


**The ICCAMS Intervention: An overview**

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**ICCAMS: Pedagogic principles**

- **Formative assessment**  
(William et al, 2004; Hattie, 2009)
- **Connectionist teaching**  
(Askew et al, 1997; Swan, 2006)
- **Collaborative work**  
(Slavin et al, 2009; Hattie, 2009)
- **Multiple representations**  
(Streefland, 1993; Gravemeijer, 1999; Swan, 2008)

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**Formative assessment**

- **Informed teacher judgment**
- **Tasks to prompt misconceptions**
- **Time and opportunity for**
  - Students to develop ideas
  - Teacher to listen to students' ideas
- **Integrate formative assessment strategies within lessons**

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### “Realistic” mathematics education

- Mechanistic
  - Procedures and rules
- Structuralistic
  - Insightful **reproduction** of mathematics



- Realistic
  - Insightful **construction** of mathematics

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### Multiple representations

- Create and use cognitive tools to solve problems
  - Familiar: Cartesian graph
  - Less familiar: Ratio Table, Double Number Line
- Compare different representations

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### Different teachers, different contexts

- Encourage extended blocks of time on topics **but** enable flexibility
- Different levels of structure / guidance
  - Basic / Extended guidance / Ways of adapting
  - Background for 2<sup>nd</sup> / 3<sup>rd</sup> time teaching

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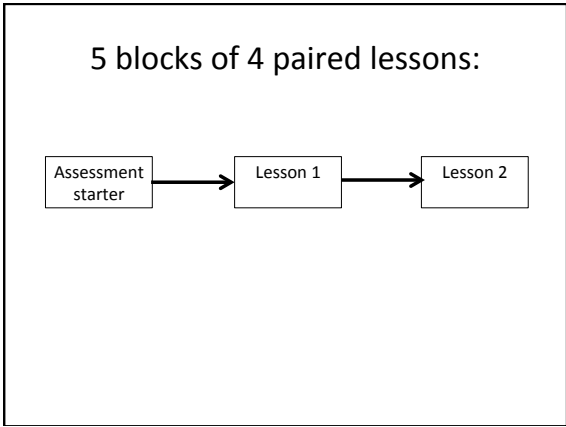
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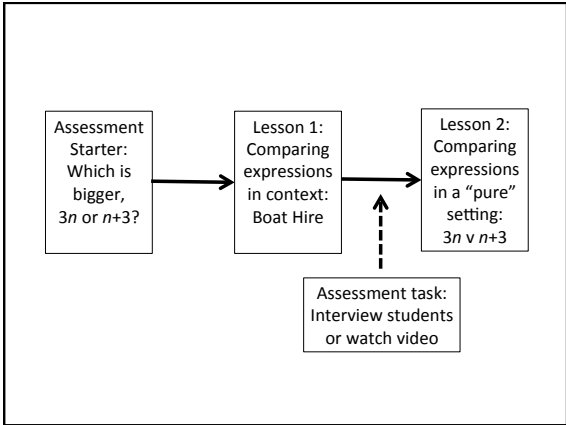
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Algebra: Lesson 1 STARTER

Which is larger,  $3n$  or  $n + 3$  ?

**Commentary**

Use the starter a couple of days before the two lessons.

- Do any students think that  $3n$  and  $n + 3$  are the same thing?
- Do any students try comparing the two expressions by substituting values for  $n$  ?
- Do any students argue that  $3n$  is larger "because multiplication makes things bigger"?
- Do any students "know" that the relationship between the two expressions changes as  $n$  changes?

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**Boat Hire**

Olaf is spending the day at a lake.  
He wants to hire a rowing boat for some of the time.  
Freya's Boat Hire charges £5 per hour.  
Polly's Boat Hire charges £10 plus £1 per hour.  
Whose boat should Olaf choose?

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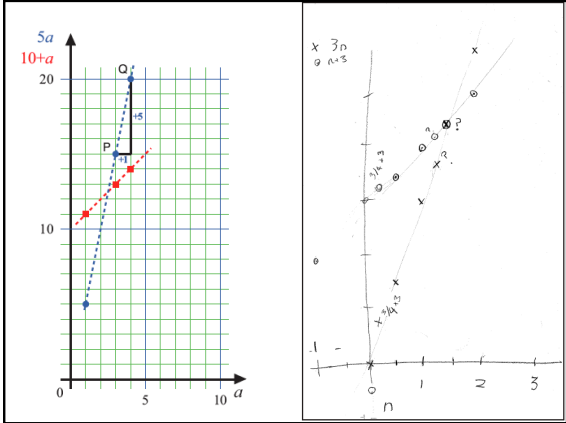
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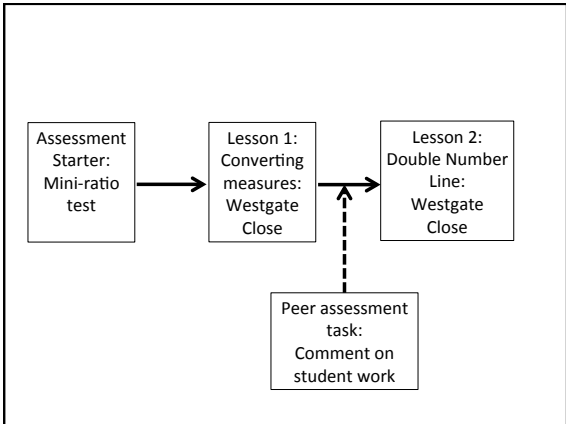
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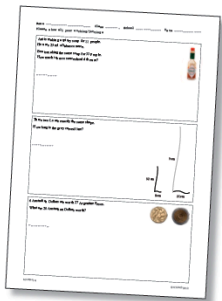
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Multiplicative Reasoning: Lesson 2 STARTER

