



Maths in Y1-2



Discovery College

What are the challenges for  
parents in supporting  
primary school children in  
mathematics at home?

# "What makes a mathematician?"

I am thinking of two numbers  
on the hundreds chart.

One number is 15 more than  
the other.

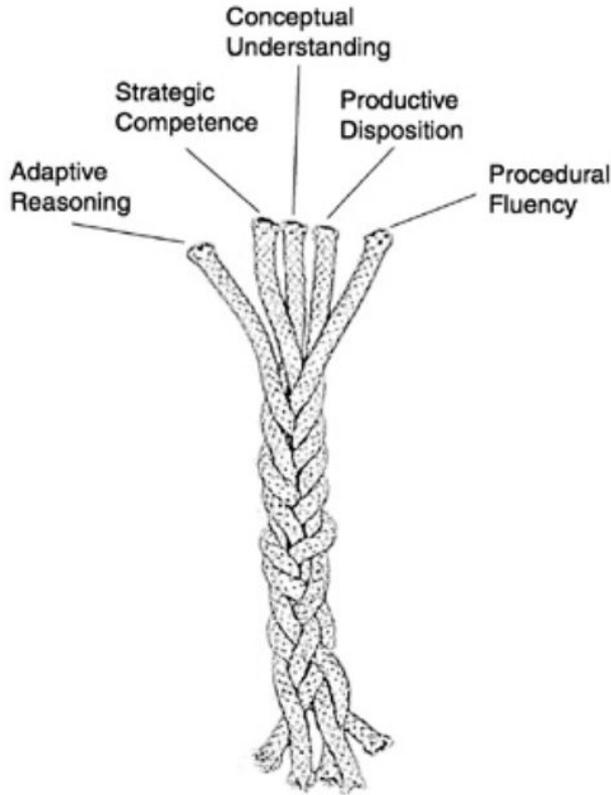
One of my numbers has a 3 in  
it.

What might be my two  
numbers?

Give as many answers as you  
can.

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
101	102	103	104	105	106	107	108	109	110

