

Playground Designer

Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Overview

Students design a playground. They find perimeters and missing side lengths for fences, compare rectangles with the same perimeter and different areas, sort quadrilateral play pads and split a garden into equal areas.

Time: 2 class periods · **Product:** Playground Blueprint
Standards: 3.MD.D.8, 3.G.A.1, 3.G.A.2
Prerequisite skills: Area of rectangles (Unit 10); Adding within 100

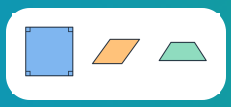
Learning targets

- I can find perimeter and unknown side lengths.
- I can show rectangles with the same perimeter and different areas.
- I can classify quadrilaterals and split a shape into equal areas.

Timing and materials

- Day 1 (45 min): fences and same-perimeter sandboxes (Parts 1–2).
- Day 2 (45 min): shapes and the garden (Parts 3–4) and the blueprint.

Materials: Grid paper; Rulers; Colored pencils; Shape cards (printable support page). No accounts, paid products or student personal information are needed.



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The three versions

- Remedial: hints for a first step, partly filled tables, sentence frames and fewer open choices; the same learning targets.
- Standard: the full task set at grade level; students choose their strategies and models.
- Advanced: open design constraints, missing information, error analysis and a written justification; no hints.

All versions use the same context and learning targets, so groups can share and compare work.

Implementation notes

- Distinguish perimeter (around) and area (inside) every time.
- Use the attribute checklist for each quadrilateral.
- Advanced students find the greatest area for a fixed fence and explain the pattern.
- Before Part 1, read the challenge aloud and ask students to restate the goal.
- Close with a gallery walk: each group explains one strategy.

Rubric

Learning target	4 Exceeds	3 Meets	2 Approaching	1 Beginning
I can find perimeter and unknown side lengths.	Correct and complete; explains how	Mostly correct	Partly correct	Not yet
I can show rectangles with the same perimeter and different areas.	Correct and complete; explains how	Mostly correct	Partly correct	Not yet
I can classify quadrilaterals and split a shape into equal areas.	Correct and complete; explains how	Mostly correct	Partly correct	Not yet
I can explain my thinking with pictures, numbers and words.	Clear for every part	Clear for most parts	Some explanation	Little explanation
My playground blueprint is complete and matches my math.	Complete, neat, accurate	Complete	Partly complete	Not complete

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Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Solutions · Remedial KEY

Part 1: Fence the Field

The grass field is a rectangle 8 meters long and 5 meters wide.

1. How many meters of fence go all the way around?

26 meters

2. The fence around the climbing area is 20 meters. Three sides are 6, 4 and 6 meters. How long is the fourth side?

4 meters

Part 2: Sandbox Choices

You have 12 meters of border for a rectangular sandbox (whole-number sides).

Length	Width	Perimeter	Area
5	1	12	5
4	2	12	
3	3	12	

3. List the rectangles you can make and the area of each.

1 by 5: area 5; 2 by 4: area 8; 3 by 3: area 9

4. Which sandbox has the most space to play?

3 by 3 (area 9 square meters)

Playground Designer

Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Part 3: Play Pads

The play pads are shapes: a square, a rectangle, a rhombus and a trapezoid.

5. Which pads are quadrilaterals?

All four.

6. Which pad is both a rectangle and a rhombus?

The square.

7. Draw a quadrilateral that is not a rectangle, rhombus or square.

Answers vary, e.g. a trapezoid or a kite.

Part 4: Garden Corner

A square garden is split into 4 parts with equal area for 4 classes.

8. What fraction of the garden does each class get?

$\frac{1}{4}$

9. Show two different ways to split it.

Answers vary, e.g. 4 strips or 4 triangles from the diagonals.

Extension

Find two rectangles with an area of 12 square meters and different perimeters.

Examples: 3 by 4 (perimeter 14) and 2 by 6 (perimeter 16)

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Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Solutions · Standard KEY

Part 1: Fence the Field

The grass field is a rectangle 14 meters long and 9 meters wide.

1. How many meters of fence go all the way around?

46 meters

2. The fence around the climbing area is 38 meters. Three sides are 12, 9 and 7 meters. How long is the fourth side?

10 meters

Part 2: Sandbox Choices

You have 16 meters of border for a rectangular sandbox (whole-number sides).

Length	Width	Perimeter	Area
7	1	16	
6	2	16	
5	3	16	
4	4	16	

3. List the rectangles you can make and the area of each.

1 by 7: area 7; 2 by 6: area 12; 3 by 5: area 15; 4 by 4: area 16

4. Which sandbox has the most space to play?

4 by 4 (area 16 square meters)

Playground Designer

Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Part 3: Play Pads

The play pads are shapes: a square, a rectangle, a rhombus and a trapezoid.

5. Which pads are quadrilaterals?

All four.

6. Which pad is both a rectangle and a rhombus?

The square.

7. Draw a quadrilateral that is not a rectangle, rhombus or square.

Answers vary, e.g. a trapezoid or a kite.

Part 4: Garden Corner

A square garden is split into 4 parts with equal area for 4 classes.

8. What fraction of the garden does each class get?

$\frac{1}{4}$

9. Show two different ways to split it.

Answers vary, e.g. 4 strips or 4 triangles from the diagonals.

Extension

Find two rectangles with an area of 12 square meters and different perimeters.

Examples: 3 by 4 (perimeter 14) and 2 by 6 (perimeter 16)

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Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Solutions · Advanced KEY

Part 1: Fence the Field

The grass field is a rectangle 18 meters long and 12 meters wide.

1. How many meters of fence go all the way around?

60 meters

2. The fence around the climbing area is 48 meters. Three sides are 15, 11 and 9 meters. How long is the fourth side?

13 meters

Part 2: Sandbox Choices

You have 20 meters of border for a rectangular sandbox (whole-number sides).

Length	Width	Perimeter	Area
9	1	20	
8	2	20	
7	3	20	
6	4	20	
5	5	20	

3. List the rectangles you can make and the area of each.

1 by 9: area 9; 2 by 8: area 16; 3 by 7: area 21; 4 by 6: area 24; 5 by 5: area 25

4. Which sandbox has the most space to play?

5 by 5 (area 25 square meters)

Playground Designer

Teacher Guide · Solutions · Rubric

Grade 3 · All levels

Part 3: Play Pads

The play pads are shapes: a square, a rectangle, a rhombus and a trapezoid.

5. Which pads are quadrilaterals?

All four.

6. Which pad is both a rectangle and a rhombus?

The square.

7. Draw a quadrilateral that is not a rectangle, rhombus or square.

Answers vary, e.g. a trapezoid or a kite.

Part 4: Garden Corner

A square garden is split into 4 parts with equal area for 4 classes.

8. What fraction of the garden does each class get?

$\frac{1}{4}$

9. Show two different ways to split it.

Answers vary, e.g. 4 strips or 4 triangles from the diagonals.

Part 5: Pattern Hunt

Look at your sandbox table.

10. What happens to the area as the rectangle gets closer to a square?

The area gets larger.

11. Use the pattern to predict the largest area for 24 meters of border.

6 by 6: 36 square meters

Extension

Find two rectangles with an area of 12 square meters and different perimeters.

Examples: 3 by 4 (perimeter 14) and 2 by 6 (perimeter 16)