

Do NOT use decimal approximations for  $\pi$ ,  $\sqrt{2}$ ,  $\sqrt{3}$  etc. Radicals should be expressed in the simplest radical form, and fractions should be expressed in the lowest terms. Label answers with unit measurements where appropriate.

1. Multiply out  $(x - y)^5$

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2. Meg is twice as old as Rolf, but three years ago, she was two years older than Rolf is now.  
How old is Rolf now?

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3. Let  $\{x_n\}$  be a sequence, where  $x_n = \frac{2n+4}{n+3}$ . What is  $x_{n+1}$ ?

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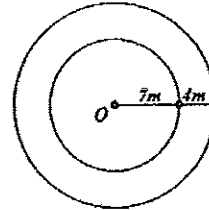
4. Solve the system of equations: 
$$\begin{cases} 2x + y + z = 7 \\ x + 2y + z = 8 \\ x + y + 2z = 9 \end{cases}$$

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5. Solve equation  $e^{x^2} \cdot e^{3x} = \frac{1}{e^2}$

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6. Find the exact area of the ring formed by two circles with the center O. The radius of an inner circle is  $7m$ , and width of the ring is  $4m$ .



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7. Which of the properties of real numbers is illustrated below:

$$2(x + 3y) + 2z = 2z + 2(x + 3y)$$

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8. State the domain of  $f(x) = 3x^3 + 2x + \ln\left(\frac{x+3}{x^2+6x-7}\right)$  in interval notation.

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9. Let  $A * B = \frac{A+B}{B}$  and  $C \blacklozenge = C + 3$ , what is the value of  $(9 \blacklozenge) * 3$ ?

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10. A square has the same area as a rectangle whose length is 2 more than its width. If the perimeter of the rectangle is 12. What is the perimeter of the square?

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11. A salesperson must travel to six cities to promote a new marketing campaign. How many different trips are possible if any route between cities is possible?

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12. A family has eight children. If this family has exactly three boys, how many different birth and gender orders are possible?

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13. Solve the given equation:  $\log 5 + \log(x + 10) = 1 - \log(2x - 1) + \log(21x - 20)$

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14. A poor man promises to work for \$0.01 the first day, \$0.02 the second day, \$0.04 the third day; his salary will continue to double each day. If he started on January 1, how much would he be paid to work on January 31? How much total would he make during the month?

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15. The cone of maximum size was carved out from the wooden cylinder. Find the percentage of the wood that was lost due to carving.

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