

STATEMENT OF THE PROBLEM

As part of the integrated curriculum, grade 5/6 students made mud bricks and used these to build a seat for the playground. Exploring the mathematics involved in building mud brick seats was based on work resulting from Maths Talent Quest Projects.

MUD BRICKS – THE STORY

The Planning Stage

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It was decided to have three areas of investigation.

- 'Single' Mud Brick Investigation
- 'Seat Design' Investigation
- 'Seat Dimension' Investigation

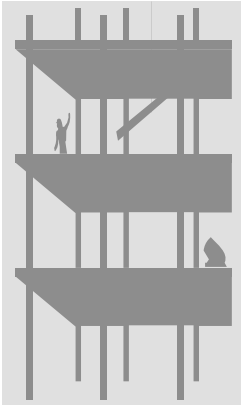
Within each area there were tasks of varying complexity, some of which could be completed as a whole class others in small groups or individually. Students were able to decide how they wanted to proceed. If students wanted to pursue ideas in more depth they were able to do so.

The investigations were outlined as follows:

'SINGLE' MUD BRICK INVESTIGATION

- Make a 3D model of one mud brick.
- Draw a 2D mud brick accurately to scale.
- Work out the volume of one mud brick
- Compare the mud brick dimensions to the dimensions of other bricks in the school. Eg. red and grey bricks.

Authentic Task – Mud Bricks



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Type of brick	Estimate	Real Measurement
Mud Brick	L- W- H-	L- W- H-
Red Brick	L- W- H-	L- W- H-
Grey Brick	L- W- H-	L- W- H-

- How accurate was your estimate?
- Can you describe comparisons between the bricks? Can you describe this in another way?

SEAT DESIGN INVESTIGATION

Seat design information:

5 bricks long

4 courses (or layers of bricks up)

1.5 bricks wide

- Make a model of the seat.
- With the current design and using interlocking bricks, how many different brick layouts are possible?
- How many bricks in total will be needed for the seat?
- Using graph paper, with a consideration to scale, draw a bird's eye view, front view, back view and side view of the seat.
- Make another model, twice the size of the current design. What do we double? Height? Length? Width? All of them? Explain.
- If you increased the length of the seat by 'x' bricks how much would you increase the sides by to keep it to scale?

SEAT DIMENSION INVESTIGATION

- Draw a net of the seat on the ground to real size.
- Calculate the surface area of the net/seat.
- What is the height of the seat?
- Is it possible to calculate the perimeter of the seat? Why?
- How many students can fit on the seat at one time? What might be some factors in this?
- If you kept the same height and thickness of the seat, how would you change the design to seat twice as many people?
- How many seats using the original design, would you need to make to seat the whole school?
- What different seat designs are available? How many people can sit on each?
- What is the ideal seat height for the average year 5/6 student? 3/4 student? P/1/2 student?
- Show an arrangement of mud bricks that will give an area of _____cm squared.

After the Task

A rubric (see rubric) was devised to guide assessment of student's investigations.



MUDDY MATHS ASSESSMENT RUBRIC

Area of knowledge/skill	High	Medium	Low
Concepts and ability to work with measurement	<ul style="list-style-type: none"> • Converts units confidently • Consistently measures accurately • Demonstrates understanding of the relationships between different dimensions • Calculates confidently in a range of dimensions (eg. perimeter, area, volume) 	<ul style="list-style-type: none"> • Can identify most appropriate unit of measurement and convert with support • Generally measures accurately • Demonstrates knowledge of length/width/height • Calculates perimeter and area 	<ul style="list-style-type: none"> • Has some idea that there are different units of measurement • With significant support can measure simple lengths, eg. Perimeter accurately
Efficiency, clarity and accuracy of mathematical strategies	<ul style="list-style-type: none"> • Consistently chooses efficient strategies for calculations • Uses a range of strategies that are appropriate to the particular purpose • Work is consistently accurate 	<ul style="list-style-type: none"> • Uses some efficient strategies • Generally chooses strategies that are most appropriate to the task • Work is generally accurate 	<ul style="list-style-type: none"> • Begins with inefficient strategies. With significant support, can use more efficient strategies. • Work is sometimes or never accurate
Demonstration of multiplicative thinking	<ul style="list-style-type: none"> • Identifies and records simple patterns • Starts to identify and calculate proportions • Makes connections between problems and solution strategies • Confidently uses decimal notation and fraction ideas 	<ul style="list-style-type: none"> • Can use a recognized relationship to solve simple problems • Show awareness of ratio, but not yet calculating with it • Beginning to use decimal notation and fractions 	<ul style="list-style-type: none"> • Using additive strategies to solve problems • Making basic visual comparisons • Demonstrating little or no understanding of decimal and fractions
Working out and communication of thinking	<ul style="list-style-type: none"> • All working out shown • Thinking clearly expressed 	<ul style="list-style-type: none"> • Most working out shown • Working out demonstrates some connection with problem and solution 	<ul style="list-style-type: none"> • Little or no relevant working shown • Answers not obviously linked to working or problem