Extract from
Math Exam Strategies Overview

A.U.S.S.I.E.® **Mathematics Workshop**

"It's not too late
– Quality lessons to help with exam review"

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Teacher Advice on Approaches to Reviewing for the Mathematics Examination

1) Review statistics for your class

For example, Continental Press Mathematics Performance Indicator.
- What are these saying?
- What are the common features?
- What do you need to target for individual students?
- Use this data to inform your instruction.

2) The role of the teacher

A minimal approach
- The role of the teacher is to provide more than just an explanation of the test question.
- Slightly better than this minimal approach would be to provide additional questions of a similar or greater complexity.
- Don't rely on a talk and chalk explanation of just the one test question. Provide other questions for the students to practice.

Enhanced approaches
Ask yourself how could you get the students to analyse the questions? What questions could you pose to prompt students to explain their thinking?

Here are some ideas
a) Get the students to explain (in writing) how each response could have been worked out, including the mistakes you make that provide the wrong answers.
b) Provide sample answers and get students to explain the processes.
c) Get students to write their own questions.

Provide feedback
Getting the students just to do the question is not sufficient. You should collect, correct and advise each student individually on improved approaches.

Teacher Modelling
It is important for the teacher to model the strategies. Talking about the strategies is not sufficient. Teachers should model reading and interpreting the question with use of the Overhead Projector.

Timing and Pacing
Ensure that some of the revision is done within restricted time constraints. Start with 10 questions, then 20 questions and build up.

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A Literacy Exam with Mathematics as the second language.

Consider, possibly for many students the Mathematics Examination is really like taking a Literacy exam but in another language, the language of Mathematics. Any examination involves the process of Reading and Writing. With this in mind we can use the elements of Balanced Literacy to support students. The following table summarises possible approaches and supports the workshop model of whole class, small groups, whole class sharing.

Focus audience	Balanced Literacy Instructional Mode	Balanced Mathematics Instructional Mode	Teacher role	Student role	Who is the driver	Use for Mathematics Examination Review
Whole class	Shared Reading	Shared Mathematics	Teacher leads, prompts the students, questioning and supporting them as they reinforce, modify and extend their skills	Students listen and follow along, ask questions, suggest strategies and solutions.	Teacher is the driver and the students are practicing.	Use OHT and read the questions with students.
Small groups	Shared Writing	Independent (Shared) Mathematics	Teacher supporting student with Roving Conferences. Select students to share their work with the whole class	Students work independently in a group without ongoing teacher support	Students are driving together.	Students work on questions and must write to explain their processes and understanding.
Small groups	Guided Reading/Writing	Guided Mathematics	Teacher providing guidance and instruction, prompting explanation of thinking and help student at specific point of need.	Independent work for students of like needs.	Students in the driver seat (together)	Students work on specific questions nominated by the teacher, providing the opportunity for additional instructions.
Individual student	Independent Writing	Independent Mathematics	Teacher supporting student with Roving Conferences. Select students to share their work with the whole class.	Student work by themselves	Students are driving by themselves.	Students work on questions and must write to explain their processes and understanding.
Whole class		Whole class share time	To facilitate and encourage students sharing their mathematics and strategies used. Target student to share, based on Roving Conference, with and without notice to individual students from the groups.	Explain to the class their strategy and why they chose particular strategy		Get students to write similar questions and share with class.

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Messages for the students

Reading the question
- Underline the key information and key words
- If you have problems understanding the question cross out what you believe are unnecessary words, and see if you can now understand the question.
- Look out for the words
    - AND (this means you have to do 2 or more things)
    - NOT
    - TRUE
    - FALSE
    - EXACTLY
    - TOTAL
    - ESTIMATE
- Be careful with questions that use data for 2 or more questions.

Completing the Multiple Choice Question
- If you work from question 1 and go question by question will you finish in time?
- Do not spend too much time on a question. Watch the clock!
- Look for questions you can do (Be careful, to "bubble in" the correct question)
- If you run out of time, make sure you answer all questions.
- Mark sure you clearly "bubble in" your answer and there are not other marks.

