First set of Homework

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Please note: You should fully justify your answers.

1 Pythagorean Theorem and distance formula

1. The legs of a right triangle have length 3 cm and 4 cm. Find the length of the hypotenuse.
2. One leg of a right triangle is 4 inches and the hypotenuse is 7 inches. Find the length of the other leg.
3. The hypotenuse of a right triangle is 6 cm and one of its legs is $\sqrt{6}$ cm. Find the length of the other leg.
4. The legs of a right triangle have lengths $\sqrt{2}$ inches and $1+\sqrt{3}$ inches. Find the length of the hypotenuse.
5. What is the length of the diagonal of a square of side 3?
6. One leg of a right triangle is 2 inches more than the other leg. The hypotenuse is 10 inches. Find the three sides of the triangle.
7. The sum of the lengths of the two sides of a right triangle is 4 cm while the length of the hypotenuse is 12 cm. Find the lengths of the two legs.
8. Verify that the triangle ABC in Figure 1 is isosceles.

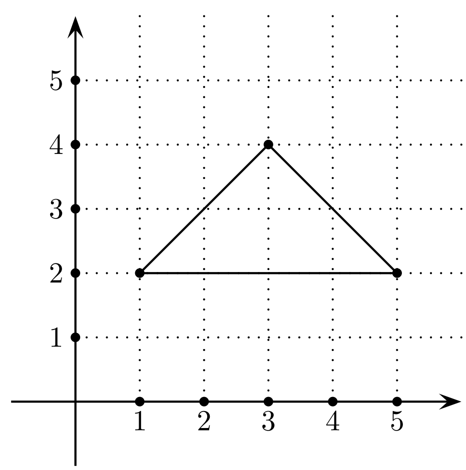
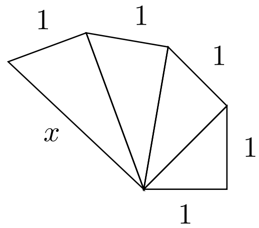


Figure 1: An allegedly isosceles triangle

9. Find x.



10. Find the distance between the points with coordinates
    (a) $(0, 0)$ and $(3, 4)$.
    (b) $(-2, 1)$ and $(-2, -4)$.
    (c) $(1, 3)$ and $(-1, -2)$.
    (d) $(2, 5)$ and $(1, 7)$.
    (e) $(-1, -3)$ and $(-4, -5)$

11. An unknown point lies in the line with equation $x = 3$ and its distance from the point $(1, 2)$ is $2\sqrt{5}$. What are the coordinates of the unknown point?

12. **Extra Credit:** Use the picture in Figure 2 to prove the Pythagorean theorem.

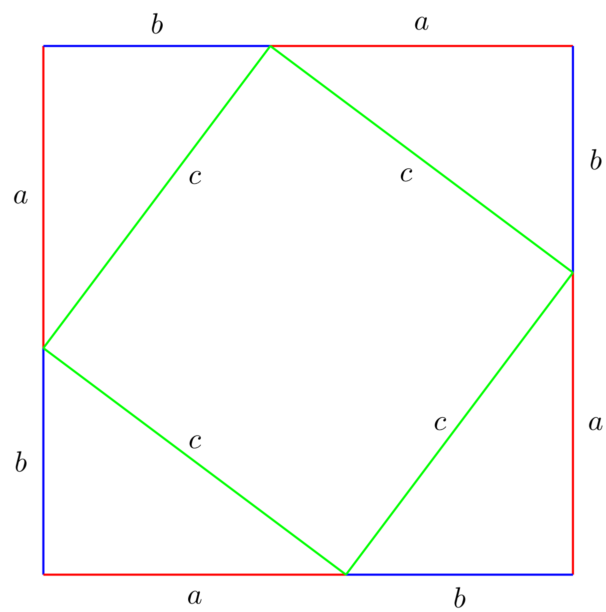


Figure 2: Figure for proving the Pythagorean theorem

13. **Extra Credit:** This is a puzzle that shows another way that one can use to prove the Pythagorean theorem. In Figure 3 a right triangle is shown with squares erected on each of its sides. Use a pair of scissors to cut the three squares and then cut the middle sized square into four pieces along the dashed lines. Your task then is to arrange these four pieces together with the smaller square to completely cover the larger square. Do you see why this is relevant to Pythagorean theorem?

