BRIDGES IN MATHEMATICS 3

GRADE 3 SUPPLEMENT

Set C1 Geometry: Parallel, Perpendicular & Intersecting

Includes

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Skills & Concepts

★ identify and sketch parallel, intersecting, and perpendicular lines and line segments

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Bridges in Mathematics Grade 3 Supplement
Set C1 Geometry: Parallel, Perpendicular & Intersecting

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Bridges in Mathematics is a standards-based K–5 curriculum that provides a unique blend of concept development and skills practice in the context of problem solving. It incorporates the Number Corner, a collection of daily skill-building activities for students.

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Set C1 ★ Activity 1

ACTIVITY

Dots & Lines

Overview

Students review the terms *parallel*, *intersecting*, and *perpendicular*, and then play a game with the teacher to practice building and drawing parallel and perpendicular lines.

Skills & Concepts

★ identify and sketch parallel, intersecting, and perpendicular lines and line segments

You'll need

★ Parallel, Perpendicular & Intersecting Lines (page C1.5, run 1 copy on a transparency)

★ Dots & Lines Gameboard (page C1.6, run 1 copy on a transparency)

★ Dots & Lines Game Record Sheet (page C1.7, run a class set)

★ single spinner overlay

★ black overhead pen

★ a piece of paper to mask parts of the overhead

★ game markers (16 red and 16 blue)

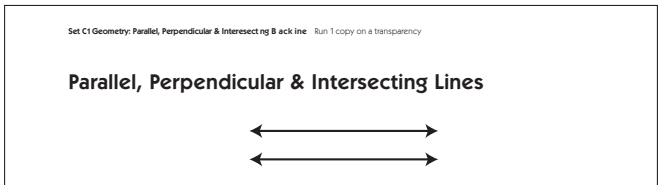
★ 10 red and 10 blue rubber bands

★ geoboards and rubber bands (class set)

★ a red and a blue colored pencil or marker for each student

Instructions for Dots & Lines

1. Display the top portion of Parallel, Perpendicular & Intersecting Lines, keeping the rest of the overhead covered for now. Ask students to pair-share any mathematical observations they can make about the display. Then invite volunteers to share their ideas with the class.



Students *There are 2 straight lines up there and they both have arrows at the ends.*
I think they're never going to cross. They're kind of like train tracks.
Those lines are parallel. I know because you can tell they won't cross.

2. Reveal the information below the 2 parallel lines on the overhead and read it with the class. Then give each student a geoboard and rubber bands. Ask them to build examples of parallel lines on their boards and share them with the people sitting nearest them.

3. Repeat steps 1 and 2 until you've reviewed all the information on the overhead. Be sure students take note of the square drawn at the intersection of the perpendicular lines. This is used to indicate that the two lines really are crossing each other at right angles.

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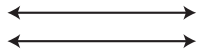
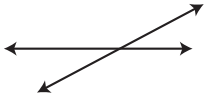
Activity 1 Dots & Lines (cont.)

Set C1 Geometry: Parallel, Perpendicular & Interesect ng B ack ine Run 1 copy on a transparency

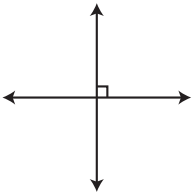
Parallel, Perpendicular & Intersecting Lines



Parallel Lines are lines that are always the same distance apart. They will never cross or intersect. Make 2 parallel lines on your geoboard. Make 3 lines on your geoboard that are all parallel.



Intersecting Lines are lines that intersect or cross each other. Make 2 intersecting lines on your geoboard.



Perpendicular Lines are special intersecting lines. Where they cross, they form a right angle. Make 2 lines on your geoboard that are perpendicular.

4. Collect students' geoboards and bands, and give them each a Dots & Lines Record Sheet. Explain that you're going to play a game that will help them remember the terms you just reviewed. They'll play as the Red Team against you, and you'll play as the Blue Team. Have them record the team color assignments on their sheet while you do so on the Dots & Lines Gameboard overhead.

5. Place the spinner overlay on top of the spinner and set a clear geoboard below the spinner. Use your overhead pen to draw a black line either vertically or horizontally across the board, following one of the lines of pegs. This is the *starting line*. Make an asterisk beside the line. Ask students to use a regular pencil to draw a line in the same location on their record sheet and mark it with an asterisk.

