Find H. C. F Of Each Set Of Number Using Long Division Method 80,215,245and720

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When dealing with large numbers, finding the Highest Common Factor (H.C.F.), also known as the Greatest Common Divisor (GCD), can seem challenging. However, the long division method provides an effective and systematic approach to determine the H.C.F. of any set of numbers, including large figures like 80, 215, 245, and 720. In this guide, we will explore the step-by-step process of calculating the H.C.F. of these numbers using the long division method, ensuring clarity and understanding for learners at various levels.

Understanding the Highest Common Factor (H.C.F.)

What is H.C.F.?

The Highest Common Factor of two or more numbers is the largest number that divides all of them exactly without leaving a remainder. For example:
- The H.C.F. of 12 and 18 is 6 because 6 is the largest number dividing both 12 and 18 evenly.
- For multiple numbers, the concept extends similarly, identifying the greatest number common to all.

Importance of Finding H.C.F.

Knowing the H.C.F. is useful in:
- Simplifying fractions
- Solving problems involving ratios
- Factoring numbers
- Simplifying algebraic expressions

Step-by-Step Process to Find H.C.F. Using Long Division Method

The long division method involves dividing the larger numbers step by step, reducing the problem until the common factors are identified. The process is iterative and relies on the Euclidean algorithm, which states that:
- The H.C.F. of two numbers also divides their difference.
- This process continues until the remainder becomes zero.

General Approach

1. Arrange the numbers in order, from the smallest to the largest.
2. Divide the larger number by the smaller one.
3. Record the remainder.
4. Replace the larger number with the smaller number and the smaller number with the remainder.
5. Repeat the division process until the remainder becomes zero.
6. The last non-zero remainder is the H.C.F.

Calculating H.C.F. of 80, 215, 245, and 720

Let's now apply this method step-by-step to the specific set of numbers: 80, 215, 245, and 720.

Step 1: Arrange the numbers

Order the numbers from smallest to largest:
- 80, 215, 245, 720

Step 2: Find H.C.F. of the first two numbers (80 and 215)

Division process:
- Divide 215 by 80:
- 80 × 2 = 160
- 215 - 160 = 55 (remainder)
- Divide 80 by 55:
- 55 × 1 = 55
- 80 - 55 = 25 (remainder)
- Divide 55 by 25:
- 25 × 2 = 50
- 55 - 50 = 5 (remainder)
- Divide 25 by 5:
- 5 × 5 = 25
- 25 - 25 = 0 (remainder)

Result:
- The last non-zero remainder is 5, so H.C.F. of 80 and 215 is 5.

Step 3: Find H.C.F. of the result (5) and the next number (245)

Division process:
- Divide 245 by 5:
- 5 × 49 = 245
- 245 - 245 = 0 (remainder)

Result:
- Since the remainder is zero, H.C.F. of 5 and 245 is 5.

Step 4: Find H.C.F. of the current result (5) and the last number (720)

Division process:
- Divide 720 by 5:
- 5 × 144 = 720
- 720 - 720 = 0 (remainder)

Result:
- The last non-zero remainder is 5, so H.C.F. of 720 and 5 is 5.

Final Conclusion: H.C.F. of 80, 215, 245, and 720 is 5

This comprehensive process shows that the H.C.F. of the set {80, 215, 245, 720} is 5. This result means 5 is the largest number that evenly divides all four numbers.

Additional Tips for Finding H.C.F. Using Long Division Method

Use the Euclidean Algorithm Effectively

- Always start with the smallest numbers.
- Repeat the division process, updating the pair of numbers.
- Consistently replace larger numbers with remainders until the remainder is zero.

Handling Multiple Numbers

- Find the H.C.F. of the first two numbers.
- Use this result to find the H.C.F. with the next number.
- Continue this process until all numbers are included.

Check Your Work

- After determining the H.C.F., verify by dividing each original number by this factor.
- Ensure that each division results in an integer quotient with no remainder.

Applications of H.C.F. in Real-Life Scenarios

Understanding how to find the H.C.F. of multiple numbers is valuable in various practical situations:
- Simplifying Ratios: For example, reducing a ratio of 80:215:245 to its simplest form.
- Dividing Items Equally: Ensuring items are divided into groups with no leftovers.
- Solving Algebraic Problems: Simplifying algebraic expressions involving multiple terms.

