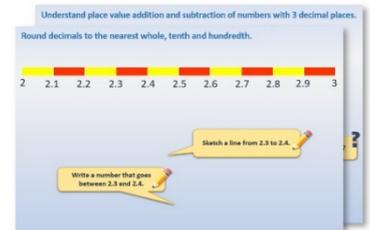


Week 15, Day 3

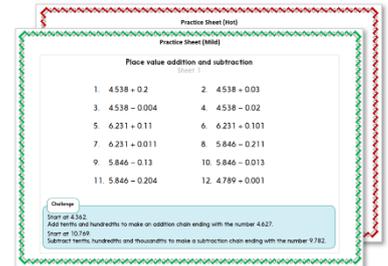
Estimating BIG numbers

Each day covers one maths topic. It should take you about 1 hour or just a little more.

1. Start by reading through the **Learning Reminders**.

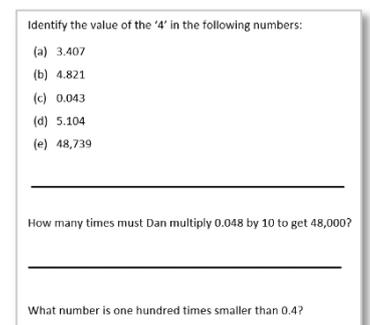


2. Tackle the questions on the **Practice Sheet**.
There might be a choice of either **Mild** (easier) or **Hot** (harder)!
Check the answers.

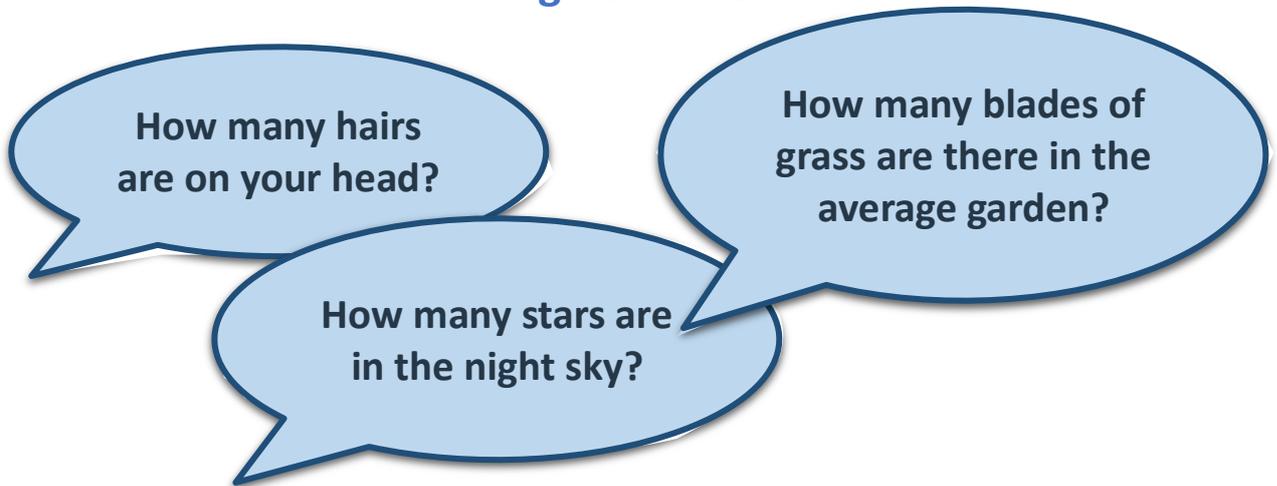


3. Think you've got it? Have a go at the **Investigation**.

4. Have I mastered the topic? A few questions to **Check your understanding**.
Fold the page to hide the answers!



Learning Reminders



- Each of these questions would take a long time to answer with absolute accuracy.
- There is, however, a branch of maths that deals with such calculations, named after physicist Enrico Fermi: **Fermi estimates** (making fast, rough estimates using quantities which are either difficult or impossible to measure directly).
- What might be a sensible way to estimate the number of hairs on someone's head?
- It would take a long time to count them all, but you could make **an estimate** based on finding **how many are in a smaller area**, and then **multiplying this by the number of these areas** on the head.
- A sensible estimate can give an 'order of magnitude' (Is it a number of 10s, 100s, 1000s, 10,000s, etc.?).



Practice for All Making estimates

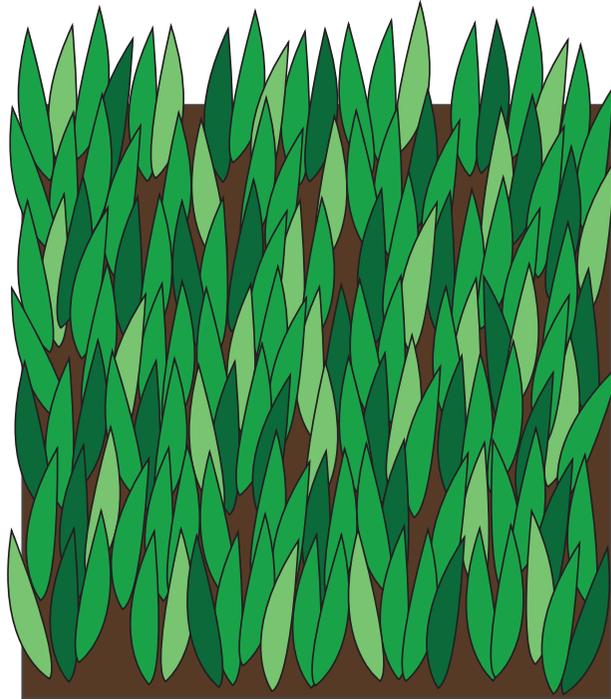
A field measures 200m by 200m.