6. Explain that you're going to take the first turn so students can see how to play the game. Spin the spinner. Read the results with the class, and use a blue rubber band to build a line all the way across the board, either parallel or perpendicular to the starting line, depending on what the spinner indicated. Ask students to use a blue pencil or marker to record the results of your turn on their sheets.

> ***Teacher*** *Okay, the spinner landed on "parallel." That means I have to use a blue rubber band to make a line that's* parallel *to the starting line. I can put it anywhere on the board, as long as it's parallel to that line, but I think I'll put it right beside the starting line.*

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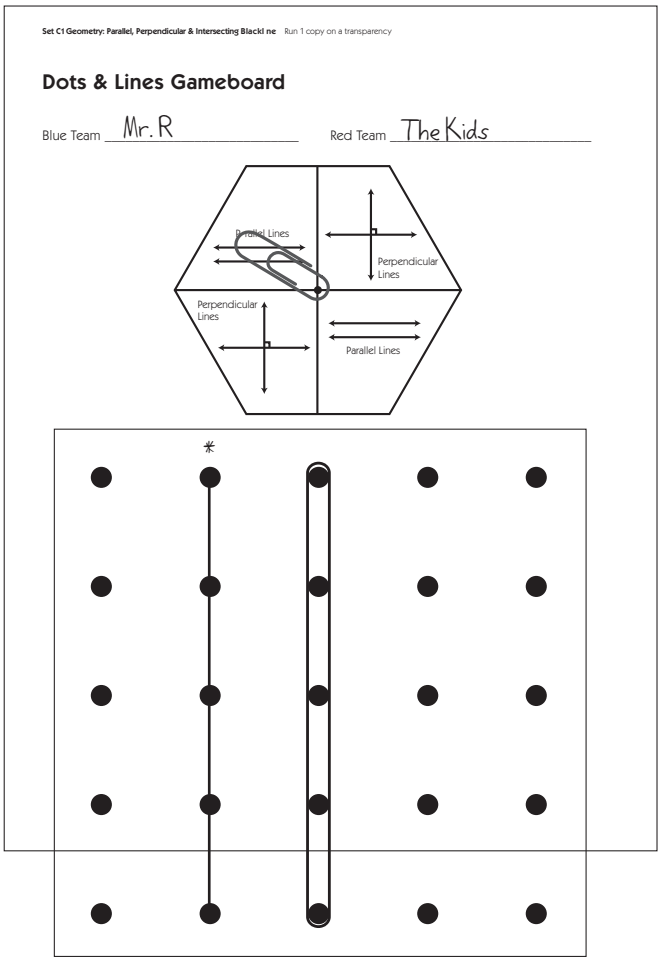
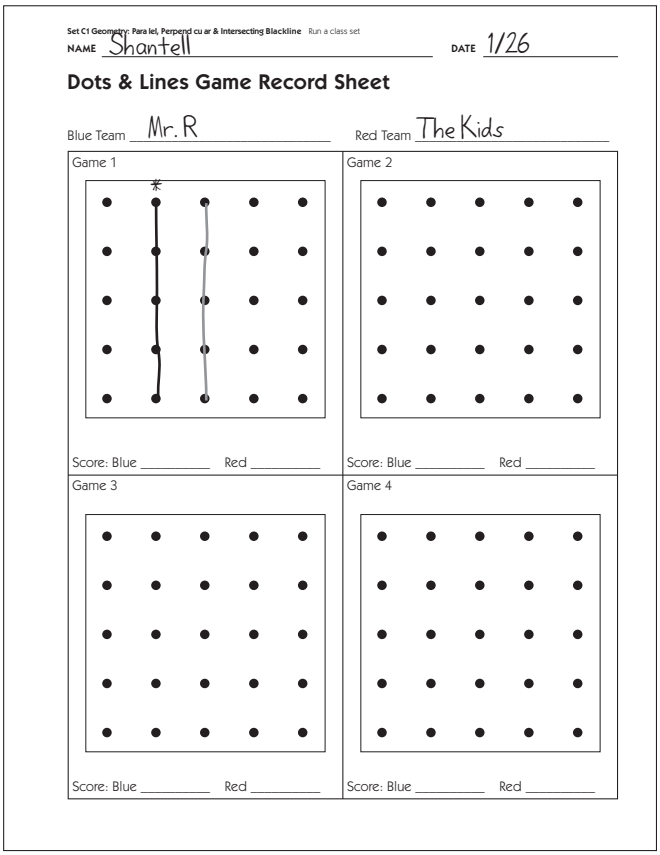
Activity 1 Dots & Lines (cont.)