Completing the Short and Extended Response
- Show your working.
- Remember to explain what you did.
- Complete all parts.

Test strategies

Major strategies	Other strategies
- Test and check - Work out each option and match with question - Draw a diagram - Estimation	- Eliminate distracters - Working Backwards - Matching units of measurement

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Test strategies

"Test and check"

This works well for Algebra questions. With the "test and check" strategy you test each answer in the question to determine which is correct. For students without the skills to solve equations this is an important technique.

Caution: Correct calculations are important. If you find option B is correct do you spend time testing option C and option D

Examples

Question 42, Level D, Form 1	
What numbers could go in the box to make this number sentence true? $30 - \boxed{} > 20$	
F	Any number less than 10
G	Any number less than or equal to 10
H	Any number greater than 10
J	Any number greater than or equal to 10

Question 20, Level E, Form 1	
What is the solution to the equation below? $5x + 8 = 23$	
F	X = 3
G	X = 4
H	$X = \dfrac{23}{5}$
J	$X = \dfrac{31}{5}$

Other Questions in Continental Press Mathematics Progress Indicator Papers
Question 47, Level D, Form 2
Question 49, Level D, Form 2
Question 12, Level E, Form 2
Question 42, Level F, Form 1
Question 45, Level F, Form 1
Question 8, Level F, Form 2

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Test strategies

"Work out each option and match with question"

Example

Question 32, Level D, Form 1	
Which expression equals 15?	
A	$12 \div 6 - 2 \times 5$
B	$(12 \div 6 - 2) \times 5$
C	$12 \div (6 - 2 \times 5)$
D	$12 \div (6 - 2) \times 5$

Work out your answer here!

Other Questions in Continental Press Mathematics Progress Indicator Papers

Question 17, Level F, Form 1
Question 25, Level F, Form 1
Question 26, Level F, Form 1
Question 48, Level F, Form 1 (test a point in each option)

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Test strategies

"Draw a diagram"

This strategy can be used for many types of questions, especially measurement. It is also very effective for questions involving changes up and down.

Example 1

Question 4, Level D, Form 1	
Jessica kept track of rainfall for a science experiment. On Monday the rain gauge contained 2¾ inches of water. Jessica forgot to empty it. On Friday, it held 4⅜ inches of water. How much rain fell between the time Jessica checked the gauge on Monday and Friday	
F	1⅜
G	1⅝
H	2⅜
J	2⅝
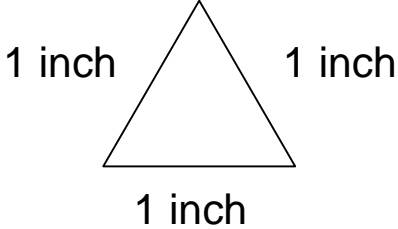
Draw lines with a ruler and measure the difference

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Test strategies

"Draw a diagram"

The "Draw a diagram" strategy can be used for many types of questions, especially measurement. It is also very effective for questions involving changes up and down.

Example 2

Question 50, Level E, Form 2

Patti cut out paper triangles like the one shown below.

1 inch   1 inch

1 inch

She put 24 of the triangles together to make a regular hexagon. What was the perimeter of the hexagon?

A	12 inches
B	18 inches
C	24 inches
D	72 inches

Many students I have seen try this question do not draw a diagram. Many get it wrong.

Draw your diagram here!

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Test strategies

"Draw a diagram"

The "Draw a diagram" strategy can be used for many types of questions, especially measurement. It is also very effective for questions involving changes up and down.

Example 3

Question 1, Level F, Form 1	
The temperature on a January day was 10°F. A strong wind made the air feel 28° colder than it actually was. What temperature did the air feel like?	
A	38° F
B	18° F
C	−18° F
D	−38° F

Draw your vertical or horizontal line diagram in the space below.

