

26th New Brunswick Math Competition (2009)

GRADE 7

HINTS

Remark:

Since this is a multiple choice competition, many problems can be done by checking the choices. ("guess and check").

Usually, these hints suggest a method other than "guess and check". Problems may have solutions other than the one suggested here.

Always try the problem before reading the hint!

1. Fractions! Be sure to simplify $3 + \frac{4}{5}$ first.
2. Lots of ways to think this out. Here is one. Since he sold the same number of $5kg$ and $1kg$ bags of sugar, lets pretend he sold $6kg$ packages (2 bags) of sugar. So yesterday he sold $\frac{216}{6} = 36$ packages . He sold twice that number of bags of sugar.
3. Check each choice in turn by subtracting 2 and then determine if the result is divisible by 3. You can just use the division algorithm, but an easy test for divisibility by 3 is this: A number is divisible by 3 if the sum of the digits is divisible by 3. (The sum of the digits of 4377 is $4+3+7+7=21$.)
4. Three equations and unknowns works fine. A cleverer way to get to the answer is to notice that $100+90-110$ is twice the number of boxes Daryl can pick in a day, so the answer is $\frac{1}{2}(100 + 90 - 110)$.
5. Since there are 270 seats in theatre 1, theatres 2 and 3 have a total of $530 = 800 - 270$ seats. Now use two equations and 2 unknowns.
6. Solve $x + (x + 6) + (x + 12) + (x + 18) + (x + 24) = 100$
7. Since one of the coins is a quarter, the other three have total value \$1.35. There is only 1 way to have three Canadian coins worth \$1.35.
8. Sam received \$21 plus the bike for work of value $\frac{4}{7}$ (\$210 + the bike).
9. The equation $fare = \$2.00 + \$1.25 \times distance$ can be used, with $fare = 19.50$. However, the numbers are small enough that one might start with \$2.00 and keep adding \$1.25 until \$19.50 is reached.
10. A factor of 12 is a positive integer that (evenly) divides 12. So the factors of 12 are 1,2,3,4,6, and 12.
11. If the son is x years old, $(x + 2) \cdot 5 = \frac{1}{2}(78 + 2)$.
12. Notice that the sentence "Forty percent of the stalls are for ponies" is unnecessary information and that on Tuesday there were 750 animals in the barn.

13. First compute the volume of the aquarium ($\frac{2}{3} \times volume = 12000cm^3$). That volume is $20 \times 20 \times length$.
14. $1 + \frac{2}{3} + \frac{4}{9} + \frac{2^3}{3^3} + \frac{2^4}{3^4} = \frac{3^4 + 2 \cdot 3^3 + 4 \cdot 3^2 + 8 \cdot 3 + 16}{3^4}$
15. A $4m \times 4m \times 4m$ hole has the volume of $\frac{4 \times 4 \times 4}{2 \times 2 \times 2} = 8$ $2m \times 2m \times 2m$ holes.
16. Count carefully! Half the rectangles have their sides parallel to the edges of the paper, half at a 45° angle to the paper.
17. Work backwards: If the dish was covered on day 16, it was only half covered on day 15
18. One way to do this problem is to notice that the large triangle is twice as high and twice as wide as the small triangle. (Because the triangles are similar.) So (using $\frac{1}{2}$ base \times height) the area of the large triangle is 4 times that of the small triangle.
19. The area of a triangle is $\frac{1}{2}$ base \times height. The area of a rectangle is base \times height. The base of the triangle and the base of the rectangle are the same length.
20. Consider the bottom right corner of the grid. The number in that position cannot be a 1 or 3, because the last column already contains both a 1 and a 3 nor can it be a 4 because the last row contains a 4. So it must be a 2. Continue like this to fill in the grid.
21. The two digit integers are the integers from 10 to 99. 1,3,5,7,9 are each used 10 times in the tens position, and each used 9 times in the ones position.
22. $A = a^2, B = 4a^2, C = \frac{1}{2} \cdot 2a^2$.
23. There are $4 \times 3 \times 2 \times 1$ ways of arranging the kids in a line, but some of those ways result in Brad and Cathy being next to each other. So, count the number of ways to arrange the kids with Cathy and Brad next to each other, then subtract.
24. After $1\frac{1}{4}$ hours, the motor cycle had travelled $60km + \frac{1}{4} \cdot 60km = 75km$.
25. All sides of the two boxes have to be painted except the bottoms of the two boxes and that part of the top of the bigger box that touches the smaller box.
26. Consider the last digits of $2^1, 2^2, 2^3, 2^4, \dots$ and notice the pattern.