

Supporting your child to develop the Big Ideas and Important Skills with Early Number

October 2018

Whilst you are waiting...

Please have a go at playing one of the games on your table...

Jelly Beans!

What you need:
Paper with 2 rows of number 1-12, Two dice (1-6), counters (e.g. buttons, coins etc)

What to do:

- Take turns to roll the dice
- Cover the two numbers rolled with counters
OR...
- Add together the two numbers rolled and cover the total e.g. 5 + 3 rolled, cover 8
Or...
- Add together the two numbers rolled and cover two *other* numbers which make the same total, e.g. 5 + 3 rolled, cover 1 and 7
- Miss a turn if you cannot place a counter
- The winner is the first to cover all 12 numbers

Whilst you are waiting...

Please have a go at playing one of the games on your table...

Which way around?

What you need:

- Two 0-9 dice
OR a pack of cards with the picture cards and tens removed. (Ace =1)
- Pencil, Paper

What to do:

- Draw 7 boxes beside each other. Write 10 in the first box, and 100 in the last box, with 5 empty boxes between.
- To vary the game, the boxes can be horizontal or vertical:

10						100
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- Take turns to roll the two dice or turn over two cards.
- Choose how this number could be written.
 - eg. If a 2 and a 6 were turned over they could be written as 26 or 62.
- Each player chooses where to record the number. Write the number in a square. Once written the order cannot be changed.
- The next player has a turn.
- A number can only be recorded if there is an available space.
- The first player to have all the boxes filled with the numbers in the correct ascending order is the winner.

Which way around?

Player 1

10

Player 2

10

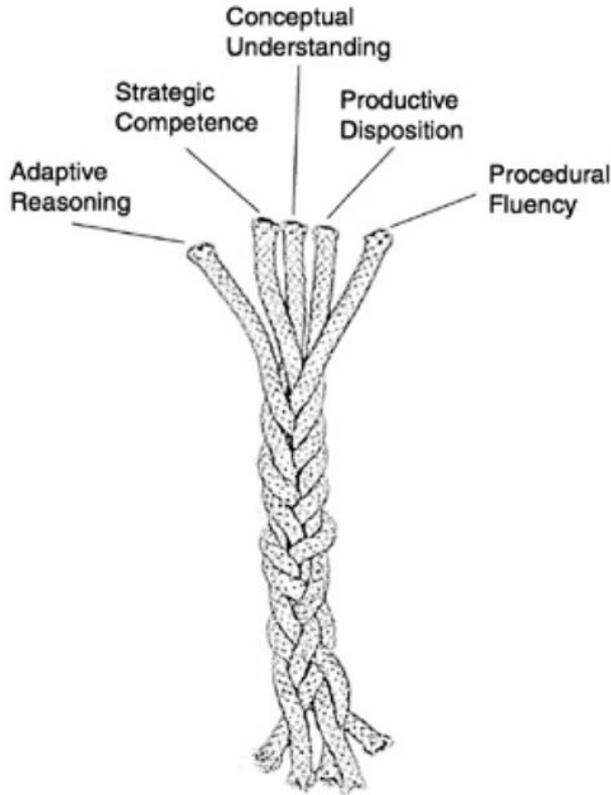
100

100

Aims for this session

- Explore the approaches to teaching and learning Maths at DC, with a focus on early number
- Overview of PYP Maths curriculum, especially for Y1&2
- Explore resources and ideas to support early number understanding and skills at home
- Visit classrooms and see number learning in action

