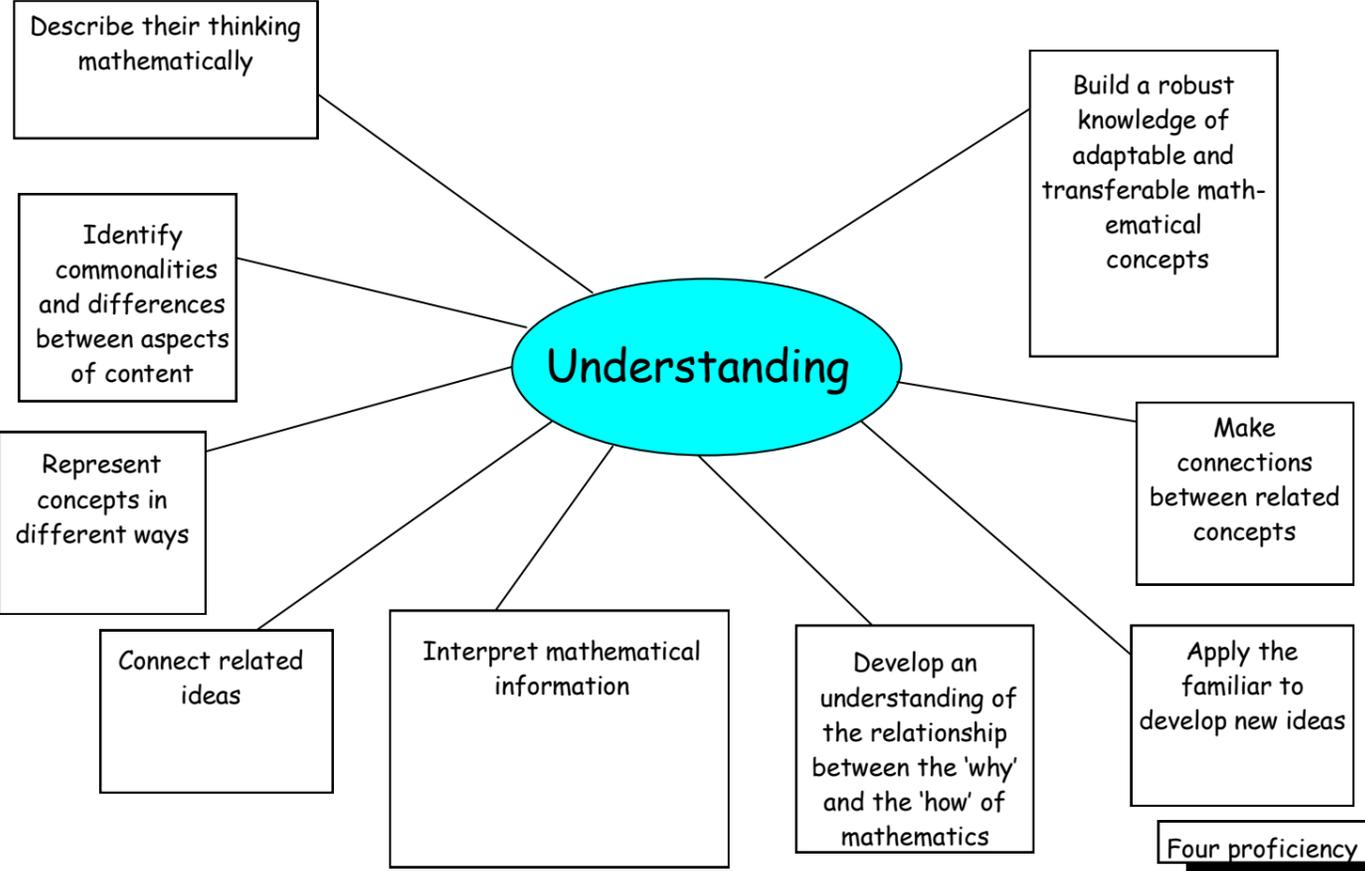
