COUNT ON US

SECONDARY CHALLENGE

TEACHER TRAINING 2022

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COUNT ON US Secondary Maths Challenge
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THE COUNT ON US SECONDARY CHALLENGE

- This is the eighth annual challenge for London secondary schools.
- Aim: enable many key stage 3 students (60+) to participate in activities providing different and unusual ways to develop curriculum focussed skills: stats and probability, geometry, number and algebra.
- May: School teams of 5 compete in F2F heats. (≈12 schools/heat).
- July: Top 12 schools will qualify for the grand finale at City Hall

60+ students engage with the activities in a challenging and fun environment where they can develop their mathematical skills with the tournament games and activities in the student book.	Five of these students are selected to represent the school in the tournament and these students train hard to be as successful as possible, just as they would for any competitive event.

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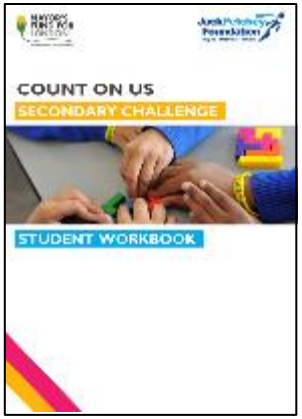
RESOURCES PROVIDED



1. We have sent you:
   - Sets of GridLines geometry game packs.
   - Sets of 24®Game packs (of all tournament types).
   - A bag of dice for Hedgehog play.
2. Key Documents on the web site:
   - *Student Workbook* (PDF) tournament activities and catch up - make available to all students.
   - *Guidance for Schools* (PDF) guidance for clubs, class and tournament for teachers and helpers.
   - *Tournament handbook* (PDF) guide to running your inter or intra school tournament
   - *Training Videos* for all of the activities

www.mayorsfundforlondon.org.uk/our-programmes/count-on-us-secondary

Also look out for this training PPT after the training session!

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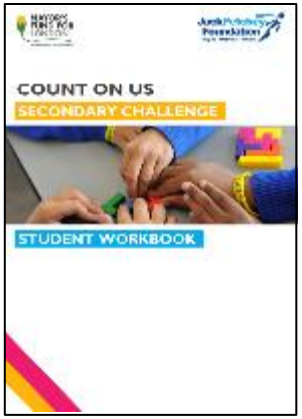
IN CLASS AND CATCH UP



- Student Workbook. Massive updates for this year:
  - Rules and activities tailored to the two all new rounds and changes to existing rounds.
  - All rounds and activities mapped to a full curriculum tracker to enable them to be integrated into a catch up curriculum.
  - Comprehensive set of self teaching worksheets to cover all curriculum areas not directly addressed by the tournament activities.
- Guidance for Schools. Updates:
  - Full details on new and modified rounds.
  - Guidance and advice on using the tournament activities in ordinary classroom teaching.

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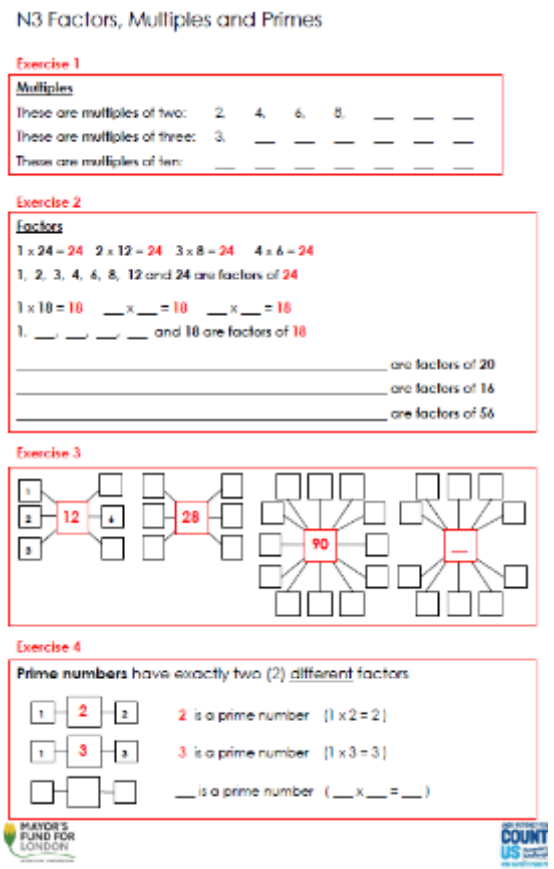
CATCH UP

