Teaching Activity

Newman's error analysis

Number and Algebra - Whole number operations, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Number and Algebra - Fractions and decimals, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Number and Algebra - Money and financial mathematics, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Number and Algebra - Patterns and algebra, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Measurement and Space - Measurement, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Measurement and Space - Space, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Statistics and Probability - Statistics, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Statistics and Probability - Probability, 155 and above, 145-154, 135-144, 125-134, 115-124, 105-114, 95-104, 85-94, 75-84, 65-74, 64 and below
Mathematics - Number and Algebra, 135 and above , 125-134, 115-124, 105-114, 104 and below
Mathematics - Measurement and Space, 135 and above , 125-134, 115-124, 105-114, 104 and below
Mathematics - Statistics and Probability, 135 and above , 125-134, 115-124, 105-114, 104 and below
As found in: Thinking Mathematically
Curriculum code: Maths processes Select state curriculum

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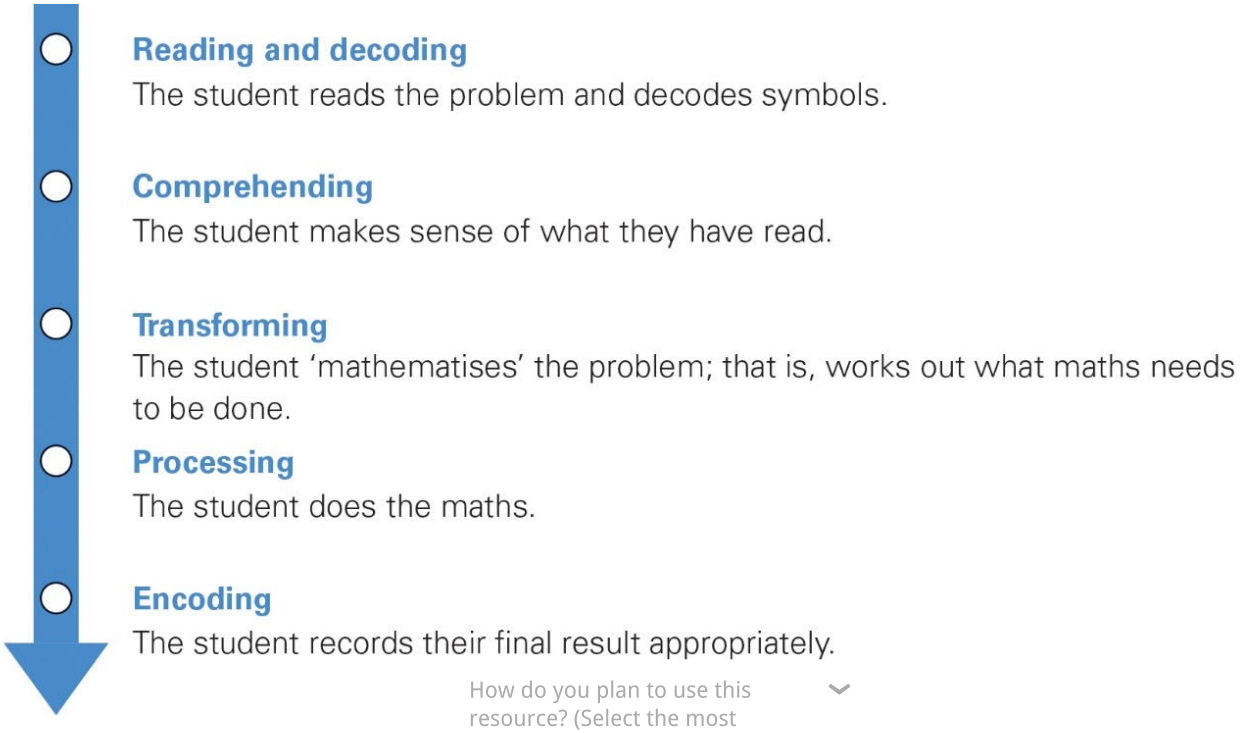
The *Thinking Mathematically* suite of materials are suitable for students operating in most of the bands and can be delivered independent of any specific content.

Newman's error analysis arose from research into language issues in maths in the 1970s. The theory posits that there are five stages that a student goes through to solve a word problem in mathematics.

Basic structure: five stages of solving word problems in mathematics



How do you plan to use this resource? (Select the most relevant.)*

Support

Conducting the error analysis interview

To conduct the error analysis, the teacher follows a series of interview cues to probe the student as they solve a word problem. Each cue relates directly to one of the five stages of the basic structure of solving word problems for mathematics. The interview can expose why a student has made an error in a word problem.

Interview cues

- Please read the question to me. If you don't know a word, leave it out.
- Tell me what the question is asking you to do.
- Tell me how you are going to find the answer.
- Show me what to do to get the answer. 'Talk aloud' as you do it, so that I can understand how you are thinking.
- Now, write down your answer to the question. (Newman, 1983)

Diagnosing error types

Error type	Likely indicators	Suggested strategies for students	Related teaching activities
Reading/decoding	• Responses that show little or no engagement with the task • Responses that are consistent with an obvious misreading • Responses consistent with unfamiliarity with technical terms	• Refer to, or create, a glossary of new words and their meaning in mathematics	• Communication
Comprehending	• Responses showing only a superficial engagement with the task • Responses consistent with a different (but related) question from the one being asked	• Ask yourself 'what do I have to find out or show?' • Draw a diagram • Restate the problem in your own words	• Communication • Identifying which operation • Reading and interpreting word problems • Reasoning and argument
Transforming	• Responses consistent with a different (but related) question from the one being asked • Responses consistent with the right numbers being used but with the wrong operations (or in the wrong order)	• Guess and check • Make a list or table • Look for a pattern • Make the numbers simpler • Experiment or act it out • Be patient: most problems are not solved quickly nor on the first attempt	• Identifying which operation • Reading and interpreting word problems • Reasoning and argument • Mathematising
Processing	• Arithmetic errors • Procedural errors • Incomplete solutions	• If one approach isn't working try a different one	• Using symbols, operations and formal language
Encoding	• Incomplete solutions • Responses that require some mathematical skill but whi the que	• Does the answer make sense? • Have I answered the	• Communication • Mathematising

How do you plan to use this resource? (Select the most relevant.)*

Related activities at the level

- Identifying which operation to use in a word problem
- Mathematising
- Reading and interpreting word problems
- Devising strategies
- Representation
- Communication
- Reasoning and argument

Further reading

- Newman, A. (1983). *The Newman language of mathematics kit: Strategies for diagnosis and remediation.* Sydney: Harcourt Brace Jovanovich Group.
- Allan L. White, University of Western Sydney. (2005). Active Mathematics In Classrooms: Finding Out Why Children Make Mistakes – And then Doing Something To Help Them. Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.472.9065&rep=rep1&type=pdf

How do you plan to use this resource? (Select the most relevant.)*