Mathematical Proficiency

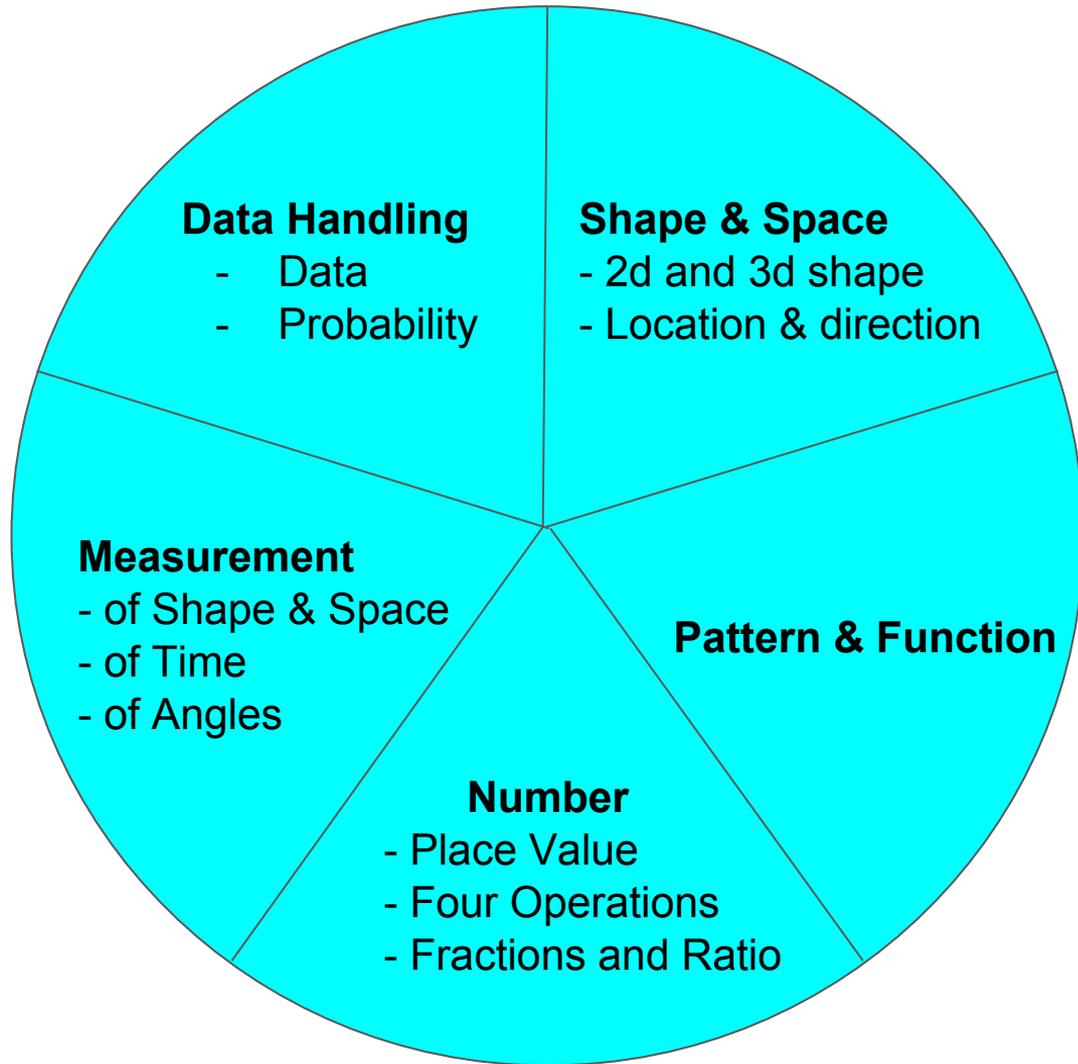


- **conceptual understanding**—understanding the big ideas in maths, how they are connected and how and *why* things work
- **procedural fluency**—knowing when and how to use procedures flexibly, accurately, efficiently, and appropriately - ‘Number Sense’
- **strategic competence**—ability to represent, and solve mathematical problems
- **adaptive reasoning**— logical thought, reflection, explanation, and justification
- **productive disposition**—viewing mathematics as useful, and worthwhile, and a belief that effort in maths will lead to improvement

The Strands of the PYP Maths Curriculum

**Conceptual
Understandings**

**Learning
Outcomes**



Year 1 & 2 Number Strand Conceptual Understandings:

- Numbers are a naming system.
 - Numbers can be used in many ways for different purposes in the real world.
 - Numbers are connected to each other through a variety of relationships.
 - Making connections between our experiences with number can help us to develop number sense.
- The base 10 place value system is used to represent numbers and number relationships.
 - Fractions are ways of representing whole- part relationships.
 - The operations of addition, subtraction, multiplication and division are related to each other and are used to process information to solve problems.
 - Number operations can be modelled in a variety of ways.

Year 1 Number Strand Learning Outcomes

Place Value
Learning
Outcomes:

Count by naming numbers in sequences, to 100
Apply place value to partition and rename two-digit number
Skip count in tens starting from zero
Recognise, model, read, and order numbers to 100
Use the language of mathematics to compare quantities, for example, more, less.
Estimate and subitise groups of up to ten objects

Four Operations
Learning
Outcomes:

Recall addition facts for single-digit numbers and related subtraction facts
Solve simple addition and subtraction problems using concrete materials
Solve simple addition and subtraction problems using part/whole strategies

Fractions
Learning
Outcomes:

Share collections into equal parts
Divide objects into equal parts

Year 2 Number Strand Learning Outcomes

Place Value
Learning
Outcomes:

Count by naming numbers in sequences, to and back from 1000, moving from any starting point
Apply place value to partition and rename three-digit numbers
Skip count by twos, fives and tens starting from zero
Recognise, model, read, write and order three-digit numbers
Round numbers to the nearest 10
Estimate up to 20 objects