Summary

- The long division method is an efficient way to find the H.C.F. of multiple numbers.
- The process involves repeated division and replacement, following the Euclidean algorithm.
- For the set {80, 215, 245, 720}, the H.C.F. is determined to be 5.
- This method can be applied to various sets of numbers, regardless of their size.

Conclusion

Mastering the long division method for finding the H.C.F. of multiple numbers enables students and mathematicians to simplify complex problems effectively. By practicing the step-by-step approach outlined here, you can confidently find the H.C.F. of any set of numbers, facilitating better understanding and application in mathematics and real-world scenarios.

Remember: The key to success is patience and careful calculation. Always verify your results to ensure accuracy, and use the Euclidean algorithm as your primary tool for efficient computation.

Frequently Asked Questions

What is the first step to find the H.C.F of 80, 215, 245, and 720 using the long division method?

The first step is to find the pairwise H.C.F of the numbers by dividing the larger number by the smaller and then using the remainders to continue the process until all divisions yield a common divisor.

How do you begin the long division method when finding H.C.F of multiple numbers?

Start by dividing the two smallest numbers to find their H.C.F, then divide this result with the next larger number, and continue iteratively until all numbers are included.

What is the H.C.F of 80 and 215 using the long division method?

Dividing 215 by 80 gives a quotient of 2 and a remainder of 55. Then, dividing 80 by 55 gives a quotient of 1 and remainder 25. Next, dividing 55 by 25 gives quotient 2 and remainder 5. Finally, dividing 25 by 5 gives quotient 5 and remainder 0. So, the H.C.F of 80 and 215 is 5.

How do you find the H.C.F of 245 and 720 using long division?

Divide 720 by 245, which gives a quotient of 2 and remainder 220. Then divide 245 by 220 to get quotient 1 and remainder 25. Next, divide 220 by 25 to get quotient 8 and remainder 20. Then divide 25 by 20 to get quotient 1 and remainder 5. Finally, divide 20 by 5 to get quotient 4 and remainder 0. The H.C.F of 245 and 720 is 5.

How is the overall H.C.F of all four numbers (80, 215, 245, and 720) determined using the long division method?

After finding the H.C.F of the first two numbers (e.g., 80 and 215), use that result to find the H.C.F with the next number (e.g., 245). Then, use this new H.C.F to find the H.C.F with the last number (720). The final result will be the H.C.F of all four numbers.

What is the H.C.F of 80, 215, 245, and 720 after performing the long division process?

The H.C.F of 80, 215, 245, and 720 is 5, as determined by successive divisions and remainders in the long division method.

Why is the long division method effective for finding the H.C.F of multiple numbers?

Because it systematically reduces the problem by finding common divisors step-by-step, ensuring accuracy and clarity in identifying the greatest common factor among multiple numbers.

Can the Euclidean Algorithm be used instead of long division to find the H.C.F of these numbers?

Yes, the Euclidean Algorithm is an efficient alternative to the long division method for finding the H.C.F, especially for larger numbers, by repeatedly applying division and taking remainders until the remainder is zero.

Additional Resources

Find H. C. F Of Each Set Of Number Using Long Division Method 80, 215, 245 and 720

Introduction

The concept of Highest Common Factor (H.C.F.), also known as the Greatest Common Divisor (GCD), is fundamental in number theory. It is the largest positive integer that divides two or more integers without leaving a remainder. Finding the H.C.F. of a set of numbers is essential in various mathematical applications, such as simplifying fractions, solving problems involving ratios, and analyzing number properties.

One of the most effective and systematic methods for determining the H.C.F. of multiple numbers is the Long Division Method. This method involves successive division of the numbers to identify common factors, ultimately leading to the highest common factor shared by all the numbers in the set.

In this comprehensive guide, we will explore how to find the H.C.F. of the set of numbers: 80, 215, 245, and 720 using the long division method. We will delve into each step with detailed explanations, illustrating the process with clear calculations and reasoning.

Understanding the Long Division Method for H.C.F.