Tracker

Number	R	CU
1. Place value for decimals, measures and integers of any size.		N1
2. Order positive and negative integers, decimals and fractions; on a number line and with symbols =, ≠, <, >, ≤, ≥		N2
3. Prime numbers, factors (or divisors), multiples, common factors, common multiples, HCF, LCM and prime factorisation.		N3
4. Use the four operations with formal written methods.		N4
5. Use the four operations with integers (+ve and -ve numbers).	R3	N5
6. Use the four operations with decimals.	R3	N6
7. Use the four operations with fractions.	R3	N7
8. Use priority of operations: brackets, powers, roots and reciprocals.	R3	BBC1
9. Integer powers & real roots (square, cube, 4, 5) as decimals and surds.	R3	N9
10. Standard form $A \times 10^n$ $1 \leq A < 10$, where n is +ve, -ve integer or 0.		BBC2
11. Convert decimals and fractions and percentages	R3	N11
12. Fraction Operations.		N12
13. Percentage; definition, calculation, comparison, change, operation.		N13
14. Round numbers and measures to appropriate degrees of accuracy.		BBC3
15. Round to estimate & calculate possible resulting errors as $a < x \leq b$		BBC3
Algebra		
1. Algebraic notation: $ab, 3y, a^2, a^3, a^2b, \frac{a}{b}$, coefficients, brackets.	R4	A1
2. Substitute numerical values into formulae and expressions.	R4	BBC4
3. Use vocab: expressions, equations, inequalities, terms and factors.	R4	BBC4
4. Algebraic manipulations: collect like terms, multiply out brackets, take out common factors, expand products of binomials.	R4	A2
5. Rearrange formulae to change the subject.		BBC4
6. Use algebraic methods to solve linear equations in one variable.	R4	A6
7. Work with co-ordinates in all four quadrants.	R4	A7
8. Graphs of linear and quadratic functions of one variable.	R4	A8
9. Reduce linear equations to $y = mx + c$; gradients and intercepts.		A9
10. Use linear and quadratic graphs to estimate values and to find approximate solutions of simultaneous linear equations.		BBC5
11. Find approximate solutions to contextual problems from graphs, including piece-wise linear, exponential and reciprocal graphs.	R4	BBC5
12. Terms of arithmetic, geometric and other sequences; nth terms with term-to-term or a position-to-term rules.	R4	A12


N3 Factors, Multiples and Primes

Exercise 1

Multiples

These are multiples of two: 2, 4, 6, 8, __ __ __

These are multiples of three: 3, __ __ __ __ __ __

These are multiples of ten: __ __ __ __ __ __ __

Exercise 2

Factors

1 x 24 = 24 2 x 12 = 24 3 x 8 = 24 4 x 6 = 24

1, 2, 3, 4, 6, 8, 12 and 24 are factors of 24

1 x 18 = 18 __ x __ = 18 __ x __ = 18

1, __, __, __, __ and 18 are factors of 18

_____ are factors of 20

_____ are factors of 16

_____ are factors of 56

Exercise 3

12 28 90 __

Exercise 4

Prime numbers have exactly two (2) different factors

2 is a prime number (1 x 2 = 2)

3 is a prime number (1 x 3 = 3)

__ is a prime number (__ x __ = __)

Tracker

- Tournament rounds (with practice activities)
- Catch up sheets (for consolidation and to fill gaps)
- Best printed out and written on.
- Catch up sheet answers to come …

- Follow the link in chat to open the web site
- Open the two handbooks
- Have a quick flick through

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PREVIOUS YEARS AND THIS YEAR

Experienced COU folk please share:

1. What activities did you do last year? How many students were involved?
2. If you have run an in-school tournament, how was it? How did you choose your team?
3. What impact has being in the challenge had on your students' maths?

Everyone:

1. What might make it hard this year (aim to solve problems that arise)
2. How will you use the catch up and in-class opportunities?

The National Curriculum
"… pupils should build … connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems"

Share interesting responses in chat

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TOURNAMENT ROUNDS & WHAT'S NEW?

	Activity	Changes
1a	The Game of Hedgehog (probability 20 mins)	This replaces Hex. It is a simple strategic dice game played teams in a mini tournament.
1b	Data-Chart-Statistics (Statistics ongoing)	An all-new card matching activity played by team members while rounds 2 and 3 are taking place.
2	GridLines Geometry (Geometry 15 mins)	No change to the gameplay. But the cards have had a major refresh with some very hard cards removed, more easier cards (still hard!) and extra content: notably volume and similar figures.
3	The 24®Game (Number 25 minutes)	No change! (Still whole numbers, integers, fractions and decimals, indices and algebra.)
4	Algebraic problem solving (Algebra 25 mins)	There will be Code breaking! The list of included algebra has been expanded and updated. Notably graphs are included.

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2022 FORMAT

- Schools will be allocated into groups of 12 for face to face heats to take place in May.
- We will confirm dates as soon as we are confident enough that we can go ahead and are able to start confirming venues.
- We expect there will be Five heats (more if needed).

Respond in chat:

- Is May OK?
- When in May is too late?

- If it proves impossible to have face to face heats, then we will run the heats online as was the case last year. We will give full details as soon as needed.
- The top two teams in each heat, plus the next 4 highest scoring losers will qualify for a face to face final in a central location early July.

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ROUND 1A – THE GAME OF HEDGEHOG

- This is a modified version of a classic dice game. The game involves rolling a single die. If you roll 2, 3, 4, 5 you score that many points.
- If you roll 1, your turn ends. If you roll a 6 your turn ends but you lose all the points you scored in that turn. Or you can choose to pass, ending the turn without rolling.
- The first to score 30 points wins. Teams will line up facing each other with one team assigned to start.
- Players in the team play in turn with no communication (verbal or non-verbal) allowed either rolling the die or passing. A judge will keep score.
- When one team has scored 30 the final scores are recorded. Points will be awarded according to the scores with a bonus for winning.

HEATS AND FINAL : playing Hedgehog

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HEDGEHOG: IN SCHOOL ACTIVITY

- The important things is to consider strategy. There are online simulators for the classic game (the game of Pig) which let you see the probabilities at given points of the game to consider your strategy.
- Once students have an idea of the strategy, they can move onto the game of Hedgehog.
- **Clubs and class**: Modify the variables in the game to see how this affects their strategy. Change the penalty for rolling a 6. Change the target score. Change the rules e.g. 1 and 2 end your turn without penalty. Play the two dice game.