# Mathematical Proficiency

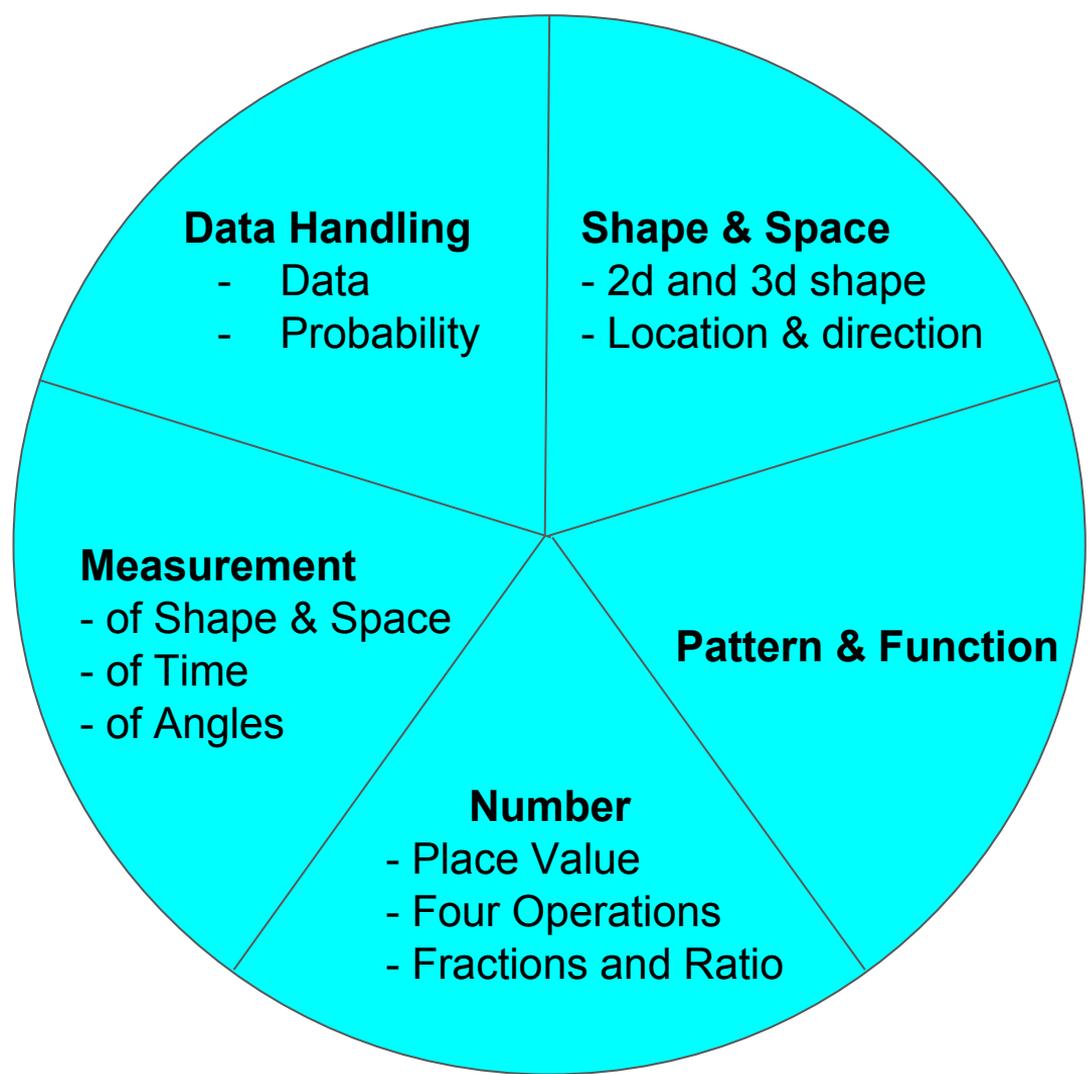


- ***conceptual understanding***—understanding the big ideas in maths, how they are connected and how and *why* things work
- ***procedural fluency***—knowing when and how to use procedures flexibly, accurately, efficiently, and appropriately - ‘Number Sense’
- ***strategic competence***—ability to represent, 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

Everyday interactions

Opportunity to make connections

Equipment to show their thinking

Through talk / questions (language)

How do children learn maths?

Share their new ideas and thinking

Multiple opportunities to understand the same concept

Apply with understanding (knowledge and strategy)

Authentic opportunities to solve problems

What does it mean to have "Number Sense?"



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)

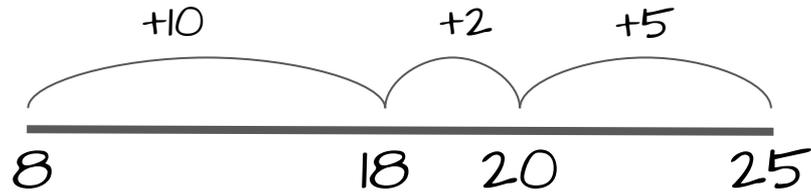
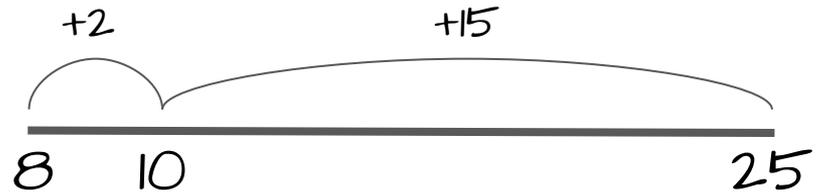
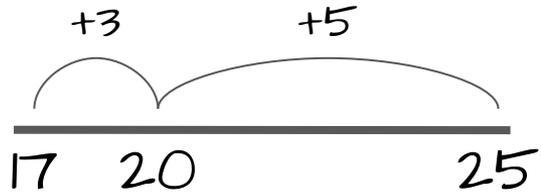