Four
Operations
Learning
Outcomes:

Recall addition facts for numbers at least to at least 20.
Model addition and subtraction of whole numbers
Represent and solve addition problems (including real life and word) involving 2 digit numbers, using appropriate strategies
Represent and solve subtraction problems (including real life and word) involving 2 digit numbers, using appropriate strategies
Model multiplication and division using groups and/or arrays
Recognise and represent division as grouping into equal sets and solve simple problems using these representations
Use estimation to check reasonableness of answers to calculations

Fractions
Learning
Outcomes:

Find equal parts of shapes and collections
Use the language of fractions, for example, half, whole, equal



*What are your experiences
of supporting children in
mathematics at home?*



How are mathematics practices changing?

Increased emphasis on:	Decreased emphasis on:
students investigating, questioning, discussing, justifying and journaling their mathematics	the use of worksheets and text books
manipulatives, to make mathematics understandable to students	rote learning, memorization and symbol manipulation
real-life problem solving <ul style="list-style-type: none">- mathematics as a means to an end- programme of inquiry as the context for learning	using mathematics word problems as problem solving <ul style="list-style-type: none">- teaching mathematics disconnected from other learning
a variety of strategies for possible multiple Solutions - emphasis on process	one answer, one method - emphasis on answer
students being encouraged to speculate and pursue hunches <ul style="list-style-type: none">- students and teachers engaged in mathematical discourse.	the teacher as the sole authority for right answers <ul style="list-style-type: none">- teacher telling about mathematics.

Taking things for granted as adults...

Could you answer this...?



What about this?

$$5 + 7 =$$

A challenge for adults is that it's difficult to remember that there's a lot of young children need to learn / understand that we take for granted. Number seems like a simple idea, but...

Number is complex and multifaceted

A complete and rich understanding involves many different ideas, relationships and skills

It takes lots of time and lots of different experiences in different contexts to develop a full understanding of foundational ideas

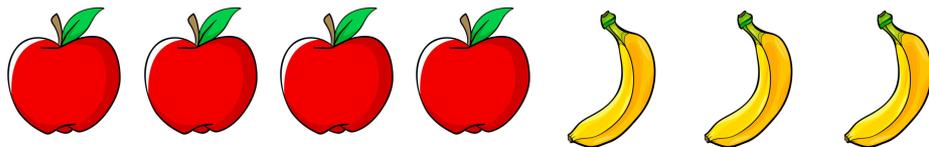
What is '7'?



Counting tells how many things are in a set.

The last word in the counting sequence names the quantity for that set.

What is '7'?



Numbers are related to each other through a variety of **relationships**.

7 can be composed of 4 and 3, as well as 2 and 5 and other combinations

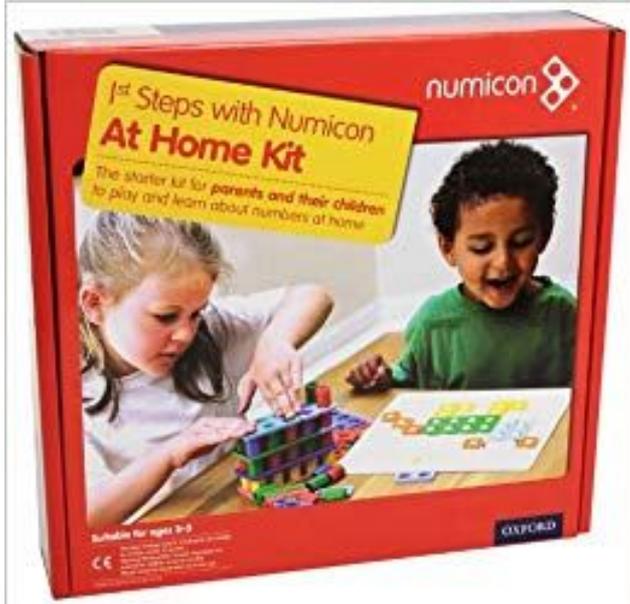
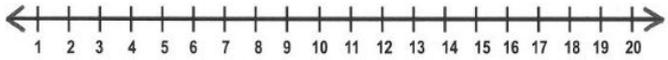
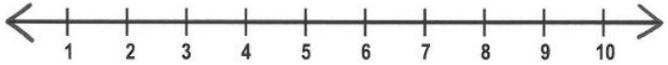
7 is three more than 4

7 is two less than 9

7 is 3 away from 10

These ideas can be extended to an understanding of 17, 57, 370 and 0.7

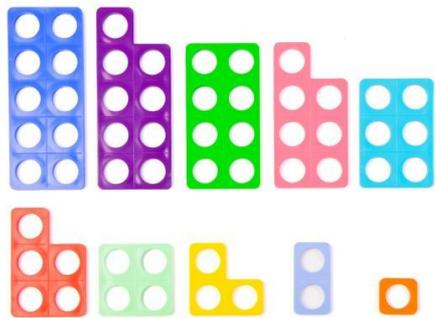
The importance of visuals and modelling



Hundred Chart									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Numicon



What does it mean to have "Number Sense?"

