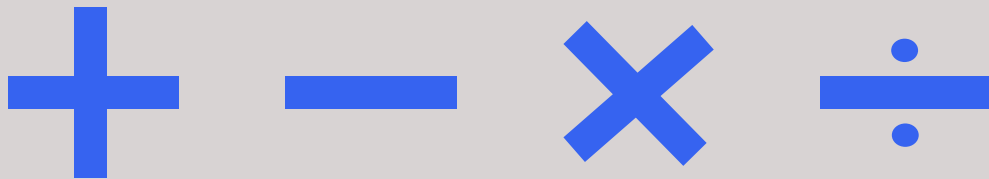


Settling Task

Write down the strategies you currently use to motivate pupils in maths.



Developing pupils' intrinsic motivation



Seminar norms

Throughout the seminar please:

- keep your camera on
- mic muted if not talking
- 'raise your hand' if you wish to speak



Introductions

Seminar objectives

By the end of this seminar you will:

- know what impacts upon pupils' motivation
- understand how to use small steps to help all pupils achieve meaningful success
- know how to plan effective explanations and tasks and help all pupils achieve meaningful success
- have reflected on your practice and identified areas to develop to support all pupils to achieve meaningful success

ECF statements



High expectations (Standard 1 – Set high expectations)

1.1 Teachers have the ability to affect and improve the wellbeing, motivation and behaviour of their pupils.

Adaptive teaching (Standard 5 – Adapt teaching)

Provide opportunity for all pupils to experience success, by:

- *Balancing input of new content so that pupils master important concepts.*

Managing behaviour (Standard 7 – Manage behaviour effectively)

7.4 Teachers can influence pupils' resilience and beliefs about their ability to succeed, by ensuring all pupils have the opportunity to experience meaningful success.

7.6 Pupils are motivated by intrinsic factors (related to their identity and values) and extrinsic factors (related to reward).

7.7 Pupils' investment in learning is also driven by their prior experiences and perceptions of success and failure.

Motivate pupils, by:

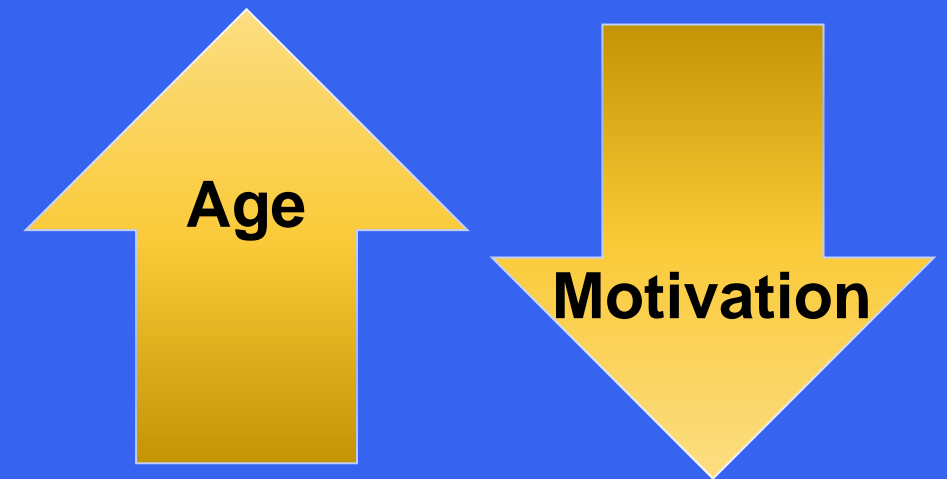
- *Helping pupils to journey from needing extrinsic motivation to being motivated to work intrinsically.*



Why is motivation important?

Motivation impacts academic achievement.

Motivated pupils learn more, persist for longer and produce high-quality work.



(Lazowski & Hulleman, 2016)

Extrinsic and intrinsic motivation

Intrinsic motivation - identity and values

Extrinsic motivation - rewards



Reflection:

Which strategies did you identify in the settling task?

Do they align with developing intrinsic or extrinsic motivation?

Developing motivation

What's the challenge?

Learning is effortful, and the brain doesn't enjoy challenging thinking.

Motivation is incredibly complex and invisible.

Self-Determination Theory

Autonomy – sense of choice

Competence – perceptions of success or failure

Relatedness – feeling connected and supported

Think of a time when you started doing a task but gave up. Can you attribute your reason to giving up to one of these components?

Developing a sense of competency

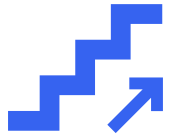


Competence – how likely am I to be **successful** at this task?

ECF statement

7.7 Pupils' investment in learning is driven by pupils' prior experiences and perceptions of *success* and *failure*.

Securing success



Teaching in small steps



Using variation to plan effective explanations and tasks



Teaching in small steps

Millie has some chocolate buttons. For every 3 milk chocolate buttons, she has five white ones.



