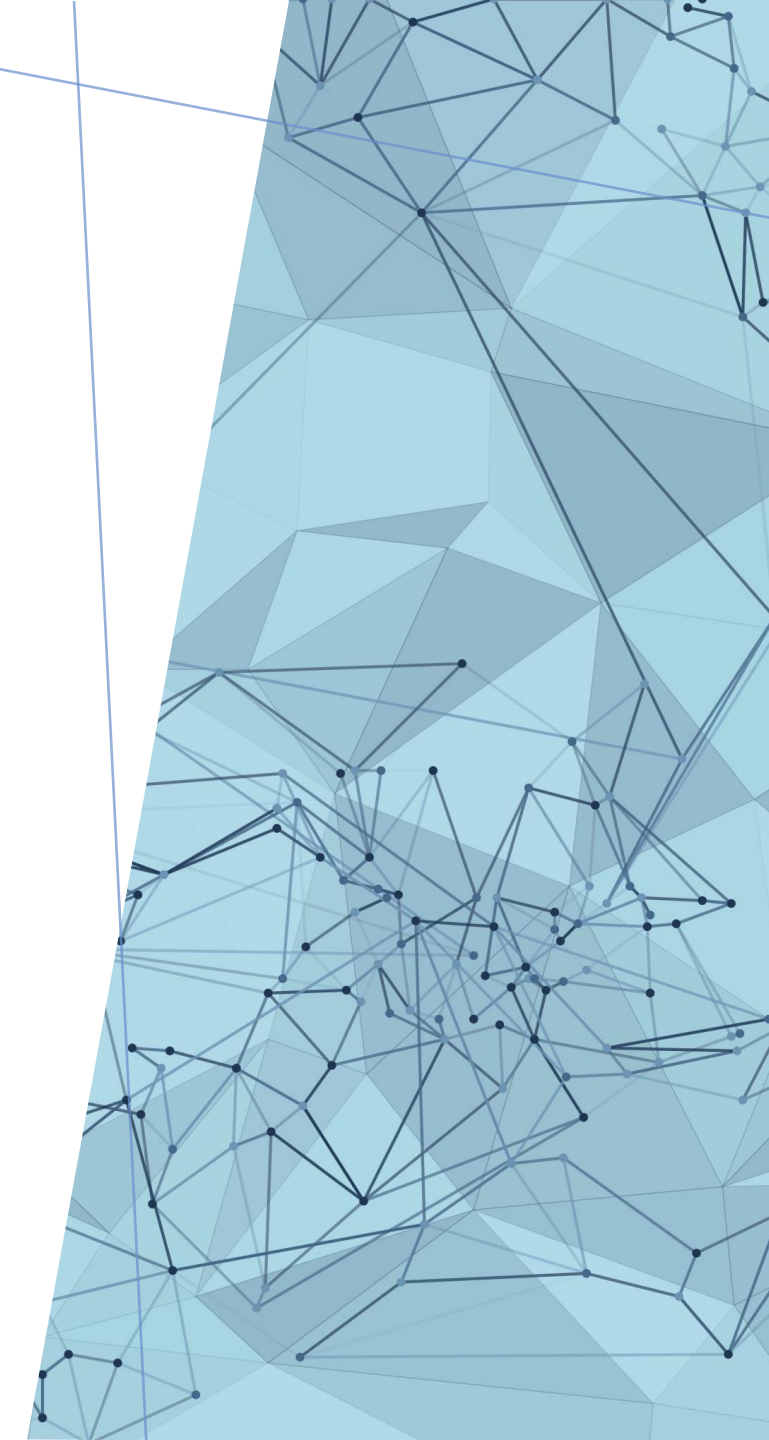


MAKING
METACONGITION
WORK
IN
PRIMARY



Session Aims

- Determine why metacognition needs to be such a key focus for *all* of us
- Develop our understanding of metacognitive theory
- Consider the strategies that we can use in the classroom

Contracting Session

- Ask questions at any time!
- Follow-up survey to ask further questions
- Contact details shared at the end

Who Am I?

- Nathan Burns
- Former Head of Maths/Pastoral Lead/MAT Lead
- Metacognitive researcher and author
- Full time training provider and consultant



Why Metacognition? The Headlines...

