



EASY CALC

$$\sqrt{\frac{1008}{847}}$$

Can you find the easy way to calculate this square root without doing any long division?

HELP

Try simpler questions first.

What is the square root of $9/16$? What are the square roots of $18/50$ and $36/25$.

If you can find these square roots can you find the square root of $1008/847$ in a similar way?

NEXT

When you find the answer, write it as a fraction and as a decimal. What do you notice about the decimal? Why does this pattern occur?

Make up a similar calculation and exchange the 'Easy Calc' you have created with a partner.

NOTES FOR TEACHERS

SOLUTION

Maybe the fraction cancels to lower terms so look for a common factor.

Yes!

$1008 = 7 \times 144$ and $847 = 7 \times 121$ so we are looking for the square root of $144/121$.

The answer is $12/11$

Why do this activity?

This non-routine question could be a lesson starter. It may look hard to learners but it is easy. So, if they think for themselves, and decide for themselves **how** to tackle it, there is a good chance that they will get the satisfaction of finding the answer.

This problem naturally leads into further work on factorisation, on finding prime factors and on exponential notation. It can also be used in a revision lesson planned as exam preparation.

Learning objectives

In doing this activity students will have an opportunity to:

- review the equivalence of fractions and cancelling;
- review factorization;
- review and deepen understanding of fractions and exponents.

Generic competences

In doing this activity students will have an opportunity to:

- interpret and **solve problems**;
- **work and learn independently** and prepare for lifelong learning;
- **present information and ideas to others**.

Suggestions for Teaching

This is a good lesson starter and should only take about 15 minutes. There is no Diagnostic Quiz here as the activity in itself gives an opportunity for formative assessment.

Write the question on the board and ask the learners to do it **on their own**. Be sure to tell them to look for an easy method. After a few minutes, for those who are having trouble getting started, you might ask “what do you know about fractions that could help you?”. If you avoid the suggestion of cancelling this still leaves the initiative to the learners.

Some learners may spot the common factor 7, and then spot that $144 = 12 \times 12$, while others may find the prime factors of 1008, namely $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 2^4 \times 3^2 \times 7$.

Having given the learners a few minutes to do the problem on their own, and when you see that some learners have got the answer, you could ask learners to check with a partner and share ideas. Learners benefit from explaining their reasoning.

You may ask a pair of learners to come to the board and explain their method to the class. Having a pair of learners to do this means that while one is writing on the board the other can do the explaining.

You could then ask if any learners have a different method. It is likely that some will have spotted that they already know the square root of 144 and 121 whereas others will have found prime factors.

Key questions

- What do you know about fractions that could help you do this calculation?
- Can you explain your method to me?
- Are any of the factors repeated?
- Do any of those numbers come into the multiplication tables that you know?
- What connections are there between repeated factors, squares and square roots?
- Have you checked your answer?

Follow up

Ask the class if they know any other way of writing the fraction $\frac{12}{11}$. As this fraction is the recurring decimal 1.0909... this pattern can also be a pleasing discovery.

Power Matching <https://aiminghigh.aimssec.ac.za/power-matching/>

Divide Divide <https://aiminghigh.aimssec.ac.za/divide-divide/>

Repetition <https://aiminghigh.aimssec.ac.za/repetition/>

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Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum



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Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and school years up to Secondary 5 in East Africa.

New material will be added for Secondary 6.

For resources for teaching A level mathematics (Years 12 and 13) see <https://nrich.maths.org/12339>

Mathematics taught in Year 13 (UK) & Secondary 6 (East Africa) is beyond the SA CAPS curriculum for Grade 12

	Lower Primary Approx. Age 5 to 8	Upper Primary Age 8 to 11	Lower Secondary Age 11 to 15	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13