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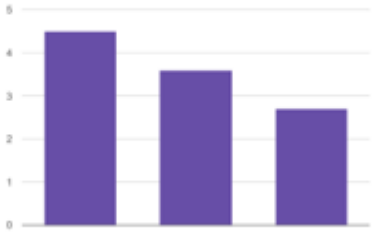
ROUND 1B – DATA-CHART-STATISTICS

- Data-Chart-Analysis will be drawn from reporting about real world events or situations. The issue is how the data can be used to make the inference that is given in the analysis and how the chart is useful in illuminating this.
- This is complementary to the more direct method of taking small data sets, calculating statistics and drawing charts, common in exams and text books.
- We will take interesting data sets from any source and ask what sorts of statements you could make using this data and how you could you illustrate this effectively for different purposes.

Data Card D1	Chart Card C1	Analysis Card A1
Coastal tide gauges showing sea levels.		"Renewable energy is getting cheaper."

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D-C-S : HEATS AND FINAL

- At the end of the Hedgehog round, teams will be handed an envelope containing a set of 18 cards and an answer sheet. 6 will contain details of data sets, 6 will show statistical charts and 6 will contain a summary analysis.
- Just before the start of the algebra round they will need to hand in their completed answer sheet for marking, so they can work on this at any time.
- When team members are not involved in the Gridlines and 24®Game rounds they could be doing this. They will need to organise the cards into sets with a best match of data + chart + analysis and write the card letters in 6 sets onto the answer sheet.
- Answer sheets must be ready for collection immediately when called as soon as the algebra round is announced.

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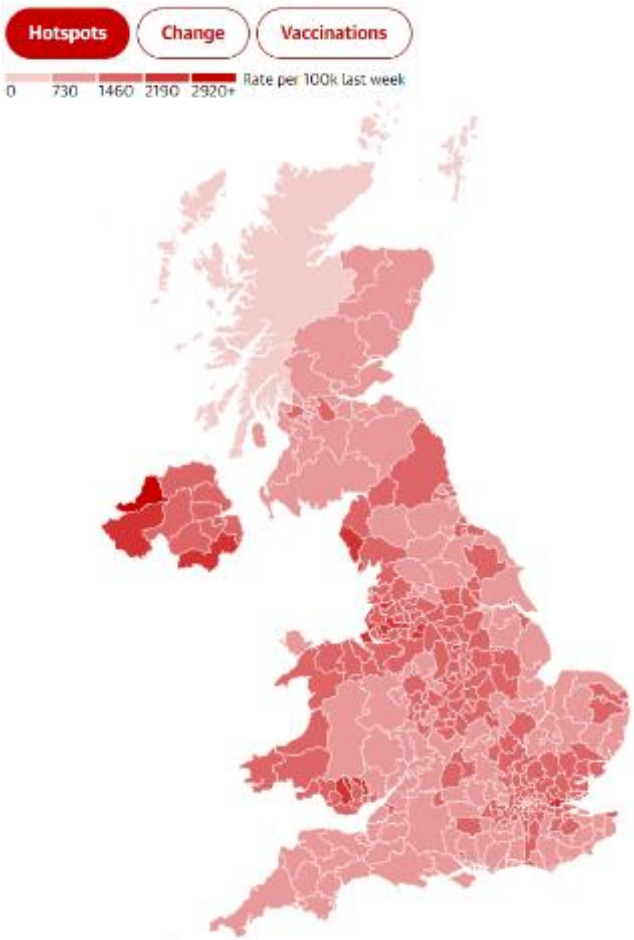
D-C-S : IN SCHOOL ACTIVITY

- As with the algebra round, the Chart-Data-Analysis round cannot be practiced directly.
- Instead, we recommend that students find other reports and articles online on issues of interest where data has been used to draw conclusions, illustrated with charts and to look at the relationships between the three components.



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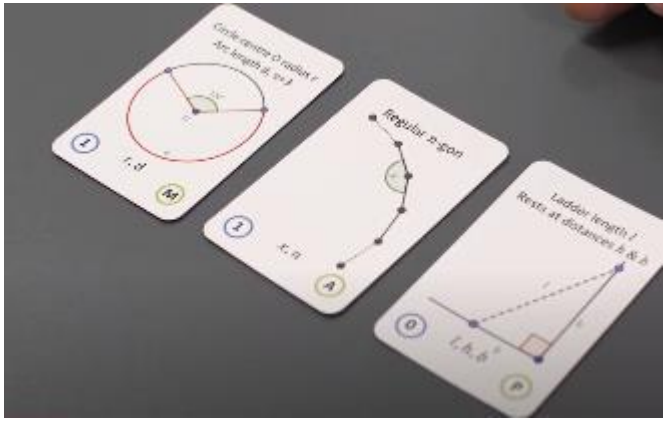
ROUND 2: GRIDLINES GEOMETRY

Gridlines Geometry is a card game designed and made especially for the challenge (by me!).

- Cards with geometric problems with variables must be solved using numbers cards.
- There are four problem areas: (i) Angle relationships (ii) Area and Perimeter (iii) Pythagoras (iv) Volume and similar figures.
- Players see three randomly chosen problem cards and use 10 randomly chosen number cards find solutions.
- The game pack contains detailed rules, which are used for normal play and in the challenge.



