

# Lesson Plan



**What's on the Back?** Four cards each have a number written on one side and a phrase written on the other. The four numbers are 2, 5, 7 and 12. The four phrases are "Divisible by 7", "Odd", "Prime" and "Greater than 100".

On each card, the number written does not have the property written on the other side of the card. What are the four number-property pairs?

**Divisible Digits** I wrote down a 4-digit number that was divisible by 3, 4, 5 and 6, but I spilt a cup of tea on it and can only see the first two digits.

The first two digits are 95 (in that order). What were the last two?

**Pairing Up** The numbers 72, 8, 24, 10, 5, 45, 36, 15 are grouped in pairs so that each pair has the same product. Which number is paired with 10?

**Tricky Customer** Charlie wants to buy a new house but he doesn't like house numbers that are divisible by 3 or by 5. If all the houses numbered between 100 and 150 inclusive are for sale, how many houses can he choose from?

**Calculation 2000** What is the value of  $2000 + 1999 \times 2000$ ?

**Reversible Primes** The integer 113 is prime, and its reverse, 311, is also prime. How many two-digit primes are there between 10 and 99 which have the same property?

**Find from Factors** A certain number has exactly eight factors including 1 and itself. Two of its factors are 21 and 35. What is the number?

**One Short** A positive whole number less than 100 has remainder 2 when it is divided by 3, remainder 3 when it is divided by 4 and remainder 4 when it is divided by 5.

What is its remainder when it is divided by 7?

**Grandma's Cake** Grandma bakes a cake for her grandchildren who are going to visit her. She has forgotten whether 3, 5 or all 6 of her grandchildren will visit.

She wants all of the cake to be eaten by her grandchildren and would like each grandchild to get the same amount of cake.

To prepare for all three possibilities, what is the smallest number of pieces into which she should cut the cake?

**Ones, Twos and Threes** Each digit of a positive integer is 1, 2 or 3. Each of these digits occurs at least twice in the number.

What is the smallest such integer that is not divisible by 2 or 3?

**Red Card Blue Card** Sally has 5 red cards, numbered 1, 2, 3, 4 and 5, and 4 blue cards, numbered 3, 4, 5 and 6. Can you find a way in which Sally can line the cards up so that the colours alternate, and so that the number on each red card is a factor of every number next to it?

**Product 100** The product of four different positive integers is 100.

What is the sum of these four integers?

**Prime Order** How many of the three-digit numbers that can be made from all of the digits 1, 3 and 5 (used only once each) are prime?

**Producing Zeros** If the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 are all multiplied together, how many zeros are there at the end of the answer?

**Almost a Million** Which of the following is divisible by 6? (a) one million minus one (b) one million minus two (c) one million minus three (d) one million minus four (e) one million minus five

**Multiple Years** The year 2010 is one in which the sum of the digits is a factor of the year itself. What is the next year that has the same property?

### **Multiplication Table Puzzle**

In the multiplication table on the right, the row and column headings are all missing, and only some of the products in the table are filled in.

All the numbers in the table are positive integers. What is the value of  $A+B+C+D+E$ ?

**Smallest Abundant Number** An abundant number is a positive integer  $N$  such that the sum of the factors of  $N$  (not including  $N$  itself) is greater than  $N$ . What is the smallest abundant number?

**Jenny's Logic** Jenny and Tom have a set of cards numbered 1-7. Jenny chose three cards at random, and Tom chose two of the remaining cards.

Jenny told Tom: "I can deduce that the sum of the numbers of your cards is even". What was the sum of the numbers on Jenny's cards?

**Adjacent Factors** Peter wrote down a list of different positive integers less than or equal to 10. For each pair of adjacent numbers, one of the numbers was divisible by the other. What is the longest list that Peter could have written?

**Back of the Queue** What is the remainder when the number  $743\,589 \times 301\,647$  is divided by 5?

**Cakes and Buns** The Pythagoras Patisserie sells triangular cakes at 39p each and square buns at 23p each. Helen spent exactly £5.12 on an assortment of these cakes and buns.

How many cakes and how many buns did she buy?