Understanding Fractions of Quantities

Thinking PRODUCTS

Instructions

Background to using this set

Children often have difficulty understanding fractions especially knowing how to find a fraction of a quantity - for example 2/3 of 18 or 3/4 of 20. This set, with its foam shapes, dice and cards enables children to master this concept through first-hand experience.

Before you start

Familiarise yourself with the contents of the set.
You will find:

- Foam shapes which are colour coded and make into 5 regular polygons including a: circle, rectangle, square, pentagon and hexagon)
- 5 dice which are colour coded to match the polygon shapes
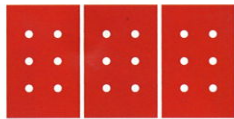- 20 playing cards showing fractions
- 36 pegs

A good starting point:

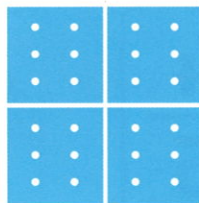Start by removing the colour coded foam pieces and arrange these into the following regular polygons.
Please note: you will need to clear the stubs from the holes in the foam shapes using one of the pegs. Once removed these should be discarded.
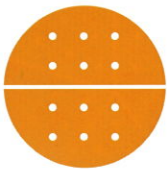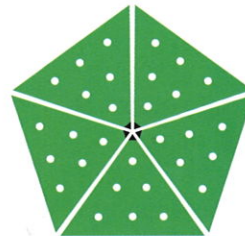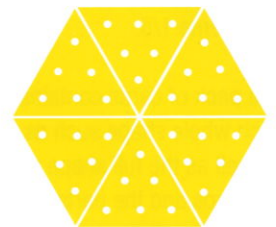
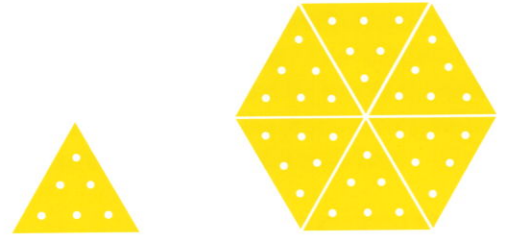| A circle made from 2 orange pieces	A rectangle made from 3 red pieces	A square made from 4 blue pieces	A pentagon made from 5 green pieces*	A hexagon made from 6 yellow pieces

*Note: The green pentagon is made from isosceles triangles and not equilateral triangles (one internal angle is 72 degrees and other 2 are 54 degrees). To make the pentagon, all of the 72 degree angles need to meet in the centre of the polygon. To aid this process, a black triangle has been printed onto this corner of each green piece so they are easy to arrange correctly. When placed together these form a small pentagon at the centre of the larger shape.

Stage 1 – Understanding Basic Fractions

Use the foam shapes to consolidate the recognition and properties of polygons. Place the same colour parts in a pile and you will discover they are identical in size and shape (although not all parts are symmetrical). Arrange the same colour parts together to form the larger shapes – an orange circle, a red rectangle, a blue square, a green pentagon and a yellow hexagon.
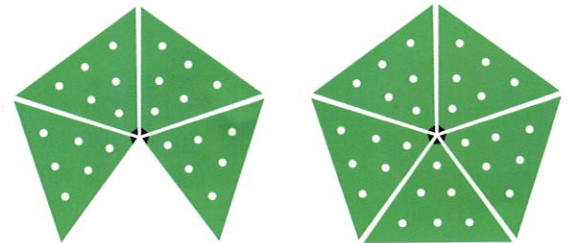
Once children have become familiar with these basic shapes it is essential that they use the language to describe them. Such as… when the 2 halves are placed together they form a complete circle. Or… one part of the square is equal to a quarter of a whole square… and one part of the pentagon is equal to one fifth of the whole pentagon. This can be further reinforced by writing down the fractions for example.

Children need to fully understand concept of what a fraction is before moving on to the next stage. One way of doing this is to use the playing cards. The cards have all the possible options covering all of the shapes. Simply shuffle the pack and select any one at a time to see if the child can point to an appropriate shape for example: If the card says 1/5, the child should find the pentagon and understand that one segment part represents 1/5.

The pack of cards contains all of the fractional parts of each whole shape such as 1/6, 2/6, 3/6, 4/6 and 5/6 as well as the full shape represented by the 6/6. Using the cards and the parts children will become familiar with finding the correct shape as indicated by the bottom number (denominator) and the correct number of parts to collect using the top number (numerator).

