**Task design for EYFS to KS5: Access, getting on with mathematics and the “fiveness of 5”**

Apologies for stating the obvious but crawling, standing, falling over, staggering, falling over, tottering, falling over… usually precedes walking (and continuing to fall over)! Sometimes a parent might help; offer a supportive hand. Lots of the time the toddler will experiment for herself; hanging on to whatever is available for balance.

There is an analogy here with the learning of mathematics for example in the ways young children learn about numbers; something along the following lines:

Introduction to numbers, forgetting numbers, more practice with numbers in lots of different contexts, seeing one-to-one correspondences between objects and counting how many objects there are, miscounting, self-correcting, counting on fingers, not counting on fingers, seeing numbers on number lines, seeing really big numbers on number lines, beginning to calculate with numbers, seeing connections/relationships between numbers and so on.

At issue is how we can support children to become confident with numbers so they are not afraid of falling over and of getting something ‘wrong’.

The key to raising children’s confidence lies in the types of tasks teachers’ design, the accessibility of tasks so children can make a start on a task; having opportunities to experiment, to play, to investigate; to get on with the mathematics.

In 2008 I led a project with three primary schools in Barrow-in-Furness, Cumbria about teaching and learning mathematics through the use of problem solving and manipulatives. An EYFS teacher, who had enjoyed the after-school workshops, asked about how to support young children when they had little sense of what numbers actually meant. We discussed the notion of the ‘numberness of a number’ and I devised some tasks intended to lead children to understand, for example, the ‘fiveness of 5’; where children explore the existence of the number 5 both inside and outside the classroom. Thus the teacher might choose a number for the week or the fortnight; display work and/or a table might be used for collecting different types of items for the chosen number. One outcome was to broadly classify these ideas according to key stage so the ideas below are intentionally progressive.

Since 2011 I have had the great pleasure of working with Helen Williams (@helenjwc) running joint workshops at ATM conferences. Helen introduces the workshop by taking a ‘simple’ resource, always some kind of manipulative with EYFS children in mind. My role has been to develop the seeds of the ideas Helen sows and to take them as far I have tasks in my ideas bank. I mention this because I believe the processes Helen, as a mathematics teacher, uses are no different for EYFS children as they are for undergraduate mathematicians. The only ‘thing’ that changes is the complexity of the mathematics. What might often be described as EYFS children ‘playing’ with ideas is, in my practice, the exact same way I use the words ‘explore’ or ‘investigate’ with older learners...

With this in mind I have extended this document to include some tasks which, in my experience, I believe are applicable for use right through to KS5 classrooms and possibly beyond... “the fiveness of 5”.



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**The fiveness of 5**

**EYFS(ish)**

* Arrange 5 teddy bears in different ways?
* Find a number 5 in a set of dominoes; how many fives are there?
* Find a number 5 in a pack of cards; how many fives are there?
* What are your 5 favourite toys?
* Make number cards from 1 to 5 and on the back of each card draw how many dots there are to describe the number on the front.
* If the teacher were to choose a group of 5 children, how many girls and how many boys could there be in the group?
* Count forwards to 5 then backwards from 5.
* Find 5 different colours in your classroom.
* Make up 5 questions you would like to ask your teacher.
* Make up a story about the number 5.
* Draw five shapes each with 5 sides.
* Make up a dance with four of your friends.

**KS1(ish)**

* Ask someone at home to say the 5 times table.
* What you were doing at 5-o-clock yesterday afternoon?
* Find five flowers each with 5 petals
* Make up five really hard questions so the answer is always 5
* Is there anybody in your class with a birth-date with a 5 in it?
* What are these: I, II, III, IV, V? What are the next five numbers? What about Yan, Tyan, Tethera, Methera Pip? What are the next five counting words?
* Using the numbers 1, 2, 3, 4, 6, 7, 8, 9 make up some number sentences so the answer is always 5.
* How many normal steps does it take for you to walk 5 metres?
* How far can you jump in 5 standing jumps?
* Throw five dice and find the total.

Record the different totals for five throws of five dice with 5 children.

* Sing the 1 2 3 4 5 song to the tune of “Knees up Mother Brown”.

See how long it takes before you get back to the beginning. Here is the first verse:

(One, two, three, four, five) - (One, two, three, four, five) – (One, two, three, four) –

(Five, one, two, three) – (Four, five, one, two, three).

* Using several white, red, green and pink, Cuisenaire rods, how many different ways can you add them together (make trains) to make the same length as the yellow rod?
* How much longer are two pink rods than the yellow rod?
* How much longer are three green rods than the yellow rod?
* How many red rods make the same length as two yellow rods?