Set C1 Geometry: Parallel, Perpendicular & Intersecting Blackline Run 1 copy on a transparency

Dots & Lines Gameboard

Blue Team Mr. R Red Team The Kids

Parallel Lines
Perpendicular Lines
Perpendicular Lines
Parallel Lines


Set C1 Geometry: Parallel, Perpendicular & Intersecting Blackline Run a class set

NAME Shantell DATE 1/26

Dots & Lines Game Record Sheet

Blue Team Mr. R Red Team The Kids

Game 1 Score: Blue _____ Red _____

Game 2 Score: Blue _____ Red _____

Game 3 Score: Blue _____ Red _____

Game 4 Score: Blue _____ Red _____

7. Before students take their turn, explain that the object of the game is to capture the most small squares (i.e., squares without any pegs between their corners). Anytime a team forms 1 or more squares during their move, you'll mark those squares with game markers in the team's color. Ask them if they think they'll be able to form a square during this turn.

> ***Isaac*** *Nope. If we land on "parallel" there will just be 3 parallel lines in a row on the board. If we land on "perpendicular" we can build a line across, but it won't make a square, no matter where we put it.*
>
> ***Erica*** *Mr. R might be able to make a square on his next turn. I think it's better to be the first team to go.*

8. Have students take their turn, and then take turns back and forth until no more rubber bands can be placed and all 16 squares have been formed. If a team spins "parallel" and all the lines parallel to the starting line have already been made, they lose that turn.

It's possible to form more than 1 square during a single move, and students may get more strategic about where they're placing their rubber bands as the game proceeds. Be sure to mark the squares with game markers and have students use colored dots to mark them on their record sheets. The sample record sheet on the next page shows how the game might look midway through and again at the end.

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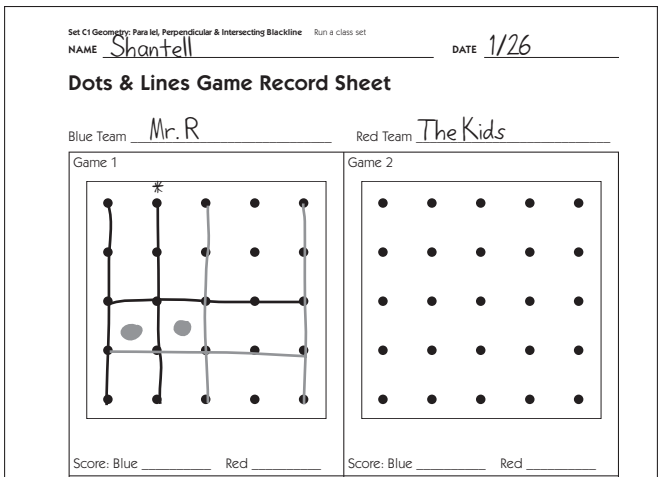
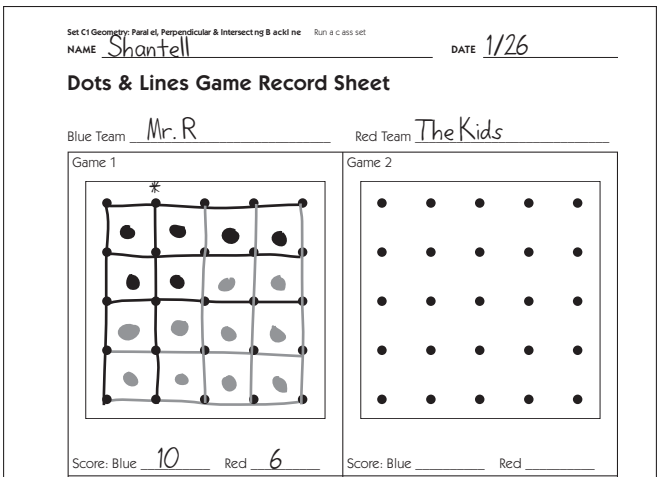
Activity 1 Dots & Lines (cont.)


