1. **Numbers**  If $A \times B = 24$, $C \times D = 32$, $B \times D = 48$, and $B \times C = 24$, what is the value of $A \times B \times C \times D$?

2. **Measurement**  The diameter of the circle is the same as the radius of the semicircle. What fraction of the area of the semicircle is shaded?

3. **Number property**  The number 153 has an interesting property.
   \[1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153\]
   There are two other three-digit numbers that begin with 3 and also have this property. There is also one three-digit number, beginning with 4, that has the same property. Find these numbers.

4. **Real numbers**  If $a$, $b$, and $c$ are three different real numbers whose sum is zero and whose product is two, what is the value of $a^3 + b^3 + c^3$?

5. **Positive integers**  The positive integers are arranged in the pattern shown. If this pattern is continued, what number will fall in the nineteenth column of the sixty-fifth row?

   
   \[
   \begin{array}{cccccc}
   1 &  &  &  &  & \\
   2 & 3 &  &  &  & \\
   4 & 5 & 6 &  &  & \\
   7 & 8 & 9 & 10 &  & \\
   11 & 12 & 13 & 14 & 15 & \\
   \end{array}
   \]

6. **Equation**  Place the fewest possible mathematical symbols between digits to make the following equation true.
   \[1 2 3 4 5 6 7 8 9 = 100\]

7. **Rolls of steel**  Three rolls of steel are held together with a band. The diameter of each roll of steel is 1 m. What is the length of the band?

8. **Time**  If it is 9 a.m. now, what time will it be 99 999 999 999 h from now?

9. **Circles**  Find the equation of the largest circle that can be inscribed in a quadrant of a circle with centre at the origin and radius $r$.

10. **Locus**  In a 2 by 2 square, find the locus of points for which the sum of the squares of the distances from the four vertices is 16.

11. **Mount Everest**  Estimate the number of dump trucks full of rocks needed to move Mount Everest.