**KS2 with possibilities for KS3**

* Choose 5 just pieces of Dienes apparatus; how many different numbers can you make? How can you be sure you have found them all? Place them in order from smallest to largest? Find the differences between adjacent pairs of numbers. What do you notice?
* Using the numbers 1, 2, 3, 4, 6, 7, 8, 9 make up some complicated sentences so the answer is always 5. For example: 8 + 9 - 4x3 = 5. Try to write some of your own more complicated number sentences equal to 5.
* Use a map to find some places which are 5 kilometres away from your school.
* How many 50p coins make £5? What about the 20p, the 10p, the 5p, and 1p coins?
* With 5 equilateral triangles how many different shapes can you make if you can only join them by full edge-length to full edge-length? What about using 5 isosceles right-angled triangles? What about using 5 squares?
* If the yellow Cuisenaire rod is worth ‘1’, what are the white, red, green and pink rods worth?
* If the edge length of the square is 1 unit, what different perimeters can be made when you have joined the five squares together by same edge lengths?
* Explain why 5 is a prime number?
* What is the fifth prime number?
* What is the fifth prime number subtract twice the second prime number?
* Make up some interesting calculations for your ‘friend’ to do using the first five prime numbers.
* What is the smallest 2-digit prime number containing the digit 5?

What is the next one? How many more are there?

* Write the first five square numbers and look for patterns.
* Find ways of making the answer 5 using square numbers only, e.g. 12 + 22 = 5, 52 – 42 – 22 = 5
* The five 5’s problem: See which totals (< 50) you can make using five 5’s. e.g. (5 x 5 + 5 + 5) ÷ 5 = 7 You are allowed to use addition, subtraction, multiplication, division, as well as 55 (which uses two of the 5’s). You may also use 5! This is shorthand for 5x4x3x2x1 and is equal to...

The challenge is to make all the numbers as far as you can go from 1 upwards

* How long would it take you to run 500 metres?
* Explain why 5 + 5 ÷ 5 + 5 x 5 is not equal to 35.
* In the playground draw a circle with a radius of 5m. Try to work out is the perimeter of your circle to the nearest metre? What is the area of your circle to the nearest square metre?
* If we draw 5 dots in a straight line we can make four joins like this

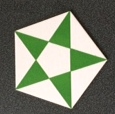
If we draw 5 dots like this: how many joins can we make?

Explore dots and joins

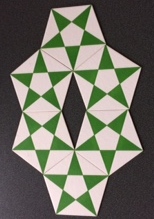
* From 00:00 to 05:00, how many degrees does the hour hand turn through? How many degrees does the minute hand turn through? How many degrees does the second hand turn through?
* A regular pentagon can be dissected into three isosceles triangles, two of which are congruent. By joining any two of such triangles together, by common edge length, what new shapes can be made? What about joining any three of these triangles together? (see task 4 below)

**Continuing the “fiveness” theme to KS3, KS4 and KS5**

1. Here is a pentagon:



What kind of tiling designs can you make from these pentagons only, e.g.



1. Work out all the different angles shown in the pentagon

If the side length of the pentagon is 1, what are the other lengths inside the pentagon?

Here is one of the possible pentagons that can be made on a 9-pin geoboard.

It has no line symmetry and rotational symmetry of order 1.

It has an area of ... and a perimeter of ...

Its angles measure...

It can be described as a set of vectors which are...

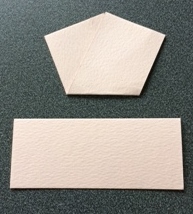
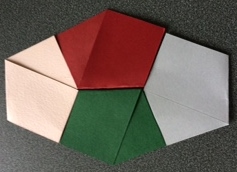
Explore other pentagons on a 9-pin Geoboard

1. Take a piece of A6 paper and cut off largest possible square, e.g.

The rectangle which is ‘left over’ contains an amazing property. This is when two opposite corners are joined together we form a pentagon with one line of symmetry. The side lengths of this pentagon are also very interesting.

But even more amazing is more of these pentagons can be used to make a hexagon with 2 lines of symmetry.

This shape can be used to create a tiling pattern known as the “Cairo Tessellation”.

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1. A regular pentagon can be dissected into three isosceles triangles, two of which are congruent. By joining any two of such triangles together, by common edge length, what new shapes can be made? What about joining any three of these triangles together? Pentagon triangles can be cut out from the final page of this document… or even better, buy pentagons from the ATM: <https://www.atm.org.uk/Shop/Primary-Education/Primary-Resources-Software---0/MATs-Pentagons-100-Pack/mat005>
2. ABCD represents an A5 piece of paper

**A&C**

Sides DF and BE join together

to form a line of symmetry

**A&C**

**F**

**E**

**A**

**B**

**D**

**C**

**B**

**D**

Prove whether or not the pentagon is regular.

1. In the diagram below the vertices and mid-points of the outer square have been joined.

Prove the area of the inner square is one fifth of the area of the outer square

1. I have bored far too many friends in the pub by folding a crisp packet into a thin strip then tying a knot in it…

Fold a flat knot in a strip of paper which has a constant width.

Prove the resulting shape is a regular pentagon.

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