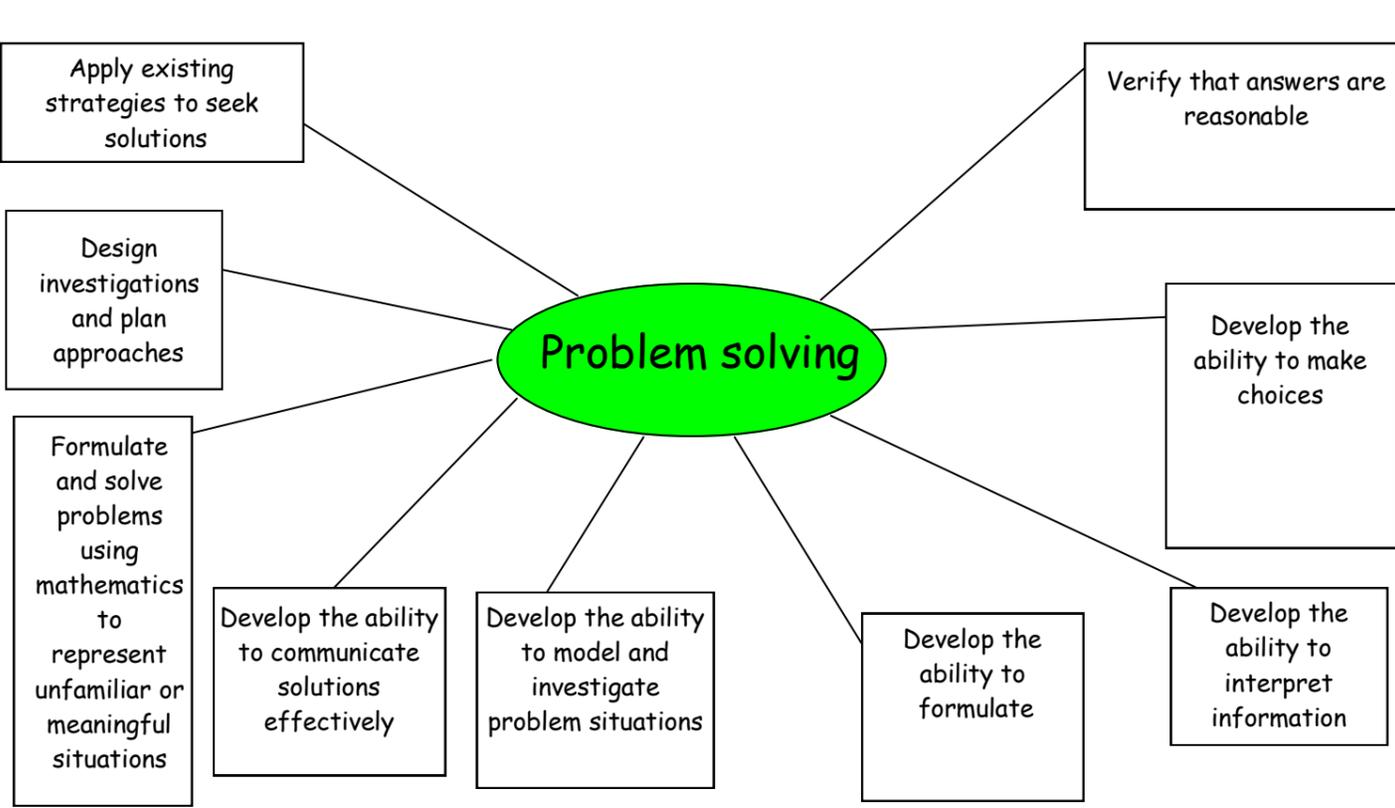


