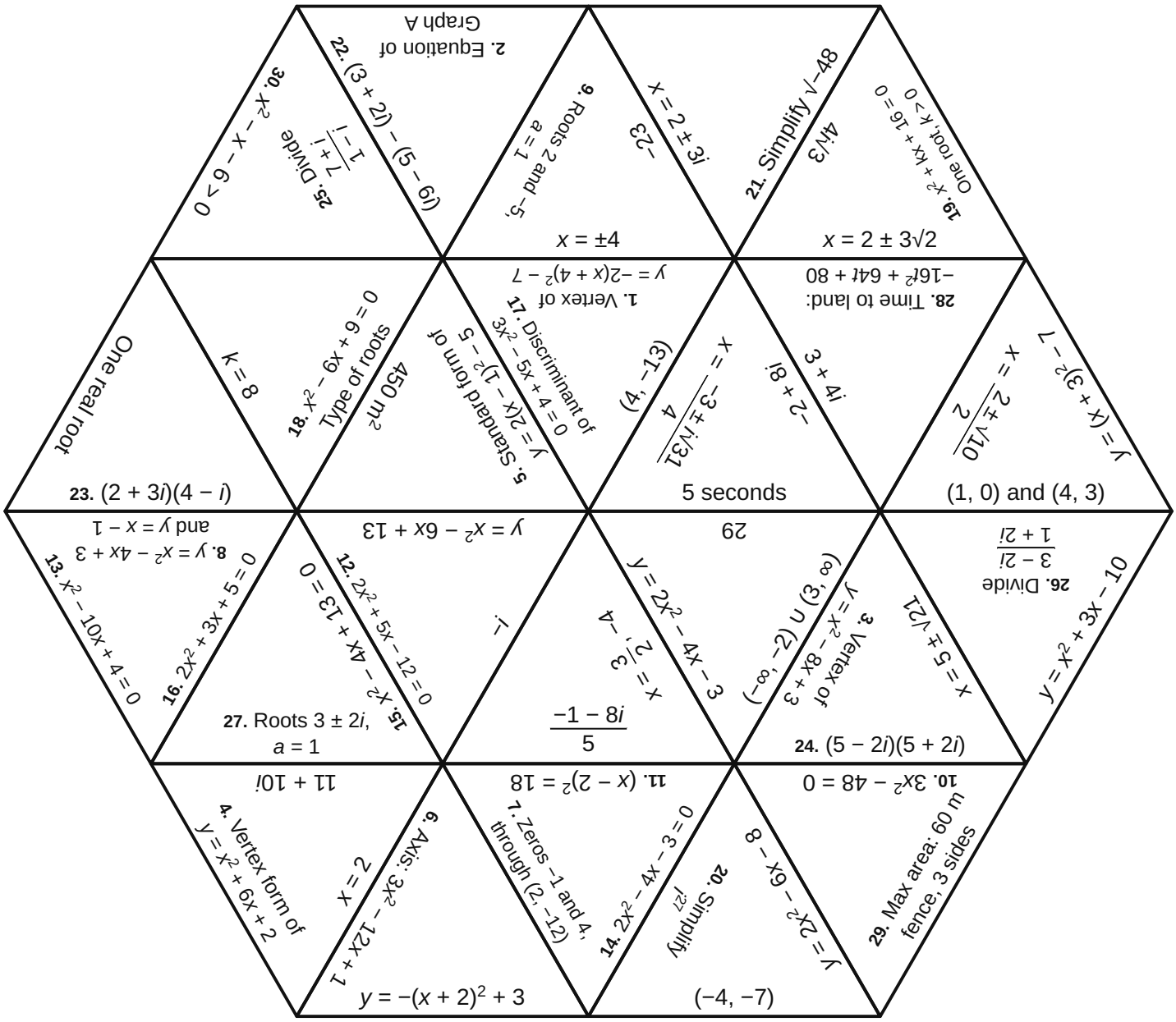
Quadratic Functions & Complex Numbers Tarsia

