

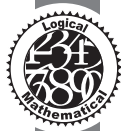
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All About the Moon

MATHS TOPICS

computation, rounding, open-ended problem solving and conversions



PRIOR KNOWLEDGE NEEDED

1. converting hours to years
2. converting grams to kilograms
3. rounding

DIFFERENTIATION STRATEGIES

Principles

Flexible grouping: Students work in pairs to solve these problems. Grouping can be homogeneous or heterogeneous.

Ongoing assessment: Students are asked to show their work and explain how they solved the problems. These can be used for assessment.

Teacher's Strategies

Product: Tiered Journal Questions: Based on student readiness, journal question Level 1 or journal question Level 2 can be assigned. Level 1 requires conversions but since the numbers are smaller, it is an easier problem to solve than Level 2.

According to Students

Learning Styles/Multiple Intelligences: logical/mathematical, verbal/linguistic, interpersonal

MATERIALS NEEDED

1. an activity sheet for each pair of students
2. calculators
3. a world atlas or access to Internet geography sites

TEACHING SUGGESTIONS

Engaging the Students

Ask students, “What were you doing 384,000 seconds ago?” When they take out calculators or a pencil and paper ask, “Why don’t you know right away what you were doing? Do you know what you were doing one hour ago? Why?” After some discussion, students will realise that because 384,400 is a large number and a second is so small, it is probably not the best unit to describe this length of time ($384,400 \text{ seconds} \approx 4 \frac{1}{2} \text{ days}$). Explain to students that this activity describes some very interesting facts about the moon but asks us to try to make sense of these enormous numbers by comparing them to things we do in our everyday lives. In order for these numbers to make sense, they need to be labelled in the most appropriate units—just like $4 \frac{1}{2} \text{ days}$ makes more sense to us than 384,000 seconds.

The Exploration

Working in pairs, students are asked to do the following:

1. Using reference materials, compare the size of a crater on the moon to countries that might fit into it. A possible answer might be Lithuania, which is 2140 square kilometres smaller than the crater.
2. Calculate how long it would take a train travelling 120 kmph to get to the moon (384,400 km away). Using calculators, students find that it takes 3203.33 hours to get to the moon. But is hours an appropriate unit to use? How long a time is this? 3203.33 hours is approximately 133 days.
3. The Apollo Space Program has cost about \$25.5 billion dollars! Do we really understand the significance of a number this large? Students calculate that each kilogram of moon rock costs \$66 million or \$600,000 per gram. Supposedly, the most expensive perfume sells for about \$53 per gram.

Debriefing

These problems are open-ended, because there is more than one way to find the answer and, in some instances, more than one correct answer. It is important to give students an opportunity to explain, not only what answers they got, but how they solved the problem. By doing this, you are saying the process (the thinking) is as valuable as the product (the answer).

ASSESSMENT

1. Student products: Student answers to problems posed on the activity sheet can be used for assessment.
2. Extension activities:
 - a. Groups of students can research the density of populations and based on these ratios, calculate how many people might live in a crater the size of Bailly Crater.
 - b. Students can research the cost per gram of everyday objects and liquids such as a pair of sneakers, petrol, their maths book and so forth.
3. Journal questions:
 - a. Level 1 question: It is 46,000,000 centimetres from Alice Springs to Uluru. While this information is correct, what unit of measure would be more reasonable than centimetres? Express the distance from Alice Spings to Uluru using this more reasonable unit of measure. Explain how you solved this problem.
 - b. Level 2 question: You are told that someone travelled 31,680,000 centimetres from their home to Sydney. What unit of measure would be more reasonable than centimetres to describe this distance? Express the distance to Sydney using this more reasonable unit of measure. Explain how you solved this problem.

All About the Moon

1. Did you know?

The largest crater we can see on the moon is called Bailly and covers an area of about 67,000 square kilometres

Problem

Use a world atlas to find what countries could fit into a crater of this size.

2. Did you know?

The average distance from Earth to the moon is 384,400 kilometres.

Problem

If you were travelling on a train going at a speed of 120 kmph, how long would it take you to get to the moon? (Be sure to use appropriate units of measure.)

3. Did you know?

The Apollo Space Program has cost about \$25,500,000,000. The Apollo astronauts who landed on the moon brought about 385 kilograms of rocks back to Earth.

Problem

About how much did NASA spend for each kilogram of moon rock?

For each gram of moon rock?