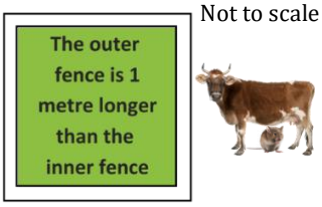
Global Teacher Empowerment Network GTEN
BELT AROUND THE EARTH – OUTER RIMS

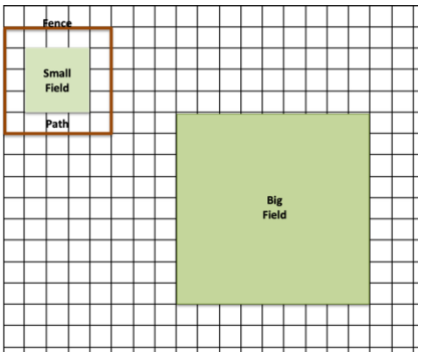
RESOURCES REQUIRED: *This Worksheet to fill in during the workshop*, Paper, Pencil.

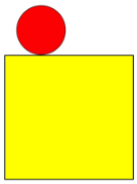
During the workshop, work out your answers on this sheet, then everyone should write comments and give answers on the chat, but not press submit until asked to do so. That way nobody will see your answer, be it right or wrong, and stop trying to find the answer for themselves.



Not to scale

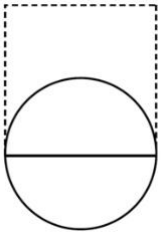
(1) A fence is built around a square field. Another fence is built exactly one metre longer so the path between the two fences is the same width along the edges of the field.
(i) How wide would this path be?
(ii) Would a mouse be able to run along this path?
(iii) Could a farmer drive a herd of cows along the path between the fences?
(iv) Suppose you were the farmer and you wanted to make the path a certain width how would you work out how much fencing to buy?





(2) A circle rolls around the outside edge of a square so that its circumference always touches the edge of the square.
(i) Describe the path (or locus) of the centre of the circle and its length?
(ii) Describe the locus of the centre when a disc rolls around other polygons.

(3) The outer fence is one metre longer than the inner fence. The path between the two fences is the same width all the way round including at the corners.
(i) How wide would this path be?
(ii) If you were the farmer and you had already decided on the width that you wanted to make the path, how would you work out how much fencing to buy for the outer fence.



(4) Which is longer, the dashed portion of the square or the circumference of the circle? Explain your reasoning.

(5) A wire belt is tied tightly around the Earth at the equator.
Suppose the belt is made exactly one metre longer and held around the Earth at the Equator so that it is the same distance away from the Earth everywhere.
(i)Would a mouse be able to crawl under the new belt? How do you know?
(ii)Would the answer be the same for the moon?
(iii)What simplification do you need to make, so that the problem can be solved?

(6) The front wheel on the penny-farthing bicycle has a circumference of 2 metres and the back wheel 50 centimetres.
(i)How many times would the wheels turn if the bicycle travels one kilometre?
(ii)Would the large or the small tyre get more wear and tear on a long journey?

See the Learning Packs on AIMING HIGH
SQUARE FENCE https://aiminghigh.aimssec.ac.za/square-fence/
ROUNDABOUT https://aiminghigh.aimssec.ac.za/roundabout/
THE CIRCLE AND THE SQUARE https://aiminghigh.aimssec.ac.za/the-circle-and-the-square/
NOT-SO-SQUARE FENCE https://aiminghigh.aimssec.ac.za/not-so-square-fence/
BELTWAY ROUND THE WORLD https://aiminghigh.aimssec.ac.za/belt-round-the-world/
METRE MEASURES https://aiminghigh.aimssec.ac.za/metre-measures/
ESTIMATE MY GIRTH https://aiminghigh.aimssec.ac.za/estimate-my-girth/
See the NRICH learning activities:
The interactivity ROLLING AROUND https://nrich.maths.org/2159
EARTH SHAPES http://nrich.maths.org/1363.
WATCHING THE WHEELS GO ROUND AND ROUND http://nrich.maths.org/1039