Set C1 Geometry: Parallel, Perpendicular & Intersecting Blackline Run a class set
NAME Shantell DATE 1/26
Dots & Lines Game Record Sheet
Blue Team Mr. R Red Team The Kids
Game 1
Score: Blue _____ Red _____
Game 2
Score: Blue _____ Red _____


Set C1 Geometry: Parallel, Perpendicular & Intersecting Blackline Run a class set
NAME Shantell DATE 1/26
Dots & Lines Game Record Sheet
Blue Team Mr. R Red Team The Kids
Game 1
Score: Blue 10 Red 6
Game 2
Score: Blue _____ Red _____

Students *Mr. R really lucked out on that last move.*
Too bad he didn't get "parallel" that last time. Then it would have been our turn again, and if we'd gotten "perpendicular" we would have won.
Can we play it again?

9. Dots & Lines goes very quickly, and students have room to record the results of 4 games. Take turns with the class to be the starting team. The team that starts first gets to erase the starting line and draw a new one anywhere they want on the board.

Here are a few important rules to remember about Dots & Lines:

- The starting line has to go all the way across the board, either horizontally or vertically.
- A rubber band can be placed anywhere on the board, as long as it's oriented correctly with respect to the starting line.
- Rubber bands have to go all the way across the board.
- The object of the game is to capture the most small squares; squares that have pegs between corners are not allowed.
- Remember to mark every square a team forms on a given turn.
- Count the squares captured by each team at the end of the game to determine the winner.

Extensions

- If your students enjoy this game, run another set of the record sheets and play it again. A single game makes a nice sponge activity, and you can have students save their record sheets for repeated use over the course of a week.
- Challenge students to explain why there are no intersecting lines *that are not perpendicular* in this game.
- Leave the materials out, along with extra copies of the record sheet so students can play the game with each other at the overhead during their free time.

INDEPENDENT WORKSHEET

See Set C1 Independent Worksheets 1 and 2 for more practice identifying and describing parallel, perpendicular, and intersecting lines using concrete objects and pictorial models.

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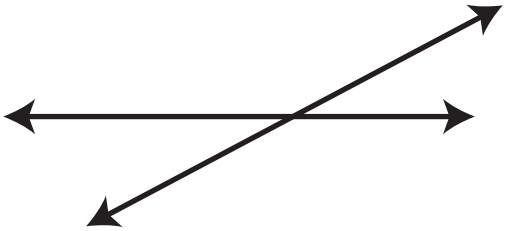
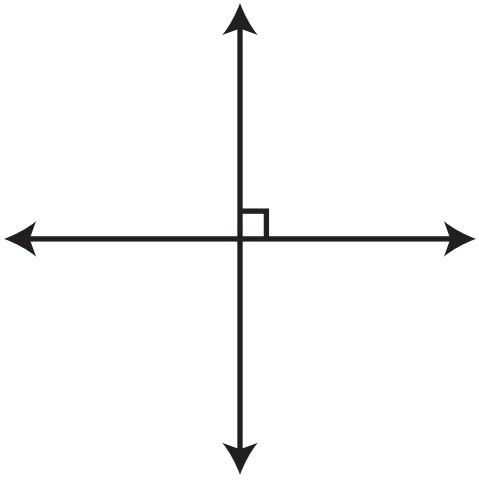
Parallel, Perpendicular & Intersecting Lines

Parallel Lines are lines that are always the same distance apart. They will never cross or intersect. Make 2 parallel lines on your geoboard. Make 3 lines on your geoboard that are all parallel.



Intersecting Lines are lines that intersect or cross each other. Make 2 intersecting lines on your geoboard.



Perpendicular Lines are special intersecting lines. Where they cross, they form a right angle. Make 2 lines on your geoboard that are perpendicular.

