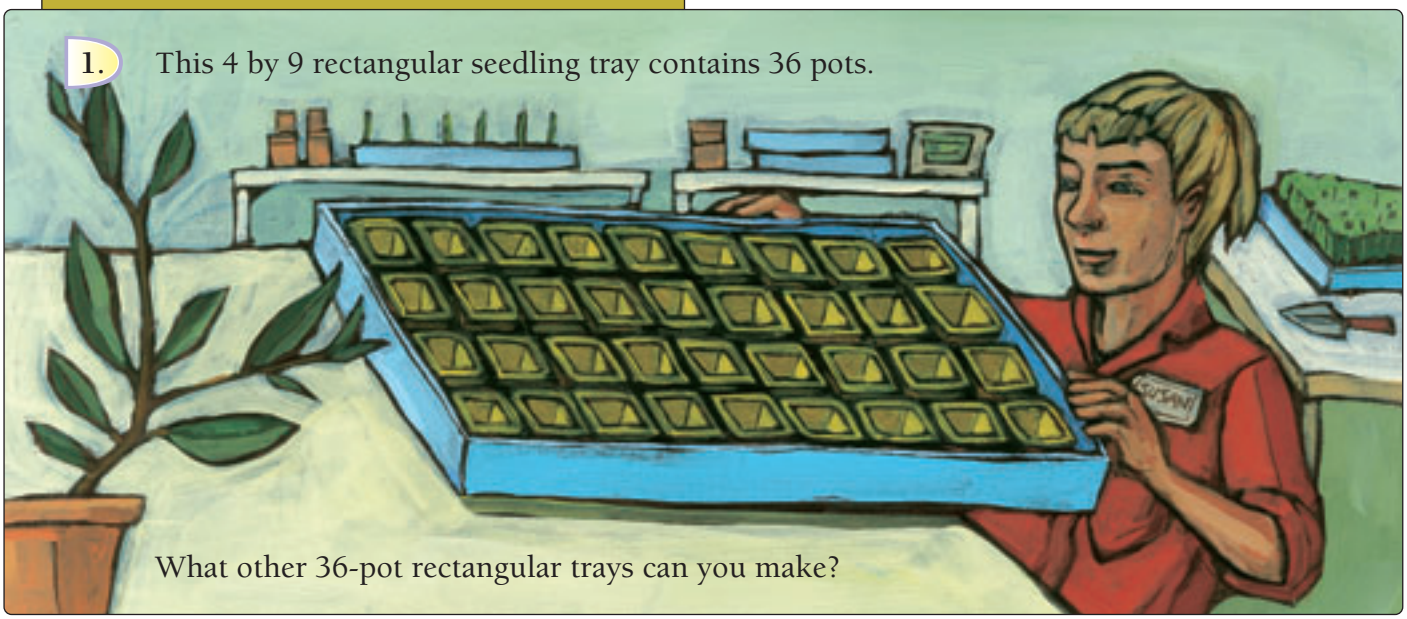
Prime Time

You need ☑ a calculator (for **Activity Four**)

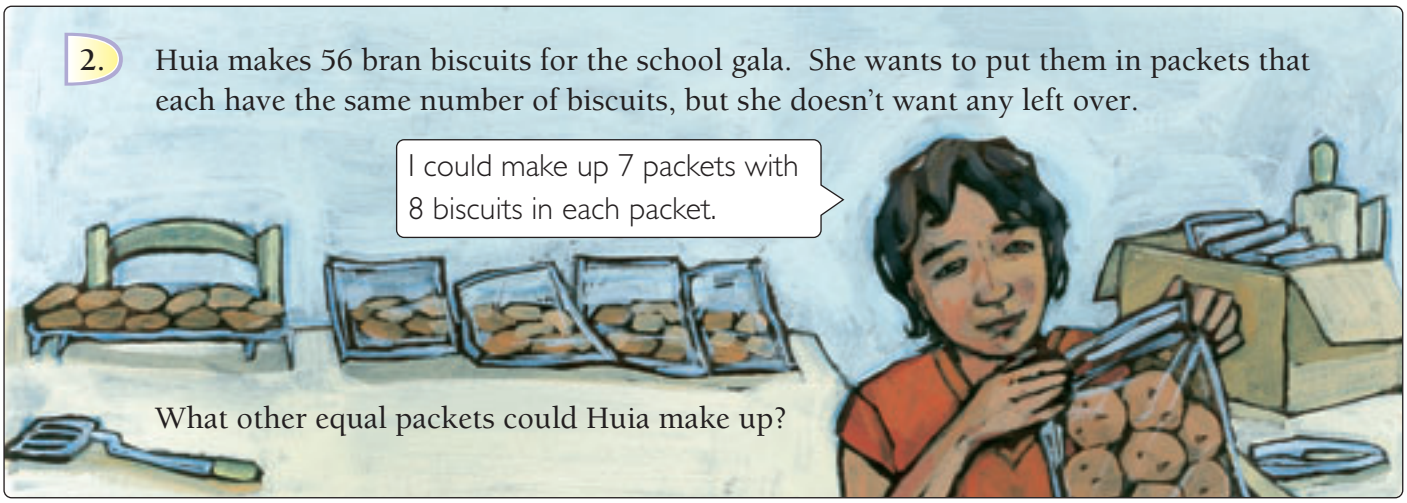
Activity One

1. This 4 by 9 rectangular seedling tray contains 36 pots.



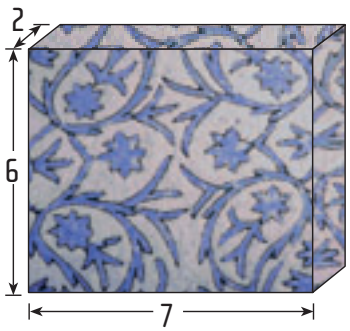
What other 36-pot rectangular trays can you make?