Please solve this in your heads

$$8 + 17$$



$$8 + 17 =$$



# Number Talk: $8 + 6$



# 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)

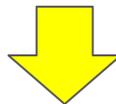
Using fingers or other support e.g. Number line

## 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"

# 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!)

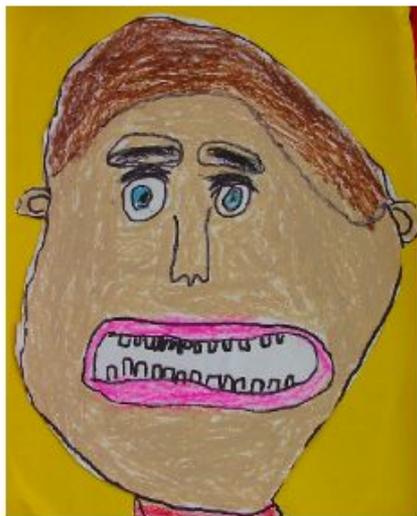
If children are using strategies that are new to you, ask them to teach you!

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?”

Be positive about maths! (Theirs and YOURS!)

# Emergent

*Can you get me 7 counters from the pile please?*

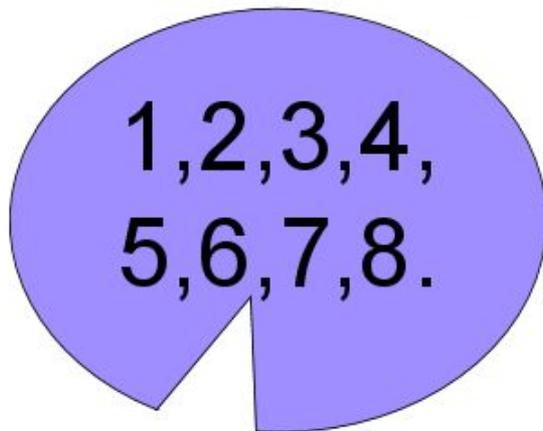
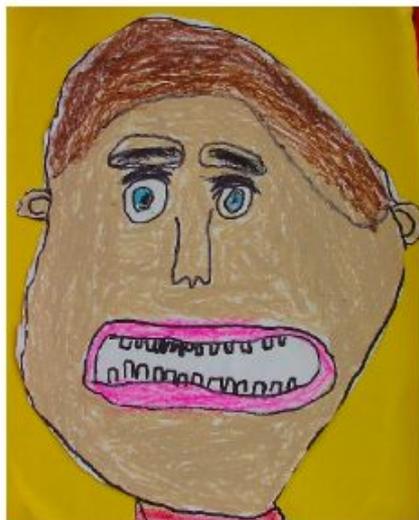


1,2,3,5,  
8...?

The child can not consistently count a collection of objects.

# One to One Counting

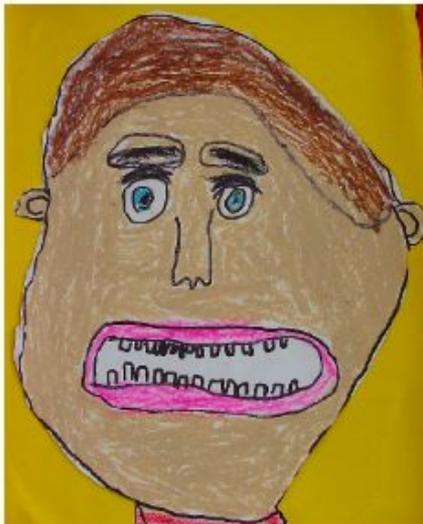
*Can you get me 7 counters from the pile please?*



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?*

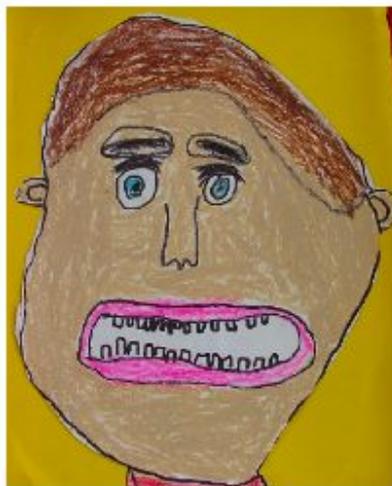


1,2,3,4,  
5,6,7.

