

Primary Maths Games

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April 2016

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Aims

- ▶ To use games that can be used to enhance and support mathematical understanding, fluency and reasoning.
- ▶ To consider how games can be adapted to meet the needs of learners in different KS phases.

Why Games?

- ▶ Engaging - Motivating
- ▶ Positive attitude
- ▶ Increased learning
- ▶ Different levels
- ▶ Assessment opportunity
- ▶ Independence
- ▶ Home and School
- ▶ Learn through doing
- ▶ Instant feedback
- ▶ Exposure to maths through peers

Why games?

- ▶ "A carefully constructed game can be a useful way to introduce a topic or concept if, in order to play the game effectively, learners need to use that topic or concept. The pleasure learners get from playing games serves to engage them in situations where they can practise the use of technical language when describing what they are seeing or doing."

Designing and Using Mathematical tasks (Mason and Johnston-Wilder, 2006, p63)

- ▶ "The more you play them, the faster you become, and the more you develop your intuitive and flexible thinking skills - the mark of a real mathematician"

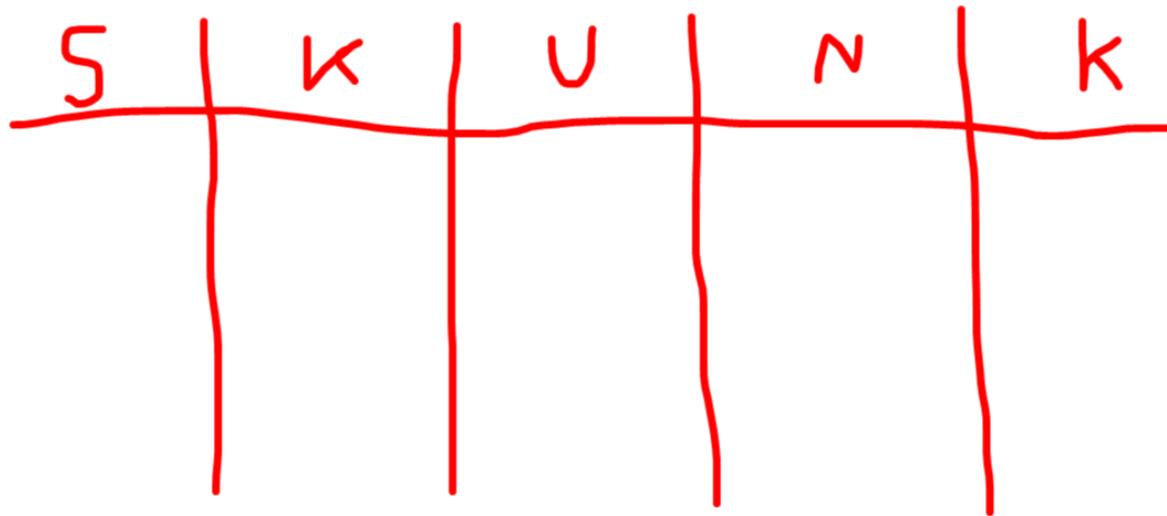
Cards on the table (BEAM, 1992)

- ▶ "Play and Learning maths do not have to be mutually exclusive events. Play and games can give young children opportunities to learn and develop foundational mathskills that are aligned with Common Core standards."

Learning early Math through play and games (Ramani and Eason, 2015)

“SKUNK” - Addition (and risk taking)

- ▶ Resources: 2 dice, scrap paper or whiteboards



Place Value game - calculation

- ▶ Resources: Die
- ▶ Generate a 2-digit number by rolling dice and deciding whether to place the digit in the Tens or Ones place. Repeat so that there are two 2-digit numbers.
- ▶ Game for 2 or 3 people each generating their own numbers.
- ▶ Closest to 100 wins.

$$\begin{array}{cc} \text{T} & \text{U} \\ \square & \square \end{array} + \begin{array}{cc} \text{T} & \text{U} \\ \square & \square \end{array} =$$

Variations

$$\begin{array}{cc} T & U \\ \square & \square \end{array} - \begin{array}{cc} T & U \\ \square & \square \end{array} = \text{smallest number}$$

$$\begin{array}{ccc} H & T & U \\ \square & \square & \square \end{array} + \begin{array}{ccc} H & T & U \\ \square & \square & \square \end{array} = 1000$$

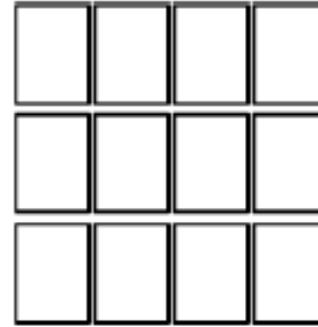
$$\begin{array}{c} U \\ \square \end{array} \cdot \begin{array}{c} t \\ \square \end{array} + \begin{array}{c} U \\ \square \end{array} \cdot \begin{array}{c} t \\ \square \end{array} = 10$$

Use 6 digit boxes and make it closest to 1 000 000.