- Greatest positive attainment impact of any intervention (EEF, 2019)
- OFSTED (2018) suggested area of focus for high-quality CPD
- Benefits ALL students (regardless of: socio-economic status; prior attainment; sex; behaviour; SEN status; age) (many, many papers...)

Anything Else?

- Works across phases (i.e. can be a focus for all)
- Works across all subject areas (i.e. can be a whole school focus)
- Compliments whole school work around feedback, modelling, questioning (and more...)

There's More?

- Develops problem solving skills
- Improve skill transference across contexts
- Improves students self-regulatory abilities

What Metacognition Isn't?

- Metacognition is not the same as self-regulation
- Self-regulation is an umbrella that cover learning habits AND behaviours

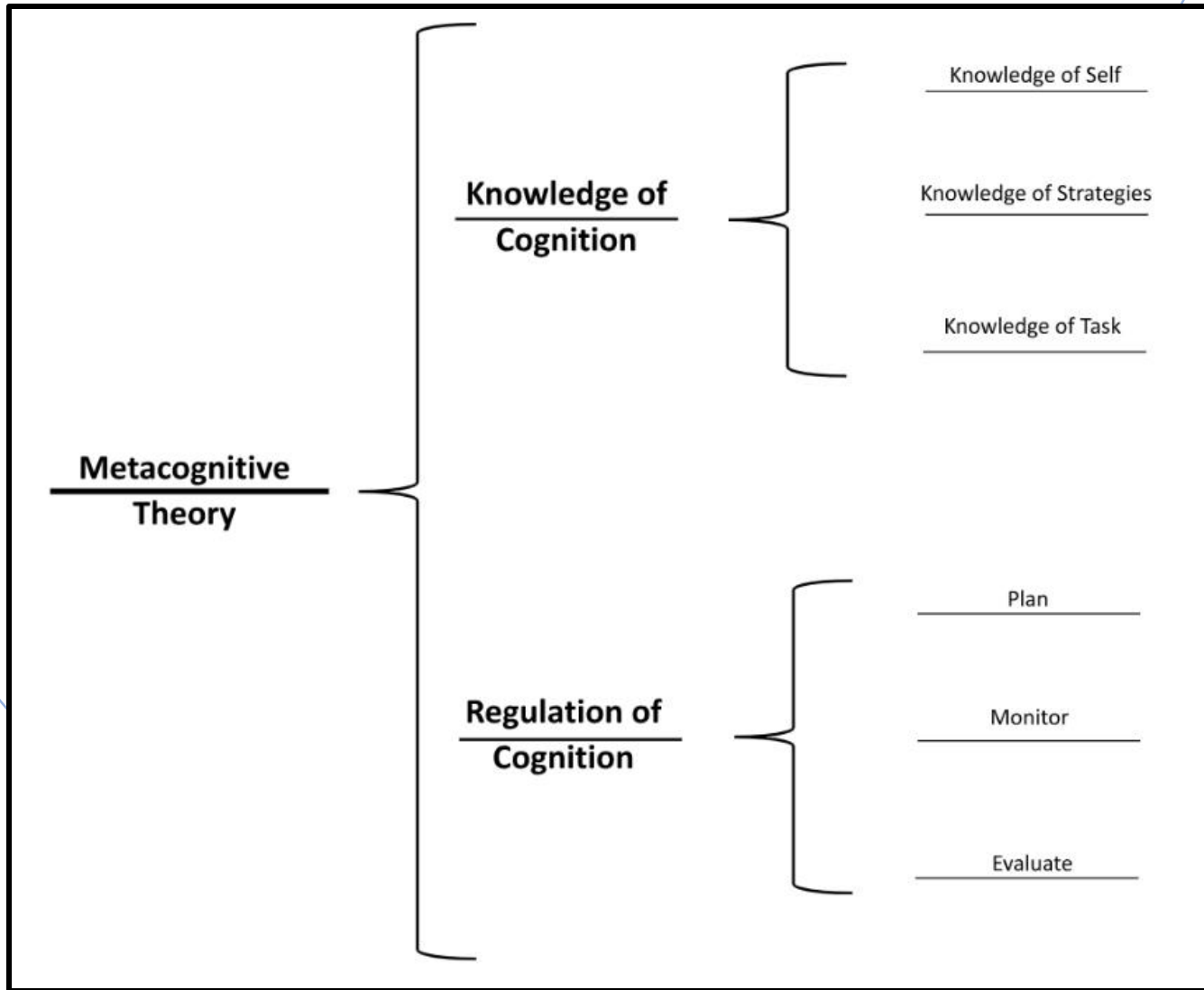


What Is Metacognition?

