


Grade 8 Mathematics

Geometry: Lesson 9

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol () by them.

Purpose of Lesson 9:

- In this lesson, the tutor and the students will
 - ✓ identify and draw line segments representing vertical, horizontal, intersecting, parallel, and perpendicular lines on dot paper;
 - ✓ draw right, obtuse, and acute angles on dot paper; and
 - ✓ identify or draw two-dimensional figures on dot paper.

Equipment/Materials Needed:

- Copies of Student Sheets 105 – 107
- Paper and pencils
- Chalkboard

Preparations before beginning Lesson 9:

- Run two copies of Student Sheet 105 for each student.
- Run one copy of Student Sheets 106 and 107 for each student.
- Have paper and pencils available.
- You should cover Lessons 1 and 2 of Geometry before beginning this lesson.

Lesson 9: Geometry

Say:

In this lesson, you will review some of the geometric terms that you have studied so far. What is the difference in a line and a line segment? (A line is a string of points that goes on forever at each end. A line segment is part of a line that has two endpoints.) A line segment can be use to represent types of lines because you cannot draw the entire line. You are going to draw line segments on special paper called dot paper.

 Give students Student Sheet 105.

Say:

In Square 1, draw a horizontal line segment. Remember to think “horizon.” How could you describe your line segment? (My line segment goes across the box. It connects the dots in one row.) In Square 2, draw a vertical line segment. How could you describe your line segment? (My line segment goes down the box. It connects the dots in one column.) In Square 3, draw a line segment that is neither horizontal nor vertical. Describe your line segment. (My line segment crosses more than one row and 1 column, but it is straight.)

You have also learned about parallel and perpendicular lines. What are parallel lines? (lines that never cross or intersect, and are always the same distance apart) In Square 4, draw two parallel line segments representing two parallel lines. In Square 5, draw two different line segments. In Square 6, draw two different parallel line segments.

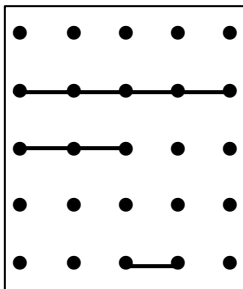
What are perpendicular lines? (lines that intersect at right angles) In Square 7, draw two perpendicular line segments representing perpendicular lines. How can you check to make sure that they are perpendicular? (Take the square corner of a piece of paper and see whether it fits the angle.) In Square 8, draw two different perpendicular line segments. In Square 9, draw two line segments that intersect, but are not perpendicular line segments. Describe your line segments. (The line segments cross, but do not form right angles.)

Say:

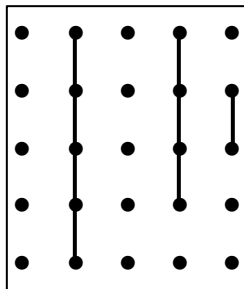
What is a right angle? (an angle that measures 90°) In Square 10, draw a right angle. What is an obtuse angle? (an angle that measures greater than 90°) In Square 11, draw an obtuse angle. What is an acute angle? (an angle that measures less than 90°) In Square 12, draw an acute angle.

Answers to the drawing instructions: Drawings will vary, but here are examples.

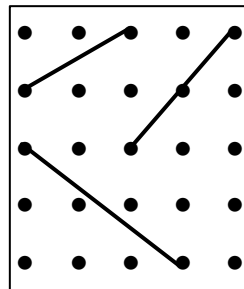
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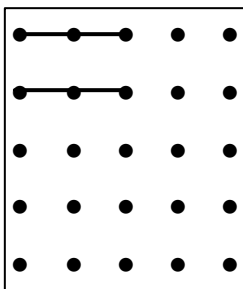
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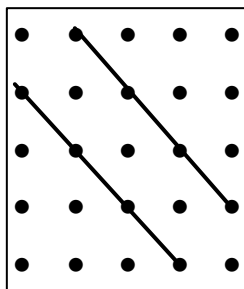
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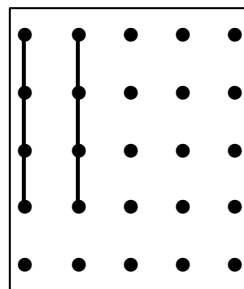
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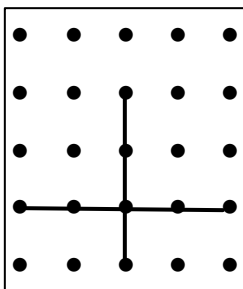
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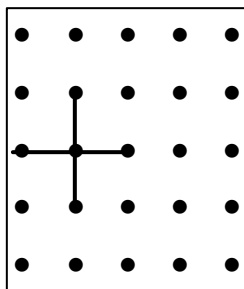
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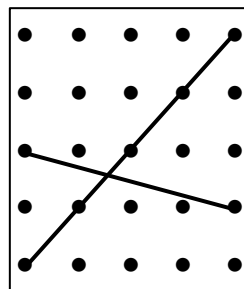
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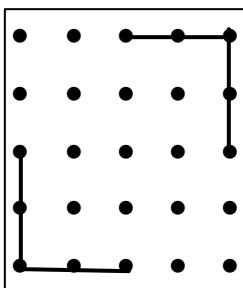
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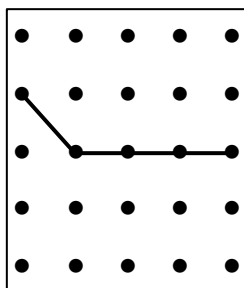
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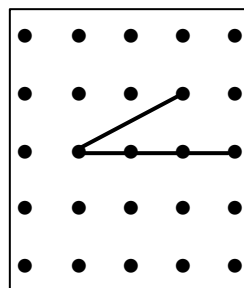
10.