Play 'Nice or Nasty'. Choose to put your digit in opponent's box!

“10” - Numbers to make 10

- ▶ Set of cards with jokers and picture cards removed.
- ▶ Place 12 cards face up in 3 rows of 4
- ▶ Take turns choosing a set of cards which total 10
- ▶ Fill in the spaces with new cards
- ▶ Play continues until no more sets of ten can be formed
- ▶ The winner is the one with the most cards
- ▶ When playing alone, find the maximum number of cards that have a sum of 10



“First to 23” - Addition and strategy

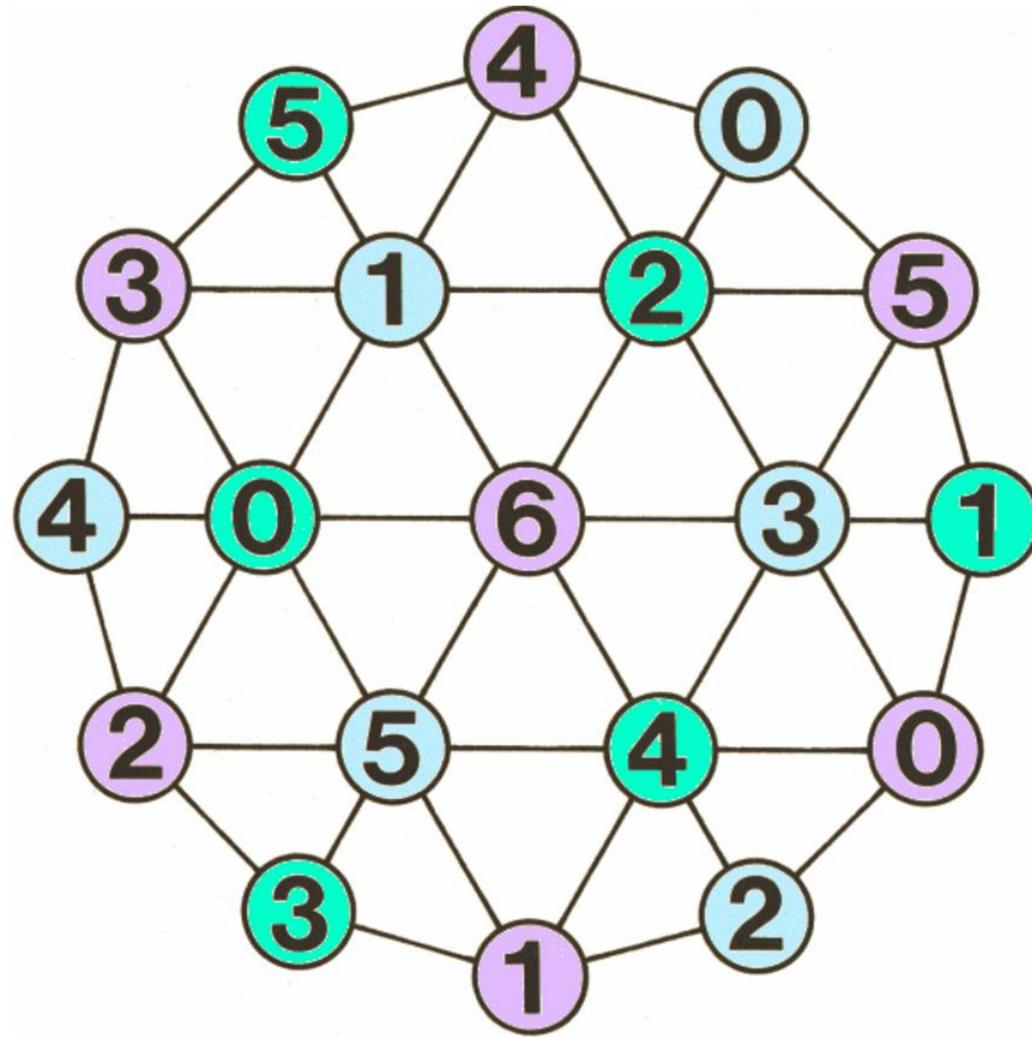
- ▶ Play in a three or a pair.
- ▶ You may only say 1,2,3 or 4
- ▶ Next player adds their number to the current total.
- ▶ First to 23 wins.

