Nassau County Interscholastic Mathematics League

Contest #1 Answers must be integers from 0 to 999, inclusive.

2025 - 2026

No calculators are allowed.

Time: 10 minutes

Name: _____

- 1. Compute $64^0 + 64^{\frac{1}{3}} + 64^{\frac{1}{2}} + 64^1 + 16^{\frac{1}{4}} + 16^{\frac{1}{2}}$.
- 2. Point *B* is on \overline{AC} and AB:BC=2:3. If the coordinates of the points *A*, *B*, and *C* are respectively (-17,92), (x,y), and (43,2), compute the product, xy.





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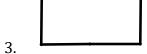
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3. Compute the positive value of x such that (4x)% of 5x is x.

4. In $\triangle ABC$, point M is the midpoint of \overline{BC} and point N is the midpoint of \overline{AC} . If AM = 12, BN = 18, and AC = 20, compute the area of $\triangle ABC$.





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5. Compute *x* if $2^{x-3} - 2^{x-4} + 2^{x+5} = 1026$.

6. If $f(x) + f(x - 1) = x^2$ and f(11) = 50, compute f(41).





Solutions for Contest #1

1.
$$64^{0} + 64^{\frac{1}{3}} + 64^{\frac{1}{2}} + 64^{1} + 16^{\frac{1}{4}} + 16^{\frac{1}{2}} = 1 + 4 + 8 + 64 + 2 + 4 = 83$$
.

- 2. Since point *B* is $\frac{2}{5}$ of the distance from point *A* to point *C* on \overline{AC} : $x = -17 + \frac{2}{5}(43 (-17)) = -17 + \frac{2}{5}(60) = 7 \text{ and } y = 92 + \frac{2}{5}(2 92) = 92 + \frac{2}{5}(-90) = 56.$ The required product is **392**.
- 3. From the problem statement, $\frac{4x}{100} \cdot 5x = x \rightarrow 20x^2 = 100x \rightarrow x^2 = 5x \rightarrow x = 5$. Reject x = 0 because the problem asks for the positive value only.
- 4. Let the intersection of \overline{AM} and \overline{BN} be point P. Because of the midpoints, AN = NC = 10 and BM = MC. Because medians of a triangle intersect and separate in a 2:1 ratio, AP = 8, PM = 4, BP = 12, and PN = 6. Because the sides of ΔAPN are 6-8-10, it is a right triangle with right $\angle P \rightarrow |\Delta APN| = 24 = |\Delta BPM|$ and $|\Delta APB| = 48 \rightarrow |\Delta AMB| = 48 + 24 = 72$, Then, since \overline{AM} is a median in ΔABC , $|\Delta ABC| = 2 \cdot 72 = 144$. Note: A median of a triangle divides it into two triangles of equal area. Alternatively, if all three medians are drawn, they divide ΔABC into 6 triangles of equal area. So, if $|\Delta APN| = 24$, then $|\Delta ABC| = 6 \cdot 24 = 144$.
- 5. From the given equation: $2^{x-4}(2-1+2^9) = 1026 \rightarrow 2^{x-4}(513) = 1026 \rightarrow 2^{x-4} = 2^1 \rightarrow x 4 = 1 \rightarrow x = 5$. Alternatively, $2^x \left(\frac{1}{8} \frac{1}{16} + 32\right) = 1026$. Multiplying by 16, $2^x(2-1+512) = 1026 \cdot 16 \rightarrow 2^x(513) = 1026 \cdot 16 \rightarrow 2^x = 32 \rightarrow x = 5$.
- 6. Start with $f(41) + f(40) = 41^2$, $f(40) + f(39) = 40^2$, $f(39) + f(38) = 39^2$, ... $f(13) + f(12) = 13^2$, $f(12) + f(11) = 12^2$. Then, subtract these equations pairwise: $f(41) f(11) = 41^2 40^2 + 39^2 38^2 + 38^2 37^2 + \dots + 13^2 12^2 = (41 + 40)(41 40) + (39 + 38)(39 38) + (37 + 36)(37 36) + \dots + (13 + 12)(13 12) = 81 + 77 + 73 + \dots + 25 = \frac{15}{2}(81 + 25) = 795$. So, f(41) = 795 + f(11) = 795 + 50 = 845.