Strand: Measurement  
Band: Middle Years  
Standard: 3  
Year Level: 6

**Key Idea**

Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts. [In] [T] [C] [KC1] [KC2] [KC6]

Students recognise and develop and report on connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers. [T] [KC1] [KC2] [KC6]

**Outcome**

3.4 Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice. [In] [T] [C] [KC1] [KC2]

3.5 Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size. [T]

**Task/Activities**

1. Estimate and calculate the area of foot with and without shoes.
2. Compare, analyse and explain the relationship between the pressure effect on feet with and without shoes by dividing body weight by total area of both feet.
3. Summarise and report findings.

**Examples of evidence towards achievement of outcomes**

Students:

- Produce tracings on 1 centimetre grid paper of their feet with and without shoes and have calculated the area.
- Use formula body weight divided by total area of both feet to work out pressure on soles of feet.
- Compare pressure effects between shod and unshod feet.
- Explain their findings using Mathematical language.
Mathematics & Health

Task
1. Take off your shoes and socks and draw the outline of one foot on 1cm square grid paper.
2. Work out the area of the foot by counting the number of squares in the outline.

   Area of one foot = _________________
   Area of both feet = _________________

3. Weigh yourself on the scale.
   How much weight do your feet support? _________________

4. Work out how much weight is carried by each square centimetre of foot by dividing your weight into the total area of both feet

   \[
   \frac{\text{Weight}}{\text{Total area of 2 feet}}
   \]

   Weight carried by each square centimetre without shoes = _________________

5. Now put your shoes on. Repeat 1, 2 & 3 with shoes on.

   Area of one foot = _________________
   Area of both feet = _________________

   Weight carried by each square centimetre with shoes = _________________

Questions on next page
Questions
1. How is the weight spread with your shoes on?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Use what you have found out to explain why it is better to wear shoes when running?

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________________________________________________________________________
________________________________________________________________________

3. How does this relate to back care?

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________________________________________________________________________
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4. What have you learnt by doing this activity?

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Background Information
Your feet support your body weight. The area of the foot that touches the ground supports most of the weight. If you wear shoes that have larger contact area than your feet, the weight is spread around more. When you run, your feet absorb a force about 4 times your body weight. Most people prefer not to run with bare feet because it hurts too much.