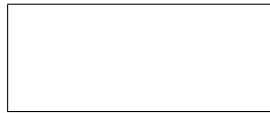**Problem 1.** A rectangular prism has edge lengths $6, 8$, and 24. What is the length of the interior diagonal?
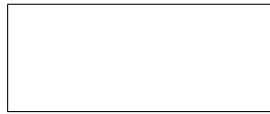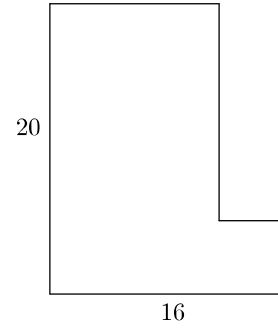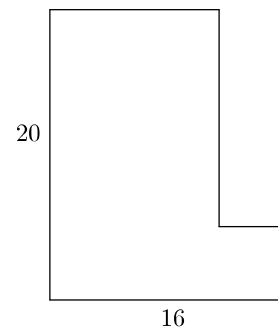
**Problem 2.** What is the perimeter of the polygon? All angles are 90°.

20

16

Problem 2. What is the perimeter of the polygon? All angles are 90°.

20

16

Problem 3. Start with a square. Connect the midpoints of adjacent sides to form a second square. Connect the midpoints of the second square to form a third square. What is the ratio of the area of the first square to the area of the third?
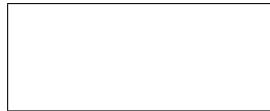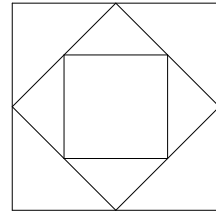
Problem 3. Start with a square. Connect the midpoints of adjacent sides to form a second square. Connect the midpoints of the second square to form a third square. What is the ratio of the area of the first square to the area of the third?
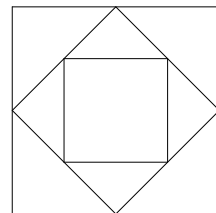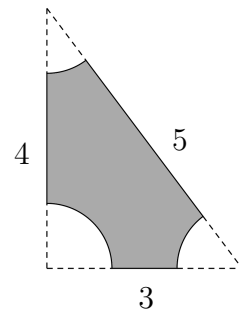
Problem 4. What is the area of the shaded region? The curves are arcs of circles of radius 1, centered at the vertices, and the triangle has side lengths $3, 4, 5$.
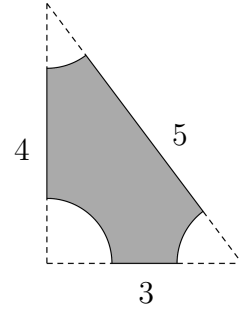
Problem 4. What is the area of the shaded region? The curves are arcs of circles of radius 1, centered at the vertices, and the triangle has side lengths $3, 4, 5$.

Problem 5. Solve for x:
$$e^{2x} - 4e^{x+1} + 4e^2 = 0.$$

Problem 5. Solve for x:
$$e^{2x} - 4e^{x+1} + 4e^2 = 0.$$

Problem 6. 10 apples and 5 bananas cost $45. 5 apples and 10 bananas cost $30. What is the difference between the price of an apple and the price of a banana?

Problem 6. 10 apples and 5 bananas cost $45. 5 apples and 10 bananas cost $30. What is the difference between the price of an apple and the price of a banana?

Problem 7. If you know that the real number x is closer to 10 than to 15, and closer to 3 than to 2, what is the length of the interval in which x can lie?

Problem 8. Mo gave a 10 question quiz to 40 students. So far he has graded all of the questions on $\frac{1}{5}$ of the quizzes, and $\frac{1}{5}$ of the questions on the rest of the quizzes. What percentage of the questions has he graded?

Problem 9. If x, y, and z are positive integers satisfying $2^x + 2^y = 2^z$ and $2^x \cdot 2^y = 2^{z+1}$, then what is z?

Problem 10. What is the smallest positive integer that has exactly 10 factors? (Hint: It is not 6, which has 4 factors: 1, 2, 3, and 6.)