Fibonacci

Leonardo Pisano Fibonacci was a mathematician who lived from 1170 to 1250. For a while, he worked extensively with a special sequence of numbers that became known as the Fibonacci sequence. Continue the pattern below to find more Fibonacci numbers.

\[ \begin{align*}
1 & \quad 1 & \quad 2 & \quad 3 & \quad 5 & \quad 8 & \quad \_ & \quad \_ & \quad \_ \\
1+1 & & 1+2 & & 2+3 & & 3+5 & & 5+8 \\
\end{align*} \]

Now let’s see some other patterns that we can get using the Fibonacci sequence.

### PATTERN #1

This many Fibonacci #’s \( \ldots \) means this sequence \( \ldots \) which equals what?

<table>
<thead>
<tr>
<th>Fibonacci #’s</th>
<th>( \ldots )</th>
<th>Sequence</th>
<th>( \ldots )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1 + 1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1 + 1 + 2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1 + 1 + 2 + 3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1 + 1 + 2 + 3 + 5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>_</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>_</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>_</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>_</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>_</td>
<td>_</td>
<td></td>
</tr>
</tbody>
</table>

**Hint:** Another way to find the sum, add the last number of two consecutive lines and subtract 1.

### PATTERN #2

Square and add the Fibonacci numbers... \( \ldots \) to get this sum

\[
\begin{align*}
1^2 + 1^2 &= 2 \\
1^2 + 1^2 + 2^2 &= 6 \\
1^2 + 1^2 + 2^2 + 3^2 &= 15 \\
1^2 + 1^2 + 2^2 + 3^2 + 5^2 &= \_ \\
1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 &= \_ \\
1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + 13^2 &= \_ \\
1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + 13^2 + 21^2 &= \_ \\
1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + 13^2 + 21^2 + 34^2 &= \_ \\
1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + 13^2 + 21^2 + 34^2 + 55^2 &= \_ \\
\end{align*}
\]

**Remember:**
\[
\begin{align*}
1^2 &= 1 \times 1 \\
2^2 &= 2 \times 2 \\
3^2 &= 3 \times 3 \ldots
\end{align*}
\]