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

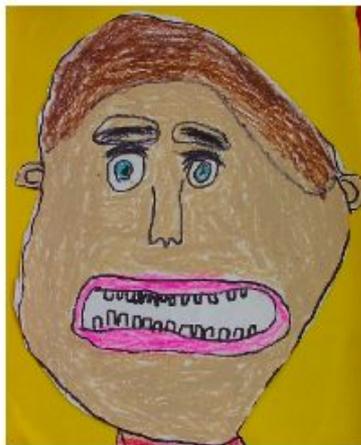
1,2,3,4,5,6

,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?*

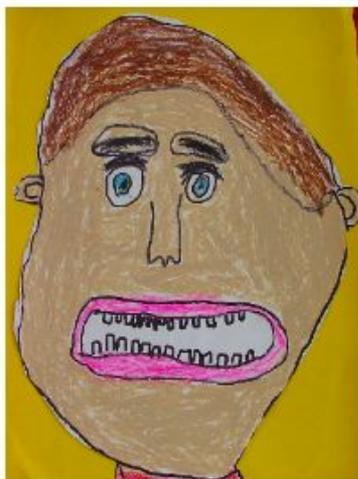


Counts on 9,  
10, 11, 12,  
13.

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?*

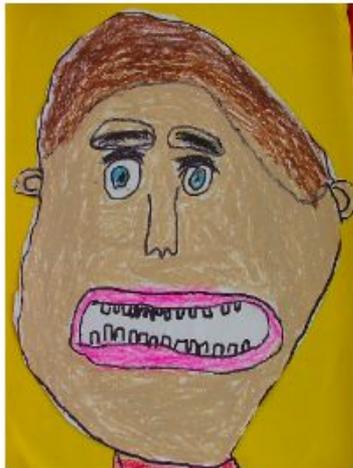


"I know that  
If I take one off  
the 6 and put it  
on the 9 it =10.  
 $10 + 5 = 15$ "

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?*



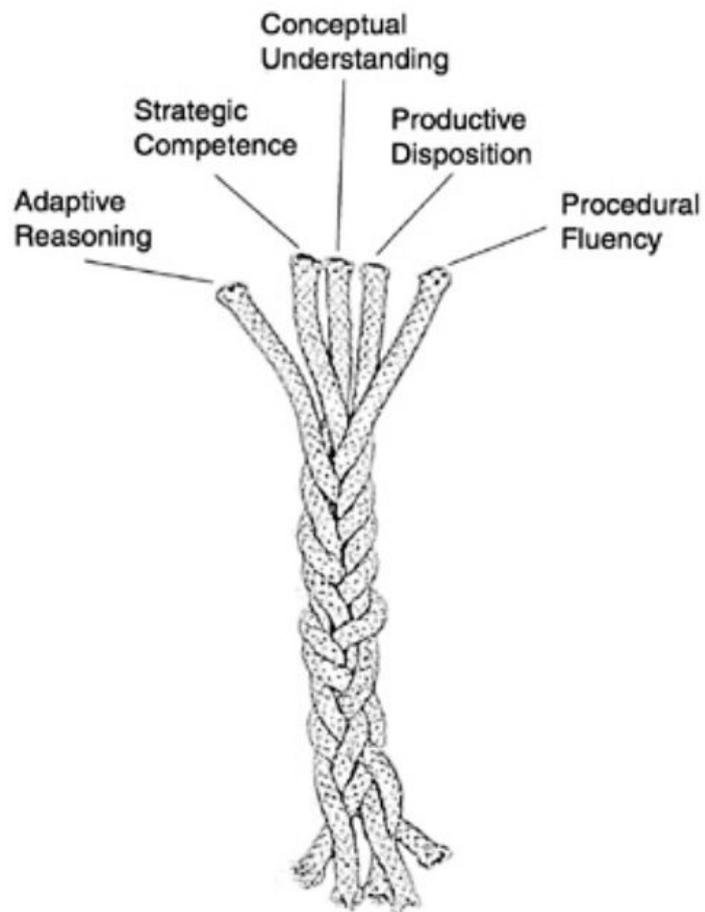
I think tidy  
numbers would  
be smartest.