- ▶ What's the strategy ?
- ▶ What number does the potential winner need to get to in order to win the game ?
- ▶ What are the crucial stepping stones?

Variations

- ▶ Change the numbers that you increase by e.g. you may only add 1,2 or 3 but stay with total of 23
- ▶ Change total to 27 (for example) but stick with adding on 1,2,3 or 4
- ▶ Change both the numbers you increase by and the final total.

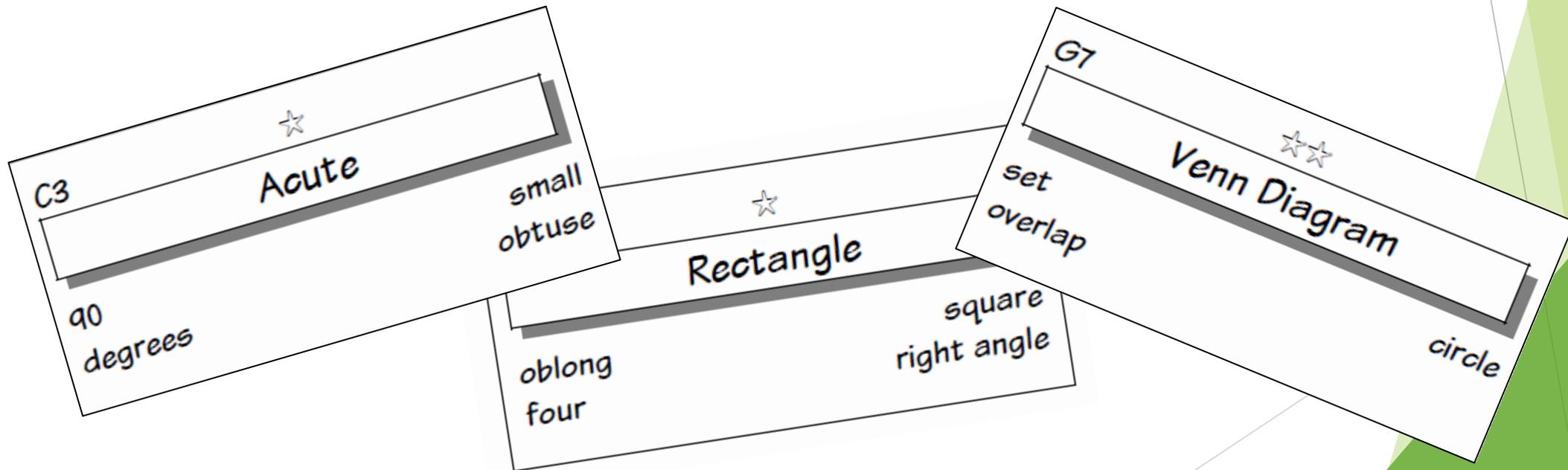
“Totality” - Nrich Addition and strategy



<https://nrich.maths.org/1216>

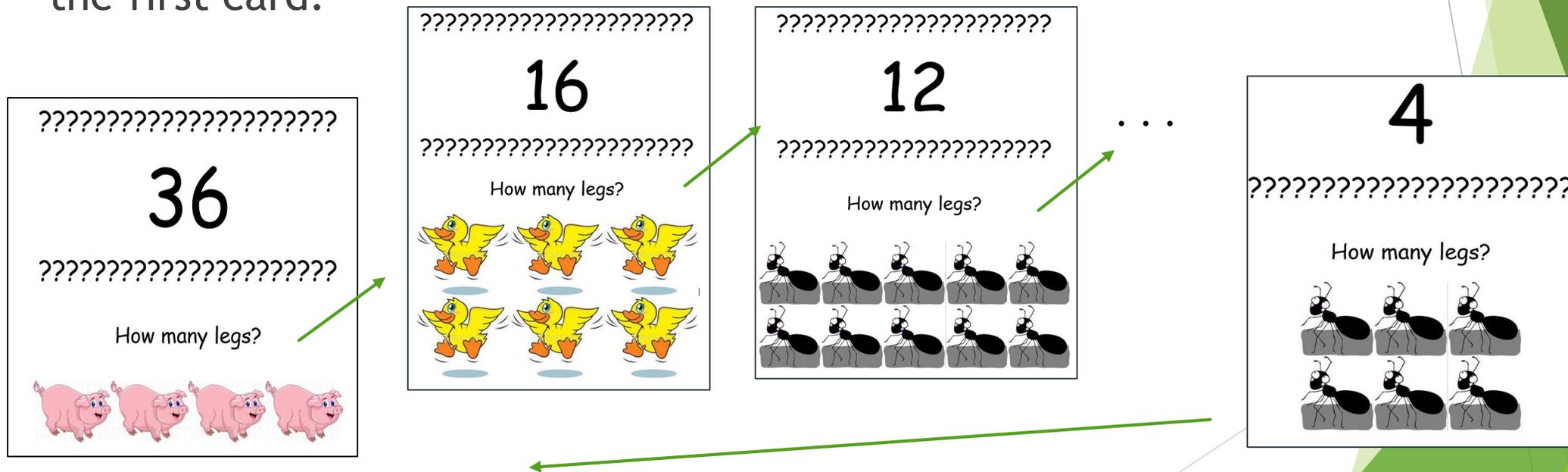
ATM “FOURBIDDEN” Game - Vocabulary focus

