtracts their own result from the winner's, and scores that number of penalty points, up to a maximum of 5.



PIG – Two Dice Version

Play in pairs or small groups.

On your turn, roll **two dice** and add their total to your turn score.

You may choose to **roll again** or **bank** your turn score.

If **either die shows a 1**, you lose all the points from that turn and your turn ends.

If **both dice show 1** (snake eyes), you lose **all your accumulated points** and your turn ends.

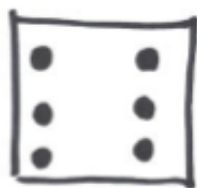
First player to **100 points** wins.

101 You're Out:

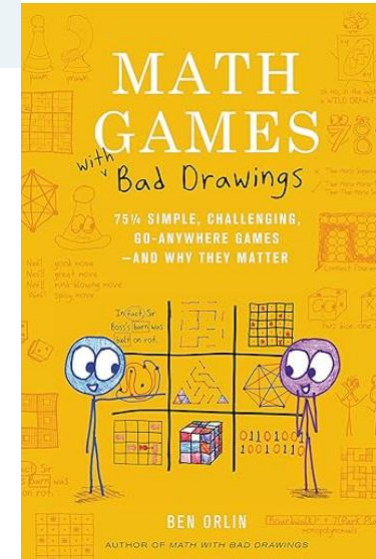
A Game of Place Value

Math educator Marilyn Burns devised this charming game to teach place value to elementary schoolers. I find that it's good fodder for all ages, even decrepit old adults like myself.

To play, you roll a standard six-sided die. **After each roll, decide whether to leave the number as it is (e.g., 3), or to multiply it by ten (e.g., 30), before adding it to your score. Roll six times in total. The goal is to get as close as you can to 100, without going over.**



50 → 56 → 66 → 96 → 99 → 103



Shut the Box

Each player writes:

1 2 3 4 5 6 7 8 9

(or **1–12** for a harder version)

Players take turns:

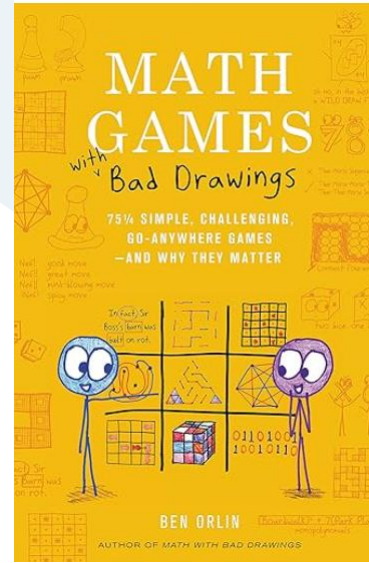
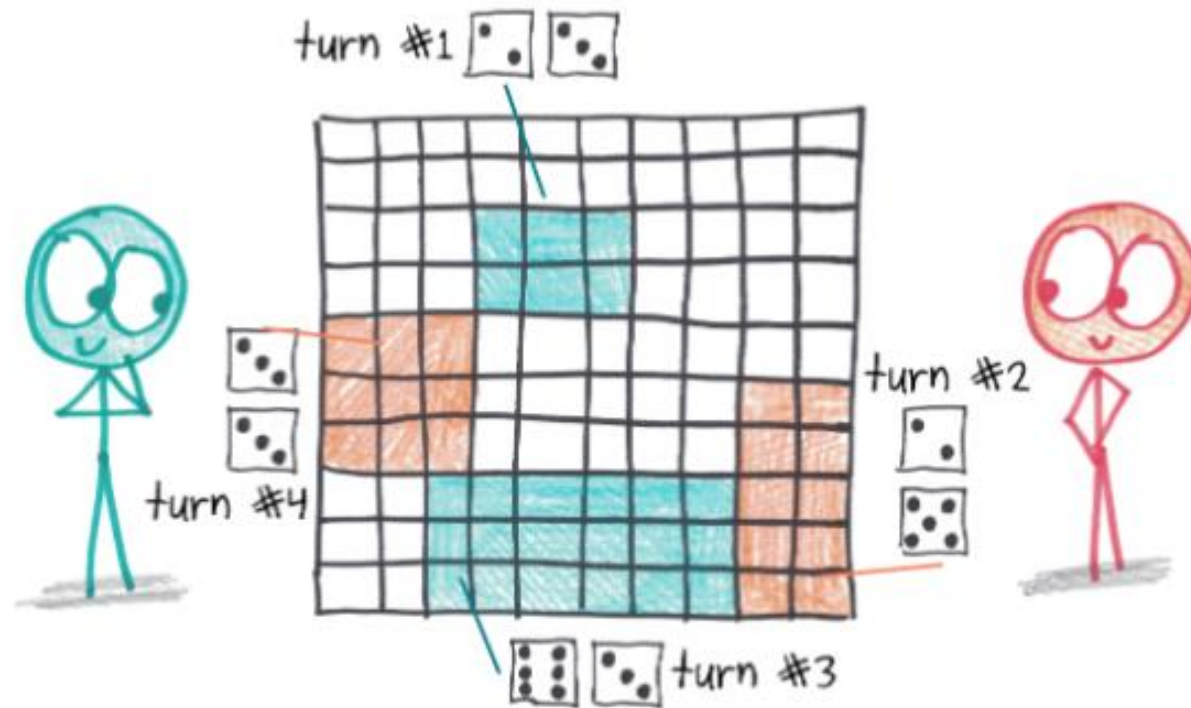
- Roll two dice.
- Cross off any combination of available numbers that adds to the total rolled.
- Continue until no legal move is possible.
- Score is the total of the numbers left uncrossed (lowest score wins).