- Flavell (1972): 'I am being metacognitive if I notice that I am having more trouble learning A than B; if it strikes me that I should double check C before accepting it as fact'
- Burns (2023): '[Metacognition is] the little voice inside your head that constantly evaluates and informs your decisions.'

Why Is It So Difficult?

- It's invisible
- There are complexities to the theory
- It is reliant on cognition and motivation (i.e. it is not a standalone strategy or pedagogy)



Knowledge

versus

Regulation

Knowledge Of Cognition

- Knowledge of task – knowledge of requirements to meet to fulfill task criteria
- Knowledge of self – knowledge of... knowledge
- Knowledge of strategies – knowledge of methods available to attempt a cognitive task

Regulation Of Cognition

- Planning – an approach for the task
- Monitoring – staying on track for successful task completion
- Evaluation – review of the efficiency and effectiveness of approach and outcomes

Levels Of Metacognition

- Metacognition is not a dichotomy
- We have Perkins' (1992) 4 levels: tacit; aware; strategic; reflective

Tacit – not aware of control of cognitive processes

Aware – aware of cognitive processes but don't actively engage with them

Strategic – begin to plan and evaluate cognitive action

Reflective – plan, monitor and evaluate cognitive action

Developing Metacognitive Skills

- Metacognitive development must be within the context of content
- Metacognition needs to be development within the wider curriculum
- Metacognition needs to be embedded – not a bolt-on or an enrichment opportunity
- Metacognition should not be taught as a discrete lesson

Knowledge of Grid

What?

- Knowledge of grid is a planning tool to get students to think about the fundamentals of *any* cognitive activity:
 - Knowledge of task
 - Knowledge of self
 - Knowledge of strategies

Why?

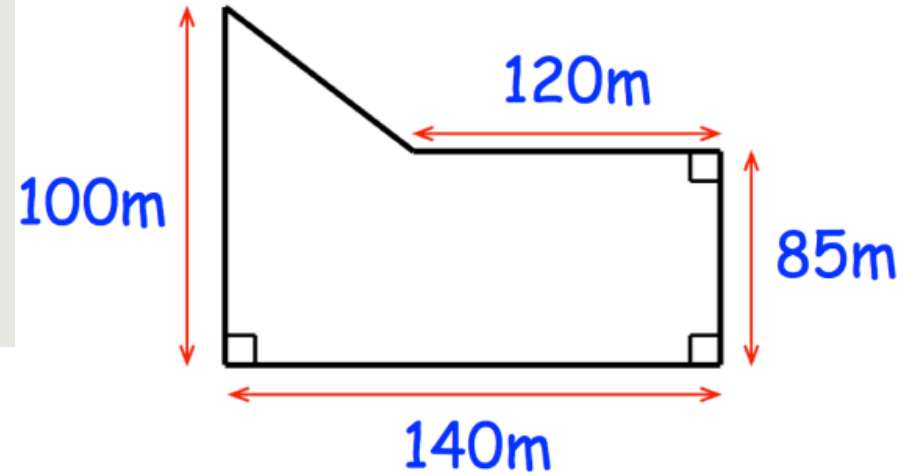
- Student forced to attend to these factors
- Places emphasis and priority on these areas (and moves it away from just doing the task)
- Scaffolds an approach to a (complex) task

Example

Consider the benefits and drawbacks of using a 'dry run' for a newly develop computer program (5)

Knowledge of Task	Knowledge of Self	Knowledge of Strategies
Need to define Need to provide at least 2 benefits and 2 drawbacks (5 marks, 1 for define, 2 for +, 2 for -)	+ Identify issues + Reduce costly changes later - Takes time - Financial cost	Start with define, then do the two + then two - Or I could try to link them together, e.g. identify issues but this will cost more money to do

Example



Farmer Martin keeps chickens in the field below.
Each chicken needs 3m^2 .

What is the maximum number of chickens that he can keep?