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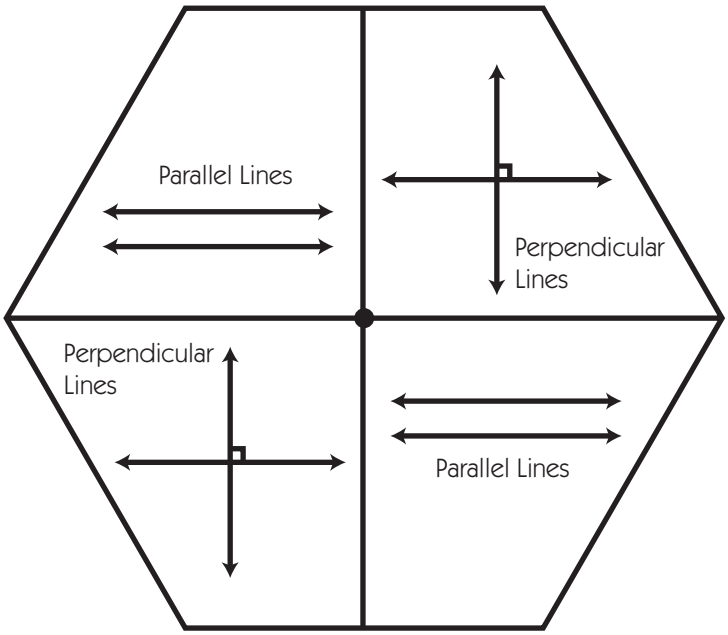
Dots & Lines Gameboard

Blue Team _____ Red Team _____



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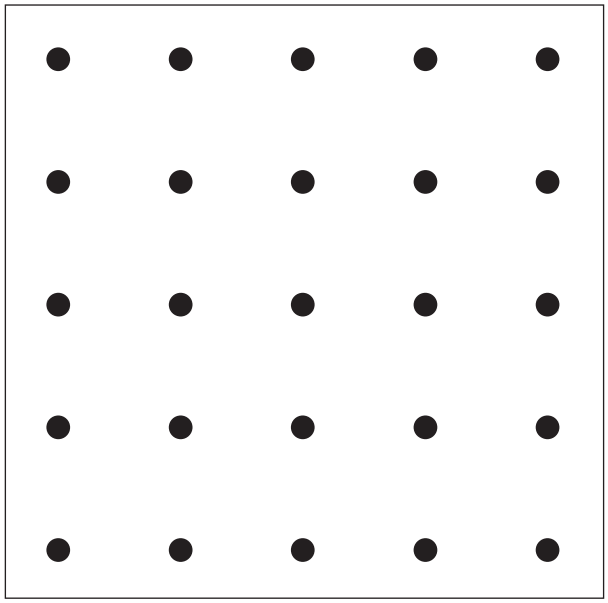
NAME _____ **DATE** _____