Gridlock:

A Game of Filling Arrays

This collaborative game from Stanford education center *YouCubed* is one of those rare classroom games that's diverting enough to play for fun. You need two standard dice (easily simulated; search Google Dice) and a 10-by-10 grid.

Play in pairs, with the shared goal of **filling up as much of the grid as you can**. On each turn, **roll the two dice**. Say you get 4 and 5; you must **then shade in a 4-by-5 rectangle anywhere on the grid**. The game ends when there is no room to place the next rectangle.



Reflections

What maths did you use?
Any other skills?

Was there chance to reason,
problem-solve or communicate
mathematically?

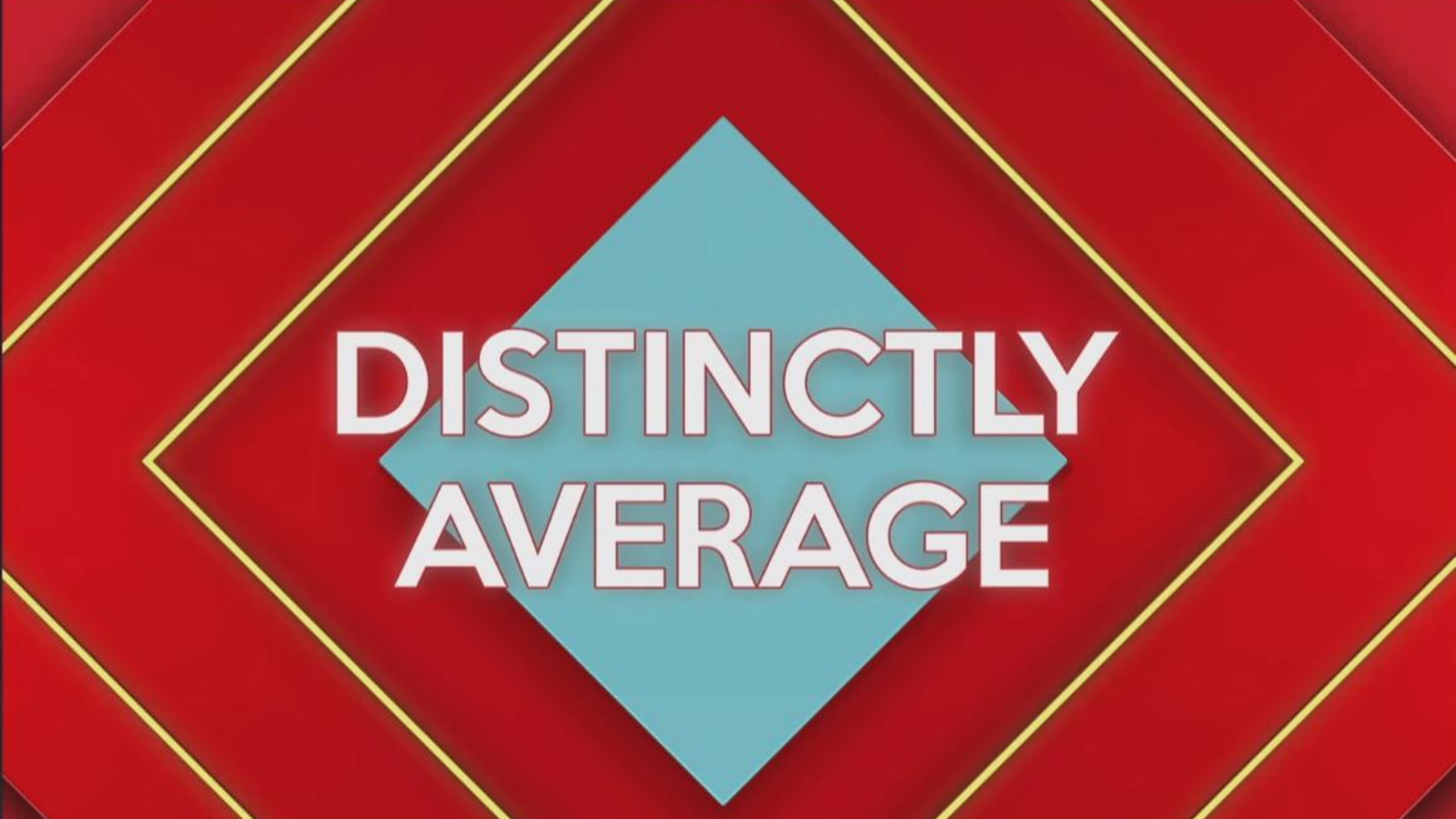
Were there opportunities for
assessment?