# Understanding



Comprehension of mathematical concepts, operations and relations  
From Adding it up (Kilpatrick, Swafford and Findell 2001)

# Problem solving

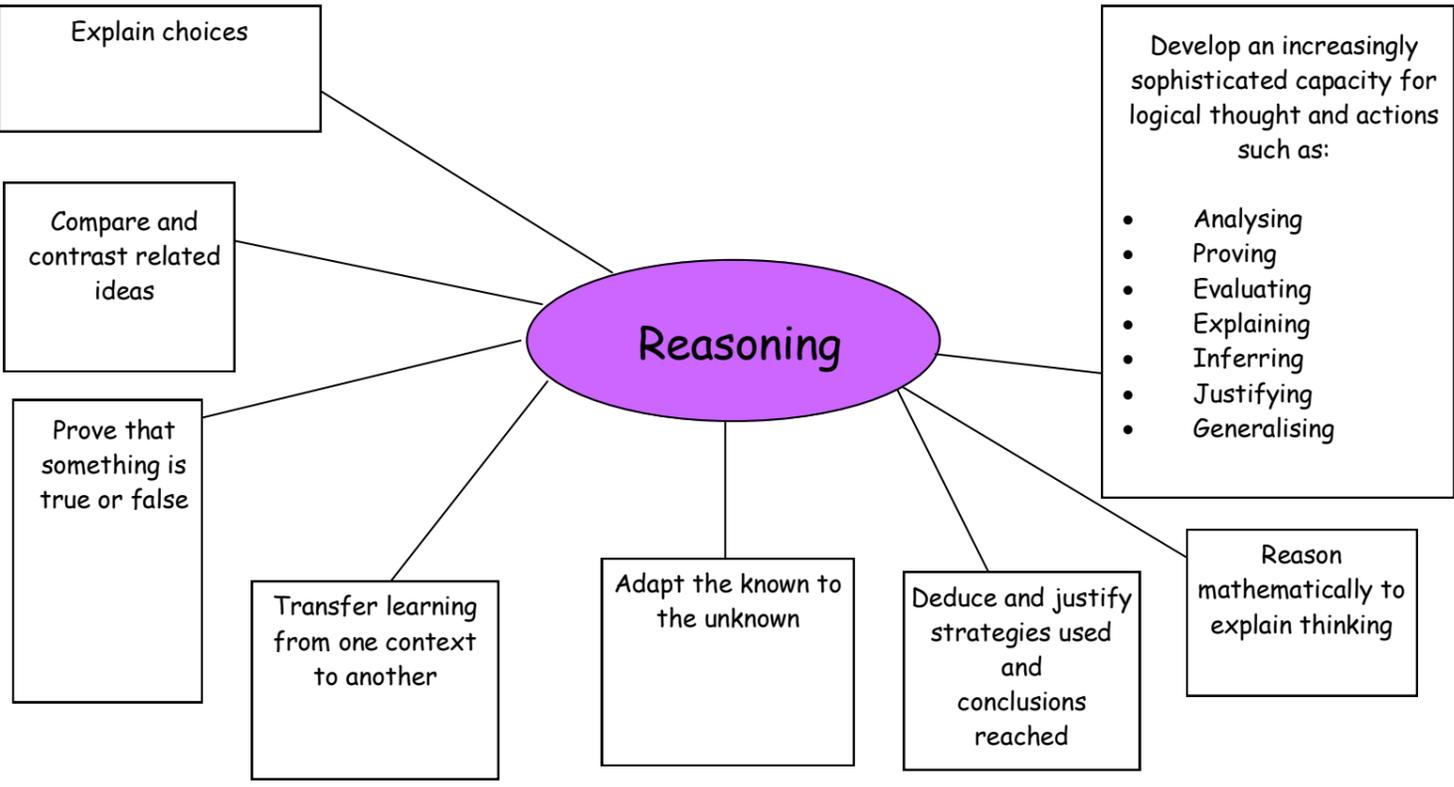


Ability to formulate, represent, and solve mathematical problems  
From Adding it up (Kilpatrick, Swafford and Findell 2001)

