Answers

Minnesota State High School Mathematics League
Individual Event

2001-02 Event 1A

The first question is intended to be a quickie and is worth 1 point. Each of the next three questions is worth 2 points. Place your answer to each question on the line provided. You have 12 minutes for this event.

1. Find the least common multiple of the set of numbers \(52, 72, 42\).

\[\text{lcm} \{2 \cdot 2 \cdot 13, 2 \cdot 2 \cdot 3 \cdot 3, 2 \cdot 3 \cdot 7\} = (2 \cdot 2 \cdot 13) \cdot (2 \cdot 3 \cdot 3) \cdot (7) = 6552\]

2. Express as an integer or the quotient of two relatively prime integers the fraction

\[
\frac{\frac{19}{3} + \frac{11}{5}}{\frac{5}{3} + \frac{7}{3}} = \frac{\frac{19 \cdot 5 + 11 \cdot 3}{3 \cdot 5}}{\frac{5 \cdot 3 + 7 \cdot 3}{3 \cdot 5}} = \frac{19 \cdot 5 + 11 \cdot 3}{3 \cdot 5} = \frac{19}{3} + \frac{11}{5} = \frac{19 \cdot 15 + 11 \cdot 3}{3 \cdot 5} = \frac{19 \cdot 15}{3 \cdot 5} = \frac{19 \cdot 3}{3} = 3
\]

3. Mr. Sellit runs a store in which he sets a selling price on each item that is a \(33\frac{1}{3}\%\) increase over what he pays for that item. What percent of the selling price represents the cost of the item to Mr. Sellit?

\[\text{percent} = \frac{3}{4}\]

4. Find the three lattice points (points with integer coordinates) closest to the origin that satisfy \(13x + 29y = 48\).

\[\text{closest points: } (26, -10), (-3, 3), (-32, 16)\]

Those who understand modular arithmetic will recognize that \(3y \equiv 9 \mod 13\), hence \(y \equiv 3 \mod 13\). Some solutions are:

\[
x | 55 -26 -32 -61
y | -23 -10 3 16 29
\]

Three closest to the origin are: \((-3, 3)\)