



Perimeter

Computer Science Concepts

- Converting user input into a variable
- Multiplying a variable*
- Using one variable to set the amount in another variable*
- Using conditional selection blocks to make a menu

Program Aim Can the users create a program that asks the user for the length of the side and then works out the length of the perimeter of regular 2D shapes

Maths Concepts

- Perimeter of regular 2D shapes can be calculated by multiplying length of side by number of sides
- Use an asterisk (*) to denote multiply on a computer

Differentiation and Assessment for Learning At the beginning of each session the *learning intention sheet* is shared and the learning journey expanded through success criteria. Pupils feed their progress back to the teacher through annotating this sheet with smiley faces at the end of the lesson. Teachers can also annotate the sheet to indicate those who need more or less help in future lessons. These extra resources can be found on the code-it.co.uk website.

Computational thinking skills

Algorithmic thinking to create an algorithm formula for calculating perimeter of an equilateral triangle that can be converted into code

Generalisation adapting a solution for an equilateral triangle to work for other 2D shapes

4c, Harder maths challenges

Extension

4b, Units of measure

4a, Perimeter of a rectangle

5, Creating a menu system

3, Converting algorithm into Scratch code

1, Share idea

4, Generalising triangle idea to work for other shapes

6, Testing & Evaluating

Learning Path

2, Find the formula (algorithm) for calculating perimeter of a triangle

Computing Program of Study

- design, write and debug programs that accomplish specific goals
- work with variables

1, Share idea

Explain to your class that they are going to make a program that works out the perimeter of regular 2D shapes (Where all the sides are same length). However they are going to start by finding a formula that will calculate the perimeter of an equilateral triangle. If it has been a while since perimeter work go over properties of an equilateral triangle emphasising equal length of sides and that perimeter is distance around all the sides.

Resources

-Scratch 1.4 or 2.0

Helpful polygon resource to print

<http://www.greatlittleminds.com/pages/maths/polygons/regular-polygons.html>



Perimeter P2

2, Find the formula (algorithm) for calculating perimeter of a triangle

Recap how they have used variables in the past (maths quiz, counting machine etc) and explain how variables can work together to add, multiply, divide or subtract any two numbers together. How would they plan an algorithm on their whiteboards to work out the perimeter of a triangle if the length of one side has been input by the user? Give the pupils variable names of **length** and **perimeter**. Pupils work on whiteboards. What formula would they need? (perimeter = length x 3, perimeter = length + length + length, length x 3 = perimeter or length + length + length = perimeter) **Working with Variables PPT**

3, Converting algorithm into Scratch code

Remind pupils how to create two variables called length and perimeter. Can they find a way to get the user to input the length of one side into the length variable? **Hint 1** Remind pupils of quiz input methods using ask and answer blocks.

```
ask type in length of one side as a number only and wait
set length to answer
```

Can they then work with both variables to turn their formula into Scratch code? See examples below

```
ask type in length of one side of equilateral triangle as a number only and wait
set length to answer
set perimeter to length + length + length

ask type in length of one side of equilateral triangle as a number only and wait
set length to answer
set perimeter to length * 3
```

Can they then report the answer using the cat? **HINT 1** drag out the

```
join hello world say for 2 secs
join hello world length
join hello world perimeter
join hello world
```

Scratch blocks they could use.

4, Generalisation Can they use skill of generalisation to adapt their solution to work with other regular 2D shapes

Reporting method via cat sprite

say
join
join
join
if length of one side is
length
the perimeter of an equilateral triangle would be
perimeter
for 2 secs



Perimeter P3

4, Creating a menu system

If you have previously created the greater than, less than or equal to menu in the coin sorter then just refer pupils to this and challenge them to create a menu. Some pupils however will need more support than this.

Create this simple menu system then demonstrate how we can fill it with our blocks created earlier.



Perimeter P4

4a, Perimeter of a rectangle

This is a harder challenge so I have included the code here

In my solution **which is not the only one** pupils first create a new variable called width

They then go on to multiply width and length by 2 and add then together to find the perimeter

The screenshot shows a programming interface with a 'Variables' panel on the right containing 'length', 'perimeter', and 'width'. The main workspace contains a script with the following blocks: 'ask What is the length of your rectangle? and wait', 'set length to answer', 'ask What is the width of your rectangle? and wait', 'set width to answer', 'set perimeter to length * 2 + width * 2', and 'say join Perimeter of a rectangle where width is width join and join length is length join is perimeter'. Arrows point from the text above to the 'width' variable and the calculation blocks.

4b, Units of measure If we type in cm, mm or m at the end of the number in the ask block the computer won't understand that we are dealing with numbers so we have to deal with units separately. Can pupils create code that allows the user to use units

4c, Harder Maths Challenges Can pupils adapt this idea to write an algorithm to calculate the perimeter of a circle from its radius, circumference of circle from its diameter or many other maths challenges. What would they like to calculate?

Computational Thinking
Evaluation is how we look at algorithms and determine how useful they are, how adaptable, how efficient, how correct.

5, Testing and evaluating the algorithm/programming

Does it work?

Can you break it in presentation mode? Are there any circumstances where it won't work?

(The menu system won't work if you type any number other than 1, 2 or 3)

How easy is it for other users to use your program? Have you asked them? Have they tried it? Can they break your program in presentation mode?

SEN Adapting this planning for pupils with very low Maths Skills

You could easily adapt this to have the input number add 10, 100, 1000 etc or multiplied by 2, 3, 4 etc. The computational thinking and programming is the same.