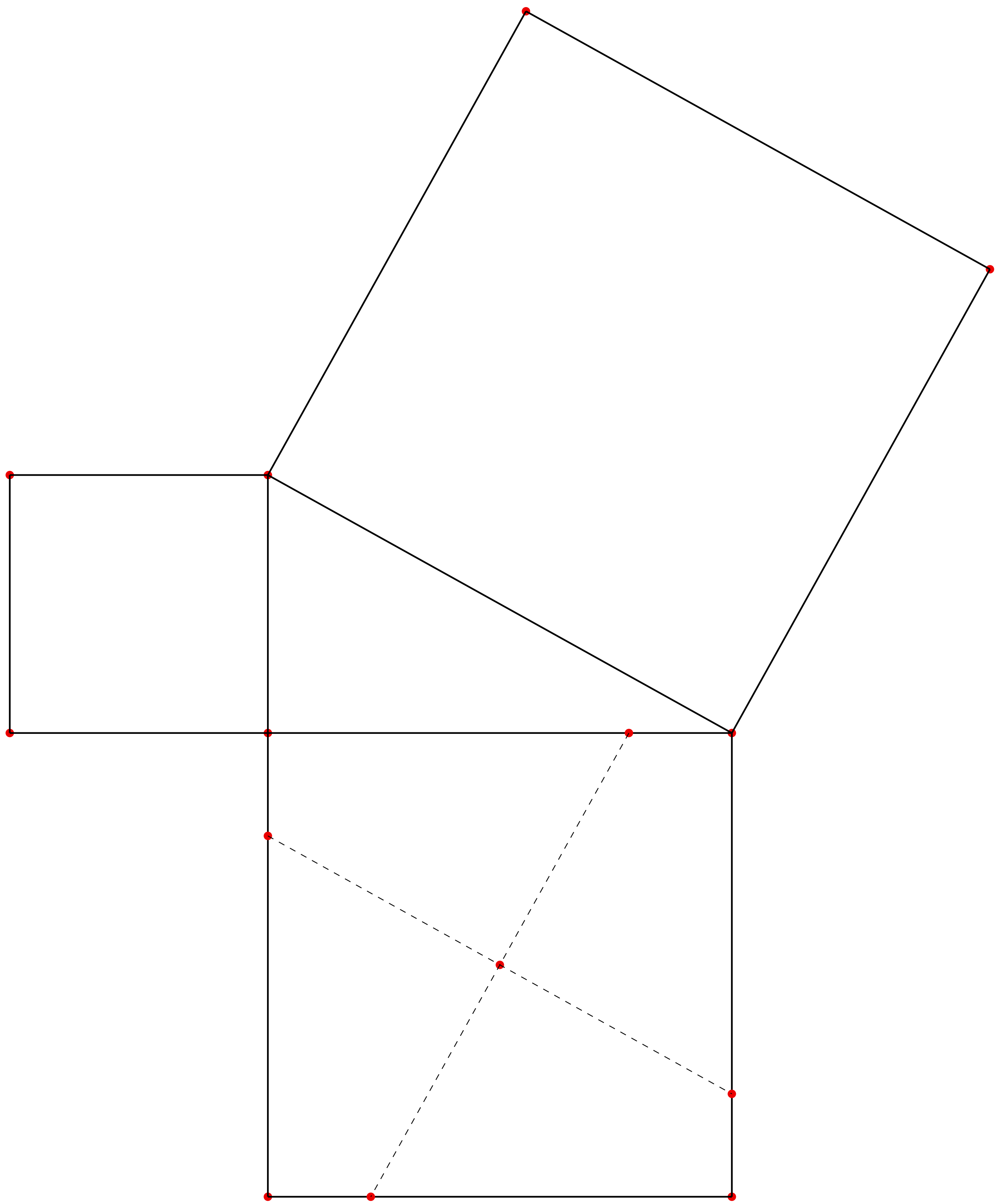


Figure 3: The Pythagorean puzzle