Digital Delights

INVESTIGATION ONE

You need: a calculator (optional)

1. Take the number 11.
   There are many sets of numbers that add up to 11. For example:
   6 + 5, 3 + 3 + 5, 4 + 4 + 3, and 2 + 2 + 2 + 2 + 2 + 1.
   If you multiply the addends, you get a product. For example:
   6 x 5 = 30, 3 x 3 x 5 = 45, 4 x 4 x 3 = 48, and 2 x 2 x 2 x 2 x 2 x 1 = 32.
   Which addends of 11 give the largest product when you multiply them?

2. **a.** Investigate the addends of other numbers to find which combination gives the largest product.
   b. Can you find a method for getting the combination with the largest product?

Hmm ... For 9:

7 + 2	7 x 2 = 14
6 + 3	6 x 3 = 18
2 + 2 + 2 + 3	2 x 2 x 2 x 3 = 24
3 + 3 + 3	3 x 3 x 3 = 27

Low prime numbers seem a good place to start!

INVESTIGATION TWO

1. Choose any two digits, for example, 4 and 7.
   - Make all the two-digit numbers you can (47 and 74).
   - Add these numbers (47 + 74 = 121).
   - Divide the result by the sum of the two digits (7 + 4 = 11 → 121 ÷ 11 = ☐).
2. Try this for some other sets of two digits. Explain why there is a pattern to your results.

INVESTIGATION THREE

1. Choose any three digits, for example, 3, 6, and 8.
   - Make all the different three-digit numbers that can be made with them. (With 3, 6, and 8, these are: 368, 386, 638, 683, 836, and 863.)
   - Add these numbers together (368 + 386 + 638 + 683 + 836 + 863 = 3 774).
   - Divide the result by the sum of the three digits (3 + 6 + 8 = 17 → 3 774 ÷ 17 = ☐).
2. Try this with several other sets of three digits. What do you notice?

INVESTIGATION FOUR

24 is a *visible factor* number because it can be divided evenly by each of its digits with no remainder.

24 ÷ 2 = 12
24 ÷ 4 = 6

36 is also a visible factor number because
36 ÷ 3 = 12 and 36 ÷ 6 = 6.

1. **a.** Find the visible factor odd numbers that are greater than 20 and less than 100.
   b. What do these numbers have in common?
   c. What ways did you use to make your search easier?
2. What are the visible factor even numbers between 20 and 50?