If there are 32 chocolate buttons in total, how many of each colour are there?

Consider:

What error might pupils make when completing the question on the slide?

Why might that happen?

Break concepts into small teaching points

Outcome: calculating ratio	
Teaching point 1	Ratio language: ratio shows the relationship between two values and can describe how one is related to another.
Teaching point 2	Ratio and fractions: pupils build on their knowledge of fractions by comparing ratio to fractions.
Teaching point 3	The ratio symbol: pupils understand the ratio notation relates to the relative order of the groups.
Teaching point 4	Calculating ratio: pupils start to solve problems involving ratio, using visual scaffolds to support them.
Teaching point 5	Problem solving: pupils apply their understanding of ratio to solve problem.



Consider:

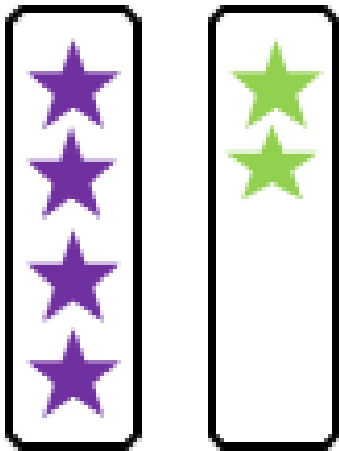
What do you notice about these teaching points?

Why is it important to identify teaching points when teaching about a concept?

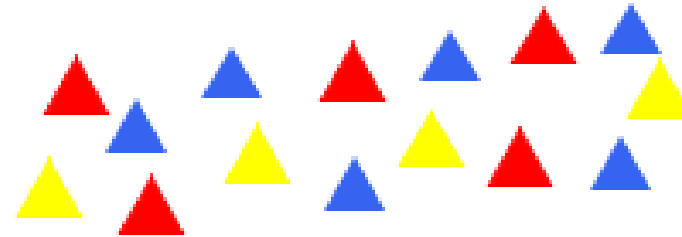
Break teaching points into small steps T

Teaching point 1: Ratio language: ratio shows the relationship between two values and can describe how one is related to another.

For every ___ purple stars, there are ___ green stars.
For every ___ green stars, there are ___ purple stars.



How many 'for every...' sentences can you write to describe this image:



True or false...

For every pink circle, there are three orange circles.



For every 1 vase, there are 5 flowers.
If there were 3 vases, how many flowers would there be?



Break teaching points into small steps



Teaching point 1 Ratio language: ratio shows the relationship between two values and can describe how one is related to another.

Task 1:

There are some cats and some dogs.



How many cats are there?
How many dogs are there?
For every ____ cats, there are ____ dogs.

Task 2:



For every one boy, how many girls are there?

Task 3:



For every 2 octopuses, there are _____ and _____.
For every 1 octopus, there are _____ and _____.

Break teaching points into small steps T

Teaching point 2: Ratio and fractions: pupils build on their knowledge of fractions by comparing ratio to fractions.

Task 1:

The ratio of red cubes to blue cubes is 2:3.



What fraction of the cubes are blue?

$\frac{1}{3}$ $\frac{1}{2}$ $\frac{3}{2}$ $\frac{3}{5}$

What fraction of the cubes are red?

Task 2:

In a tub of Celebrations, there are Snickers, Mars and Twix.



What fraction of the chocolates are snickers?

What fraction of the chocolates are Mars?

What fraction of the chocolates are Twix?

For every ____ Snickers, there are ____ Mars and ____ Twix.

What is the ratio of Snickers: Mars: Twix?

Task 3:

There are some yellow and pink cubes in a bag. $\frac{2}{5}$ of the cubes are pink.

True or false:

- For every 2 pink cubes, there are five yellow cubes.
- For every 2 pink cubes, there are 3 yellow cubes.
- For every 3 yellow cubes, there are 2 pink cubes.
- For every 3 yellow cubes, there are 5 pink cubes.

Explain your answers.

Breakout activity

Discuss:

- What are pupils learning in each task?
- What order would you introduce these explanations/tasks in?
- How does each task build on from the last?
- How do these small steps support pupils to understand the teaching point 4: *Calculating ratio: pupils start to solve problems involving ratio, using visual scaffolds to support them.*

A

The mass of strawberries in a smoothie is three times the mass of raspberries in the smoothie.

The total mass of the fruit is 840g.

How much of each fruit is needed?

B

Jack mixes 2 parts of red paint with 3 parts blue paint to make purple paint.

If he uses 12 parts blue paint, how many parts red paint does he need to use?

C

Annie is making some necklaces to sell.

For every 1 pink bead, she uses 3 purple beads.



Each necklace has 32 beads in total.