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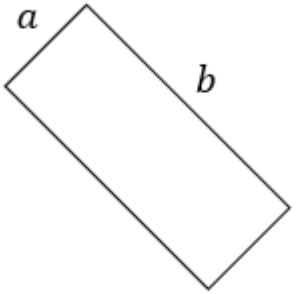
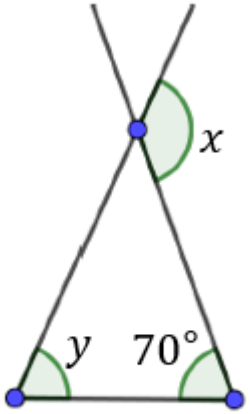
PLAYING GRIDLINES GEOMETRY

Area = 100

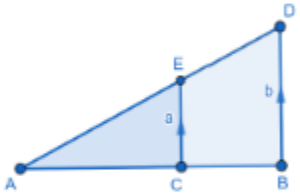


0 a, b M



1 x, y A

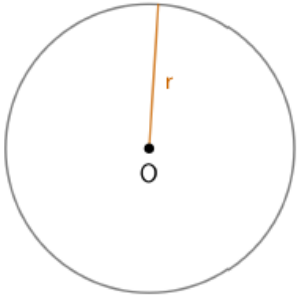
$\overline{AE}$=24, $\overline{AD}$=32



1 a, b V

Circle centre O

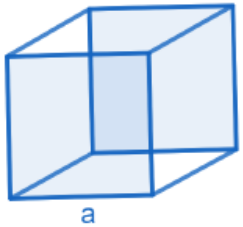
Circumference C, π=3



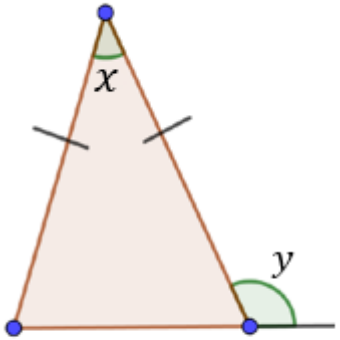
1 C, r M

Cube, side a

S=Total surface area



1 S, a V



2 x, y A

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PLAYING GRIDLINES GEOMETRY

The Number Cards

Number Cards can be organised into groups or played individually. Put cards on top of each other to make new numbers. When placed, ONLY the required number can be visible. Examples:

Use:			To Make	Or	Or
90	5		9 5	5 90	5 0
5	100	2	2 100	1 2 5	2 10 5

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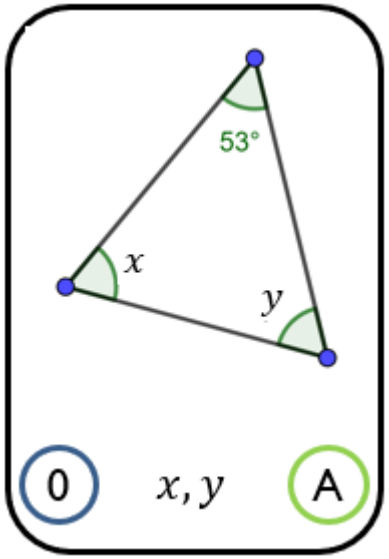
PLAYING GRIDLINES GEOMETRY

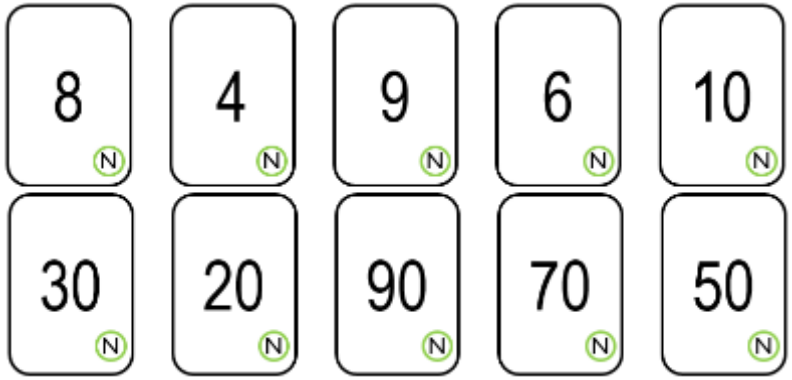


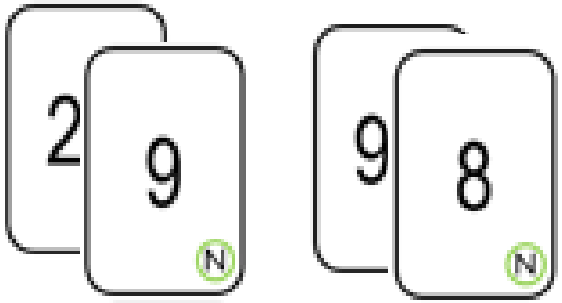
$x + y = 180 - 53 = 127$

So, we need to make two numbers with a sum of 127.

Use the 8 and 9 cards to end with 7. So we need 110 more.

Use 20 and 90 cards to make the 110.





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GRIDLINES : HEATS AND FINAL

- Play an uninterrupted 15 minute round according to the game pack rules.
- As soon as any one problem card is solved, the card is put to one side for scoring and replaced to make three in play problems.
- Any number cards used in the solution are placed at the bottom of the number card pack and replaced.
- Players have three “I give up” cards allowing the replacement of any number of problem and/or number cards.

Substitutions: as often as you like with only 3 players at the table at a time.
Solutions are shown and explained to a table judge, not written down.

Watch the video after this session.

