

M.A.B. Student Resource Book**Concepts & Activities****Contents**

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OPERATIONS

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Regrouping / Renaming / Exchanging When Adding

Division

Multiplication

Problem Solving

Averages

Subtraction

Regrouping / Renaming / Exchanging When Subtracting

RATIONAL NUMBERS

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Decimals

Percentages

Ratio

MEASUREMENT

Area

Capacity

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Frequency Polygons

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Probability

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LANGUAGE

SPEAKING AND LISTENING

INTRODUCTION

I have tried to cover as many concepts as I could but the exercises and activities are not exhaustive, they are only starting points. In reality there would be hundreds of thousands of individual activities and exercises that teachers and home schoolers could devise for their students. The exercises that are suggested may have to be varied to suit the ability of students. The Numerical Summary on Page 21 will help in devising suitable exercises and activities.

MATHS

EARLY NUMBER

Auditory Discrimination

- When students are listening to instructions then carrying out the directions they are using auditory discrimination. They are determining the meaning of words by comparing them with similar sounding words they already know. Sometimes they don't listen carefully enough and errors are made.
- Use similar sounding words in giving instructions and observe the students' response e.g. top, stop; five, nine; best, left; more, draw; even, seven, eleven; take, eight, etc.
- *"A tap on the desk means a ten, a tap on this glass means a one. Close your eyes while I tap then choose the correct frame on page 5. Bock ...bock ... ting ... ting ... ting."* (5C)

Auditory Memory

- *"After I count to three find the frame on page 4 that has four tens and seven ones. One ... two ... three."* (4D) Do not repeat the instruction. Those students who forget can try the next time.
- *"After I count to three I want you to turn to page 3 and point to the tallest shape. One ... two ... three."* (3G)
- Vary the number of steps in each command to meet the level of students. Begin with ones that they are likely to get right e.g. *"After I count to three point to a ten. One ... two ... three."*

Conservation of Number

- *"Get the same number of MAB ones as in frame 2A. Count them to make sure you have the same number. Now see how many different ways you can arrange the ones. Count them each time to make sure you have the same number."*

Counting by Ones

- *"Count aloud the little blocks in 1B."* (One, two, three, four, five, six, seven, eight, nine.)
- *"Count in your head the little blocks in 2D and put your hand up when you know how many."* (8)

Fine Motor Skills

- Students develop fine motor skill when colouring. They can colour the blocks many different ways. This is a good opportunity to differentiate between the ones and tens by colouring them different colours.
- Students can also copy the different frames by using real MAB. Fine motor skills is required to copy even the simplest frames.

Hand / eye Coordination

- This skill is developed in colouring and manipulating small items. See exercises under Fine Motor Skills.

One to One Correspondence

- When students reproduce with real MAB the figure in a frame they will automatically practice one to one correspondence. Another word for one to one correspondence is 'matching'.

Ordering

- Pages from the book can be photocopied and cut into frames. Students can order them according to the number represented.
- *"Which frame on page 4 has the largest number?"* (4H)
- *"Which frame on page 3 has the smallest number?"* (3D)
- *"Order the frames on page 3 from smallest to largest."* (3D, 3A, 3E, 3G, 3B, 3H, 3C, 3F)

Pattern & Repetition

- The MAB in some frames are arranged in patterns. In 6B the pattern is vertical and students could be asked to continue the pattern. Another example is 15E.
- Students can match a frame with real MAB and then arrange them in some form of pattern using more real MAB.
- Many frames could be taken as the first part of a pattern e.g. 5B, 6F, 8G, 8H, 9F, 10A and 10D. Students can copy this frame and continue the pattern with real MAB.

Sorting & Classifying

- To facilitate sorting and classifying, pages from the book can be photocopied and cut into frames. Students are then able to sort and classify them according to specific attributes.
- Some examples of specific attributes of frames are: numbers less than ten; numbers greater than 500; numbers needing zeros as place holders; blocks in place value order or random, shapes that are symmetrical in some way; blocks that are neat or untidy; frames where all blocks are no higher than a one block.