Dots & Lines Game Record Sheet

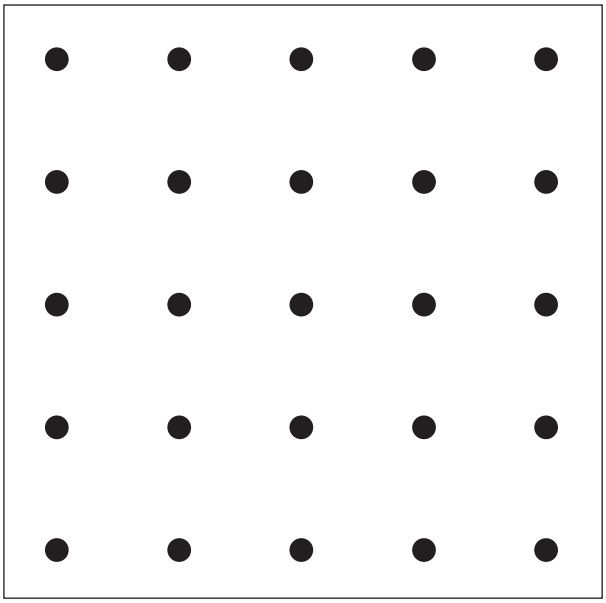
Blue Team _____ Red Team _____

Game 1



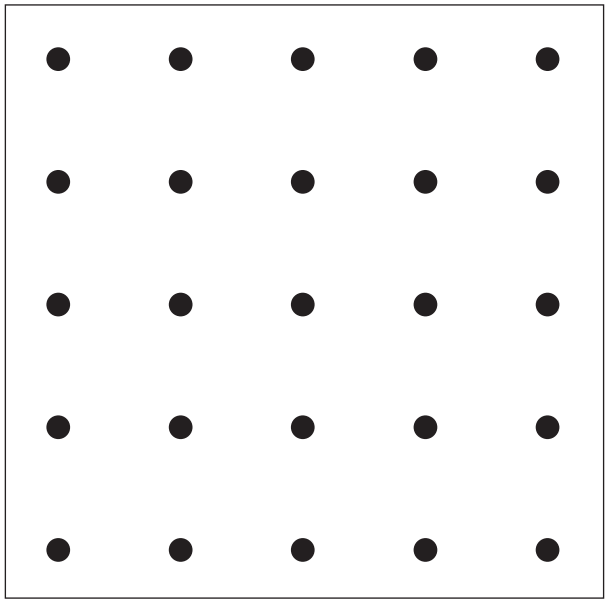
Score: Blue _____ Red _____

Game 2



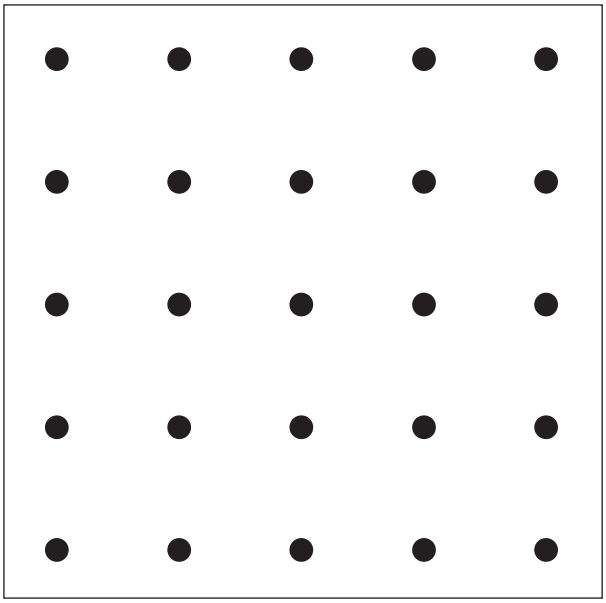
Score: Blue _____ Red _____

Game 3



Score: Blue _____ Red _____

Game 4



Score: Blue _____ Red _____

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NAME _____ **DATE** _____

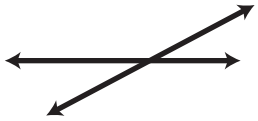
Set C1 ★ Independent Worksheet 1

INDEPENDENT WORKSHEET

Lines & Designs

1 Fill in the bubbles in front of the words that describes each set of lines below. Then explain your answer. How do you know? The first one is done for you.

example



● intersecting lines

○ parallel lines

○ perpendicular lines

How do you know?

I know these are intersecting lines because they cross. I know they're not perpendicular because they don't cross at right angles.

a

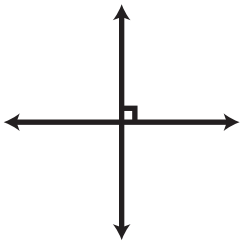
○ intersecting lines

○ parallel lines

○ perpendicular lines

How do you know?

b



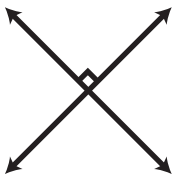
○ intersecting lines

○ parallel lines

○ perpendicular lines

How do you know?

c



○ intersecting lines

○ parallel lines

○ perpendicular lines

How do you know?

(Continued on back.)

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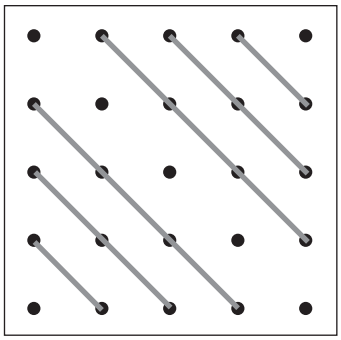
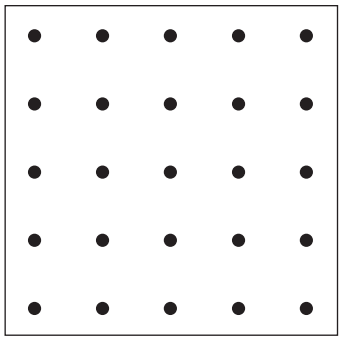
Independent Worksheet 1 Lines & Designs (cont.)

2 Get a geoboard and some colored rubber bands. Use them to make each of the designs described below. Then use regular and colored pencils to record your work on this sheet.