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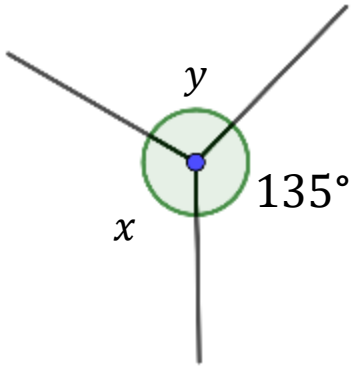
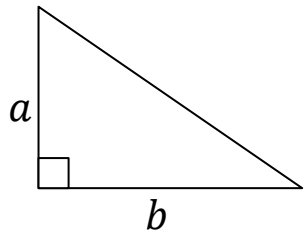


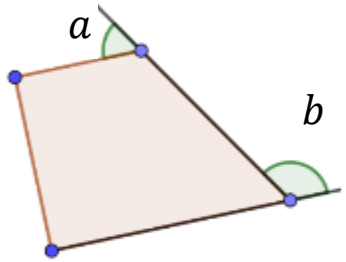
0 x, y A

Area A



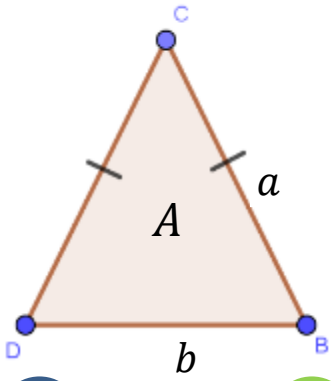
0 A, a, b M

Right Trapezium



1 a, b A

Area A of BCD



2 A, a, b P

40 N

4 N

5 N

1 N

2 N

3 N

60 N

7 N

100 N

1 N

ROUND 3: THE 24® GAME ROUND

The 24® Game is a Card Game

Mentally, combine four numbers using +, –, × or ÷ to make an answer of 24.

ALWAYS 24

The numbers can be one or two digits, they can include negative numbers, fractions or decimals, indices or even algebraic statements.

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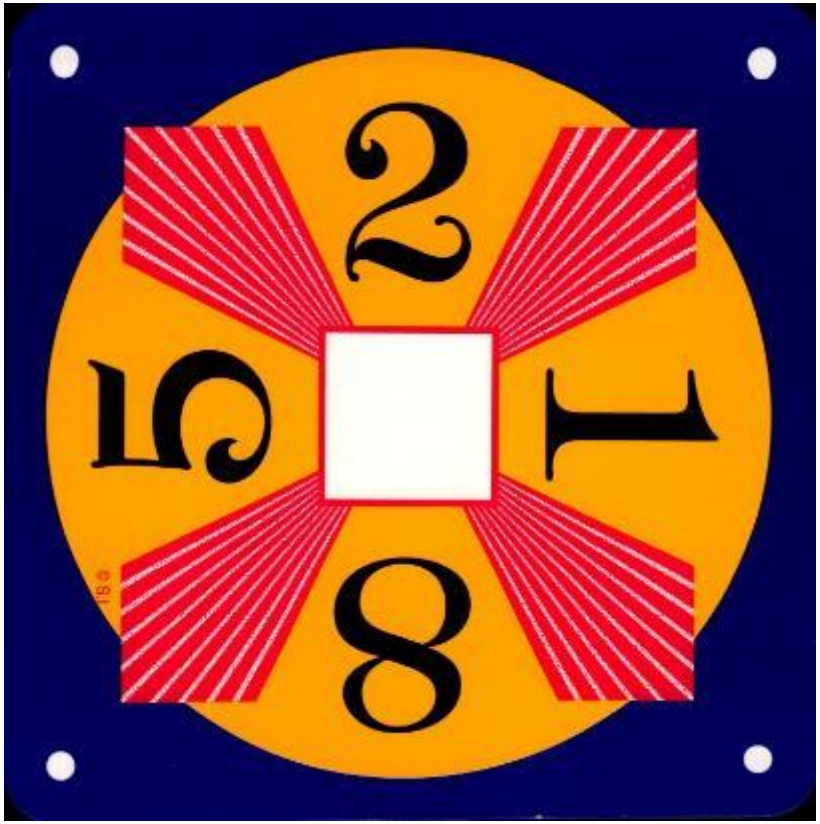
ROUND 3: THE 24® GAME ROUND



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ROUND 3: THE 24® GAME ROUND

Here are two different pairs you can use to make 24.

8 x 3

6 x 4

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ROUND 3: THE 24® GAME ROUND

Find two pairs that you can use to make 24.

8 x 3 → 8 x 1 = 8 5 - 2 = 3

6 x 4 → 8 - 2 = 6 5 - 1 = 4

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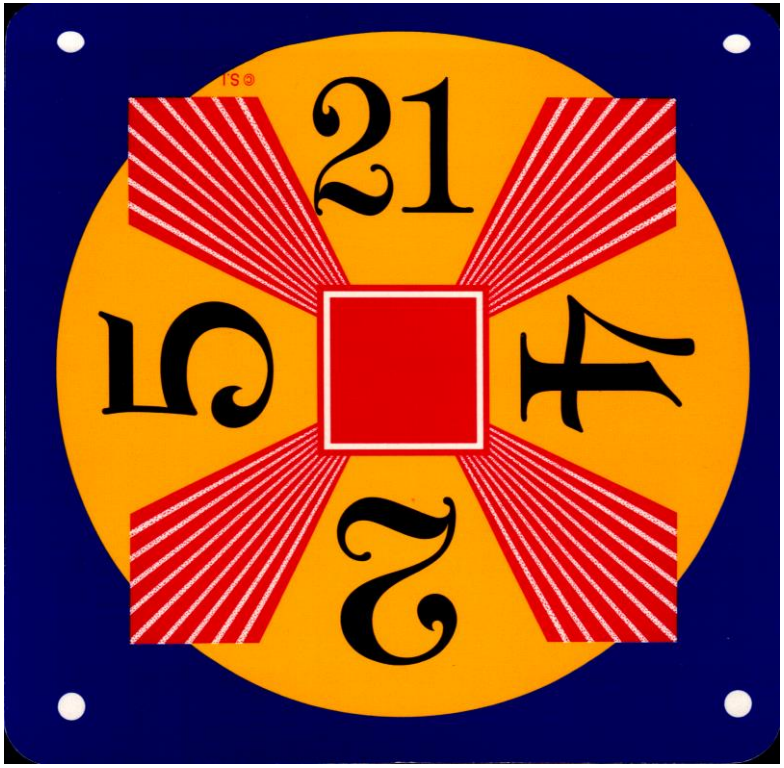