"Students with a strong number sense can think and reason flexibly with numbers, use numbers to solve problems, spot unreasonable answers, understand how numbers can be taken apart and put together in different ways, see connections among operations, figure mentally, and make reasonable estimates."

Marilyn Burns, *About Teaching Mathematics* (2007)

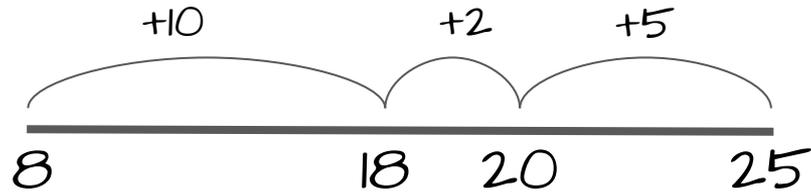
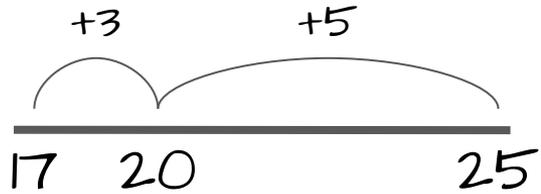


Please solve this in your heads

$$8 + 17$$



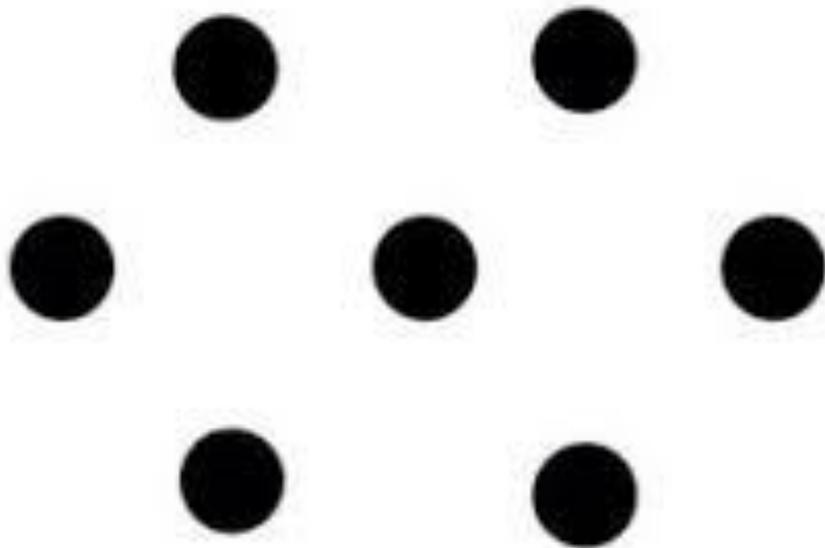
$$8 + 17 =$$



Dot images for number talks

How many dots
do you see on
the next slide?

Dot images for number talks



What does it mean to have "Number Sense?"

How might students think about $6+7$?

Counting Strategies

Counting on from 7
(8,9,10,11,12,13)
Using fingers or other
support e.g. Number line

Reasoning Strategies (Derived Facts)

Building on number
relationships that make
sense *to them*

Memorisation

"I just know it"
(and use it for other
derived facts
E.g. $60+70$)



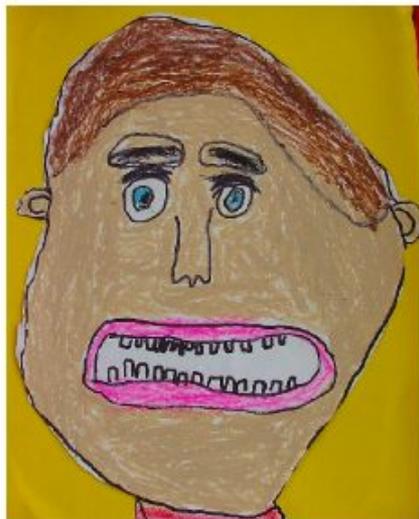
"Double 6 is 12 so add one more to get 13"

"Double 7 is 14 so take one away to get 13"

"7 add 3 is 10. Add the remaining 3 to get 13"

One to One Counting

Can you get me 7 counters from the pile please?

