



Spear throwing 6: assessing understanding



Final lesson 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: prior knowledge and cultural considerations – Aboriginal Elder visit
- Spear throwing: measuring using non-standard units
- Spear throwing: measuring and comparing using uniform units
- Spear throwing: measuring and comparing using standard units
- Spear throwing: graphing results
- **Spear throwing: assessing 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 uniform units and measure accurately to compare lengths.





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*)

While some students may immediately select an appropriate unit for measuring different distances, and line up these units end to end, along the distance to be measured, many will choose different sized objects (unit) to measure different distances. This lesson draws on First Steps in Maths: Measurement – understand units/direct measure, to help clarify the concept of using a uniform unit of measurement for comparison of distances.

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

- KWL chart completed throughout lesson series – What I know, What I want to learn, and What I have learnt.
- one copy of **Learning Guide 1: Diagnostic task – Spear Throwing** (you may wish to make a larger copy on A3 paper)
- **recording sheet** – a copy for each student
- materials for measuring, e.g. matches, blocks, counters, unifix cubes, toothpicks, paperclips, marbles ...

LESSON STEPS

As this task must be completed individually by each student being assessed it will only be required when the teacher is unsure about a student's level of understanding of why the same unit of measurement must be used when comparing two distances. Adapt this lesson to suit the needs/levels of your students. It may also be used, where required, as a diagnostic or assessment instrument.

Please note that prior to presenting to a student a sheet containing a representation of the distance spears have been thrown, such as Learning Guide 1: Diagnostic task – Spear throwing, it is important that the student has had the opportunity to engage in the hands-on activity. Without this prior experience the representation may be meaningless.

Whole class

- **Engage** students in a discussion about what they have learned about spear throwing, in order to create a context for the activity, and to assess students understanding of why the same unit of measurement must be used when comparing two distances.
- **Enter** points raised on KWL chart (as in Lesson 1 in this series). For example, entries may look like these:

What I already know about spears	What I want to learn about spears	What I learnt about spears
Aboriginal people used them for hunting. Girls can't throw them. Spears were made from special trees called _____. * A woomera makes a spear go further.	Do Aboriginal people still hunt with spears? How do you make a spear? * Who will throw the greatest distance? Who teaches you how to make spears? What is a spear called in Aboriginal language?	A spear is called _____. It is made from _____ trees. Men teach boys how to make spears. * Spears are made for each boy based on his arm length. <i>(Entries may be added to this part at the end of each lesson.)</i>
* These points relate to mathematical understandings.		

- **Integrate** cultural knowledge provided by the Elder and ask students to discuss what maths learning has now been added to this. You may revisit focus questions like: What makes someone a good spear thrower? How can you make a spear go further? Why do men use a woomera? How does it help? How will you know if your spear has gone further than someone else's? How can we measure the distances thrown? What is more important, distance or accuracy? If we were out in the bush, how might we measure the throw? Does aiming high change the distance thrown?
- **Discuss** focus questions using a co-operative learning strategy like: think, pair, share.





ASSESSMENT

Observe and record on checklist how students participated in class discussion and their understanding of maths concepts involved.

To assess understanding of students about whom you are unsure, use **Learning Guide 1: Diagnostic task – Spear Throwing** (for years 1 – 4). This is an adaptation of *The First Steps in Mathematics* task called *Snail Trails*.

Conduct individual interviews as follows:

- **Show** student **Learning Guide 1: Diagnostic task – Spear Throwing**, and the materials they may use for measuring, e. g. matches, blocks, counters, unifix cubes, toothpicks, paperclips, marbles ...
- **Explain** that you want them to show you how to answer the question, ‘Which throw was longer?’ using information they have learned in the spear throwing lessons.
- **Follow** instructions on **Recording sheet** below to find out if student can measure lines to identify the longer one, and to check if they understand the reason for this.
- **Record** student’s responses using a sheet for each student who completes the task.

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RECORDING SHEET: Spear throwing

Name: _____ Year level _____ Date _____

PURPOSE: To find out if students understand why they must choose the same object as a unit of measurement when comparing two distances.

1. **Look at the picture. The lines show how far two spears travelled. Can you tell me which one was thrown the longer distance? Can you work out which is the longer line? Use these materials to help you measure them.**

If child is unsure of what to do point to one line, and prompt:

Can you use any of these materials to find out how long this throw is?

Or indicate cubes and prompt: **How many of these fit along this line?**

If child does not measure the other line independently, prompt child to do so.

Record what student does:

2. If child does not say which line is longer after placing materials on each line, ask, **Now can you tell me which is the longer line? How do you know?**

Record student's responses:

3. If child chooses the same unit to measure both lines, remove units from the shorter line and replace with a *smaller* unit. For example, if child chose matches remove these from the shorter line and place counters along it instead. If child used the smallest unit available, remove these from the longer line and place larger units along that line. Now ask the child:

How many counters (or whatever unit used) **fit along here?** (point to the shorter line)

How many matches (or whatever unit used) **fit along here?** (point to the longer line)

Which line is longer? How do you know?

Record student's responses:

If the child changes his/her decision about the longer line, ask, **How come you have changed your mind?**

Record student's responses:



LEARNING GUIDE 1: Diagnostic Task – Spear Throwing

Student's name: _____ Date _____

The two lines show how far two spears travelled.

Which throw was longer?