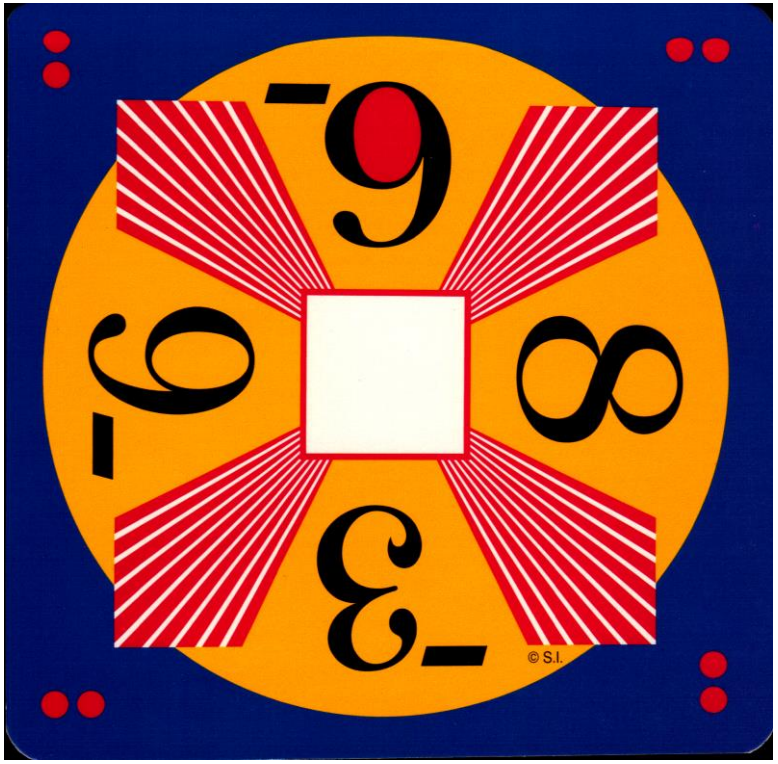

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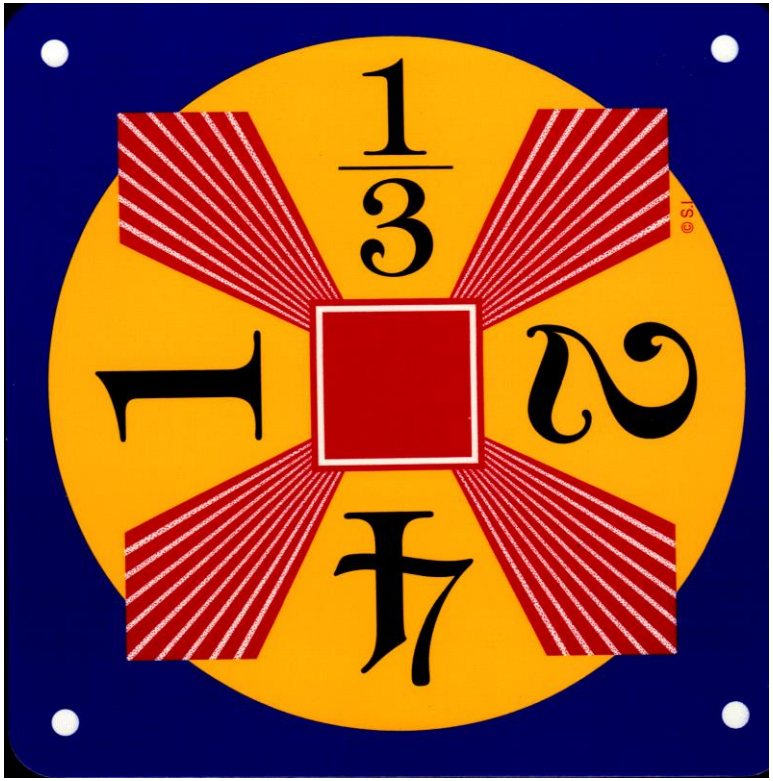
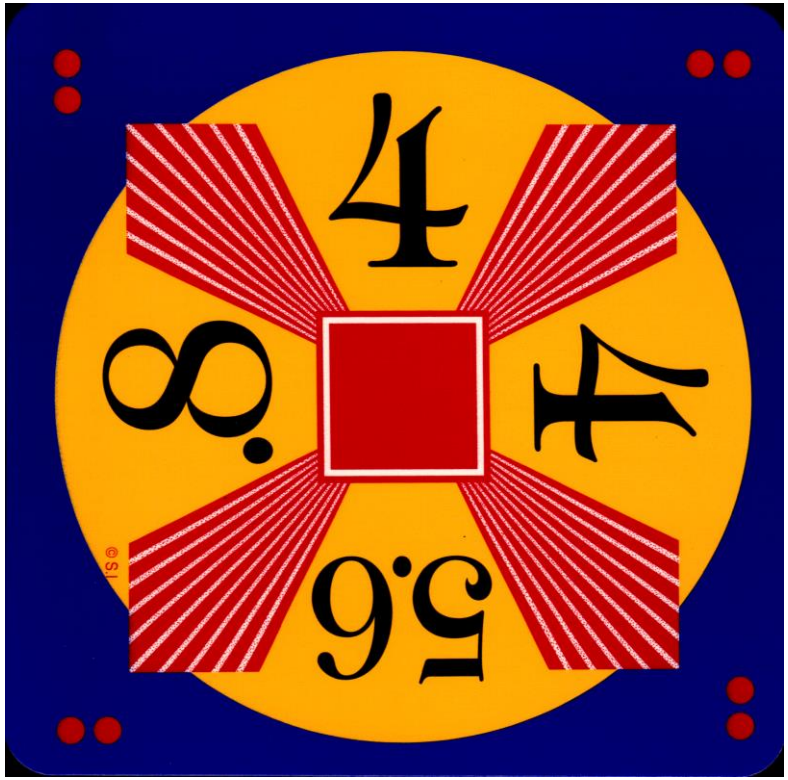
ROUND 3: THE 24® GAME ROUND