Knowledge of Task	Knowledge of Self	Knowledge of Strategies
Finding the maximum chicken that can be in there Whole number Round down Show method	Not confident on method to find area Know need to divide area by chickens Confident I need to round down	Area – split into two shapes or three. Not clear on area of a trapezium Do know area of triangle – slower but more confident

Example

Look in detail at this extract, from **lines 10 to 19** of the source:

I am not one to hold a prejudice against any animal, but it is a plain fact that the spotted hyena is not well served by its appearance. It is ugly beyond redemption. Its shaggy, coarse coat is a bungled mix of colours, with the spots having none of the classy ostentation of a leopard's, they look rather like the symptoms of a skin disease. The head is broad and too massive, with a high forehead, like that of a bear, but suffering from a receding hairline, and with ears that look ridiculously mouse-like, large and round, when they haven't been torn off in battle. The mouth is forever open and panting. The nostrils are too big. The tail is scraggly and unwagging. All the parts put together look doglike, but like no dog anyone would want as a pet.

How does the writer use language here to describe the hyena's appearance?

You could include the writer's choice of:

- words and phrases
- language features and techniques
- sentence forms.

[8 marks]

Knowledge of Task	Knowledge of Self	Knowledge of Strategies
Only in relation to hyena and appearance 8 marks, so 8 points. 2 for each category and explain them (Is this enough)? Not limited by this, so maybe make 2 other points?	Can draw out examples from text - 'too big', 'scraggly' Techniques include... Sentence forms include... What about..?	Work through each area they've mentioned, 2 points each. Then my further 2 points. Need to quote from text (but not too long)

Goal Free Problems

What?

- The removal of the question from a context problem, so students are left with multiple things that they could work out, and are not just limited by the question

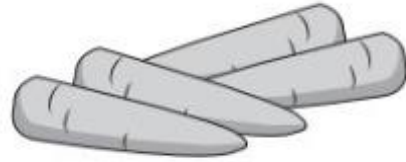
Why?

- Removes the barrier of a 'question'
- Improves student confidence; show them what they can do
- Removes limitation of absence, misunderstanding etc.