$$63 - 40 = 23$$

$$23 + 1 = 24$$

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

# Rich Tasks...





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 know's you're there. Say, "You can do it!  
Just two more steps!"

Do nothing and wait and see what happens.

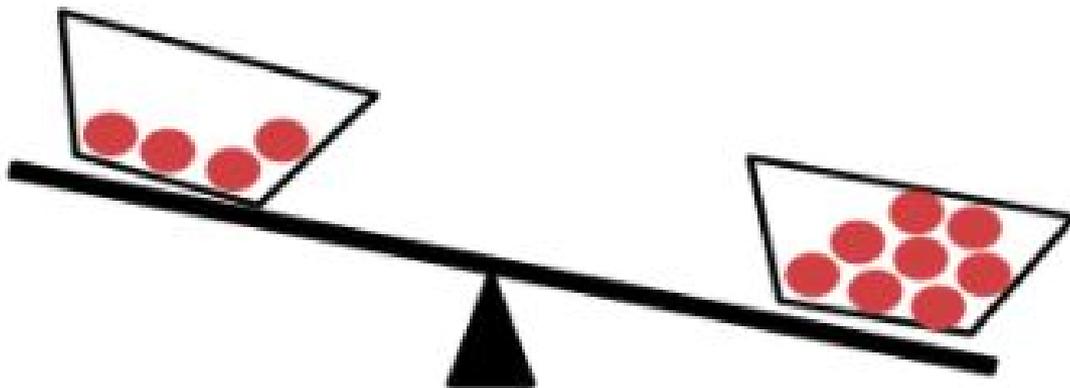
Physically move her hands and feet into the next holes

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?



*How might this task  
develop*

- logical thinking,*
- problem-solving,*
- perseverance*
- conceptual  
understanding?*

**Give as many different answers as you can.**

# Rich Tasks...

Require students to:

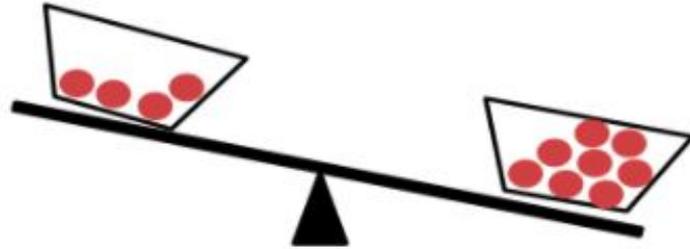
- plan their approach own approach
- process multiple pieces of information
- choose their own strategies, goals, and level of accessing the task
- spend time on the task
- record their thinking;
- explain their strategies and justify their thinking

Tasks are carefully chosen to...

- Be developmentally appropriate
- Address important mathematical ideas
- Enable students to engage *with minimal prior instruction*.

## Balancing

How can we make the scales balance?

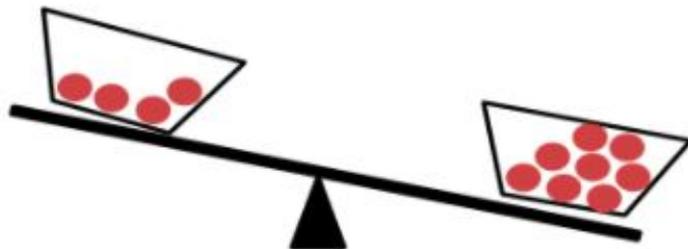


Give as many different answers as you can.