- ▶ The idea of the game is for one player to try and describe an object, idea or phrase without using certain forbidden words.
- ▶ The other players have to try and guess the word.
- ▶ This can be played in groups or as a class split into two teams.



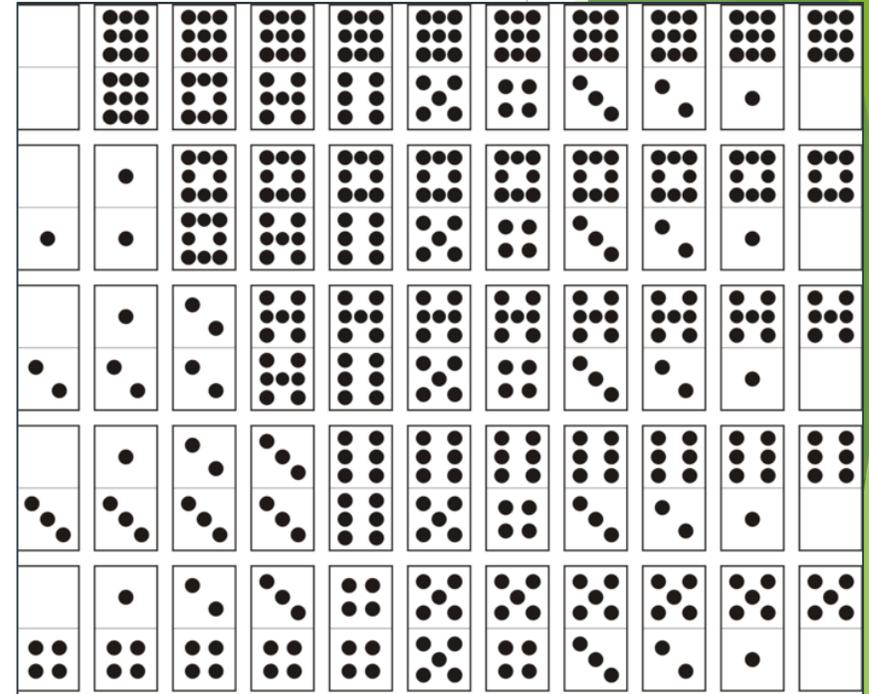
“Treasure Hunt” - All areas of maths

- ▶ Set up 10 or 12 cards (any number really)
- ▶ Put the question on the main part of the card and it’s answer on the top of the next card.
- ▶ Repeat until you have put the answer to the last question on the first card.

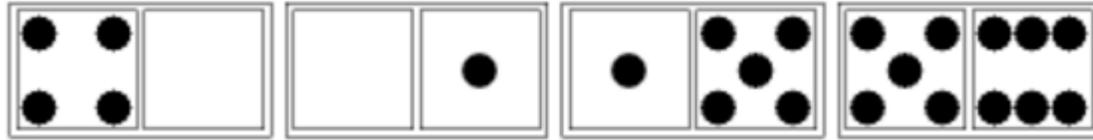


“Dominoes” - Fives and threes

- ▶ Give out 5 dominoes to each player. Play in groups of 2,3,4. Leave rest in a pile.
- ▶ Decide who starts or highest double lays their piece out first.
- ▶ Points are scored when the dominoes at the ends of the chain add up to a multiple of 5 or a multiple of 3. Divide the total on the ends by 5 or 3 and add the answer to the player's score. If the end total is divisible by both 5 and 3 then you score both, so for the end total of 15 you score 8 points.