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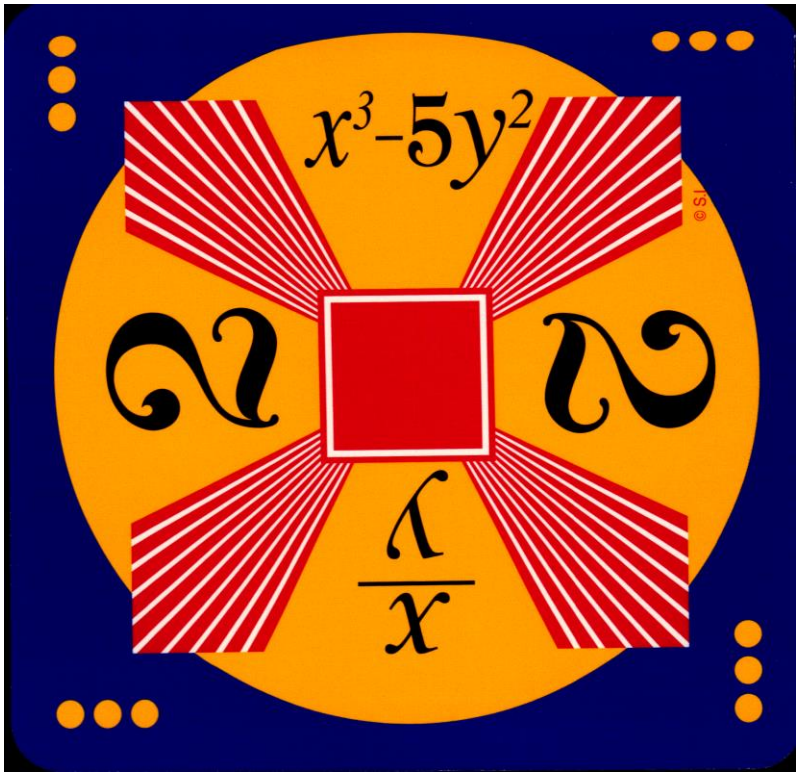
ROUND 3: THE 24® GAME ROUND



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THE 24®GAME: HEATS AND FINAL

Format

Five rounds each of 5 minutes

Rules

- Hands behind table until card is placed.
- Claim with whole hand on card.
- Explain immediately but not quickly.
- If player correct they take the card. If not judge takes the card.
- (FINAL: NO giving up rule!)

Substitutions

At end of round 2:

- Two players must be replaced.

Scoring

5 Rounds.

- 7 points for the round winner.
- 4 points for the round runner up.
- 1 point for a scoring third place.

Very detailed tournament rules in the handbook!

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THE 24®GAME: IN SCHOOL ACTIVITY

1. Show three problem cards at the start of a lesson. (While you take the register?) Students find solutions and share.
2. The Student Guide contains various practice activities.
3. Students can get a 24®Game App for their phones.
4. To compete, your team must have practised very hard. Some individuals are staggeringly good at this – on one occasion the entire pack was completed in a 5 minute round!

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ROUND 4: LESSONS FROM PREVIOUS YEARS

Teams (as a whole) **must** be able to do all of the algebra listed.

There will be instructions but it will not be clear that they are instructions. For example, listen (and make notes) on what is shown introducing the task.

- FOLLOW ALL INSTRUCTIONS.
- Share out the work but have a team leader to follow the instructions.
- Write down any answers that are found on the answer sheet.
- Solve equations carefully and check answers.

No help will be given, so there is no point asking!!