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Test strategies

"Estimation"

This is a very important strategy that allows students to spend a minimum amount of time doing a question without a long algorithmic process.

Estimation can be used in several types of questions
- Number computation by rounding
    - (be careful when dividing by decimals less than 1)
- Angle estimation (clock angles)
- Percentages (10% and 1% benchmarks)

Question 6, Form 1, Level D	
Which of these is the best estimate of $\frac{1}{3}$ X 161?	
F	30
G	50
H	70
J	90

The Fundamental Concepts
Estimation involves rounding: 161 can be rounded to _____
The word "of" can be used as a word to replace the multiplication operation

$\frac{1}{3}$ is the same as dividing by ____

(Similarly, $\frac{1}{2}$ is the same as dividing by ___, $\frac{1}{4}$ is the same as dividing by ____)

Re-writing the question
$\frac{1}{3}$ X 161 = $\frac{1}{3}$ of ____, that is ____ ÷ _____

Answer is ____, which will be an under-estimate as 150 is smaller than 161

Under or Over Estimation
When choosing the correct multiple choice response, consider if your estimate is an under or over estimation.

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Test strategies

"Estimation" – Sample Percentage Question

Which of these is the best estimate 12% of 50.34??	
A	4
B	6
C	8
D	10

The Fundamental Concepts
Percent % means out of every 100
To find 10%, divide the amount by 10
To find 1%, divide the amount by 100, or 10% by 10

Traditional and Alternative Approaches
There are many approaches to solving this question, including proportion and decimal multiplication. (See Percentage Study Sheet and Study Help).
Using **benchmarks** and **estimation** results in a quicker process for solving this problem.

Using Estimation
Think of the question as 10% of 50 = _____
This is an underestimate therefore the answer would be _____

A more exact calculation
10% of 50 is _____
1%   of 50 is _____
1%   of 50 is _____
    so by adding
12% would be about _____

Other Questions in Continental Press Mathematics Progress Indicator Papers
Question 6, Level D, Form 2 (division by a whole number)
Question 8, Level E, Form 1 (percentage estimation)
Question 25, Level E, Form 1 (percentage estimation)
Question 11, Level E, Form 2 (percentage estimation)
Question 12, Level F, Form 1 (angle estimate to eliminate distracters)
Question 27, Level F, Form 1 (angle estimate for 110°)
Question 33, Level F, Form 1 (decimal multiplication)
Question 22, Level F, Form 2 (division by a decimal)

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Estimation – Student Activities

1.   Which is the best estimation of $36.27 \div 0.61$?

A   6   **B**   36   **C**   37   **D**   60

2.   A clothing store sold $420 000 worth of T-shirts in one year. They sold 5328 T-shirts in the year. Which is the best estimate of the average price of these T-shirts?

A $8   **B** $10   **C** $12   **D** $15

3.   A special spice sells for $16.95 per ounce. Which of these is the best estimate of the total cost of 2.95 ounces of this spice?
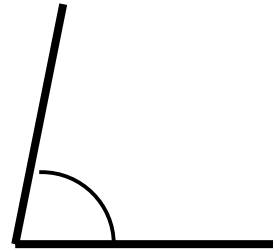
A $40   **B** $45   C $50   **D** $55

4.   Which is the best estimate of 2.5% of 163.8?

A   4   **B**   8   C   18   **D**   40

5.   What is the best estimate of the angle?

A   65⁰   **B**   85⁰   C   95⁰   **D**   105⁰

For each question complete the following

Reflection 1: Explain clearly why you chose the answer you did. What was wrong with the other choices?

     Remember: You may be asked to justify your reasons aloud.

Reflection 2: Write about the class discussion. What is the correct answer? What mathematical thinking is needed to find the correct answer? Are you confident that you understand the problem?

Reflection 3: Create similar questions. Work out the answers and explain what you did next to your working.

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