The cost of a string is £2.80.
The cost of a pink bead is 72p.
The cost of a purple bead is 65p.

How much does it cost to make one necklace?

D

A farmer plants some crops in a field.

For every 4 carrots, he plants 2 leeks.

He plants 48 crops in total.
How many leeks did he plant?

Reflection



Think about the most recent concept you taught:

- Were all pupils successful in understanding this concept?
- How did you break the teaching point into small steps to enable all pupils to succeed?
- How could you have improved this further?



What do you notice about this activity?



Consider:

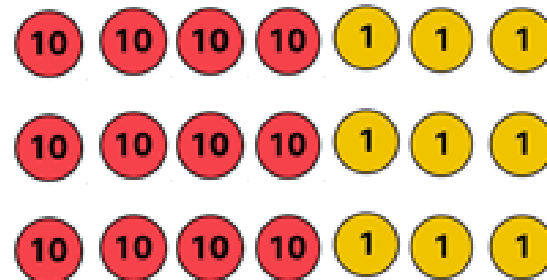
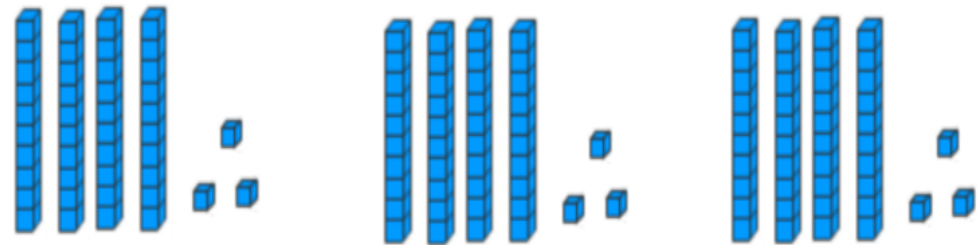
What do you notice about this activity?

Why have those four questions been chosen?

Look at the representations below.

What is the same?

What is different?



Plan effective explanations and tasks

- Presenting concepts using multiple representations to show what the concept is and what it is not.
- What will change and what will stay the same?

Avoid mechanical repetition!

T

Can help pupils overcome:

- Limited understanding of mathematical concepts.
- Limited ability to identify the mathematics when its context is slightly changed.
- Limited ability to know how to approach a mathematical problem with a slight variation to what they are familiar with.
- Inflexible and unconnected understanding.

Select calculations carefully

Calculate the missing numbers:

$$460 \div \underline{\quad} = 46$$

$$4,600 \div \underline{\quad} = 46$$

$$46 \div \underline{\quad} = 4.6$$

$$46 \div \underline{\quad} = 0.46$$

$$460 \div \underline{\quad} = 4.6$$



Consider:

What do you notice about the answers and why do you think the teacher has ensured that happens?

Why has the teacher put them in this order do you think?

How might this help to develop intrinsic motivation?

Select calculations carefully



$$460 \div 10 = 46$$

Starts off with a calculation that is accessible to all.

$$4,600 \div 100 = 46$$

The dividend is ten times larger than in the calculation above but the quotient remains the same, meaning pupils know the divisor will also need to be ten times larger than in the calculation above.

$$46 \div 10 = 4.6$$

This is the first question to introduce a decimal as the quotient. Pupils know that 4.6 is ten times smaller than 46; they can also link back to $460 \div 10 = 46$ in the initial question.

$$46 \div 100 = 0.46$$


The dividend remains the same as in the previous question but the quotient is ten times smaller, meaning the divisor needs to be ten times larger.

$$460 \div 100 = 4.6$$

The dividend is ten times larger than in the third question but the quotient is the same, meaning the divisor also needs to be ten times larger.


Breakout activity

A Odd One Out

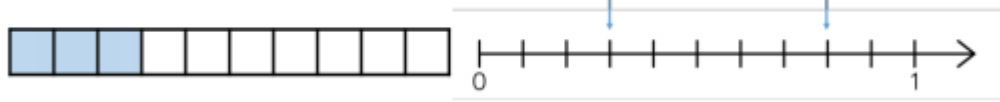


Which is the odd one out?
Explain your answer.


B Label any acute or obtuse angles in these images.



C Write the fractions and decimals shown.



D Complete the table:

Start number	Rounded to the nearest 10
	
851	
XCVIII	

Discuss:

- Which part of each task helps pupils to avoid mechanical thinking and deepens their understanding?
- Which misconceptions does this help to address?
- How can this support pupils to be successful?

Reflection



Think about the most recent concept you taught:

- Were all pupils successful in understanding this concept?
- How did you purposefully select examples and questions to develop understanding and help pupils avoid mechanical thinking?
- How could you have improved this further?



Networks and resources

- Teach First Networks
- NCETM
- White Rose maths
- The Primary Collective





Thank you.

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