Your Turn



potatoes
£1.50 per kg

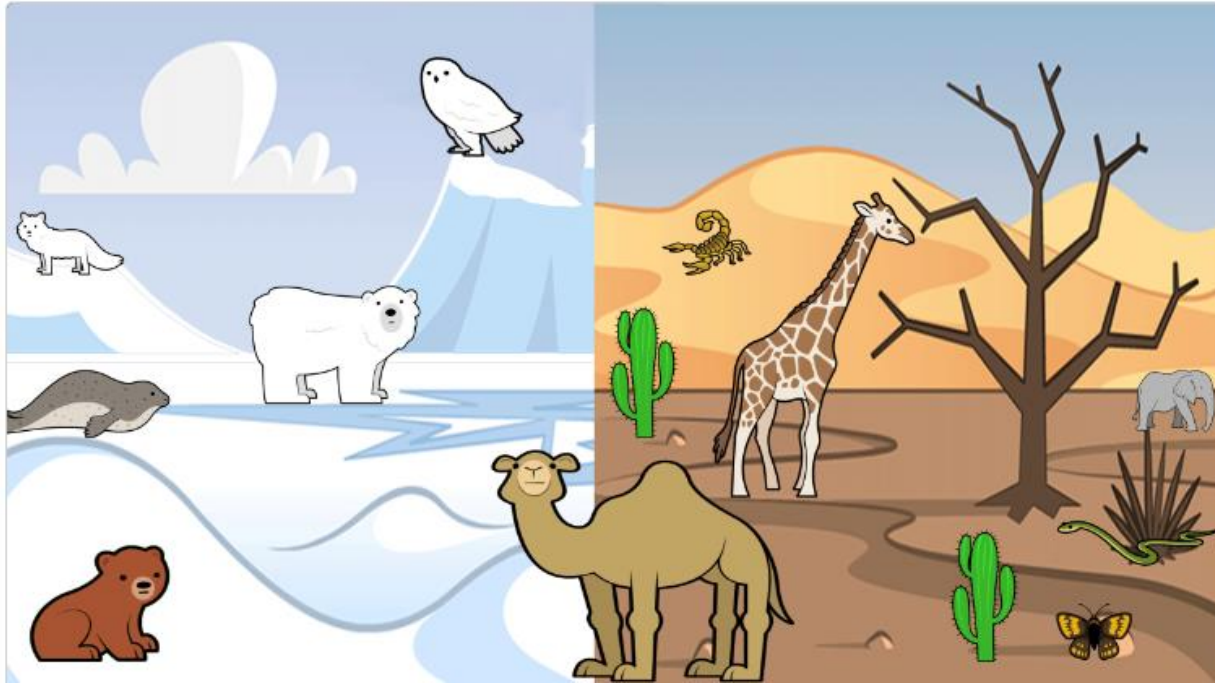


carrots
£1.80 per kg

Jack buys $1\frac{1}{2}$ kg of potatoes and $\frac{1}{2}$ kg of carrots.

- What can you calculate?
- How many marks can you achieve?
- List all potential questions
- What units does the question link to?

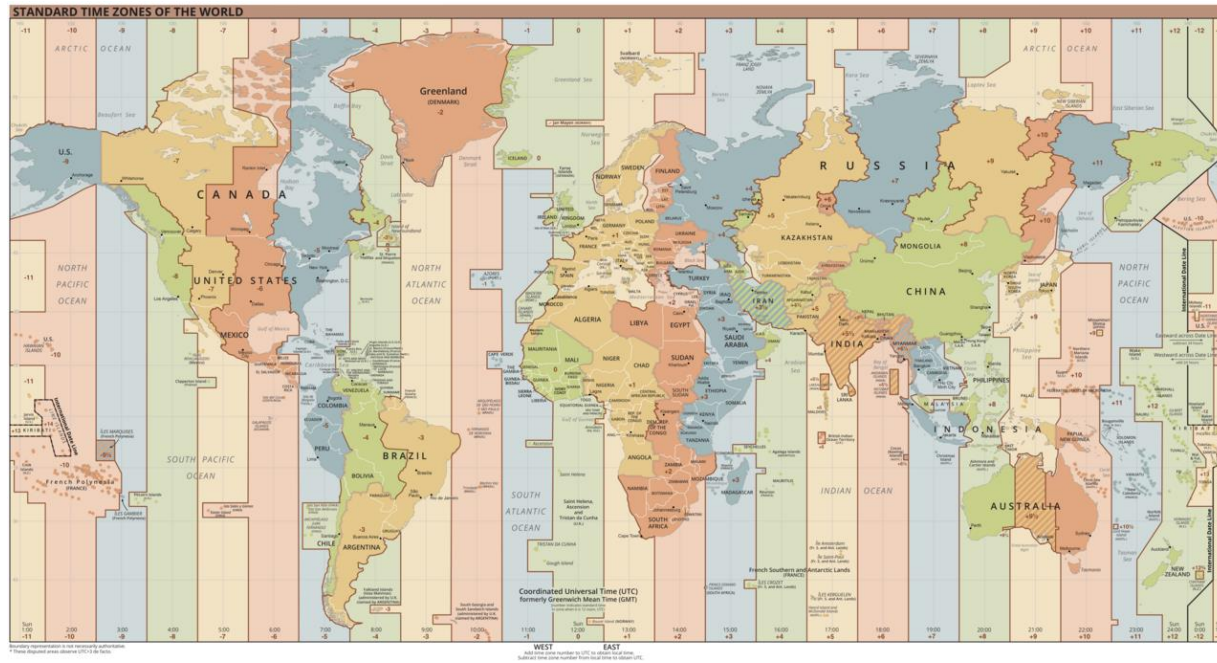
Example



Describe the adaptations shown by 3 animals in this photo

What could a question be?
What can you deduce from the image?
What do you agree on? What do you disagree on?
What topic(s) may this link in to?

Example



What do you know?
What can you calculate?
Are you in agreement?

Example



What do you know?
What might the image tell us?
How does it connect with other learning?
What questions might we be asked?
Are you in agreement?

Model Scaffold Use

What?

- Scaffolds used to bridge gaps between current levels and desired level.
- Focus here is on training students *what* scaffolds that they have available to them, *how* to use them and *why* they are helpful.

Why?

- High quality feedback supports student in identifying and improving on target areas.
- Improved independent learners

Example

For example...