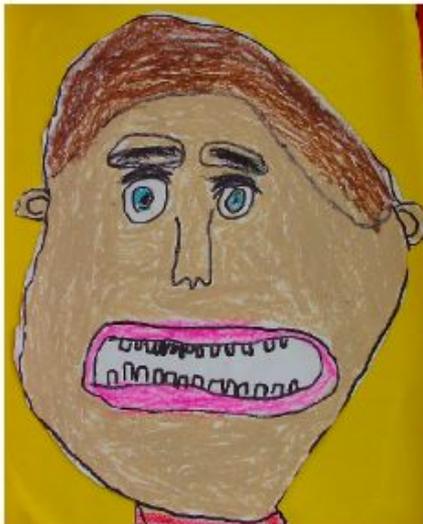


1, 2, 3, 4,
5, 6, 7, 8.

The child can count a set of objects up to ten but can't join and separate sets like $4 + 3 =$

Count From One on Materials

There are 4 counters and another 3 counters. How many are there altogether?

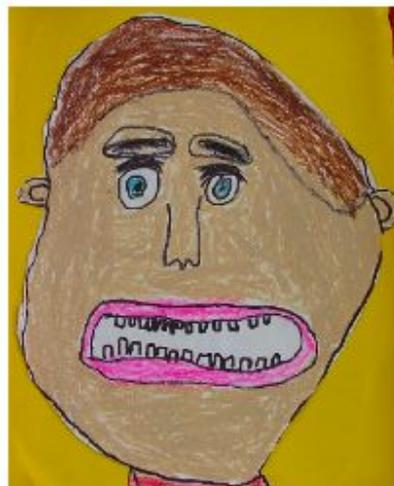


1,2,3,4,
5,6,7.

The child solves the problem by using their fingers or other materials and counts from one.

Count From One By Imaging

There are 4 counters and another 3 counters. How many are there altogether?

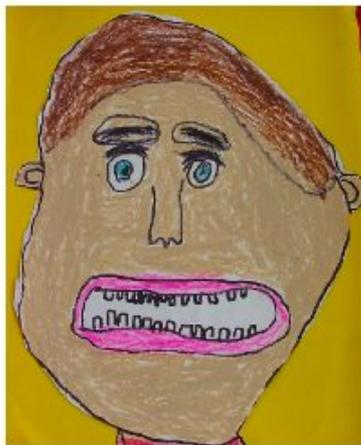


Counts in head
1,2,3,4,5,6
,7,8.

The child counts all the objects from one by imaging visual patterns of the objects in their mind.

Advanced Counting

There are 9 counters under there and another 4 counters under there. How many are there altogether?

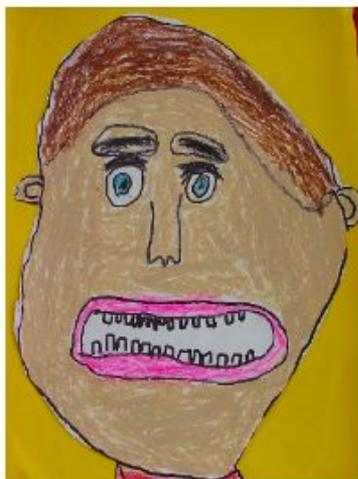


Counts on 9,
10, 11, 12,
13.

The child counts on from the largest number

Early Part-Whole

There are 9 counters under there and another 6 counters under there. How many are there altogether?

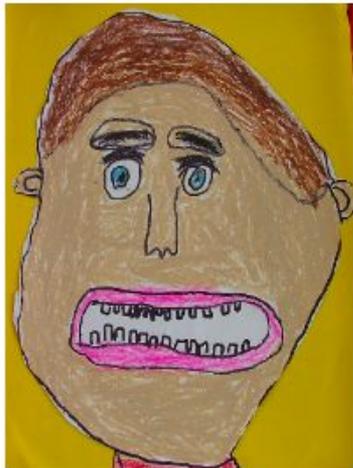


"I know that
If I take one off
the 6 and put it
on the 9 it =10.
 $10 + 5 = 15$ "

The child uses simple strategies to solve addition and subtraction problems mentally

Advanced Part-Whole

*63 people are on the bus
and 39 people get off the
bus. How many people are
left on the bus?*



I think tidy
numbers would
be smartest.

$$63 - 40 = 23$$

$$23 + 1 = 24$$

The child can select from a wide range of strategies to solve various addition and subtraction problems mentally

How might we support the development of Number Sense?

Top Tips:

Let children explain and record calculations in any ways that *make sense to them*

Ask questions like, can you show that another way?

Focus on the process rather than the answer (especially when they are correct!)

If children are using strategies that are new to you, ask them to teach you!

If children have got wrong answers, ask questions such as “how can we check if that answer makes sense? Can we work it out a different way check?”