Nrich - Dominoes

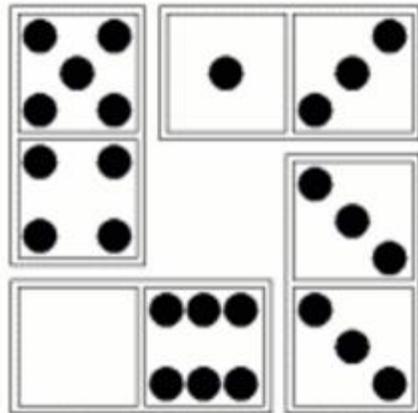


- ▶ In this example the (1,5) domino starts, scoring 2 points as the total of the ends is 6 and can be divided by 3 twice.
- ▶ Then the (0, 1) domino scores 1 point because the ends add up to 5.
- ▶ Then the (4,0) domino makes the ends add up to 9 so it scores 3 points.
- ▶ Finally the (5,6) domino makes the end total 10 scoring 2 points.

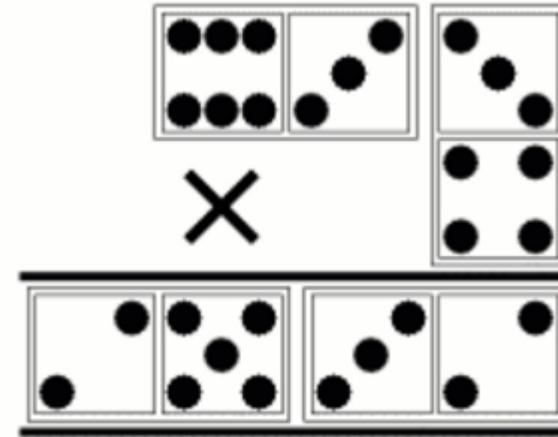
<https://nrich.maths.org/1200>

Nrich games - Windows and Multiplication

The spots on each side total nine. Can you make seven windows like this using all 28 dominoes so that each window has the same spot-sum for each side? One window need not have the same spot-sum as another.