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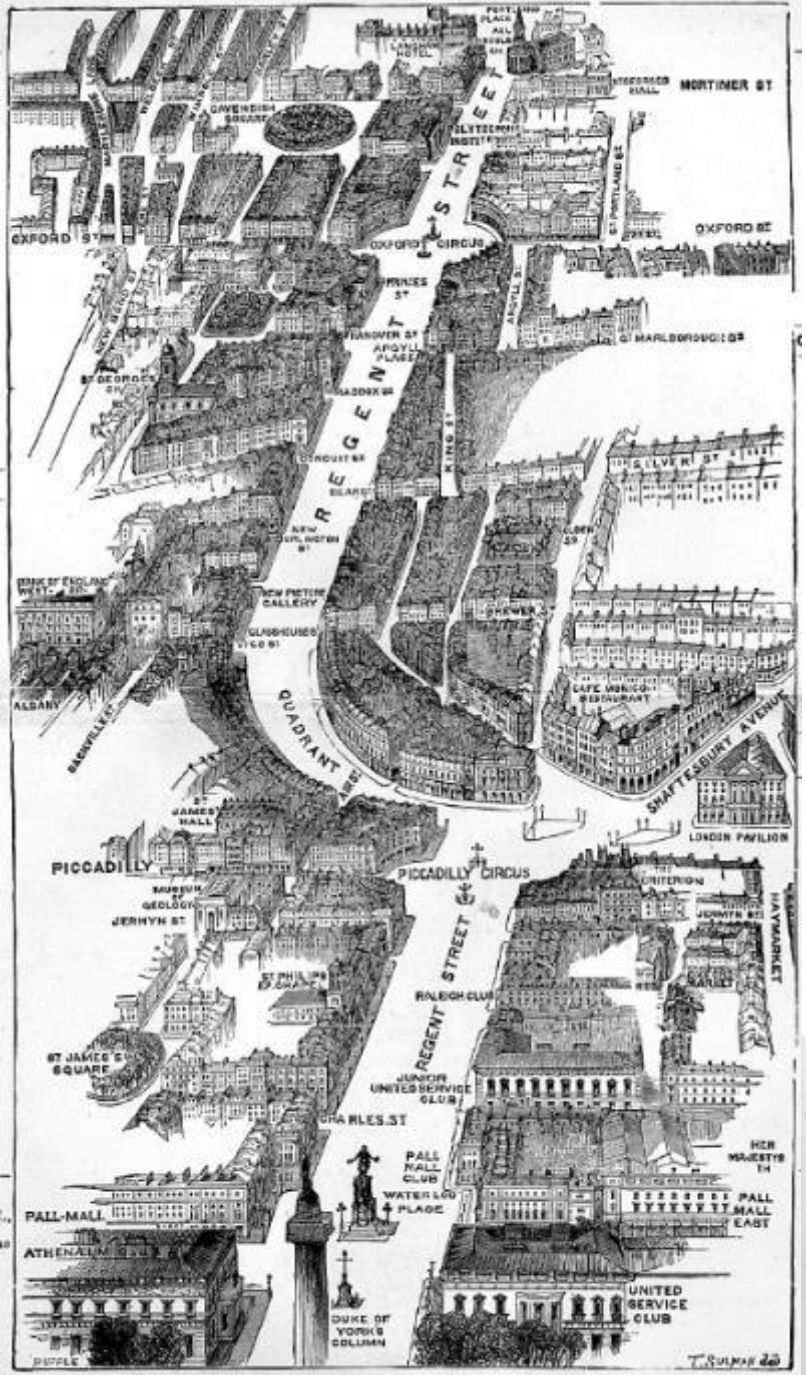

REGENT STREET,
FROM WATERLOO PLACE TO PORTLAND PLACE.

The $2x + 1 = 5$ letter of a circus

The x^0 letter of the widest street

The $\frac{1}{4}x = 1$ letter of a saint with a hall and a square

The $x^2 + 1 = 50$ letter of the quarter circular street

The $5 - x = 0$ letter of a street which isn't gold

The $3x + 1 = x + 5$ letter of a club for bicyclists

The $x^5 - 1 = 0$ letter of the title held by York with the column

A club and road has this letter the 2nd square number of times

The third triangle number letter of a King who lost his head

The $27x - 9 = 25x + 1$ letter of a city with an old university

I say Watson, this map has the name of my 2nd most deadly enemy encoded in it. Can you work out who she is?

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IF THE HEATS MUST BE ONLINE EVENTS

Hedgehog: Teams play mini-tournaments in a breakout room with a judge using a dice simulator and keeping score.

Data-Chart-Statistics: The cards sets and answer sheet will be made available by a link sent through chat. Teams will photo scan their answer sheet before the start of the Algebra round.

GridLines: Five rounds with slides showing 3 problem cards and 10 number cards. Solutions written in a specified format submitted after each round. No "I give up" cards.

24©Game: Mini-tournaments in a breakout room with a judge. Players use mini whiteboards and hold up an answer in a specified format.

Algebraic Problem Solving: Timed multimedia presentation with problems to solve. Answer sheet submitted at the end.

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Q+A

- You will have 10 minutes in a break-out group.
- Ask and wherever possible answer burning questions.
- Use chat to post questions you cannot answer for me to deal with (max 2 per group!)

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COUNT ON US: GROUP to TEAM

- Find ways to share the activities with as many students as possible in years 7, 8 and 9 (60?!)
- Run an in-school tournament for all the participating students.

- Send details of your team members with parental consent forms.
- Organise the space and technology for your team to compete in the online heats.
- **Heats: TBC May**
- **Final: 4th July TBC**

- Be ready to be surprised by who begins to shine in the different aspects of the Challenge.
- Look for students who excel at any one of the elements (substitutions are allowed).
- Use your practice tournament to see who performs best under pressure!
- For returning schools the team must be all students who have not competed before … we keep lists of names!

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… FINALLY … HOWEVER YOU CAN …

The most important thing is that the largest number of students get the chance to have fun engaging with the maths and get better in their maths by doing so …

…then a small group reach an elite level and represent your school and they have fun taking part.

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