LEARNING TO STRUGGLE:

What would you *do* if you were there?
What would you *say* to the child?

Lift her up to the top and say "well done!"

Lif her down and take her to a smaller piece of equipment,
saying "that's a bit big for you at the moment!"

Move closer so she knows you're there. Say, "You can do it!
Just two more steps!"

Do nothing and wait and see what happens.

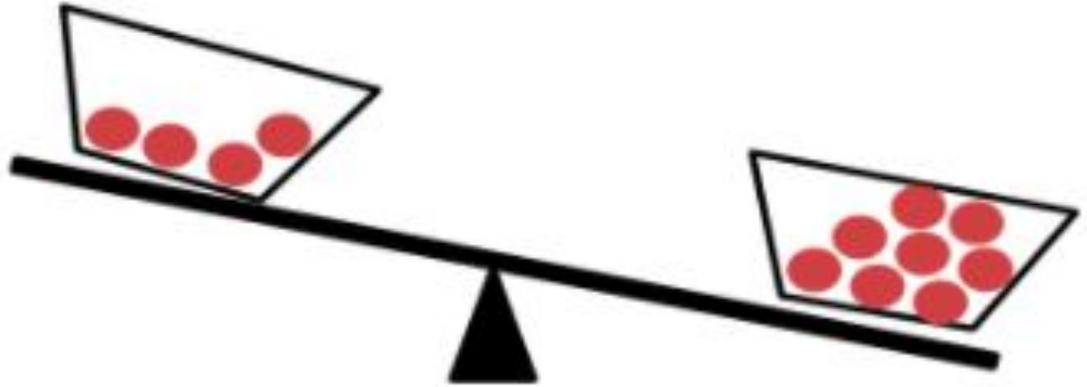
Physically move her hands and feet into the next holes

Lift her down and then climb up yourself to show her how
to do it

Other ideas...?

Balancing

How can we make the scales balance?



What are the connections between this task and the girls in the playground?

Give as many different answers as you can.

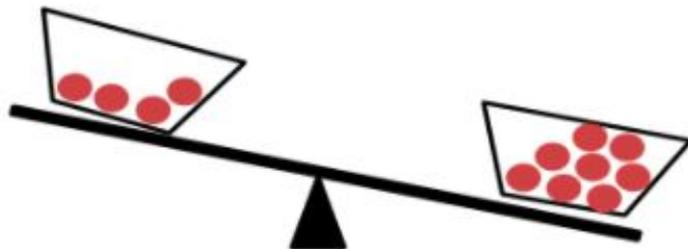
Rich Tasks...

Require students to:

- plan their approach own approach
- process multiple pieces of information
- choose their own strategies, goals, and level of accessing the task
- spend time on the task
- record their thinking;
- explain their strategies and justify their thinking
- engage *with minimal prior instruction*.

Balancing

How can we make the scales balance?



Give as many different answers as you can.

4	\neq	8
$4 + 4$	$=$	8
4	$=$	$8 - 4$
$4 + 2$	$=$	$8 - 2$
$4 + 6$	$=$	$8 + 2$
$4 + 96$	$=$	$8 + 92$

How can we make the number of cakes on each plate the same?



Give as many possible ways of doing this as you can.

Two boxes of highlighters

I want to make these two sets of highlighters the same. How can I do that?



Give as many different answers as you can.

*How can we
support mathematics
at home?*

Around the house

Put items in order. You could do this by weight, height or size. Ask your child to help you organise items around the house.

Cooking. Measure ingredients and set the timer together.

Talk about time. For example, get them to work out what time you need to leave the house to get to school on time.

Talk about the shape and size of objects. Look online for interesting facts, like tallest and shortest people, or biggest and smallest buildings etc.

Talk about numbers in sport. How many points does your team need to avoid relegation? How many goals/tries/conversions/points/runs has your team scored this season?

Out and about

Play games that use counting. Hopscotch, hide and seek, What's the Time Mr Wolf, skipping or hula hooping are a great place to start.

Look for numbers. on doors, buses, cars, signs, at the shops... anywhere. Remember to talk about what the numbers mean

Sport. Sports are the perfect chance to think about speed, scores, time and angles. Get competitive; try out different angles to score from, ask them how many star jumps can they do in a minute.

Hobbies. Ask them to talk about the maths they have come across in the favourite hobby.

Journeys. Ask them questions like how many miles or kilometres have we travelled, how many are left and what time should we get to our destination.

Have Fun & Play Games!