Mr. K's Classroom · Hexagon of 24 triangles, 30 matches

Name: _____

Directions: Work with parabolas (vertex, axis, forms), solve quadratics four ways, use the discriminant, compute with complex numbers, and model with quadratics. Answers with two solutions are written with ± or as a pair; Problem 2 uses a graph shown on the work pages. Cut out the 24 triangles. Match each problem to its answer so that touching edges fit, and build a **hexagon**. Glue it on a sheet of paper. Show your work for every problem on the work pages (the number before each problem tells you where).

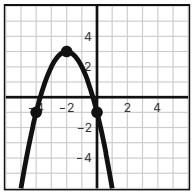


Show Your Work

Quadratic Functions & Complex Numbers Tarsia · Problems 1–15 Name: _____

1.
Find the vertex of $y = -2(x + 4)^2 - 7$.

2.
Graph A shows a parabola through the three marked points. Write its equation in vertex form.



3.
Find the vertex of $y = x^2 - 8x + 3$ by finding the axis of symmetry first.

4.
Complete the square to write $y = x^2 + 6x + 2$ in vertex form.

5.
Expand $y = 2(x - 1)^2 - 5$ into standard form.

6.
Find the axis of symmetry of $y = 3x^2 - 12x + 1$.

7.
A parabola has zeros at $x = -1$ and $x = 4$ and passes through $(2, -12)$. Write its equation in standard form.

8.
Solve the system $y = x^2 - 4x + 3$ and $y = x - 1$. Write each solution as an ordered pair.

9.
Write the quadratic with leading coefficient $a = 1$ and roots 2 and -5 in standard form.

10.
Solve $3x^2 - 48 = 0$ using square roots.

11.
Solve $(x - 2)^2 = 18$. Give exact answers in simplest radical form.

12.
Solve $2x^2 + 5x - 12 = 0$ by factoring.

13.
Solve $x^2 - 10x + 4 = 0$ by completing the square. Give exact answers.

14.
Solve $2x^2 - 4x - 3 = 0$ with the quadratic formula. Give exact answers.

15.
Solve $x^2 - 4x + 13 = 0$. Write the complex solutions in the form $a \pm bi$.

Show Your Work

Quadratic Functions & Complex Numbers Tarsia · Problems 16–30 Name: _____

16. Solve $2x^2 + 3x + 5 = 0$ with the quadratic formula. Divide every term of the numerator by the denominator.	**17.** Find the discriminant $b^2 - 4ac$ of $3x^2 - 5x + 4 = 0$.	**18.** Use the discriminant to describe the roots of $x^2 - 6x + 9 = 0$ (one real, two real, or two complex).
19. For what positive value of k does $x^2 + kx + 16 = 0$ have exactly one real root?	**20.** Simplify i^{27} using the cycle of powers of i.	**21.** Simplify $\sqrt{-48}$ using the imaginary unit i.
22. Subtract: $(3 + 2i) - (5 - 6i)$.	**23.** Multiply: $(2 + 3i)(4 - i)$. Remember $i^2 = -1$.	**24.** Multiply the conjugates: $(5 - 2i)(5 + 2i)$.
25. Divide by multiplying by the conjugate of the denominator: $\dfrac{7 + i}{1 - i}$.	**26.** Divide by multiplying by the conjugate of the denominator: $\dfrac{3 - 2i}{1 + 2i}$.	**27.** Write the quadratic with leading coefficient $a = 1$ and roots $3 + 2i$ and $3 - 2i$ in standard form.
28. A ball is thrown so its height is $h = -16t^2 + 64t + 80$ (feet, t in seconds). When does it hit the ground ($h = 0$)?	**29.** A rectangular pen uses 60 m of fence on three sides (a barn is the fourth side). Find the maximum area.	**30.** Solve $x^2 - x - 6 > 0$. Write the solution in interval notation.