2007 Coconino County Math Contest College Bowl Competition

Students, start your brain cells!
What is three more than twice seven?
Evaluate: $\sqrt{5^2 - 4^2}$
Simplify: \( \frac{1}{5} + \frac{1}{20} \)
Simplify: \( 1-(3-(5-(7-9))) \)
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 ?? 5 1
What mathematician’s name is associated with the array in the previous slide?

[Pascal]
The first Annual Slug Race was held in 1998. When will the 20th one be?
<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>??</td>
<td>??</td>
<td></td>
</tr>
</tbody>
</table>

$[11, 17]$
What are the prime factors of 330,000?

[2, 3, 5, 11]
What number is three more than half of itself?
What number is three less than half of itself?

[-6]
Sam is two years older than his brother Jim. The sum of their ages is 30. When will the sum of their ages be 40?
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>17</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>??</td>
<td></td>
</tr>
</tbody>
</table>

[9]
If \( t = 4 \) and \( Q = 11 \), what is the value of \( \frac{Q-1}{t+1} \)?
George tells you that the average of 20 consecutive numbers (i.e. positive integers) is 52800. What do you deduce?

[That George is a liar]
“x@y” stands for x/(y-x). What, then, is 6@(4@2)?

[-3/4]
Calculate: \[ \frac{10 + \frac{1}{2}}{\frac{3}{2} + 2} \]
The problem says, “The first number is 7 more than twice the second number.” If the first number is $t$, what is the second number?

$$\frac{(t-7)}{2}$$
If I drive at 30 mph for 20 minutes, then 60 mph for 10 minutes, what is my average speed?

[40 mph]
Two numbers differ by 7 and their sum is 9. What are they?

[1 and 8]
Two numbers differ by 9 and their sum is 7. What are they?

[8 and -1]
Simplify: \[
\frac{1 + \frac{1}{2}}{1 + \frac{3}{4}}
\]
What is 110% of 90% of 300?
The sum of a number and its reciprocal is smaller than the number. How can that be?

[The number must be negative]
What is the area of circle of radius \( \frac{1}{\pi} \)?
<table>
<thead>
<tr>
<th></th>
<th>23</th>
<th>25</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>45</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td></td>
<td>67</td>
<td></td>
</tr>
</tbody>
</table>

[65]
What value of x makes this possible?

[x = 65]
If $a = 3$, evaluate:

$$a^{a-1} + (a - 1)^a$$
What is the next number in this sequence:
1, 0, 1, 1, 2, 3, 5, 8, ...?
If \( \sqrt{1+\sqrt{x}} = 2 \), what is \( x \)?

\[ x = 9 \]
Simplify: \[ \frac{A}{B} + \frac{A + \sqrt{B}}{B + \sqrt{A}} \]
10-(9-(8-(7-(6-5)))) = ?
If A is always the average of B and C, what is C when A = 6 and B = 8?
Simplify: \[ 1 + \frac{1}{2} - \frac{1}{2} - \frac{1}{2} \]
Evaluate:

\[ \sqrt{49} - \sqrt{9} \]
What is the next number in this sequence?
48, 41, 34, 27, 20, . . . . .
What is:
| |3-8| - |2-11| |
?

[4]
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>??</td>
<td>??</td>
<td>??</td>
<td></td>
</tr>
</tbody>
</table>

[16, 22, 29]
What is the sum of these nine numbers:

\[ a = 2^2 - 1^2 \]
\[ b = 3^2 - 2^2 \]
\[ c = 4^2 - 3^2 \]
\[ d = 5^2 - 4^2 \]
\[ r = 6^2 - 5^2 \]
\[ s = 7^2 - 6^2 \]
\[ t = 8^2 - 7^2 \]
\[ x = 9^2 - 8^2 \]
\[ y = 10^2 - 9^2 \]
1
1 1 1
1 2 3 2 1
1 3 6 7 6 3 1
1 4 10 16 ? 16 10 4 1
[19]
See those four guys in line? I happen to know that each one has twice as much money as the guy in front of him and a dollar more, as well. If the one in front has $10 what does the guy in back have?

[$87]
<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>100</td>
<td>??</td>
</tr>
</tbody>
</table>

[301]
Simplify:
\[
\frac{1}{5} + \frac{1}{45}
\]
R is less than T, and yet $R^2$ is greater than $T^2$. How can that be?

[R is negative]
Evaluate

$$\sqrt{\sqrt{16}} = [2]$$
James was 26 when Suzie was born. How old will Suzie be when he is three times as old as she?
The rectangle is 4in x 9in and divided into identical parts. What is the area of the shaded region?

[16\&1/2 sq. in.]
What do these shapes have in common?

[They are all parallelograms]
Spell “pair-uh-lllelll-uh-gram “
The sum of four consecutive numbers is 50. What is the smallest of them?
What do these six shapes all have in common?

[Each one is a hexagon]
What is the next number in this sequence:
44, 31, 13, 18, 5, 13, 8, …?
20 feet per minute is how many inches per second?

[4 in/sec]
What is the smallest odd number $k$ such that $\frac{2}{7} - \frac{1}{k}$ is positive?
The diagram shows the seven clever pieces, often called Tangrams, formed into a square. If the area of the square is 1, what is the area of the smallest size of triangle, shown shaded?

\[
\frac{1}{16}
\]
What is the next number in this sequence:
1, 2, 4, 7, 12, 20, 33, 54, 88, ... ?
1 + 2 + 3 + . . . + 998 + 999 + 1000 = ?
N is the sum of four distinct odd numbers. What is the smallest N can be?
Which of these cannot be folded up to make a cube?

A

B

[C]

[D]
<table>
<thead>
<tr>
<th></th>
<th>18</th>
<th>2</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>11</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>??</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

[20]
Kalkoola Middle School's student body is 60% 7th-graders and 40% 8-th graders. Half of the 7-th graders are bussed in, as are one-fourth of the 8-th graders. What proportion of the KMS kids walk to school?

[60%]
Each of the triangles is right and each of the indicated legs has length 1. How long is the last hypotenuse $x$?
This is a non-convex pentagon. It has two places where the lines cross. What is the greatest possible number of crossings in a pentagon?

[5; in a star]
What is the decimal form of the sum below?

\[
\frac{5}{10} + \frac{2}{100} + \frac{6}{1000}
\]

[.526]
How many square yards of carpet are needed to carpet a rectangular room that measures 12 feet by 15 feet?

[20 sq. yds.]
Simplify: \((2i-1)(i-2)\)
The points (2, 17), (5, 11) and (9, t) all lie on the same line. What is the value of t?
Consider all the points in the plane of the form 
\((t^3+4\sin(t)-e^t, t^3+4\sin(t)-e^t+1)\). What is the shape of this set of points?

[The line \(y = x+1\)]
Three consecutive numbers add up to 3000. What are they?

[999, 1000, 1001]