# Language Counts in Maths: challenges and opportunities for EAL learners

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## Aims

- To develop awareness of issues in learning mathematics for learners of EAL.
- To develop thinking about the use of language to support mathematics learning.
- To consider ways to support the mathematical learning and language development of advanced EAL learners in mathematics.

## Find the missing numbers

- 8 x a = 32
- b x a = 64
- c x a =320
- b x c = d

For each one try to slow down your calculation to observe what steps are involved and how you would put those steps into words.

## What was involved in verbalising the calculation of the missing numbers?

- Subject specific vocabulary
- General vocabulary used in a subject specific way
- Academic vocabulary related to logic, logical conclusions, possibility etc.

## Subject specific

- Multiplied by
- Multiple
- Divided by
- Divisor
- Quotient
- Etc.

## General but subject specific

- times
- goes into
- double
- relationship
- factor
- tens

## Language for reasoning and logic

- ….. then…..
- because …..
- ..must be …
- ..can't be …
- ..could be ..
- Therefore ..

## Meaning in mathematics

- Write a sentence which uses the word 'circle' in it.
- Now write four more sentences using the following words;

  time, about, hold, weigh

## Pitch and expectations
## Year 5

- Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy e.g. the nearest whole centimetre; convert larger to smaller units using decimals to one place, e.g. change 2.6 kg to 2600 g.

## Pitch and expectations
## Year 5

Circle one amount each time to make these sentences correct.

The distance from London to Manchester is about:

320 cm  320 m  320 km

A tea cup is likely to hold about:

15 ml  150 ml  1500 ml

A hen's egg is likely to weigh about:

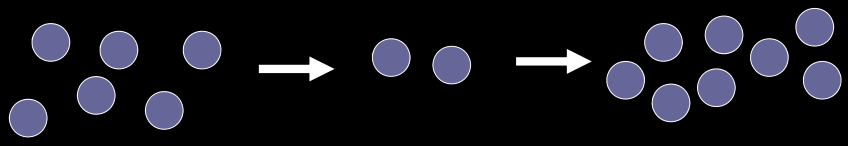
6 g  60 g  600 g

Y5 optional test 2003 Paper B level 4

## Ambiguity

- Circle (used here as a verb)
- time (occasion)
- about (approximately)
- hold (contain)
- Weigh (sounds like but is not ‘way’)

## Addition



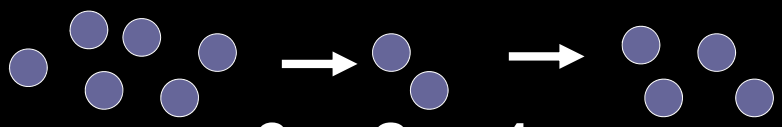
6 + 2 = 8

You have six and you count on two and you get eight.

## Process to concept

- If you add six and two the answer is 8.
- Six and two (when they are) added together make eight.
- Two more than six is eight.
- Six plus two equals eight.
- The sum of six and two is eight.

## Subtraction



6 – 2 = 4

You have six and you take away two and it leaves four.

## Verbalising

- Take two away from six and you have four.
- If you count two back from six you get to four.
- If you subtract four from six then the answer is two.
- Two less than six is four.
- Six minus four is two.
- The difference between six and two is four.

## Alternatives 1

- What is the distance from x to y?
- How far is it from x to y?
- How many kilometres is it from x to y?

- How much does X weigh?
- What is the weight of X?

## Alternatives 2

- A tea cup is likely to hold about 150ml.
- A tea cup probably holds about ….
- A tea cup usually holds about
- It is likely that a tea cup holds about ..
- A typical tea cup holds about ……
- Most tea cups hold about …..

## Alternatives 3

- One orange costs nineteen pence. How much will three oranges cost?
- **Y4 optional test 2003 Mental test level 3**
- One orange costs fifteen pence. How much would five oranges cost?
- **Y4 optional test 1998 Mental test level 4**
- An apple costs seventeen pence. How much will three cost?
- **Y4 optional test 1999 Mental test level 4**
- A fruit pie costs fifty-five pence. What is the cost of three fruit pies?
- **KS2 2004 Mental test level 4**
- 4 pineapples cost £3.40.
  Calculate the cost of 1 pineapple.
- Y4 optional test 2003 Paper A level 4

# Language functions

- Language functions are the meanings and concepts which we want to communicate.
- Language structures are the words and word order we use to express the language functions.