The long division method for finding the H.C.F. involves the following steps:

1. Arrange the numbers in order, typically from the smallest to the largest.
2. Divide the larger number by the smaller number to find the quotient and remainder.
3. Replace the larger number with the smaller number and the smaller number with the remainder.
4. Repeat this process until the remainder becomes zero.
5. The last non-zero remainder obtained in this process is the H.C.F. of the two numbers.
6. To find the H.C.F. of multiple numbers, pairwise apply the process:
- First, find the H.C.F. of the first two numbers.
- Then, find the H.C.F. of this result with the next number.
- Continue until all numbers have been included.

Step-by-Step Calculation of H.C.F. for 80, 215, 245, and 720

Let's now apply these principles to our specific set: 80, 215, 245, and 720.

Step 1: Find H.C.F. of 80 and 215

- Arrange numbers: 80 and 215

Long Division Process:

- Divide 215 by 80:

215 ÷ 80 = 2 (quotient) with a remainder:

215 - (80 × 2) = 215 - 160 = 55

- Now, replace the larger number with 80, and the smaller with 55:

- Divide 80 by 55:

80 ÷ 55 = 1 (quotient) with a remainder:

80 - 55 = 25

- Next, divide 55 by 25:

55 ÷ 25 = 2 (quotient) with a remainder:

55 - 50 = 5

- Now, divide 25 by 5:

25 ÷ 5 = 5 with a remainder of 0.

Conclusion:

- Since the last non-zero remainder is 5, the H.C.F. of 80 and 215 is 5.

Step 2: Find H.C.F. of the result (5) and 245

- Arrange numbers: 245 and 5

Long Division Process:

- Divide 245 by 5:

245 ÷ 5 = 49 with a remainder 0.

- Since the remainder is zero, the H.C.F. of 245 and 5 is 5.

Step 3: Find H.C.F. of the previous result (5) and 720

- Arrange numbers: 720 and 5

Long Division Process:

- Divide 720 by 5:

720 ÷ 5 = 144 with a remainder 0.

- Since the remainder is zero, the H.C.F. of 720 and 5 is 5.

Final Result: H.C.F. of 80, 215, 245, and 720

Since the H.C.F. of all the pairwise calculations is 5, this is the highest common factor for the entire set.

Therefore,

> The H.C.F. of 80, 215, 245, and 720 is 5.

Additional Notes and Insights

Why Use the Long Division Method?

- Systematic Approach: The long division method provides a clear, step-by-step procedure to find the H.C.F., especially useful for larger numbers.
- Efficiency: It often requires fewer calculations compared to listing all factors.
- Applicability: Suitable for multiple numbers, especially when they are large or not easily factorable at a glance.

Advantages over Other Methods

- Unlike listing all factors, which can be time-consuming, especially for large numbers, the long division method quickly narrows down the common divisor.
- It also naturally extends to more than two numbers, making it versatile for various mathematical problems.

Limitations

- For very large numbers, long division can become tedious.
- Sometimes, prime factorization could be more straightforward if the numbers are small or easily factorable.

Practical Applications of H.C.F.

Understanding and calculating the H.C.F. has numerous practical applications:

- Simplifying Fractions: Dividing numerator and denominator by their H.C.F. simplifies the fraction to its lowest terms.
- Problem Solving in Ratios: Ensures ratios are in their simplest form.
- Dividing Items Equally: Helps in distributing items evenly among groups without leftovers.
- Cryptography and Number Theory: Fundamental in algorithms involving divisibility.

Summary and Conclusion

In this detailed exploration, we have demonstrated how to find the H.C.F. of the set of numbers 80, 215, 245, and 720 using the Long Division Method. The process involves successive division steps, identifying remainders, and reducing the problem to simpler pairs until the last non-zero remainder is obtained. The key takeaways include:

- The H.C.F. of the numbers is 5.
- The method is systematic, reliable, and applicable to multiple numbers.
- Understanding the process enhances number sense and problem-solving skills.

By mastering the long division method for H.C.F., students and practitioners can efficiently analyze number sets, simplify fractions, and solve diverse mathematical challenges with confidence.

Practice Exercises

To reinforce understanding, consider practicing with the following sets:

1. Find H.C.F. of 48, 60, and 72.
2. Determine the H.C.F. of 105, 210, and 315.
3. Calculate the H.C.F. of 121, 242, and 363.

Consistent practice will develop proficiency and deepen comprehension of the long division method for H.C.F.

End of Content

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