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Activity Sheet for the January, 2017, MATHCOUNTS Mini

Try these problems before watching the lesson.

1. Expand the product $(x+2)(x-7)$.
2. Find the value of k for which $kx^2 - 5x - 12 = 0$ has solutions $x = 3$ and $x = -\frac{4}{3}$.
3. What is the value of $4^{10} \times 8^{20}$? Express your answer in the form a^b, where a and b are positive integers such that a is the least possible positive integer.
4. If $b(b^4 \cdot b^3)^2 = b^{3x}$, what is the value of x?

First Problem: If $(x^2 + 3x + 6)(x^2 + ax + b) = x^4 + mx^2 + n$ for integers a, b, m and n, what is the product of m and n?

Second Problem: If x is a number such that $3^x + 3^{x+2} = 9^x + 9^{x+2}$, then what is the value of 3^x?

Follow-up Problems

5. Find $a^2 + \frac{1}{a^2}$ if $a + \frac{1}{a} = 3$.

6. If r is a solution of the equation $x^2 + 11x - 19 = 0$, what is the value of $(r+5)(r+6)$?

7. Solve for x: $\left(\frac{1}{4}\right)^{2x+8} = (16)^{2x+5}$.

8. Find all values of x such that $4^x = 33 \cdot 2^{x-1} - 8$.

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).