Functions & Transformations Tarsia

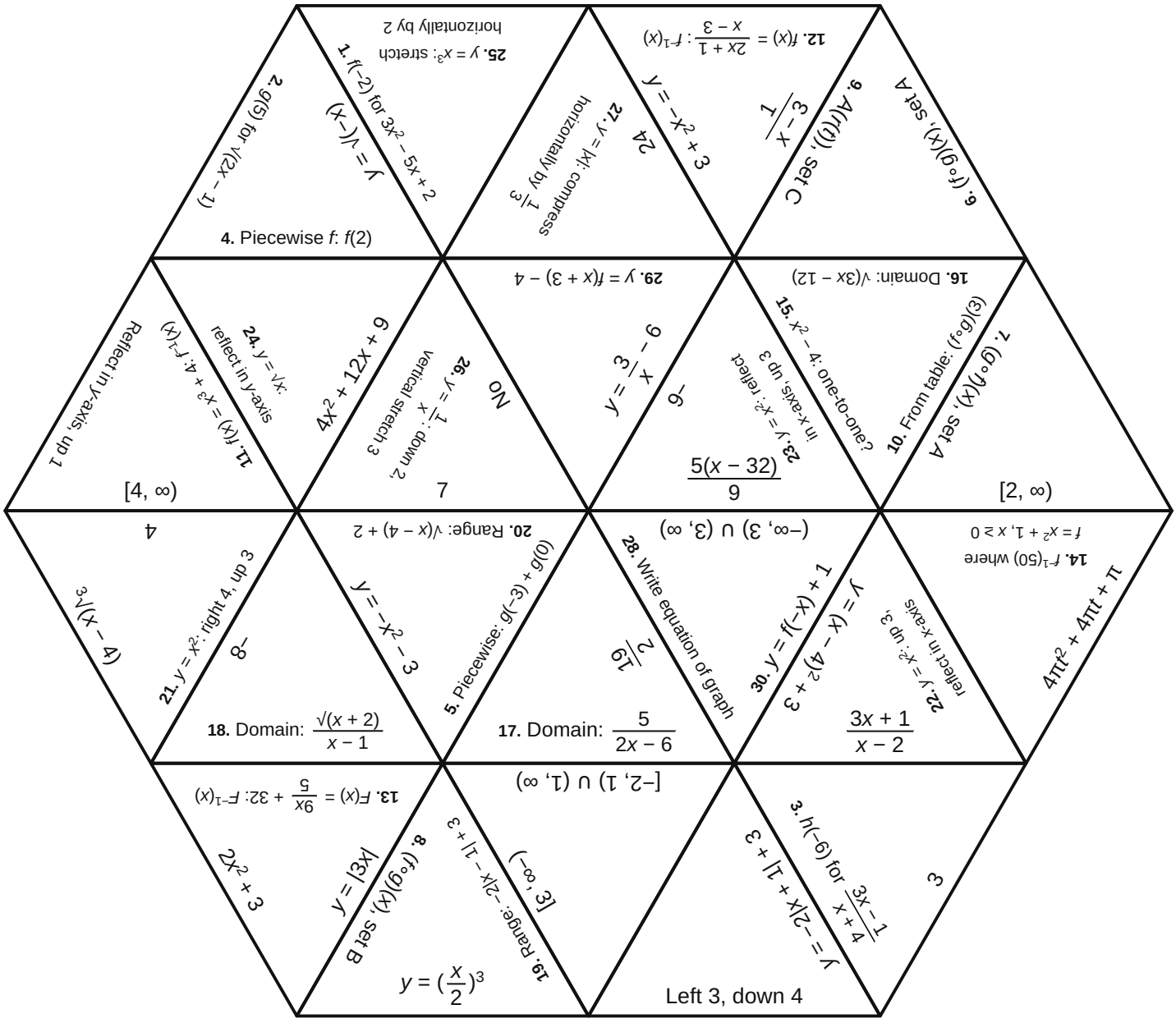
Mr. K's Classroom · Hexagon of 24 triangles, 30 matches

Name: _____

Directions: Evaluate, compose, invert, find domains and ranges, or describe each transformation. Write intervals in interval notation, and do transformation steps in the order given. Problems 10 and 28 use a table and a graph shown on the work pages.