Where else could you take
the activity?

House of Games

Instructions:

- Work in pairs or small groups to estimate numerical answers to questions without conferring.
- The answers are averaged, and the groups with the average closest to the correct answer wins a point.



**DISTINCTLY
AVERAGE**

DISTINCTLY AVERAGE

?

What is the population of the UK?

ANSWER

DISTINCTLY AVERAGE

?

What is the population of the UK?

ANSWER

69.9 million

DISTINCTLY AVERAGE

?

How many miles of road are there in the UK?

ANSWER

DISTINCTLY AVERAGE

?

How many miles of road are there in the UK?

ANSWER

247 200

DISTINCTLY AVERAGE

?

How many tennis balls will be supplied to Wimbledon this year?

ANSWER

DISTINCTLY AVERAGE

?

How many tennis balls will be supplied to Wimbledon this year?

ANSWER

54,250

DISTINCTLY AVERAGE

?

How many active users does TikTok have in the UK?

ANSWER

DISTINCTLY AVERAGE

?

How many active users does TikTok have in the UK?

ANSWER

26.8 million

Commercial games

Confident?

There are quiz games, and then there are *quiz games*.

Confident is different because instead of answering questions with one answer, you give a range. The aim is to get the answer in your range, while also getting the smallest range compared to the other players.



Reflections

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Any other skills?

Was there chance to reason,
problem-solve or communicate
mathematically?

Were there opportunities for
assessment?

Where else could you take
the activity?

A confidence testing game...

- Play in a team
- You start with 1,000 points
- For each question, assess how confident you are with the answer and choose a number of points that reflects that your confidence
- If your answer is correct, you win that number of points plus the same amount again
- If you are wrong, you lose that number of points. If you are left with zero, you can't play, so be careful...

Practice go

Name this shape



A – square

B – circle

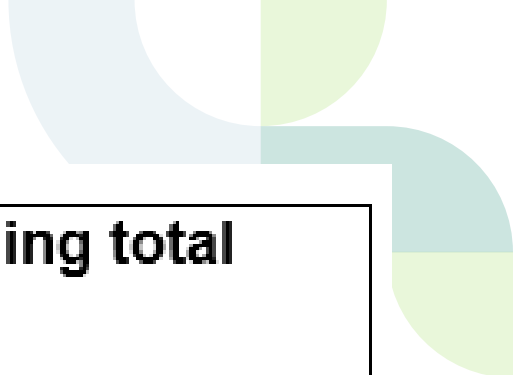
C – triangle

If you are reasonably confident it is a triangle you could choose 700 points.

If you are right, you keep your 700 points and get another 700 points. So, 1400 points which is added to your starting 1000.

Your running total is now 2,400 points.

But be careful. If you are wrong, you lose 700 points and your running total is now 300 points.



Question	Answer A, B or C	Amount	Running total
			1000
1	C	700	2400
2			
3			
4			
5			
6			

Question 1

How many goals were scored in total at the World Cup in Qatar in 2022?