2. Huia makes 56 bran biscuits for the school gala. She wants to put them in packets that each have the same number of biscuits, but she doesn't want any left over.



What other equal packets could Huia make up?

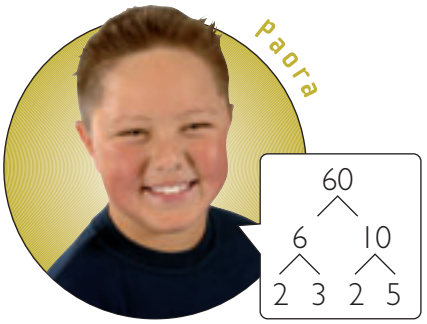
3. 84 cubes fit into this box:

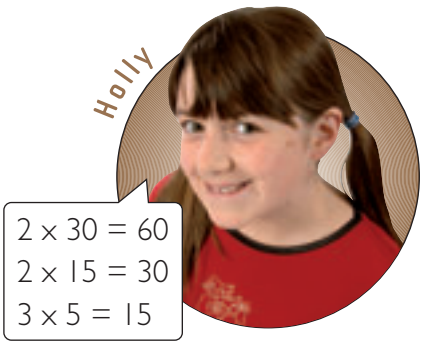


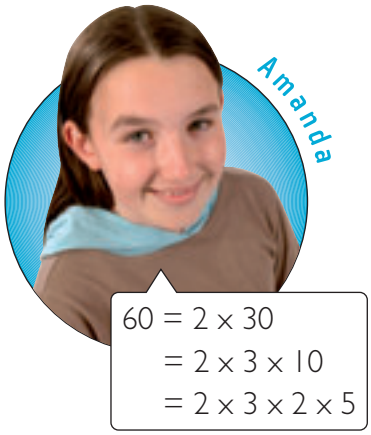
What other boxes would fit exactly 84 cubes?

Activity Two

Paora, Holly, and Amanda each use different ways to work out the prime numbers that multiply together to give 60:







1. What is the same and what is different about their methods?

2. Is 2 x 2 x 3 x 5 the only set of prime factors for 60? Explain your answer.

3. Use any strategies you like to work out the prime factors for these numbers:

   a. 36 b. 54 c. 72

   d. 84 e. 140 f. 210.

   Discuss your choice of strategies with a classmate.

Activity Three

1. Jane sits a spelling test of 72 words. She gets 36 words correct. She has just learnt about prime factors, so she writes her score like this: $\frac{2 \times 2 \times 3 \times 3}{2 \times 2 \times 2 \times 3 \times 3}$

   a. From these prime factors, Jane can see her score is $\frac{1}{2}$ or 50 percent. How?

   b. Use prime factors to find the simplest fraction and the percentage for these students' scores on the same test:

   i.

   I got 54 words right. The prime factors of 54 are …

   ii.

   I got 60 words right.

   iii.

   I got 63 words right.

2. You want to go on a 210 kilometre journey. Use prime factors to work out how long the trip would take if you were to travel by:

a. bicycle at 30 kilometres per hour

b. scooter at 42 kilometres per hour

c. car at 84 kilometres per hour

d. bus at 60 kilometres per hour

e. bullet train at 140 kilometres per hour.

3. At the jamboree, there are 36 girl guides and 54 boy scouts. The leaders want to make teams of 15 for the raft race. Each team must have the same number of boys and girls. Can this be done? How?

Activity Four

1. A decimal that has a fixed number of digits is said to terminate (for example, 1 ÷ 5 = 0.2). Some decimals repeat forever, for example, 7 ÷ 22 = 0.3181818 ... These are called recurring decimals. (A dot or bar is usually put over the recurring digits, for example, $0.3\overline{18}$)

Look at the prime factors of the following numbers:

8 = 2 x 2 x 2 20 = 2 x 2 x 5 125 = 5 x 5 x 5

64 = 2 x 2 x 2 x 2 x 2 x 2 100 = 2 x 5 x 2 x 5

Use your calculator to find out if the decimal answers for these divisions terminate:

a. 1 ÷ 8 = ☐ **b.** 1 ÷ 20 = ☐ **c.** 1 ÷ 125 = ☐

d. 1 ÷ 64 = ☐ **e.** 1 ÷ 100 = ☐.

Do these divisions terminate? (You will need a wide-screen calculator for **i** and **j**.)

f. 1 ÷ 36 = ☐ **g.** 1 ÷ 60 = ☐ **h.** 1 ÷ 54 = ☐

i. 1 ÷ 140 = ☐ **j.** 1 ÷ 210 = ☐

2. **a.** What do the divisions in question **1** that result in terminating decimals have in common?

b. When 1 is divided, how can you use the prime factors of the divisor to tell if the decimal answer will be a non-terminating decimal?

The prime factors you found in **Activity Two**, question **3**, will be useful here.

Challenge

How can you use prime factors to tell you if the division of a number that is not 1 will result in a terminating decimal (for example, 3 ÷ 120)?