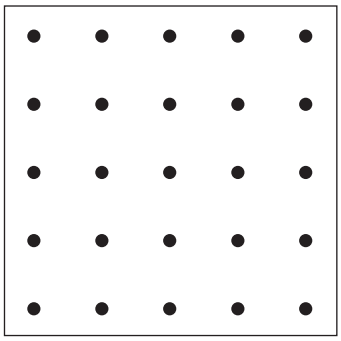
example Make a design with 6 gray parallel lines.



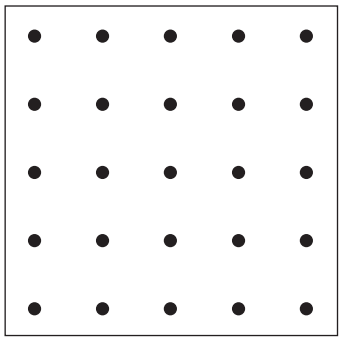
a Make a design with 6 red intersecting lines.



b Make a horizontal blue line all the way across the board. Then add 4 green lines that are all perpendicular to the blue line.



c Make a yellow diagonal line all the way across the board. Then add 4 blue lines that intersect with the yellow line.



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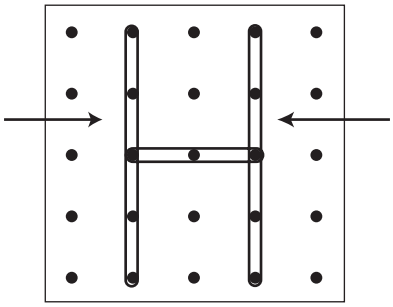
NAME _____ **DATE** _____

Set C1 ★ Independent Worksheet 2

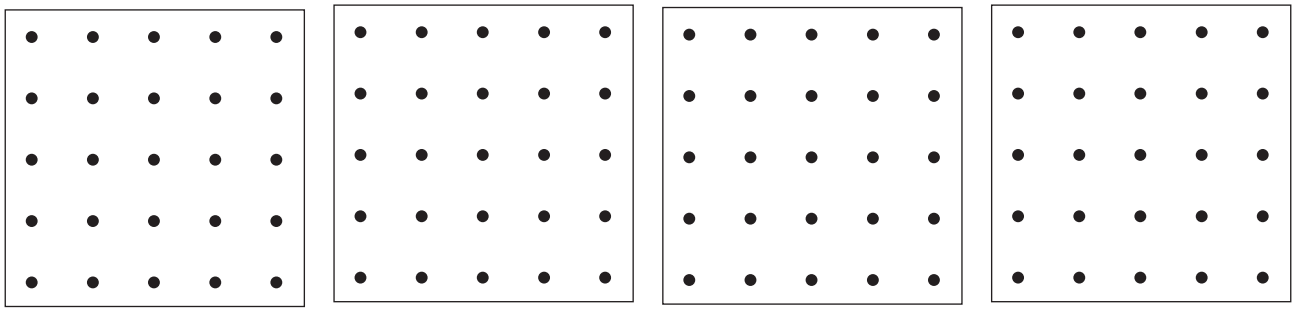
INDEPENDENT WORKSHEET

Alphabet Lines

1 The kids in Mrs. Odell's third grade were learning about different kinds of lines. Hector made the letter H on his geoboard and said, "Hey look! These 2 lines I'm pointing to are parallel."



a Get a geoboard and some colored rubber bands. On your geoboard, make 4 other capital letters that have 2 or 3 parallel lines in them. Use red rubber bands to make the lines that are parallel to each other. Use a ruler and colored pencils to record your work below. Show the parallel lines in red.



b How do you know for sure that the lines you made in red are parallel?