Visual Copying

- Using real MAB students copy as accurately as they can a particular frame.

Visual Discrimination

- When ordering, sorting, classifying or comparing frames students are discriminating between different attributes of frames.
- Students look for the similarities and differences when comparing frames. Always keep it simple to start with.
- *“What is the same about 1G and 2D?”* (They have the same number of ones)
- *“What is different about 1C and 1G?”* (1C shows the ones in a row. 1C has less ones. 1G has more ones.)

Visual Memory

- Students are allowed to examine a particular frame for a limited time (5 seconds, 10 seconds). When the time has expired students are to turn the page over and reproduce the frame using real MAB.
- Again, after the time has expired students are asked questions about the frame: *“Did the frame have any tens? Were the blocks in place value order? How many ones were there? What number was represented? How many more ones would I need to make up another ten?”*

Vocabulary

- While giving instructions to students teachers and home schoolers can incorporate appropriate vocabulary necessary for students to master: smaller than, larger than, on top of, below, beside, on the right, on the left, straight, pattern, longer than, shorter than, taller than, equal to, order, half, most, more, add, take away, lots of etc.

NUMBER**Analysing Numbers**

- Analysing numbers is looking at the composition of the number and how, by using operations, a person could arrive at the number.
- This analysis of 11B (278) is not exhaustive. Each of the following expressions is equal to 278: $200 + 78$; $270 + 8$; $200 + 70 + 8$; $(2 \times 235) + 8$; $500 - 300 + 78$; $(9 \times 30) + (2 \times 4)$; $(2 \times 100) + (7 \times 10) + (8 \times 1)$; $(11 \times 25) + 8$; $(5 \times 55) + 3$; $300 - (20 + 2)$ etc.

Contracting Numbers

- Teachers give students the expanded form of the number represented by a frame. Students contract the number and find the frame on a given page or pages.
- *“Which frame on page 14 is equal to: $50 + 9 + 200$?”* (14H)
- *“Which frame on pages 11 to 13 is equal to: $(7 \times 10^2) + (5 \times 10^1) + (1 \times 10^0)$?”* (13D)

Comparing Numbers

- *“Using page 15 write the numbers of the frames in order from smallest to largest.”* (15H, 15B, 15C, 15E, 15F, 15A, 15G, 15D)
- *“What is the same about the numbers in frames 5A and 2E?”* (Both are square numbers, both are even numbers, both are divisible by two and four)
- *“Which is the largest number represented on page 17?”* (4 085)
- *“Write the numbers on pages 9 to 11 inclusive, that are divisible by five.”* (70, 600, 800, 85, 500, 740)

Converting Concrete into Abstract

- i.e. representing the number using digits (1, 2, 3 etc.) when the number is shown using practical aids such as counters, MAB or an abacus.
- When students determine the number represented by a frame they are converting concrete into abstract. Each time they do this they write the digital (or abstract) number for the frame in the small oblong in the top right hand corner of the frame. This will make some subsequent exercises easier.
- The MAB Number Cruncher is ideal for tallying the MAB in frames. This Number Cruncher gives an automatic and dynamic link between concrete and abstract

Counting Forwards and Backwards

- The number represented by a frame can be used as a starting point for counting forwards and backwards. Counting can be by: 1, 10, 100, 5, 25, 50, 200, 3, 1000, 1500, 250, 500 etc.
- Counting forward by 1 from frame 1B (9): *“Nine ... ten ... eleven ... twelve ...”*
- Counting forward by 25 from frame 11D (500): *“Five hundred ... five hundred and twenty five ... five hundred and fifty ...”*
- Counting backward by 20 from 11C (112): *“One hundred and twelve ... ninety-two ... seventy-two ... fifty-two ...”*

