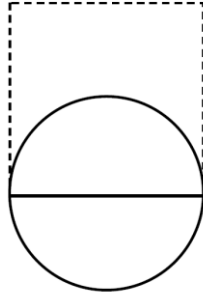


### The Circle and The Square

In the diagram below we have a square and a circle.

Which is longer the dashed portion of the square, or the circumference of the circle?

Explain your reasoning



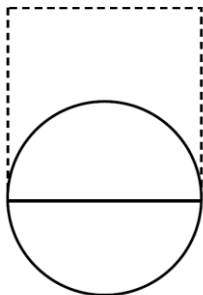
### SOLUTION

The dashed portion of the square is  $3 \times D$

The circumference of the circle is  $\pi \times D$

( $\pi$  is approximately 3,14)

Therefore the circumference of the circle is bigger than the dashed portion of the square.



### NOTES FOR TEACHERS

**Diagnostic Assessment** This should take about 5–10 minutes.

- Write the question on the board, say to the class:  
“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D”.
- Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
- Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
- Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers. It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.
- If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

Calculate the perimeter of the square



Choose the correct answer.

- 12cm
- 9cm
- 6cm
- 16cm

The correct answer and possible misconceptions

- a) The correct answer
- b) Calculating the area instead of the perimeter
- c) Does not understand the meaning of perimeter.
- d) Has multiplied incorrectly

<https://diagnosticquestions.com>

## Why do this activity? Suggestions for Teaching

This activity could be used in two different ways.

- As a problem solving activity at the end of a teaching session on circumference where you have measured the circumference and diameter of a number of circular objects. You have then divided the circumference by the diameter and introduced the learners to the number  $\pi$  and used the information you have gathered to establish the formula for the circumference of a circle.
- Or you could make the picture in the problem bigger and give each learner a copy at the beginning of the lesson. The learners working in pairs would use the string and a ruler to establish the answer to the question. This would then be followed by looking at the circumference divided by the diameter to introduce  $\pi$  and hence the formula for finding the circumference of a circle.

## Learning objectives

### Generic competences

In doing this activity students will have an opportunity to:

1. think mathematically
2. reason logically
3. solve problems
4. communicate and exchange ideas
5. criticize and present information and ideas to others
6. analyze, reason and record ideas effectively
7. co-operate and collaborate/work in a team
8. have empathy with others, listen to different points of view
9. engage in independent learning
10. prepare for lifelong learning.

## Key questions

Key Questions to check knowledge and understanding

1. How do we find the perimeter of a square?
2. How could you find the length of one side of the square?
3. How could you find the length of the circumference of the circle using string and a ruler?
4. How could you find the diameter of the circle?
5. How is the diameter of the circle related to the side of the square?

Mathematical questions on the content for teachers to check how their student's understanding of the topic has progressed

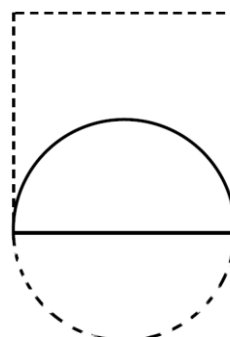
1. What number do we get when we divide the circumference of a circle by the diameter of the circle?
2. From this how do we get the formula for the circumference of a circle?
3. Can you rewrite the formula for the circumference of a circle using the radius instead of the diameter?
4. Explain why the circumference of the circle is longer than the dashed section of the square

## Possible extension

Find a formula for the dashed part of the diagram.

Write this formula in two different ways

- a) Using diameter
- b) Using radius



## Possible support

Use string and a ruler to find the answer to the original problem.

**Note:** The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and up to Secondary 5 in East Africa. New material will be added for Secondary 6.

For resources for teaching A level mathematics see <https://nrich.maths.org/12339>

**Note:** The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is **beyond** the school curriculum for Grade 12 SA.

	Lower Primary or Foundation Phase Age 5 to 9	Upper Primary Age 9 to 11	Lower Secondary Age 11 to 14	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6