- Writing frame
- Sentence starters
- Key word bank
- Knowledge organisers
- Calculator
- Model answers
- Calculation sheets
- Exemplars
- Textbooks/guides

Explicit Justifications

What?

- Justify the choices that you make during modelling
 - Explaining where (relevant) you take a different possible pathway (use of a key word; strategy; use of prior knowledge and so forth)

Why?

- Ensures students learn from our experiences rather than trial & improvement 100 times over.
- Aim to lead to a greater depth of understanding.
- Model to students how an expert goes about decoding and completing a task.

Example

I would utilise a bar chart to graph this data. This is because the data is discrete, not continuous, so a line graph is not suitable. There is not a total amount so I cannot use a pie chart.

**Water Temperatures
at Various Depths**

Water Depth (meters)	Temperature (°C)
50	18
75	15
100	12
150	5
200	4

Example

Method

1. **Get an adult** to preheat the oven (◀) le four) to 200°C or gas mark 6.
2. Whisk (◀) fouette) the eggs and sugar in a bowl until frothy, then add the baking powder, flour, lemon juice and zest.
3. **Get an adult** to melt the butter and add this.
4. Leave to stand for twenty (◀) vingt) minutes, then pour the mixture (◀) la pâte) into your tray, making twelve (◀) douze) to sixteen (◀) seize) cakes.
5. Bake (◀) fais cuire) for eight (◀) huit) to ten (◀) dix) minutes.
6. Leave to cool down.

The words are in bold because...

Example

Animals are divided into two main groups. Animals that have a **backbone** (spine) are called **vertebrates**. Animals that don't have a **backbone** are called **invertebrates**.

Vertebrates and invertebrates are divided into smaller groups.

Ensuring that we define these key words, rather than just assuming that students will know them, because it is 'banked' knowledge for us.

Example

Art – I am going to mix together these two colours because...

PE – I am going to make this movement instead, because...

Drama - I would deliver the line like this, because...

History – I will focus on this figure instead, because...

Geography – I am going to focus in on these human factors instead, because...

Maths – I am going to partition 17×8 to $(10 \times 8) + (7 \times 8)$

English – I am going to put a full stop/comma/colon here because...

Good, Better, Best Answers

What?

- Provide students with 3 answers to a given question.
- Similar in levels (e.g. A+ to A-; B+ to A+ etc.)
- Focus on drawing out subtleties of the best answer; aspects which are strong in one (even if not the best overall answer).

Why?

- Illuminate your expertise
- Illuminate task requirements and examiner expectations
- Drawing attentions to subtlety

Example

Explain what is meant by an ancient civilization:

- An ancient civilisation is one that is super old and doesn't exist anymore.
- Is a group of people, from a very long time ago, who often did things differently to how we did.
- An ancient civilisation is now extinct and is a group of very similar people.

What is good about each answer?

What might the best overall definition be?

Example

What is meant by the composition of soil?

- The composition of soil is three different parts.
- Topsoil, subsoil, bedrock.
- Soil is topsoil and subsoil and bedrock.

What is good about each answer?

What might the best overall definition be?

Talking Heads (Concept Cartoons)

What?

- Provide students with a question and several different responses
- These can be alternative answers, or often, answers with varied depth
- Students need to identify correct answer/most detailed answer

Why?

- Force consideration of depth of answers
- Develop understanding of effective answers
- Discuss subtlety in response
- Tease out misconceptions

Example

Define a rectangle

A square is a rectangle

A rectangle has two pairs of opposite parallel sides

A rectangle has two pairs of equal sides

A rectangle has four sides

A rectangle has four sides, with two pairs of congruent parallel sides

A rectangle is a quadrilateral with four right-angles

A rectangle has parallel sides

A rectangle has parallel sides

Example

The glass gets wet because the cold changes into water on the glass

?

Maybe the ice has melted on the outside of the glass

I think the water vapour in the air has turned into drops of water on the glass

I think that some of the water must have leaked out of the glass

What do YOU think?

Example

What happens when some solid NaCl is added to water?

nothing will happen - salt will not dissolve because there is strong chemical bonding in the solid

the salt dissolves as it breaks up into separate NaCl molecules

the salt dissolves as it breaks up into separate sodium ions and chloride ions

the salt dissolves as it breaks up into separate sodium atoms and chlorine atoms

KST 2023

Science Education Research

Session Survey

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