Function sets: *A*: $f(x) = 2x + 3$, $g(x) = x^2$ · B: $f(x) = \frac{1}{x}$, $g(x) = x - 3$ · C: $A(r) = \pi r^2$, $r(t) = 2t + 1$

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

Functions & Transformations Tarsia · Problems 1–15 Name: _____

1.
Evaluate:
$f(x) = 3x^2 - 5x + 2$. Find $f(-2)$.

2.
Evaluate:
$g(x) = \sqrt{(2x - 1)}$. Find $g(5)$.

3.
Evaluate:
$h(x) = \dfrac{3x - 1}{x + 4}$. Find $h(-6)$.

4.
Evaluate the piecewise function at $x = 2$:
$f(x) = x^2 - 1$ if $x < 2$
$f(x) = 3x - 2$ if $x \geq 2$

5.
Evaluate:
$g(-3) + g(0)$
$g(x) = 2x + 1$ if $x < 0$
$g(x) = x^2 - 3$ if $x \geq 0$

6.
Find $(f \circ g)(x)$ if $f(x) = 2x + 3$ and $g(x) = x^2$. Simplify.

7.
Find $(g \circ f)(x)$ if $f(x) = 2x + 3$ and $g(x) = x^2$. Expand and simplify.

8.
Find $(f \circ g)(x)$ if $f(x) = \dfrac{1}{x}$ and $g(x) = x - 3$.

9.
Each circular ripple has area $A(r) = \pi r^2$ and radius $r(t) = 2t + 1$ (t in seconds). Write the area as a function of time:
$A(r(t))$. Expand.

10.
Use the table to find $(f \circ g)(3)$:

x	$f(x)$	$g(x)$
1	4	3
2	−6	4
3	1	2
4	8	1

11.
Find the inverse of $f(x) = x^3 + 4$.
Write $f^{-1}(x)$.

12.
Find the inverse of $f(x) = \dfrac{2x + 1}{x - 3}$.
Write $f^{-1}(x)$.

13.
$F(x) = \dfrac{9x}{5} + 32$ converts °C to °F.
Find the inverse function $F^{-1}(x)$, which converts °F to °C.

14.
Let $f(x) = x^2 + 1$ with $x \geq 0$. Find $f^{-1}(50)$.

15.
Is $f(x) = x^2 - 4$ one-to-one? Show two different inputs with the same output.

Show Your Work

Functions & Transformations Tarsia · Problems 16–30 Name: _____

16.
State the domain of $f(x) = \sqrt{(3x - 12)}$ in interval notation.

17.
State the domain of $f(x) = \frac{5}{2x - 6}$ in interval notation.

18.
State the domain of $f(x) = \frac{\sqrt{(x + 2)}}{x - 1}$ in interval notation.

19.
State the range of $f(x) = -2|x - 1| + 3$ in interval notation.

20.
State the range of $f(x) = \sqrt{(x - 4)} + 2$ in interval notation.

21.
Write the equation after transforming $y = x^2$:
shift right 4, then up 3.

22.
Write the equation after transforming $y = x^2$:
shift up 3, then reflect in the x-axis. (Do the steps in order.)

23.
Write the equation after transforming $y = x^2$:
reflect in the x-axis, then shift up 3. (Do the steps in order.)

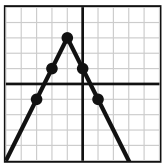
24.
Write the equation after reflecting $y = \sqrt{(x)}$ in the y-axis.

25.
Write the equation after stretching $y = x^3$ horizontally by a factor of 2.

26.
Write the equation after transforming $y = \frac{1}{x}$:
shift down 2, then stretch vertically by a factor of 3. (Do the steps in order.)

27.
Write the equation after compressing $y = |x|$ horizontally by a factor of $\frac{1}{3}$.

28.
The graph shown is a transformation of $y = |x|$. Write its equation.



29.
Describe how the graph of $y = f(x)$ is transformed to get $y = f(x + 3) - 4$.

30.
Describe how the graph of $y = f(x)$ is transformed to get $y = f(-x) + 1$.