The Race to Ten

Two players - take it in turns

The first player says “zero”

The next player adds on 1 or 2 and says the answer

The winner is the first person to say “Ten”



Race to 10 - Variations

The Race to zero starting at 10

The Race to 200 adding on 10 or 20

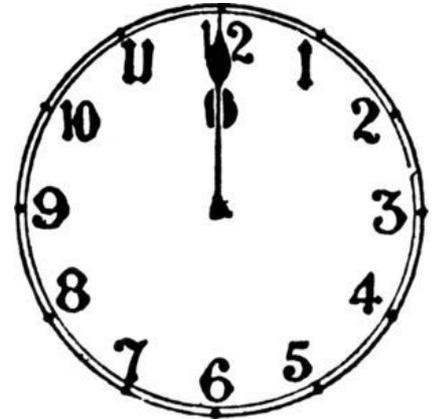
The Race to 1 adding on 0.1 or 0.2

The Race to midnight adding on 10 minutes or 20 minutes

The Race to 1km adding on 200m or 400m

The race to 5 adding on $\frac{1}{4}$ or $\frac{1}{2}$

...



Clapping Games

8 2 4 1 6 7 5 3 9

80 20 40 10 60 70 50 30 90

Top Tips

DO:

- Make it fun; Make it relevant; Make it hands on and visual
- Talk positively about 'doing' maths - the need for perseverance and that challenge/mistakes are normal and are opportunities to learn
- Allow children to use methods which make sense to them
- Talk about numbers using correct terminology e.g. the 2 in 26 is "two tens" etc

DON'T

- Make it a chore
- 'Force' children into mathematical procedures that they are not ready for or don't understand e.g. rote memorization of facts, use of standard written algorithms etc
- Over-emphasise mistakes as something to be avoided

Read all about it – books to share

- 1 **One is a Snail, Ten is a Crab** by April Pulley Sayre and Jeff Sayre
- 2 **Edward the Emu** by Knowles Sheena and Rod Clement
- 3 **Rosie's Walk** by Pat Hutchins
- 4 **Fifteen Pigs on a Pirate Ship** by P Edwards and G Parkin
- 5 **The Very Hungry Caterpillar** by Eric Carle
- 6 **The Australian 1, 2, 3 of Animals** by Bronwyn Bancroft
- 7 **The Doorbell Rang** by Pat Hutchins
- 8 **Ten Apples Up On Top!** by Dr Seuss
- 9 **Counting on Frank** by Rod Clement
- 10 **Mr Archimedes' Bath** by Pamela Allen



Bring maths into your home with books and as you read aloud ask questions.

Who was the second person to arrive?

How many people have brown hair?

Talk about the position of things such as *in*, *out*, *on* and *under*.

What is in the bath?



Sometimes young children think zero means "blast off!" Explain that it also means none or nothing.

More ideas:

<http://www.familymathstoolkit.org.uk/>

Family Maths Toolkit

Advice for families Activities for children Information for schools Search

National Numeracy Family Maths Toolkit

Helping children improve their everyday maths

The Family Maths Toolkit is full of ideas to help parents, families and children aged 13 and under enjoy everyday maths activities together.

The site also offers resources to help teachers support family engagement with children's maths learning.

Top tips for parents and families:

- Be positive** about maths. Don't say things like "I can't do maths" or "I hated maths at school"; your child might start to think like that themselves.
- Point out the maths in everyday life.** Include your child in activities involving maths such as using money, cooking and travelling.
- Praise your child for effort rather than talent** - this shows them that by working hard they can always improve.

More ideas:

<https://nzmaths.co.nz/number-knowledge-activities>

The screenshot shows the nzmaths.co.nz website. The header includes the TKI logo, navigation links for Communities and Schools, and a search bar. The main navigation menu has icons for Home, Professional development, Teaching material, Families and whānau (highlighted), Search, and Login. The breadcrumb trail below the menu reads: Home / Families and whānau / Supporting school maths / Number knowledge activities.

Number knowledge activities

These activities aim to help develop your child's number knowledge. They include related vocabulary in Te Reo Māori, and many of them include versions with key questions translated into Māori. Click for information written specifically for [Pasifika families](#).