A – 172

B – 215

C – 311

Question 2

How many calories are there in a medium Iced Latte from Starbucks?

A – 128

B – 249

C – 311

Question 3

Which exam stage is this question taken from?

Kirsty mixes blue paint and yellow paint.

$\frac{2}{5}$ of her mixture is blue paint.

She uses **3.5** litres of blue paint.

How many litres of yellow paint does Kirsty use?

A – KS1

B – KS2

C – GCSE

Question 4

What year's maths curriculum is this objective taken from?

*add and subtract fractions
with the same denominator
and denominators that are
multiples of the same number*

A – Year 4

B – Year 5

C – Year 6

Question 5

How many shows is Harry Styles doing on his current Together, Together tour?

A – 68

B – 98

C – 173

Question 6

To the nearest mile, how far is Keele University from Stoke-on-Trent railway station?

A – 3 miles

B – 5 miles

C – 7 miles

Question 7

Find the number that is exactly halfway between $\frac{3}{10}$ and $\frac{3}{4}$

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Wednesday 3 June 2026

Morning (Time: 1 hour 30 minutes)

Paper
reference

1MA1/2F

Mathematics

PAPER 2 (Calculator)

Foundation Tier



$$A - \frac{19}{40}$$

$$B - \frac{21}{40}$$

$$C - \frac{3}{7}$$

Question 8

How many goals has Harry Kane scored for England?

A – 53

B – 79

C – 84

Question 9

If the world were 100 people...

....how many would hold a university degree?

A – 7

B – 11

C – 19

Question 10

What year was This Morning first broadcast on television?

A – 1988

B – 1990

C – 1992



THE competition

Competition

MEI FE Maths Challenge

					Start
					double 8
22	double 3	6	10	$5 + 5$	16
$11 + 11$					
14					
7×2	8	4×2	2	double 1	18
					$9 + 9$
					12
Finish	20	double 10	double 2	4	double 6

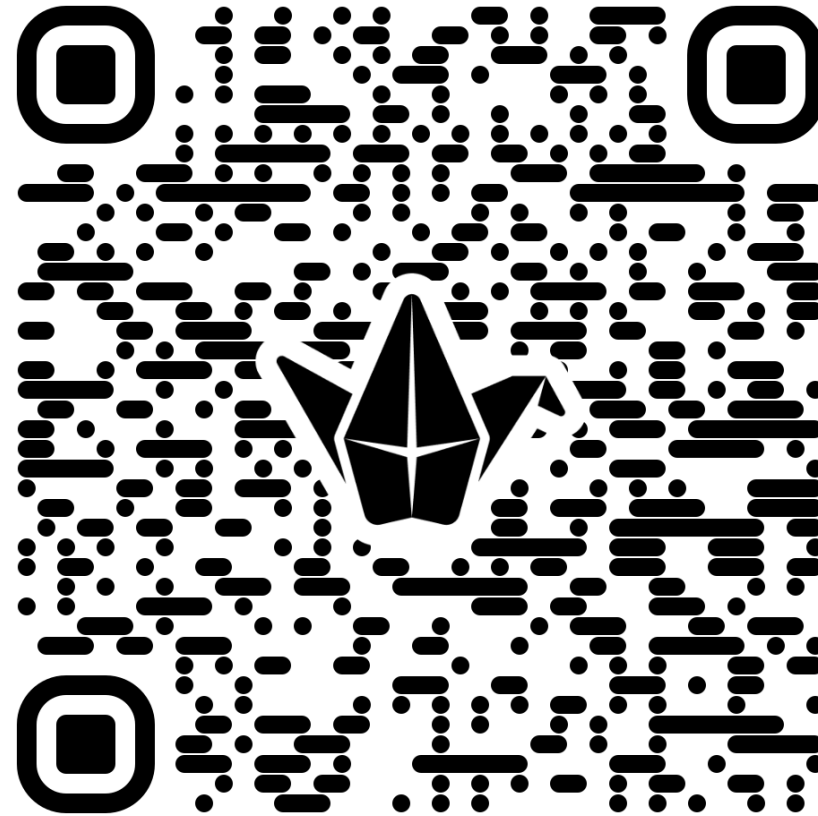


Kahoot!

Format:

- Practice rounds in September/October
- Mini SoL
- Round 1 in November/December
- College Final in January
- Regional Final in February
- National Final in April

Playful Pedagogy Padlet



<https://padlet.com/meifecpd/PlayfulPedagogy26>