Activity description

This activity introduces standard form and shows students how to use it in real life contexts.

Suitability and time

Level 2 (Intermediate/Higher); 1–2 hours

Resources and equipment

Student information sheet, worksheet
Optional: slideshow
Calculators

Key mathematical language

Standard form, power, index, formula

Notes on the activity

The slideshow introduces standard form using real contexts, and then gives worked examples involving conversions and calculations. With judicious use of the animation, students can practise the skills before the answers appear. The slideshow returns to the original contextual problems at the end. The same examples, including the answers, are given on the information sheet. This is followed by plenty of practice questions, including straightforward numerical work and a variety of real life scenarios. Images from the worksheet are included in the slideshow. These could be displayed whilst students attempt the questions and also used in class discussion.

During the activity

You could stop the slideshow at suitable points for students to discuss the questions asked, or to use their calculators to do the given calculations before you reveal the answers.

Points for discussion

'Think about…' items in the slideshow can be used to aid class discussion about the mathematics involved. These are also included on the students' information sheet. Some of the thinking tasks, especially those in the reflection section, could be discussed in pairs or small groups. Each pair or group could be asked to agree a clear explanation which could then be shared with the rest of the class.

Before attempting a difficult calculation, students are encouraged to think of a similar easier question to help them see what type of calculation is needed. Discuss this strategy with students.

Extensions

Ask students to write very large numbers from newspaper articles in standard form. These often occur in articles concerning the UK economy or things like the cost of the Olympics.

You may wish to add examples reflecting your students' other studies or interests to the worksheet, such as Economics, Geography, Business Studies, or Science.

The website used in question 13 (http://hypertextbook.com/facts/index-topics.shtml) also contains other interesting material that could be used to extend the work. Another website at http://www.powersof10.com provides examples that can help students to appreciate the size of numbers. Alternatively, you could use a Search engine to find other suitable information and resources.

Answers

1a 3×10^6 **b** £1.26×10^7 **c** 8×10^4 **d** 5×10^9

e £3.25×10^9 **f** 1.05×10^{10} **g** 7.52×10^6 **h** 4.50068×10^8

2 a 2 400 000 **b** 0.000 0024 **c** 3 000 000 000 **d** 0.000 000 003

e 714 000 **f** 0.000 0714

3 a 3.6×10^7 **b** 4.82×10^5 **c** 9×10^8 **d** 2.5×10^{-4}

e 7×10^{-6} **f** 3.456×10^{-3}

4 1.13×10^9 **5** 500 seconds or 8 minutes and 20 seconds

6 3×10^{-7} metres **7** 5 times bigger

8 Dust mite is 1.35×10^{-3} metres longer

9 2% nearest % **10** 60 kg

11a Encaladus, Tethys, Dione, Rhea, Titan, Iapetus
b Titan, Rhea, Iapetus, Dione, Enceladus, Tethys
c Titan, Rhea, Iapetus, Dione, Tethys, Enceladus
d Dione 1430 kg m^{-3}, Enceladus 1280 kg m^{-3}, Iapetus 1150 kg m^{-3}, Rhea 1320 kg m^{-3}, Tethys 1210 kg m^{-3}, Titan 1890 kg m^{-3} to 3sf

12a Hydrogen, Carbon, Nitrogen, Oxygen

bi 4.65×10^{-26} kg **ii** 7.31×10^{-26} kg **iii** 2.99×10^{-26} kg

ci Nitric acid **ii** 5.09×10^{-27} kg

13 Total length of DNA = 2.04×10^{13} metres
This is about 50 000 times the distance between the Earth and the Moon!