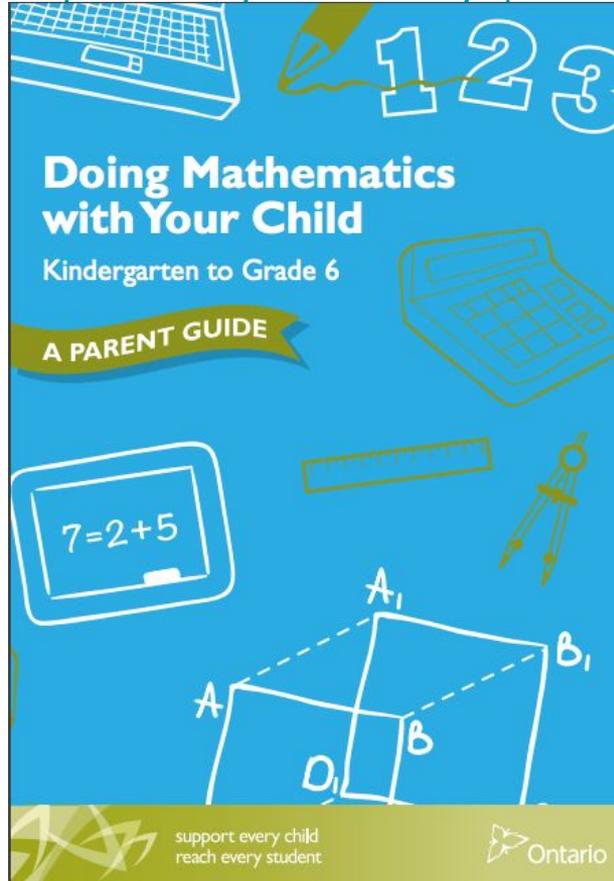
Select a domain or stage from the table below to display the related activities. Choosing a cell from within the table will display the activities related to that domain AND stage. Click for information on "[What is the Number Framework?](#)".

		Number Sequence	Place Value	Number Facts
Year 1	Stage 0-3	Numbers to 20		Facts with 10
Year 2	Stage 4	Numbers to 100	Numbers to 100	Addition facts
Year 3-4	Stage 5	Numbers to 1000	Numbers to 1000	Single digit multiplication facts
Year 5-6	Stage 6	Numbers to 1 000 000	All whole numbers and tenths	Multi digit multiplication facts and fractions that add to 1
Year 7+	Stage 7-8	Fractions, percentages and negative numbers	Decimals, percentages and powers of ten	Common factors, divisibility rules and conversion of common fractions

The Le@rning Federation is conducting a pilot project called *Helping at home* to assist Australian and New Zealand parents. *Helping at home* has a range of digital activities for children to do and gives suggestions of ways parents/caregivers can help their children. Click to participate in the [Helping at home Pilot](#).

More ideas:

<http://www.edu.gov.on.ca/eng/literacynumeracy/parentGuideNumEn.pdf>

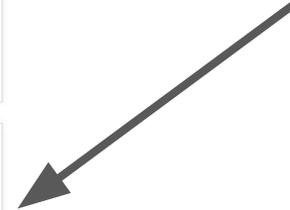


<https://www.youcubed.org/resource/parent-resources/>



Parent Resources

 <p>Learn math without fear, Stanford expert says</p> <p>Stanford Professor Jo Boaler says that students most effectively learn "math facts" working on problems that they enjoy, rather than [...]</p>	 <p>Memorizers are the lowest achievers and other Common Core math...</p> <p>Mathematics classes of the past decade have valued one type of math learner, one who can memorize well and calculate [...]</p>	 <p>100 Percent is Overrated</p> <p>People labeled "smart" at a young age don't deal well with being wrong. Life grows stagnant. "Mistakes grow your brain," [...]</p>	 <p>Why We Need Common Core Math</p> <p>A video made especially for parents and teachers on why we need the common core. It shows some great data [...]</p>
 <p>Why a Math Revolution?</p> <p>There is a math crisis in America. By middle school, two-thirds of our students will fall behind grade level in [...]</p>	 <p>The Mathematics of Hope: Moving from Performance to Learning</p> <p>A paper by Jo that with some important ideas about mathematics messages and the opening of tasks.</p>	 <p>How Math Should be Taught</p> <p>Jo describes what math classrooms should look like in 2 pages that may be useful to give to parents/administrators.</p>	 <p>Advice for Parents: Helping Children with Maths</p> <p>Jo Boaler shares twelve steps parents can take to increase a child's math achievement and make math fun!</p>



More ideas:

<http://www.discovery.edu.hk/>

The Explorer Dingj ESF Gateway

f t e EMPLOYMENT

ESF DISCOVERY COLLEGE

About Us Curriculum Admissions School Life Current Parents Contact us

- College Policies & Forms
- Parent & Student Handbook
- Bad Weather
- Cafeteria
- Absence Report
- Buses
- PTA Fees & Stationery
- Laptop Programme
- Uniforms
- ePayment
- Information Sessions**
- Gateway Help
- No Boundaries

Grow. Discover. Dream

DC Discovery College @DCHKlearning
DC Secondary CPD yesterday focused on the #ExtendedEssay, a mandatory component of the IB Diploma. #IBDP

www.discovery.edu.hk/current-parents/information-sessions/

Maths Activities for Helping with Numeracy at Home