Estimation

- Without counting students are asked to estimate the number in a frame, or totals of several frames.
- After estimating totals students should then determine the exact sum and compare it with their estimate.
- Various strategies for estimating should be explained and practiced.
- *“Estimate how many more I would need to add to frame 10D to make 500.”* (about 140)
- *“Estimate as quickly as you can the sum of all the frames on page 7.”* (about 500)

Expanding Numbers

- *“Expand the number represented by 9C.”* ($500 + 70 + 6$)
- *“Write in expanded form the number represented by 15D.”*
($2000 + 500 + 3$)
- *“Expand using index notation the number represented by 17B.”*
($2 \times 10^3 + 1 \times 10^2 + 5 \times 10^1 + 7 \times 10^0$)

Largest and Smallest Numbers from Digits

- Students need to be able to make the largest or smallest number from two, three, four or more digits e.g. the largest number that can be made from the digits 3, 5 and 1 is 531.
- *“The smallest number that can be made from the digits 8 and 3 is found on page 6. Which frame would you choose?”* (6D)
- *“Find the frame that represents the largest number you can make from the digits 5, 2 and 9.”* (14H)

Ordering Numbers

- Pages can be photocopies and frames cut out so students can order them from smallest to largest or from largest to smallest. Frames on pages are arranged so that ordering is easier or harder e.g. compare pages 9 and 12.
- *“Write the numbers of the frames on page 11 in order from smallest to largest.”* (11C, 11B, 11G, 11F, 11E, 11D, 11A, 11H)
- *“Write the numbers represented by the frames on page 17 in order from largest to smallest.”* (4085, 3902, 2157, 1596, 1154, 1008)

Place Value

- The MAB in some frames are arranged in place value order. Some are obviously arranged in place value order some are not so obvious e.g. consider 4G, 11H, 12F, 13D, 13F.
- *“Which frames on page 14 are arranged in place value order?”* (14A, 14D and 14G)

Reading Numbers

- Reading numbers directly from MAB is a good place value exercise. Some frames are more difficult than others.
- *“Read the number represented by 13F.”* (“Three hundred and thirty-three”)
- *“Read the number represented by 13C.”* (“One hundred and seventy-seven”)

Rounding Numbers

- *“Round 3F (19) to the nearest ten.”* (20)
- *“Round 9E (711) to the nearest hundred.”* (700)
- *“Round 17B (2157) to the nearest hundred.”* (2200)
- *“Round 16B (275) to the nearest ten.”* (270)

Unnecessary Zeros

- Students need to be aware of the necessity to eliminate unnecessary zeros e.g. if I divide 18B (4000) by 100 the answer is 40 not 40.0 or 40.00.
- The elimination of unnecessary zeros at the right end of numbers is also necessary e.g. the difference after subtracting 450 from 11E (470) is 20 not 020.
- *“Divide 9H (600) by one hundred and write your answer.”* (6)

Writing Numbers

- Students need practice in writing numbers in digits and words.
- *“Write using digits the number represented by 10F (507).”* (507)
- *“Write in words the number represented by 13H (648).”* (Six hundred and forty-eight)

Zero as a Place Holder

- *“Which frames on page 6 need zeros as place holders when writing the number in digits?”* (6A and 6E)
- *“Which frame in pages 16 to 20 needs the most zeros as place holders when writing the number in digits?”* (18B)

OPERATIONS**Addition**

- **Regrouping / Renaming / Exchanging When Adding**

Division**Multiplication****Problem Solving**

- **Averages**

Subtraction

- **Regrouping / Renaming / Exchanging When Subtracting**

RATIONAL NUMBERS**Fractions****Decimals****Percentages****Ratio****MEASUREMENT****Area****Capacity****Length****Mass****Money****Perimeter****Temperature****Time**

Volume

SHAPES / GEOMETRY

Angles

Plane Shapes

Solid Shapes

Symmetry – mirror & rotational

STATISTICS / GRAPHS / DATA

Frequency Polygons

Line Graphs

Picture Graphs

Probability / Chance

Tallying

LANGUAGE

SPEAKING AND LISTENING