Windows

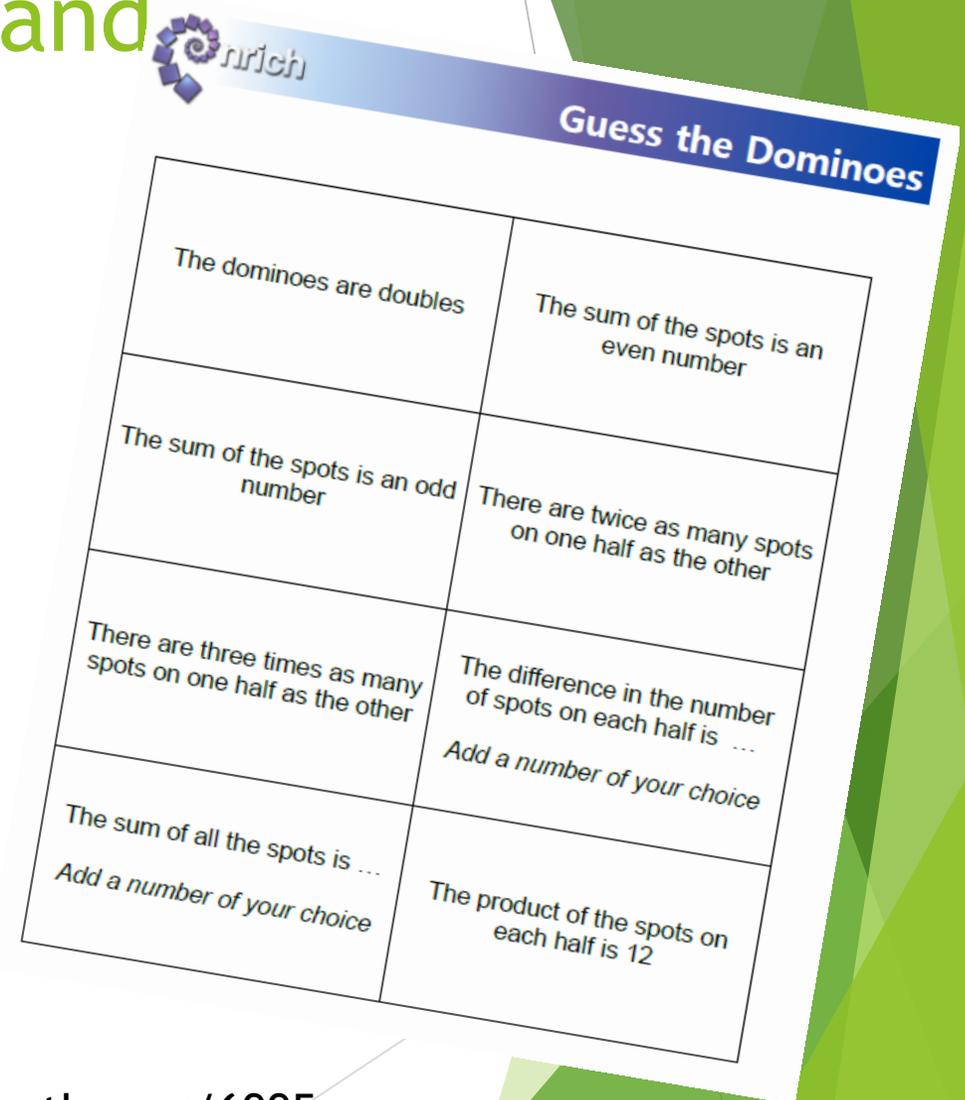


Multiplication

Here you have four dominoes laid out in the pattern of a multiplication sum. Can you make seven multiplication sums like this using all 28 dominoes? Again, like 'Windows' this organises the dominoes into seven sets of four.

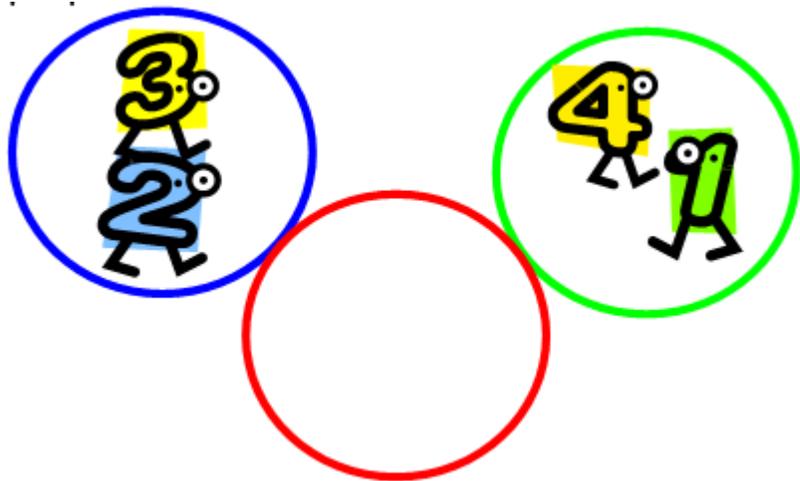
“Guess the Dominoes” - Logic and reasoning

- ▶ Aim is to find the rule on the Ruler's card, using the minimum number of tests. A test is asking whether a particular domino obeys the rule.
- ▶ The team is made up from 4 or 5 people with one of them being deemed the Ruler.
- ▶ Ruler decides what the rule is (can select a card)
- ▶ The team have to choose a domino that they think might obey the rule. They need to discuss this together and explain their thinking.
- ▶ The Ruler can then say whether it does or not putting it on the right if it obeys and on the left if it doesn't.



“Hoops” - Logic and reasoning

- ▶ There are three hoops, red, green and blue.
- ▶ Four people numbered 1 to 4 stand in the red hoop.
- ▶ A person may move to another hoop provided he or she is the largest number in both the hoop she/he is leaving and the hoops he/she is moving to.
- ▶ The aim is to get all the people in the blue hoop



“Product Connect” - Multiplication and strategy

- ▶ Game for two players
- ▶ A set of coloured counters for each player

Game 1

3	5	6	7	8	9	20	40	60	80
---	---	---	---	---	---	----	----	----	----

120	400	40	24	15	140
48	18	640	45	160	42
300	72	360	480	54	56
280	60	200	320	35	63
21	240	30	27	100	180

Rules:

A player chooses two numbers from the row and multiplies them. Then covers the product on the grid. Next player repeats process. Player 1 looking for route from top to bottom. Player 2 looking for route from left to right.

“Yes, No, You’ve got it” - Logic and properties of number



- ▶ Need a pack of cards.
- ▶ Work in pairs or teams.
- ▶ One person draws a card at random from pack and keeps it secret
- ▶ Other players question to see which card was drawn
- ▶ First person responds with ‘yes’, ‘no’ or ‘you’ve got it’
- ▶ E.g. Is it red ? Is the value greater than 6? Is the card a 5?
Is the card a heart?
- ▶ The person/team score 1 point for each question asked.
- ▶ The winner is the one with the fewest points.