Mini Ratio Test (Versions A and B)

Ask students to work through version A or B of this mini test, sometime before starting on Lessons 2A and 2B. Distribute Versions A and B randomly to students in the class. This can be done during another lesson, or for homework.



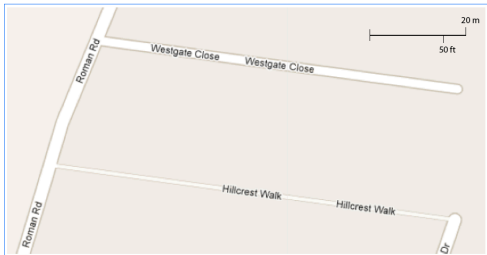
Commentary

The aim of this mini test is to get a sense of the range of methods that students use to solve ratio tasks, and to see how the choice of method is influenced by the numbers involved and the context.

Seven horizontal lines for student answers.

Westgate Close Task A

Look at the scale on the map. Use the scale to estimate the length of Westgate Close i. in metres ii. in feet.



Seven horizontal lines for student answers.

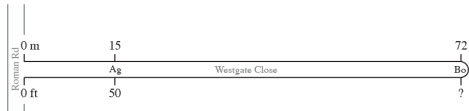
Westgate Close Task B

Here is another map of Westgate Close and Roman Rd.

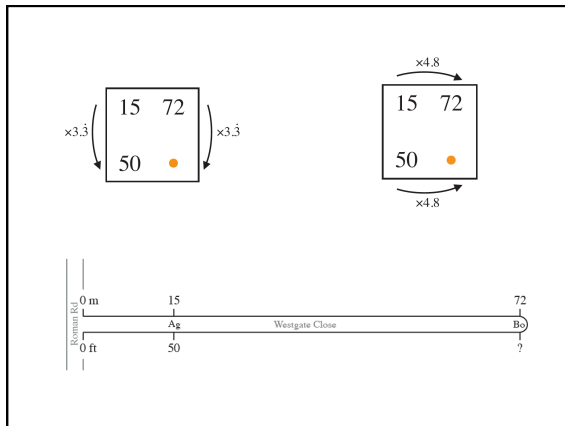
Ag's house is 15 m, or 50 ft, along Westgate Close.

Bo's house is 72 m along Westgate Close, at the very end of the road.

- i. Estimate Bo's distance in feet.
ii. Calculate Bo's distance in feet (try to find several ways of calculating the answer).



Seven horizontal lines for student answers.




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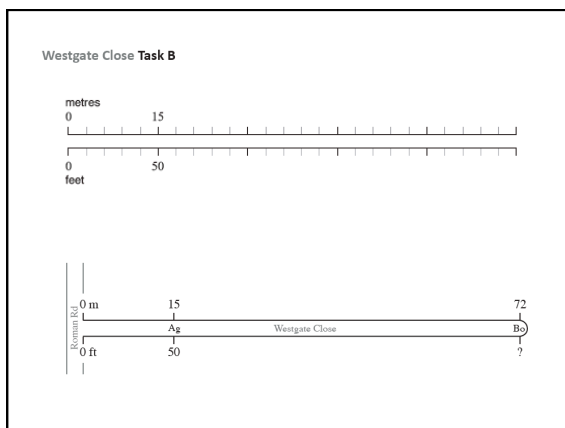
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Ask students to evaluate these student responses (see Task D). This could be set or completed for homework.

$$\begin{array}{r} \times 4 \\ + 12 \\ \hline 212 \end{array}$$

$4.8 \times$	$15 =$	$50 \times 4.8$
	$72 =$	$240$

$50 + 15 = 35 \quad 72 + 35 = 107 ?$

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Ask students to evaluate these student responses (see Task D). This could be set or completed for homework.

$\begin{array}{r} \times 4 \\ + 12 \\ \hline 212 \end{array}$	$\begin{array}{r} m \quad f \\ 4.8 \times 15 = 50 \times 4.8 \\ 72 : 240 \end{array}$
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$50 + 15 = 35 \quad 72 + 35 = 107 ?$

$\begin{array}{c} \xrightarrow{\times 4.8} \\ 15 \quad 72 \\ 50 \quad \bullet \\ \xleftarrow{\times 4.8} \end{array}$

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### ICCAMS lessons

- **Assessment:**
  - Listening to students
  - Framed around students' difficulties / misconceptions
  - Variety of strategies integrated within lessons
- **Representations:**
  - Cartesian graph, familiar to teachers
  - Double Number Line, Ratio Table, less familiar
  - Introduce as a tool, then construct

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