4		8
4 + 4		8
4		8 - 4
4 + 2		8 - 2
4 + 6		8 + 2
4 + 96		8 + 92

## 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.

Where are we heading...?

Some people came for a sports day.

When the people were put into groups of 3 there was 1 person left over.

When they were lined up in rows of 4 there were 2 people left over.



**How many people might have come to the sports day?**

*(Find as many answers as you can!)*

**Describe the pattern in your answers.**

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

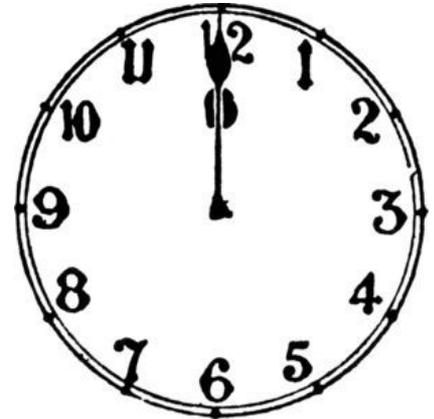
The Race to 1 adding on 0.1 or 0.2

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  $\frac{1}{2}$

...



# 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.

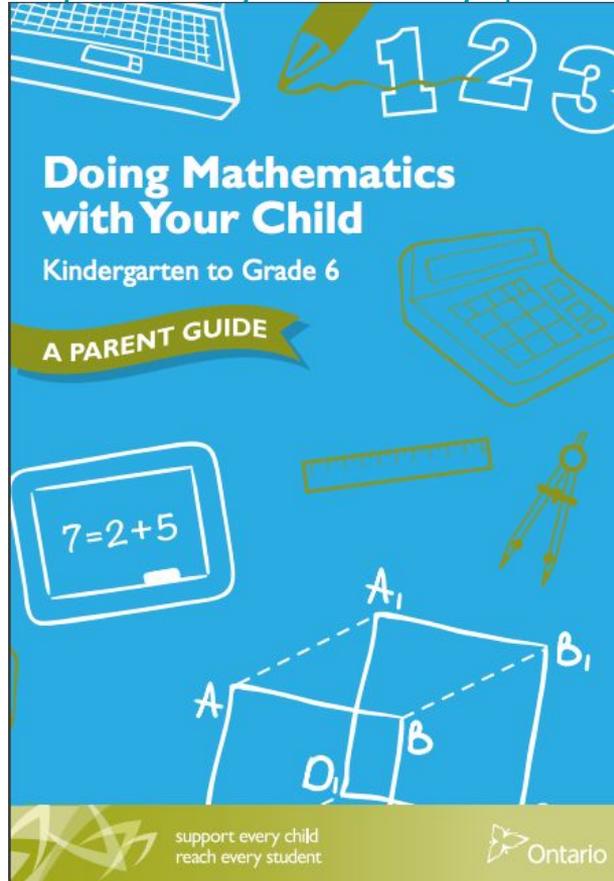
The site also offers resources to help teachers support family engagement with children's maths learning.

#### 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:

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



More ideas:

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

The screenshot shows the Discovery College website. The main navigation bar includes 'The Explorer', 'Dingj', 'ESF Gateway', and 'EMPLOYMENT'. The secondary navigation bar contains 'About Us', 'Curriculum', 'Admissions', 'School Life', 'Current Parents', and 'Contact us'. A dropdown menu is open under 'Current Parents', listing various services such as 'College Policies & Forms', 'Parent & Student Handbook', 'Bad Weather', 'Cafeteria', 'Absence Report', 'Buses', 'PTA Fees & Stationery', 'Laptop Programme', 'Uniforms', 'ePayment', 'Information Sessions' (highlighted), 'Gateway Help', and 'No Boundaries'. The main banner features a group of students running on a track with the text 'Grow. Discover. Dream.' and a large yellow arrow pointing to the 'Information Sessions' menu item. Below the banner are two smaller images: one of the school building and one of two students looking at a globe. A tweet from Discovery College is also visible at the bottom right.

## Maths Activities for Helping with Numeracy at Home