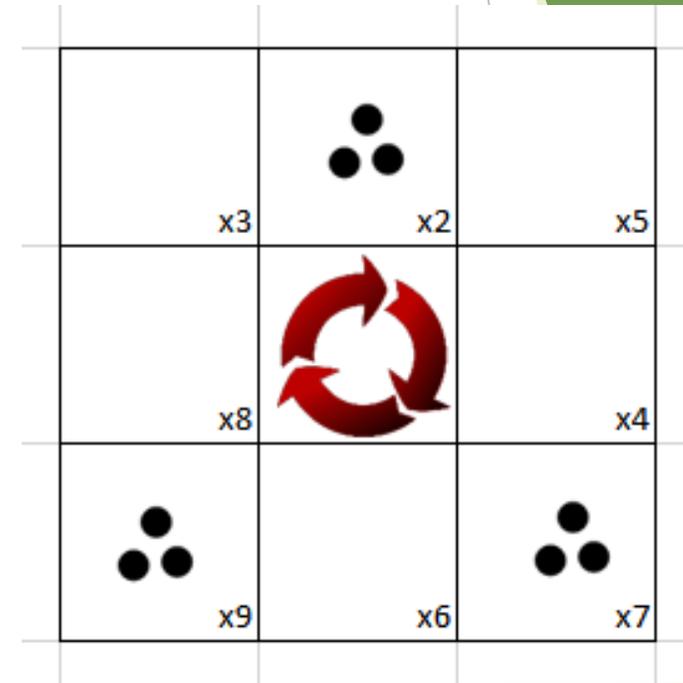
“The answer is” - Four rules of number



- ▶ Need a pack of cards
- ▶ Use three cards to generate a number, this is the answer
- ▶ Whole class can play in pairs or groups
- ▶ Write down up to 10 questions that give this answer
- ▶ Score 1 point for each question that is correct
- ▶ Score a bonus point if no-one else has that question

“Pebbles” - Times tables and addition

- ▶ Game for 2 players
- ▶ Winner is the player with highest score after 10 turns
- ▶ Player 1 starts by placing the 9 counters onto the spaces marked
- ▶ Player 2 picks up all the counters from any square and ‘sows’ them by placing 1 counter on the square, 1 in the square after that and 1 in the square after that. Moves must be clockwise.
- ▶ The score is the number of counters in the last square that was ‘sown’ to multiplied by the number written in the square.
- ▶ Player 1 now continues picking up all the counters from a chosen square and repeating process.



“BINGO” games

- ▶ Draw a grid (say 3 x 2) select six numbers from this list:

8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96

- ▶ Now call out tables questions, if pupil has the answer they cross it off.
- ▶ Shout OGNIB when have all crossed off. Check the answers/questions.

“BINGO” - Fractions example

- ▶ Draw a 5x6 grid and fill in the numbers from 2 to 32 (in any order)
- ▶ Call out a mixed number in simplest form and record it on board
- ▶ Players cross out the numerator of the equivalent improper fraction off their grid.
- ▶ Winner is the first one to cross out 4 in a line with no gaps in between

These numbers will generate all 30 numerators: $2 \frac{2}{5}$, $4 \frac{1}{3}$, $3 \frac{1}{3}$, $2 \frac{2}{3}$, $2 \frac{1}{4}$, $1 \frac{1}{5}$, $1 \frac{1}{6}$, $2 \frac{1}{2}$, $6 \frac{1}{4}$, $7 \frac{2}{3}$, $1 \frac{1}{3}$, $4 \frac{2}{3}$, $6 \frac{2}{3}$, $4 \frac{4}{5}$, $3 \frac{3}{4}$, $2 \frac{1}{8}$, $2 \frac{2}{7}$, $1 \frac{1}{2}$, $3 \frac{3}{5}$, $5 \frac{3}{5}$, $4 \frac{2}{5}$, $5 \frac{4}{5}$, $3 \frac{4}{5}$, $4 \frac{1}{5}$, $7 \frac{3}{4}$, $4 \frac{2}{7}$, $10 \frac{2}{3}$, $5 \frac{2}{5}$, $1 \frac{5}{6}$