# Language functions

If you double it then you get ...

expressing cause and effect

It's greater than ten

comparing

First I added them together and then I multiplied by .....

recounting

An acute angle is an angle which ....

generalising

describing

It has three sides.

All multiples of even numbers are even numbers

defining

## Estimating:

- It's about …
- It's approximately …,
- It's around …
- It's nearly
- It's between ..
- It's n to n+ km.
- It's a bit more than ..
- It's slightly less than …
- It's roughly …

## Comparing:

- it's nearer to,
- it's more / less than,
- there are fewer ..
- It's heavier / lighter /shorter /
- it's the same as , nearly the same as.
- shortest , longest etc.
- how much less / more ..
- It's twice the size of …
- It's half the size of ..

## Expressing possibility and certainty

- It can't be….
- it could be …
- it must be ….
- it might be ….
- It should be …
- It has to be…
- It doesn't have to be ….

## Aspects and Principles of Language Learning

- Focus on meaning ( some attention to form)
- Comprehensible input
- Modelling
- Interaction
- Reformulating
- Experimenting

## A problem

Farzana goes into a shop. She buys a carton of milk. The carton of milk costs 30p. She gives the shop assistant one pound. The shop assistant gives her 7 coins in change.

## Some questions

- How much change should she have?
- Could she have two 50p coins?
- If she has two 5p coins could she have three 10p coins?
- If she has four 5p coins what other three coins must she have?
- Does she have to have at least one 10p?

## Graphic organiser

| 1p | 2p | 5p | 10p | 20p | 50p | |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | x7 | 0 | 0 | =70p |
| 0 | 0 | x4 | x1 | x2 | 0 | =70p |
| | | | | | | =70p |
| | | | | | | =70p |
| | | | | | | =70p |
| | | | | | | =70p |

## Thinking continuum

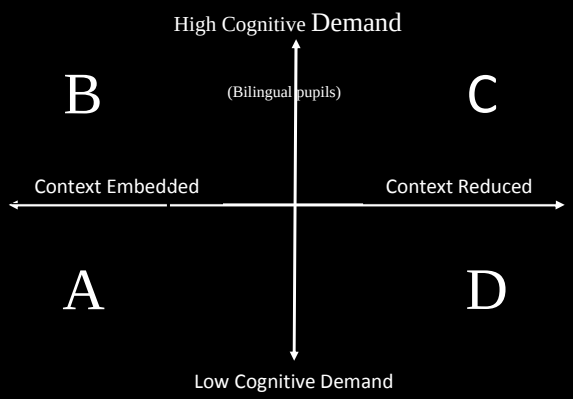
High cognitive demand

Low cognitive demand

## Some types of thinking

- Copying , describing, evaluating, comparing, naming, hypothesising, narrating, classifying, generalising, following instructions, repeating.

## Cummins Quadrant



## Cummins Quadrant

- Place the given cards on the grid.
- Change the given activities to move them forward or back one section of the quadrant.

## Football scores

Can you work out the scores in each of the matches using the clues on the A and B sheets?

# Word problems?

## Change Problems

Sort the word problem cards and picture cards onto the grid so that the picture cards tell the 'story' of the problem. Then think about what operation you need to use in order to calculate the answer.

## What might tasks like this provide for EAL learners?

- An opportunity to enable them to develop content skills and knowledge in maths.
- An opportunity to focus on language for expressing degrees of possibility.
- Integrating language and content.

## Reflecting on planning

- Identify a significant language function children need to use in the context of mathematics.
- Consider an activity that you could plan to enable children to understand and use language associated with that function.

## Next steps?

- What classroom activities will support pupils in developing their understanding and use of 'academic' language?
- How can we plan for a systematic and principled approach to language development in the context of mathematics?