



Try these problems before watching the lesson.

1. To express 20 as a sum of different powers of 2, we would write $20 = 2^4 + 2^2$. The sum of the exponents of these powers is $4 + 2 = 6$. If 400 were expressed as a sum of at least two distinct powers of 2, what would be the least possible sum of the exponents of these powers?
2. What is the base 4 representation of the base 2 number 11011000_2 ?
3. The product of integers 240 and k is a perfect cube. What is the smallest possible positive value of k ?
4. The base six number 53_6 is equal to the base b number 113_b . What is the positive value of b ?




First Problem: What is the least positive base-10 integer that can be written as a 4-digit number in base 3 and as a 3-digit number in base 4?

Second Problem: A positive integer q is the product of a prime number and a perfect square. Additionally, q is the product of a different prime number and a perfect cube. What is the least possible value of q ?

 Follow-up Problems

5. What is the smallest positive integer n such that $2n$ is a perfect square and $3n$ is a perfect cube?
6. The base 9 representation of a positive integer is AB and its base 7 representation is BA . What is the integer expressed in base 10?
7. If $2015 + a = b$ for positive integers a and b , both of which are palindromes, what is the smallest possible value of a ?
8. In base b , 441_b is equal to n^2 in base 10, and 351_b is equal to $(n - 2)^2$ in base 10. What is the value of b , expressed in base 10?

 Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).