

## Workshop: Ensuring progress for EAL learners in Mathematics

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### This workshop will:

- Consider expected progress and tracking of EAL cohorts
- Introduce key features of Mathematical language
- Model strategies to extend oral skills and improve reading comprehension in Maths

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### Vocabulary Starter

Put these words in alphabetical order

Binocular, biped, bivalve, bigamy, bicycle, biplane, bisect

- Can you sort these ones out?  
trangle, detirtn, plitret, cytrilec, roptid
- What links them?

Online dictionary  
<http://www.amathsdictionaryforkids.com/>

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## Comparative data (KS2 2016)

% Attainment in:	Reading	Writing	Maths
England all other	68	74	69
England EAL	61	75	74
Birmingham all other	62	70	65
Birmingham EAL	55	69	67

- Nationally EAL pupils are 5% point ahead in KS2 Maths
- In Birmingham EAL pupils are only 2% points ahead of English speaking peers and still behind the national average
- The EAL/All gap is widest in Reading with both 'All' KS2 pupils in England and EAL pupils in England.

Source: <http://www.education.gov.uk/schools/performance/>

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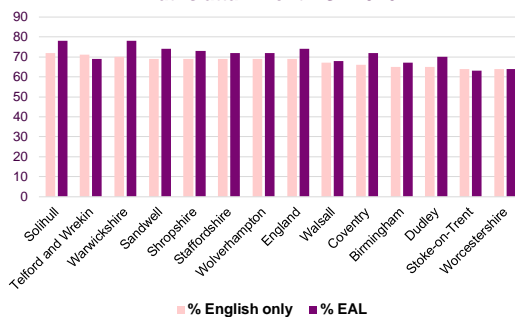
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Maths attainment KS2 2016




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## Maths Vocabulary

- Everyday words: put, make, has, book
- Subject technical words: isosceles, addition
- Subject specialised words (*with an everyday meaning as well as a specific meaning*) average, factor, function, table, chance
- Semantic fields e.g. fractions, fifth, quarter, denominator
- Symbols:  $\pi$ ,  $\sqrt{\quad}$ ,  $\leq$ ,  $\frac{2}{3}$ , %,  $a^2$

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Maths word	Everyday definition	Mathematical definition
root		
odd		
face		
mean		
power		

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Different Number systems				
Number	English	Polish	Turkish	Chinese
3	three	trzy	üç	Sān 三
13	thirteen	trzy nacie	on üç	Shi Sān 十三
30	thirty	trzy dziesci	otuz	Sān shí 三十
300	three hundred	trzysta	üç yüz	Sān Bai 三百
1/3	a third	jedna trzecia one in three	üçte bir one in three	sān fēn zhī yī 三 分 之 一
3% (3/100)	three percent	???	Yüzde üç	bǎi fēn zhī sān 百 分 之 三

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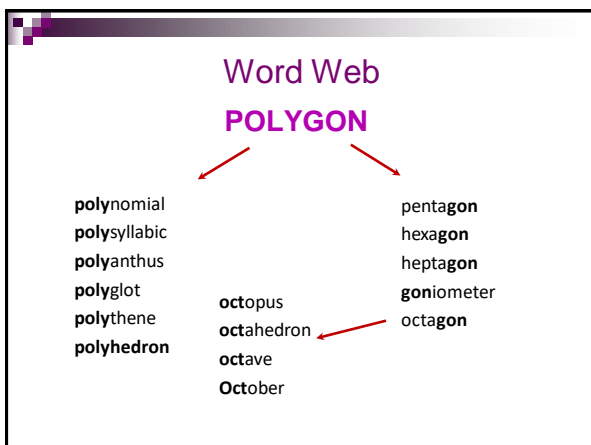
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## Language Functions in Maths

The older the car, the cheaper it is.

comparing

An equilateral triangle has three equal sides.

defining and classifying

First I multiplied by 2, then I added 4

recounting

If you double it then you will get 6

predicting

All multiples of even numbers are also even

generalising

The angles are all the same so the shapes must be congruent

reasoning

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## Constructing triangles



<https://www.youtube.com/watch?v=NzcTKGxwCCE>

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## Sequencing Instructions

To construct a triangle with dimensions of 10cm, 7cm and 8 cm:

**First** draw a line of 10 cm.

**Then** set the pencil and compass exactly 7 cm apart.

Place the compass point at **one** end of **the 10cm** line.

Draw an arc above **the line**.

**Next**, set the compass and pencil at 8 cm wide.

Place the compass point at **the other** end of **the 10 cm line**.

Draw **another** arc.

Use a ruler to join **each** end of the 10 cm line to the point where the two arcs cross.

Label the sides of the triangle with the correct length in cm.