Four proficiency strands unpacked as elements

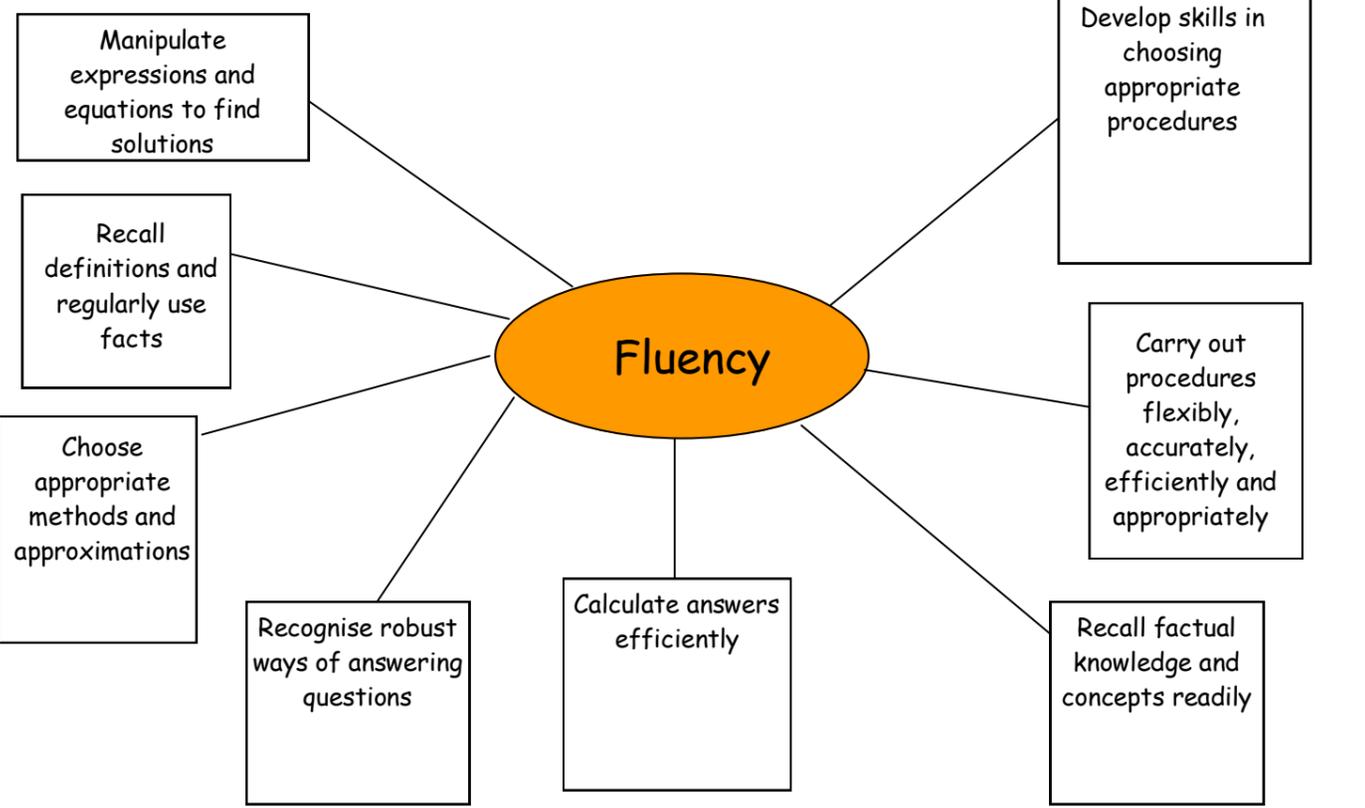
Capacity for logical thought, reflection, explanation and justification  
From Adding it up (Kilpatrick, Swafford and Findell 2001)

# Reasoning



Skill in carrying out procedures flexibly, accurately, efficiently and appropriately  
From Adding it up (Kilpatrick, Swafford and Findell 2001)

# Fluency



## Understanding

- ♦ Describe
- ♦ Identify
- ♦ Represent
- ♦ Connect
- ♦ Interpret
- ♦ Develop
- ♦ Apply
- ♦ Make connections
- ♦ Build

Comprehension of mathematical concepts, operations and relations

From Adding it up (Kilpatrick, Swafford and Findell 2001)

## Problem solving

- ♦ Apply
- ♦ Design
- ♦ Plan
- ♦ Formulate
- ♦ Solve
- ♦ Represent
- ♦ Communicate
- ♦ Model
- ♦ Investigate
- ♦ Interpret
- ♦ Make choices
- ♦ Verify

Ability to formulate, represent, and solve mathematical problems

From Adding it up (Kilpatrick, Swafford and Findell 2001)

# Proficiency Verbs

Capacity for logical thought, reflection, explanation and justification

From Adding it up (Kilpatrick, Swafford and Findell 2001)

## Reasoning

- ♦ Compare and contrast
- ♦ Prove
- ♦ Transfer learning
- ♦ Adapt
- ♦ Deduce and justify
- ♦ Reason
- ♦ Analyse
- ♦ Prove
- ♦ Evaluate
- ♦ Explain
- ♦ Infer
- ♦ Justify
- ♦ Generalise

Skill in carrying out procedures flexibly, accurately, efficiently and appropriately

From Adding it up (Kilpatrick, Swafford and Findell 2001)

## Fluency

- ♦ Manipulate
- ♦ Find solutions
- ♦ Recall
- ♦ Use
- ♦ Choose
- ♦ Recognise robust ways
- ♦ Calculate
- ♦ Recall
- ♦ Carry out
- ♦ Develop skills