



Spear throwing 2: measuring using non-standard units



Lesson two in a series of six lessons titled **Spear throwing**, planned to allow students to make connections with their cultural understanding of spear throwing, linking it to mathematics learning.

- Spear throwing 1: prior knowledge and cultural considerations – Aboriginal Elder visit
- **Spear throwing 2: measuring using non-standard units**
- Spear throwing 3: measuring and comparing using uniform units
- Spear throwing 4: measuring and comparing using standard units
- Spear throwing 5: graphing results
- Spear throwing 6: understanding

CURRICULUM INFORMATION

PHASE OF DEVELOPMENT

Early Childhood	Middle Childhood	Early Adolescence	Late Adolescence
✓	✓ ✓	✓	✓

MAJOR LEARNING AREAS

The Arts	English	H & PE	LOTE	Mathematics	Science	S & E	T & E
		✓		✓ ✓		✓	✓

VALUES

Pursuit of knowledge & commitment to achievement of potential	Self acceptance & respect of self	Respect & concern for others & their rights	Social & civic responsibility	Environmental responsibility
	✓	✓	✓	

TOPIC INFORMATION

PURPOSE

- To provide an opportunity for students to integrate their culture into their mathematical learning.
- To make students aware that maths concepts are a part of everyday Aboriginal activities, both past and present.
- To have students investigate ways to measure the distance a spear will travel when thrown.

STUDENT OUTCOMES FROM THIS LESSON

- Students use non-standard units to measure the distance travelled by a spear.
- Students choose appropriate items to use as units of measurement ensuring the unit relates to what is being measured.
- Students find a ‘true’ measurement by ensuring there are no gaps and overlaps.
- Students use tables to record results





KEY BACKGROUND POINTS

The concept of length is one which teachers often assume children understand, particularly when they use words such as ‘kilometres’ or ‘ks’ in appropriate ways in their conversation. Many children from Western cultures are immersed in this language even prior to formal schooling.

Aboriginal cultures are less concerned with quantity and accuracy so Aboriginal children are unlikely to bring similar understandings to a classroom situation. In these cultures, measures of distance are often referred to in general terms, such as ‘not far’ or ‘a little way’ rather than in specific distances.

In some Aboriginal cultural groups, direction is more important than distance. For example, an Aboriginal person might point in a particular direction and say ‘close up’ (meaning not far that way) or ‘long way’. The time it takes to say the word ‘long’ may indicate the distance.

Similarly, length is frequently more about individual or personal length, rather than a measurement in generic units. When making a spear for example, the length of the arm of the person using the spear may be used as a reference – an appropriate unit for this purpose.

All children should be presented with this view of measurement.

(From Thelma Perso, *Improving Aboriginal Numeracy*)

CULTURAL & PROTOCOL CONSIDERATIONS

- In our school, East Kalgoorlie Primary School, girls were not to participate in this activity as in their culture they were not allowed to throw spears. Men used spears for hunting and this is not part of the women’s role. Check with your local community to see rules for girls’ participation.
- If you live on the coast, girls may be able to participate using fishing lines instead of spears. If spears are not available, boomerangs may be substituted.

RESOURCES

Medium	Author, producer, developer etc	Title	Source
book	Department of Education and Training, WA, & Rigby Harcourt Education	<i>First Steps in Maths – Measurement and Chance and Data</i>	Educational bookshops
book	Thelma Perso	<i>Improving Aboriginal Numeracy</i>	MASTEC (Aust.) 2003, Available from the Mathematical Association of Western Australia

TEACHING AND LEARNING STRATEGIES

TEACHING RESOURCES

- digital camera to capture the experience
- spears, woomeras (available from Aboriginal community or students can bring spears from home)
- oval – or similar space, marked clearly to show the place to throw spears from, each time
- measuring box – fill a box with different ‘units’ for students to choose from: e. g. paperclips, pens, pipe cleaners, streamers, counters, unifix cubes, marbles, toothpicks, cotton wool ...
- large copy **Learning Guide 1: Record of distance travelled by spear** for recording data
- easel for learning table
- thick marker pens
- individual copies of **Learning Guide 1: Record of distance travelled by spear** for each student to record results and their reflection response





LESSON STEPS

Adapt this lesson to suit the needs/levels of your students.

Preparation

- **Collect** a variety of equipment to make a measuring box.
- **Book** AIEO support time and arrange for community helpers (as appropriate) so that you have one adult per group for the spear throwing activity.
- **Plan** lesson in conjunction with AIEO and maths specialist staff where appropriate.
- **Prepare** a chart-size class copy of the first section of **Learning Guide 1: Record of distance travelled by spear**, to use on an easel outside. Sample partially completed chart follows:

Name	Estimation of best throw	Throw one	Throw two	Throw three	Chosen unit of measure
Bob	60 footsteps	74 footsteps	80 footsteps	70 footsteps	Footsteps
Dick					Body lengths
Harry					A stick
Peter	100 strides	18 strides	22 strides	40 strides	Strides

Implementation

In classroom, prior to moving to the oval:

Whole class

- **Discuss** measurement – **focus questions:** What do we want to measure? What shall we use?
- **Practise** selecting appropriate units from the measuring box to measure different things in the classroom – **focus questions:** What shall we use? How will we do it? Of all the things you tried to measure with, which was best? Why? Could you measure how high or how far you could throw something?
- **Discuss** the need for no overlapping or gaps between units when measuring, and how overlapping and gaps change measurement results.
- **Group** students (4 to 6 per group) according to understanding demonstrated in discussions and in Lesson 1, for example, group together students who left gaps, or overlapped ...
- **Revise** safety rules from Lesson 1.

Move students out onto the oval.

Working in groups

- **Select** a unit (each student) to measure their throws.
- **Estimate** (each student), using chosen unit as a measure, how far their best throw will travel.
- **Revise** spear throwing techniques, and **discuss** how to improve the distance they can throw.
- **Reach** a consensus through voting on: Do we use a woomera to help us throw? (yes/no)

Then, students take turns to work through the following steps.

- **Throw** spear and **measure** throw using chosen unit.
- **Report** and record first throw on class tally/table.
- **Repeat** process for subsequent throws (number of throws each will depend on number in groups).

Return to classroom with class data.





Whole class

- **Distribute** student copies of **Learning Guide 1: Record of distance travelled by spear.**
- **Transfer** data onto individual record sheets.
- **Complete** maths journal reflection about comparing results to determine who threw the furthest.
- **Write** about any problems encountered.

ASSESSMENT

Students complete **Learning Guide 1: Record of distance travelled by spear.**

Were students able to explain in their maths journal reflection why comparison of results was not valid?

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Donna Bridge – Principal, East Kalgoorlie Primary School (writer)

Sue Webber – *Getting it Right* Numeracy Specialist Teacher, East Kalgoorlie Primary School (writer)

Alwyn Evans (editor)

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LEARNING GUIDE 1: Record of distance travelled by spear

Student's name: _____ Date _____

Instructions:

- Enter your name and results on the table below.
- **Choose** four of your group members and enter their names and results on the table.

Be sure you include the unit of measurement that each person used.

Name	Estimation of best throw	Throw one	Throw two	Throw three	Chosen unit of measure

My Maths Reflection

Now, reflect on the spear throwing activity and write responses to the questions below:

- Can you compare results of the spear throwing to see who threw the spear furthest? Why/why not?

- Which of the things you tried to measure with made it easiest to decide who could throw furthest?

- Did you experience any problems in the activity? Explain what they were.