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## Language Features

- Symbolic notation 1,000... 2:3 ... 2,3
- Graphs and other visuals
- Dense noun phrases
- 'timeless' present tense verbs
- Logical conjunctions
- Technical vocabulary
- Specialised vocabulary

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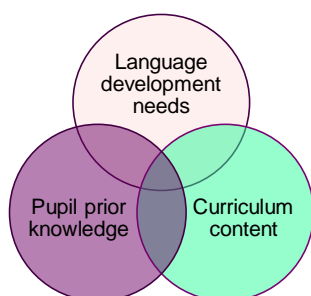
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## Planning for pupils with EAL in Maths




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## Language and Content

*'Language and content integration concerns the teaching and learning of both language and subject areas (e.g. science, mathematics) in the same classroom, at the same time.'*  
(Barwell 2004)

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## Content led language planning

### Learning Objectives

- Use mathematical names for 2 D shapes
- Use mathematical vocabulary to describe position

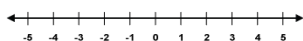
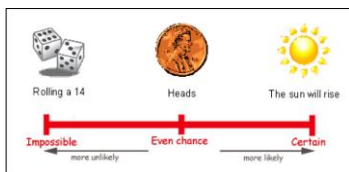
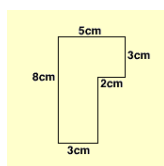
### Language Functions and Structures

- Describing
- Present tense verbs
- Prepositions
- Adverbs of direction

### Vocabulary

- circle
- triangle
- rectangle
- square
- pentagon
- next to, above, below, between, on the left, to the right

## Multimodal texts



## Sample Word Problem

ENAF : Test de maths en 30 langues

Langue : roumain

Niveau : 6<sup>ème</sup>

12 Trebuie să cumperi 15 stilouri care costă 2 euros fiecare și un caiet care costă 5 euros.

a) Ce sumă va trebui să plătești ?

b) Ai un bilet de 50 de euro. Cât o să-ți mai rămână ?

### What research tells us about word problems in Maths

- Students treat them too realistically and suspend their sense-making abilities
- EAL and learners from economically deprived backgrounds tend to have greater comprehension difficulties because of context.
- When writing their own word problems, students **are** able to **mathematize** real world scenarios.
- The key to success is to draw on this ability so that students respond to the form and structure of unfamiliar word problems.

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### Generic question structure

- Three part structure
- The information is arbitrary in relation to scenario (x buys a y....its price is z)
- There is ambiguous use of verb tenses (e.g. timeless present rather than past tense for narrative)

Scenario:

In a sale, the ratio of the sale price to the normal price is 3:5

Information:

Selina buys a jacket in the sale. Its normal price is £45

Question:

What is the sale price of the jacket?

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Sam wants to buy a camera for £345

He has already saved £96

Each week

his pay is £80

he saves 30% of this pay.

How many **more** weeks must he save?

[4 marks]

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Answer \_\_\_\_\_ weeks

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## Discussion

- What is the scenario? **Buying a camera**
- What is the maths involved? **Percentages**
- What is implied or ambiguous? **He is earning the same amount every week**
- Write another scenario using same structure
- Write another structure using the same Maths

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3. Harry asked each student in his class how they travelled to school that day. He used the results to draw this pie chart.



- (a) How did most of the students travel to school?

..... (1)

Harry asked a total of 24 students.

- (b) Work out the number of students who cycled to school.

..... (2)

(3 marks)

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## Group Roles for Oral Maths task

### Chairperson

- **Organise** the group and their roles
- **Make sure everyone understands** what to do. Say, "Shall we discuss it together?"
- Make sure everyone has a chance to speak. Ask, "Does anyone have a different idea or method?"

### Clarifier

- Make sure group members are listening to each other.
- **Check their understanding**: Say, "Does everyone understand that?" or "Can you explain that again?"
- Summarise the method or calculation process to others.

### Recorder/Explainer

- **Write down** the method and record your working out.
- Be ready to **explain and demonstrate** the question to the rest of the class.
- You will have to show your working out in formal language: "First we had to... then... because... etc"

### Language Recorder

- Make sure everyone keeps on task
- **Record the key Maths words** and phrases used during the discussion.
- Record the examples of Maths language used when explaining to class.

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## Language Recorders' Task

### ■ Listening to the discussion:

Listen for slang words, unfinished or short sentences, people interrupting, use of good Mathematical words.

### ■ Listening to the explaining:

Listen for full sentences, examples of clear explanation, giving reasons and using good Mathematical vocabulary or explaining words.

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## Online Resources for EAL

### ■ Online dictionary

<http://www.amathsdictionaryforkids.com/>

### ■ E-Maths

<http://www.emaths.co.uk/index.php/4-teachers/other-resources/eal>

### ■ Dfes Read Write Plus Numeracy materials

<http://rwp.excellencegateway.org.uk/Numeracy/Numeracy%20teaching%20and%20learning%20materials/>

### ■ EAL Nexus

<https://eal.britishcouncil.org/resources/maths-glossary-russian>

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## Thank You

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@catharineEAL

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