There are five sheep in the field. Between them, they have eaten a quarter of all the blades of grass!

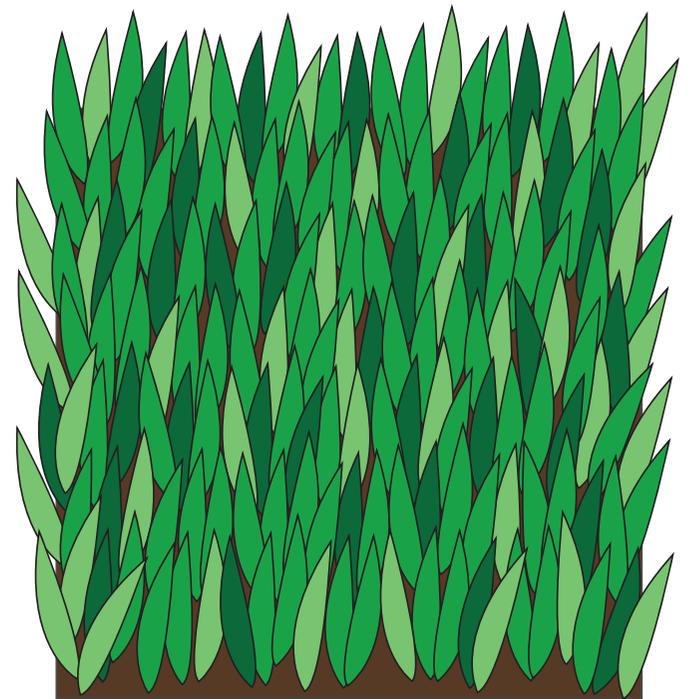
Before they entered the field, these three 10cm by 10cm samples of grass were taken:



Sample A



Sample B



Sample C

Work with a partner to estimate how many blades of grass each sheep has eaten.

Practice Answer Sheets

Practice for All

Number of blades in 10cm x 10cm samples = **Sample A = 149, Sample B = 137 and Sample C = 164.**

Average of **150 blades of grass/100cm² or 15,000 blades of grass/m².**

Field 200m x 200m or 40,000m²

Number of blades of grass in the field = 15,000 x 40,000 = **600,000,000**

Total number of blades of grass eaten by the five sheep = **150,000,000**

Each sheep ate $150,000,000 \div 5 =$ **30,000,000 blades of grass each.**

Investigation

Making estimates of large numbers

Choose at least two of the following challenges to try to solve.
You might like to share your strategies with someone else!

Make a Fermi estimate of:

- the numbers of hairs on your head
- how many times you might blink in a lifetime
- how many litres of fluids might you drink in a lifetime
- how many cubic centimetres of toothpaste you might use in a lifetime
- how many kilometres you might walk to and from primary school from Reception to Year 6
- how long a line would be if all your hairs were laid end to end

Check your understanding: Questions

Fill in the missing digits:

$$384,\square 79 < 384,0\square 9$$

$$1,0\square 0,841 > 1,040,996$$

Fill in the missing numbers.

(a) $245,789 \times \square = 24,578,900$

(b) $73,890 \times \square = 7,389,000$

(c) $4782 \times \square = 47,820,000$

Marcus has 124 hairs in a sample patch of one square centimetre on his head. The surface area of his head is approximately 1000cm^2 .

Estimate how many hairs Marcus has on his head.

Check your understanding:

Answers

Fill in the missing digits:

$$3\ 8\ 4, \square\ 7\ 9 < 3\ 8\ 4, 0\ \square\ 9 \quad 384,079 < 384,089 \text{ or } 384,099$$

$$1,0\ \square\ 0, 841 > 1, 0\ 40,996 \quad \text{Any } 10,000\text{s digit } 5 \text{ or more.}$$

If there are errors, check children have read the 'greater than/ less than' symbols correctly.

Fill in the missing numbers.

(a) $245,789 \times 100 = 24,578,900$

(b) $73,890 \times 100 = 7,389,000$

(c) $4782 \times 10,000 = 47,820,000$

Marcus estimates that he has 124,000 hairs on this head. The surface area of his head is approximately 1000cm^2 . How many hairs did he count in one square centimetre?

Estimate how many hairs Marcus has on his head.

$$124,000 \div 1000 = 124 \text{ hairs per cm}^2.$$