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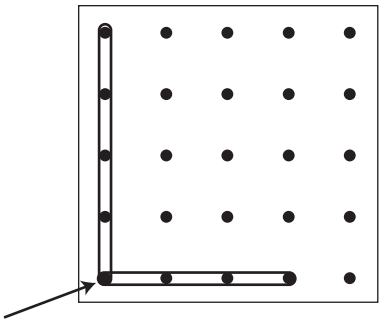
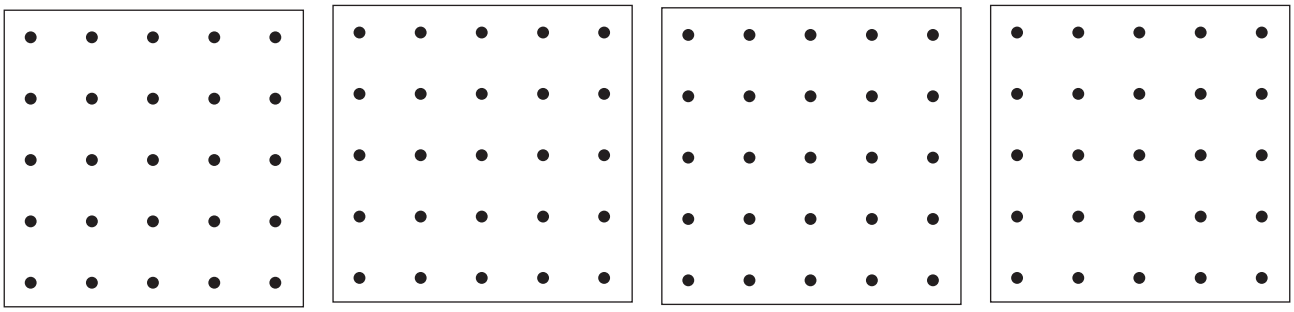
Independent Worksheet 2 Alphabet Lines (cont.)

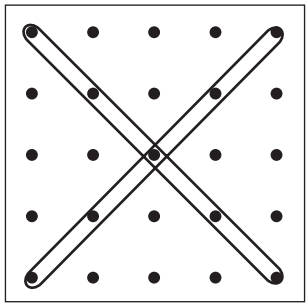
2 Then Lani said, "The two lines in the first letter of my name are perpendicular. You can see that they meet at a right angle on the board."



On your geoboard, make 4 other capital letters that have perpendicular lines. Record your work below. Draw arrows to show where the lines meet at right angles.



3 Then Xavier said, "I think the first letter of my name has intersecting lines."



a Do you agree with him? Why or why not? If you do, draw an arrow to show where the 2 lines intersect.

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Independent Worksheet 2 Alphabet Lines (cont.)

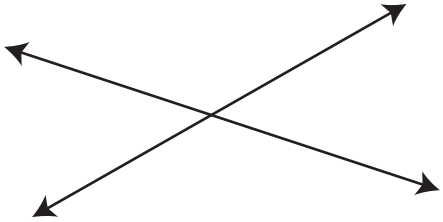
3b Circle the letter that has 2 intersecting lines.

c j x i s l

4 Write the first letter of your first name in this box. Label it to show any lines that are parallel, perpendicular, or intersecting. If the first letter of your first name is completely curved (like O or C), choose a different letter in your first or last name that has straight lines.

CHALLENGE

5 Circle True or False to show which statements below correctly descibe these lines.

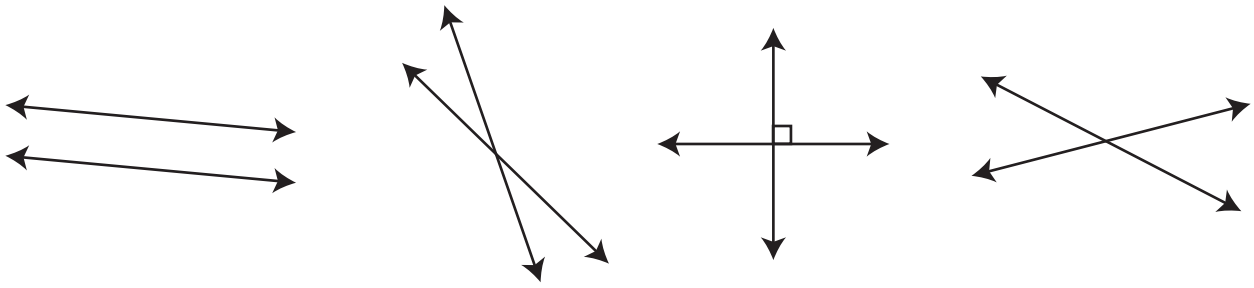


a The two lines above are parallel. True False

b The two lines above are pependicular. True False

c The two lines above are interesecting. True False

6 Two lines that are not parallel and not perpendicular are called oblique lines. Circle all the pairs of oblique lines below.



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