Use the cards as an assessment to test and repeat until you are sure that the child has understood the idea of what a basic fraction is.

$\dfrac{1}{6}$

1 part of the hexagon = 1/6

$\dfrac{2}{3}$

2 parts of the rectangle = 2/3

$\dfrac{4}{5}$

4 parts of the pentagon = 4/5

Stage 2 – Fractions of Quantities

Moving to the next stage the dice, cards and pegs can be used to provide a challenge to find the fraction of a given quantity. The following examples show how these may be used:
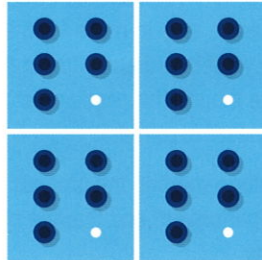
The child takes a card at random – the card selected is 3/4. The child finds the blue square shape which is divided into quarters. The blue dice is selected because it is colour coded to the blue shape. The dice is rolled. The number that appears is 20.

The problem set therefore is to find 3/4 of 20

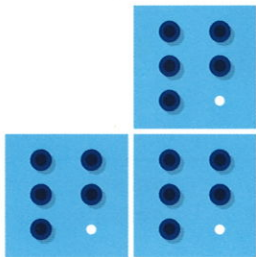The child now divides the 20 pegs equally between the 4 square foam parts. This will give 5 pegs in each of the 4 squares.

They now need to work out the number of pegs in 3/4 of 20. To do this they can separate out 3 parts of the 4 squares and then count the number of pegs.

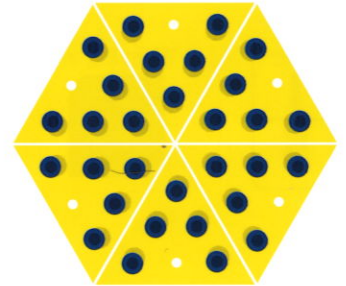
The answer they will get is 15

Therefore 3/4 or 20 is 15.

Playing again….

The child selects a card at random – the card selected is 4/6.
The child sees that the shape required has 6 parts – so selects the yellow hexagon.
They throw the dice and get 30.

The problem set therefore is to find 4/6 of 30

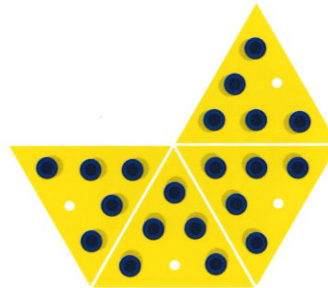30 pegs are counted out and divided equally between the 6 parts giving 5 pegs in each part.

Separating out 4 parts and adding up the number of pegs gives an answer of 20.
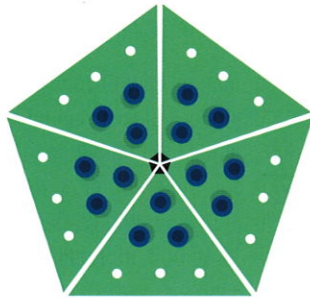

Therefore 4/6 of 30 = 20

And again…

The child selects a card at random – the card selected is 1/5.
The child sees that the shape required has 5 parts – so selects the green pentagon.
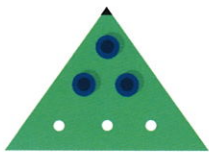They throw the dice and get 15.

The problem set therefore is to find 1/5 of 15

15 pegs are divided equally between the 5 parts giving 3 pegs in each part.

Separating out 1 part and adding up the number of pegs gives an answer of 3.

Therefore 1/5 of 15 = 3

Stage 3 – Supporting and reinforcing learning

Once children understand this concept use different scenarios to support and reinforce the learning for example: I have 18 olives and I need to find 1/6th of them. Use the pegs and the shapes to help the calculation, check that they have counted the pegs correctly and then ask the children to record their calculation on a white board: 1/6 of 18 is 3.

The set contains whole number fraction quantities such as 6/6, 3/3 to consolidate the understanding of fractional notation.

When children have played with the components of this set, they will begin to instinctively recall fractions of quantities and be able to understand fractions beyond the sixths used in this set. At the heart of this process is the reinforcement and security of using concrete components to understand what is actually taking place. The success that children will assist in the understanding process. Later on, children should be able to move from the pegs to solving this type of problem on a whiteboard and without the pegs to support the process. At any stage though the pegs and shapes are there to act as reinforcement whenever required.

We hope you find the process of teaching fractions of quantities straightforward and that the children find it interesting and easy to follow.