Multiplication and division as 'arrays' and inverses lesson plan

Subject: Maths **Lesson Title:** Multiplication and division as 'arrays' and inverses	
Date:	**Time Span:**
Year Group: Year 3	**Group Size:** 30

Desired Learning Outcomes	**NC PoS ref:**
To understand multiplication and division as 'arrays' To understand multiplication and division as inverses To calculate area	

Key Language:	**Use of ICT:**
Multiply, divide, groups of, columns, rows, arrays, inverses and area	Smartboard for introduction

Assessment (Make reference to each section of the lesson)
Intro – TA to monitor progress of more able children
Main – Mark children's work as they complete it. Sit with any children who are struggling, bringing them back to the carpet if necessary. If still unsure by end of lesson sit with TA during plenary.
Plenary – Can children work together to create a representation of the multiplication and division sentences and explain why they have made the representation that they have made? (Can they draw a shape for their partner to calculate area and perimeter of?)

Use of Other Adults
TA to monitor progress of children and provide support as needed
TA to sit and continue working with children (of any ability) who struggled in plenary

Anticipated Misconceptions/Difficulties
Children miscounting numbers of squares in total, particularly with larger products
Children confusing multiplication and division
Children writing orders in the incorrect order e.g. 4 ÷ 3 = 12
(Children confusing area and perimeter)
(Children forgetting to write area as cm^2

Resources
Pupil whiteboards and pens

Introduction	**Time**
More able children to attempt to use a given multiplication or division sentence to derive 3 related sentences without listening to teacher. TA to monitor their progress. If confident, allow to finish; if insecure send back to carpet to listen to teacher e.g. given 4 X 0.3 = 1.2, derive 0.3 X 4 = 1.2, 1.2 ÷ 4 = 0.3 and 1.2 ÷ 0.3 = 4 Teacher (with remainder of class): Explain that we will be looking at multiplication and division as 'arrays' and using each array to write 4 related number sentences, all using the same numbers Revise how an array is a grid – it has columns and rows A column is vertical and a row is horizontal Use children to make an array e.g. 4 rows of 2 What 2 multiplication and 2 division sentences can we make from this array? (4 X 2 = 8, 2 X 4 = 8, 8 ÷ 4 = 2 and 8 ÷ 2 = 4) Repeat this model for several arrays, including squares e.g. 2 X 2 = 4 / 4 ÷ 2 = 2, 3 X 3 = 9, 9 ÷ 3 = 3 etc and how these can only be written one way Model how to complete independent work Emphasise the need to have the numbers in the correct order in each number sentence (can give children clue that divisions always start with greatest number and multiplications always end with the greatest number, although this is not true when working with decimals) With more able children who were secure on higher ability work explain area and perimeter Go through PowerPoint covering the following: • Multiplication as arrays and how this is the same as calculating area • Explain perimeter as the length of the fence around a field and area as the space inside the field and how to calculate perimeter by totalling the length of all of the sides and calculate area by multiplying a long side by a short side, and write as cm^2 • Model how to find perimeter and area of two rectangles • Model how to find perimeter and area of two irregular shapes by counting squares Remind children to write perimeter as cm and area as cm^2	10 mins
Main (including differentiated tasks) Lower ability – derive 2 multiplication and 2 division sentences from arrays (multiplying and dividing by 2, 3, 4 and 5) (slow workers to work on worksheet) Middle ability – derive 2 multiplication and 2 division sentences from arrays (multiplying and dividing by 6, 7, 8 and 9) Higher ability – use known facts to calculate with decimals e.g. 4 X 0.3 = 1.2, 0.3 X 4 = 1.2, 1.2 ÷ 4 = 0.3 and 1.2 ÷ 0.3 = 4 G+T – calculate area and perimeter Extension – make up own arrays and related multiplication and division sentences on pupil whiteboards or draw own shapes to calculate area and perimeter of	20 mins
Plenary Ask the class to split themselves in to groups, with each group being an array Tell class that all children in the class need to be in a group; no one can be left out Ask children to give a multiplication sentence or division sentence that could come from their array G+T – draw a shape of their own for a partner to calculate the area and perimeter of	10 mins