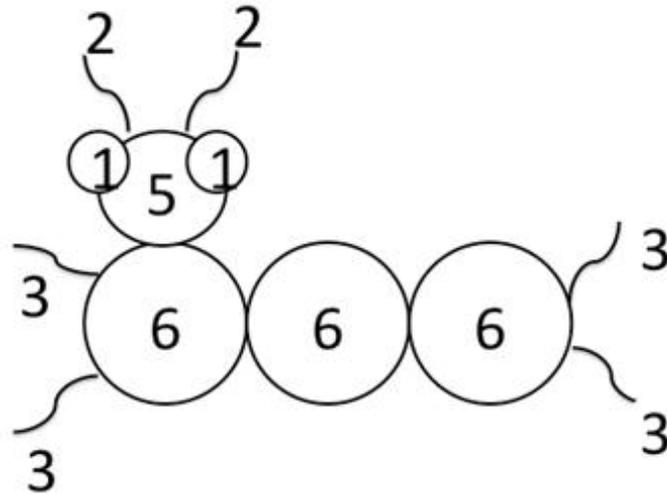
“Beetle” - Addition and/or subtraction

- ▶ There are 14 body parts - body, head, 2 wings, 6 legs, 2 feelers, 2 eyes
- ▶ • you must throw a 6 to start - and you can then draw the **BODY**
- ▶ • throw a 5 - draw the **HEAD** - must be drawn before eyes & feelers
- ▶ • throw a 4 - draw the **WING** (2 of these)
- ▶ • throw a 3 - draw a **LEG** (6 of these)
- ▶ • throw a 2 - draw a **FEELER** (2 of these). Must have the head first
- ▶ • throw a 1 - draw an **EYE** (2 of these) Must have the head first



Variation

- ▶ *Draw crazy creatures:* Throw the dice 12 times and draw the creature that you get. Add up the values of the body parts drawn. See example to the right: I threw: three 6s, four 3s, one 5, two 2s and two 1s, to get a score of 41.



Draw Crazy Creatures

Idea taken from SANC Numeracy games with dice and cards (South African Numeracy Chair, 2012)

Times Targets, Remainders, Multiply Games from BEAM

BEAM Maths of the Month

- you need:**
- a watch that shows seconds
 - pencil and paper

Times targets for 2 players

First of all
Decide who is A and who is B.

When it is your turn
Ask your partner to choose a target number for you and cross it out.

They need to time you: you have one minute to reach that target by making a multiplication sum. You may multiply as many numbers as you like as long as the answer is correct.

Write down your sum and ask your partner to check it. If it is correct, you may cross out the numbers you used in your box.

The end of the game
Keep playing until one player has crossed out three rows of numbers. They win.

Sample game
Fred's target was 56. He wrote down $7 \times 2 \times 4$.
Tanya agreed that made 56, so he crossed out a 7, a 2 and a 4.

7	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7

Target numbers

48 96 56 32 40 54 49 72 63 100 64 80 200 144

Player A

2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Player B

2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

BEAM Maths of the Month

- you need:**
- counters in two colours
 - bean

Remainders for 2 players

Put the bean here, on 36.

When it's your turn

Move the bean either one or two jumps – you choose. Read out what it says.

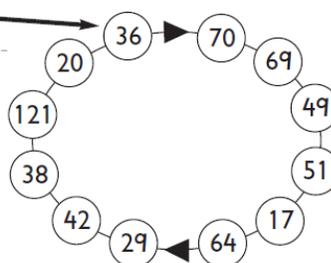
Divide that number by 6 and say the remainder. Put a counter on the remainder on the grid.

The rest of the game

When one player gets three of their counters in a line, they win a point.

Remove those three counters.

Go on playing until one player has won five points.



0	1	2	3	4	5
1	2	3	4	5	0
2	3	4	5	0	1
3	4	5	0	1	2
4	5	0	1	2	3
5	0	1	2	3	4

BEAM Maths of the Month

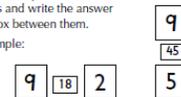
- you need:**
- 1-9 digit cards
 - pencil

Multiply for 1 person and a friend

What to do
Arrange the digit cards in the boxes, any way you like.

Multiply each pair of next-door numbers and write the answer in the box between them.

For example:



When you have written a number in each small box, remove all the cards.

Give this sheet to a friend and ask them to replace the cards exactly as you had them.

Now

Try again, but leave some of the small boxes empty. Can your friend still do the puzzle?

How many boxes can you leave empty and they can STILL do the puzzle?

<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Rainy Day Cricket

RAINY DAY CRICKET					
Team Name:			Name:		
	Name	Performance	How out	Score	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
			Team total		

5 = Howzat? Roll dice again 1= Bowled 2 = Caught 3 = Not out 4 = LBW 5 = Run out 6 = Not out

Aims

- ▶ To use games that can be used to enhance and support mathematical understanding, fluency and reasoning.
- ▶ To consider how games can be adapted to meet the needs of learners in different KS phases.

Conclusion

- ▶ It's important to try out the ideas and adapt where necessary (dimensions of variation)
- ▶ Thank you for your engagement.

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