11.



12.



Say:

You will use dot paper to draw and identify two-dimensional figures. What is another name for a two-dimensional figure? (plane figure) What are some plane figures that we have talked about in other lessons? (circles, triangles, squares, rectangles, etc.)

Give students another copy of Student Sheet 105.

Say:

If you connect two dots that are side by side in any row, you are going to say that the line segment that you draw is one unit long. If you connect two dots in any column, you are going to say that the line segment that you draw is one unit long. However, if you connect two dots that are side by side on a diagonal, the line segment is not one unit long, it is longer than one unit. If the students question this fact, have them measure to see that it is longer. If students know about the Pythagorean Theorem, they know that the diagonals form the hypotenuse of a right triangle and must be longer than either leg. The Pythagorean Theorem is covered in Lesson 8 of Geometry.

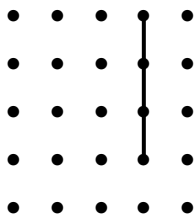
In the first square, draw a vertical line that is three units long. In the second square, draw a horizontal line that is four units long. (Students may count dots. Remind them that they must count the spaces between the dots.)

Give students Student Sheet 106. Tell them to draw the figures from the descriptions on Sheet 106 on the dot paper from Student Sheet 105.

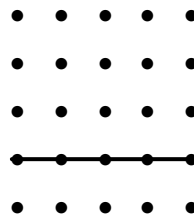
Answers for Student Sheet 106.

Drawings will vary. Here are some examples.

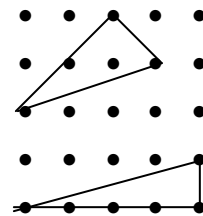
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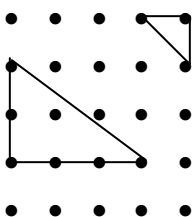
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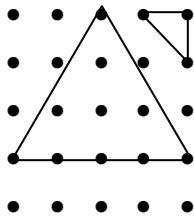
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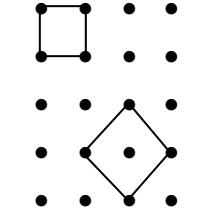
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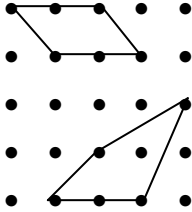
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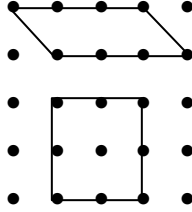
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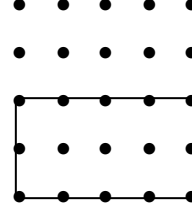
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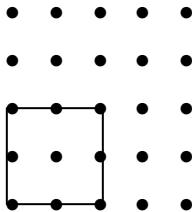
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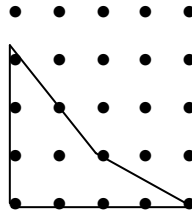
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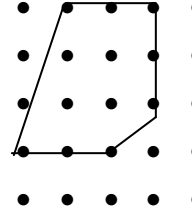
10.



11.



12.



Give students Student Sheet 107. On this sheet, figures are drawn. The students need give all of the names for each figure.

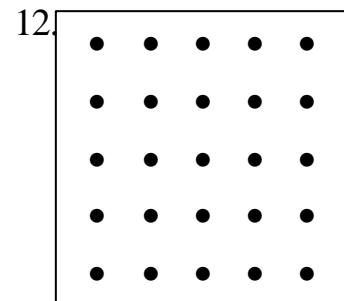
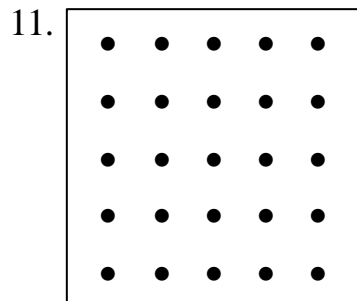
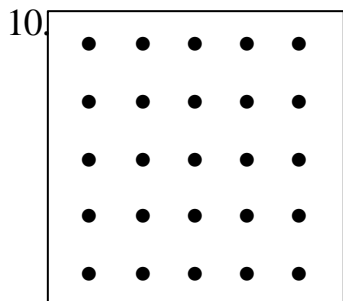
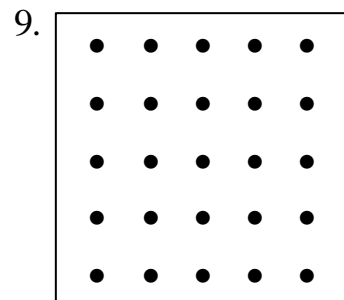
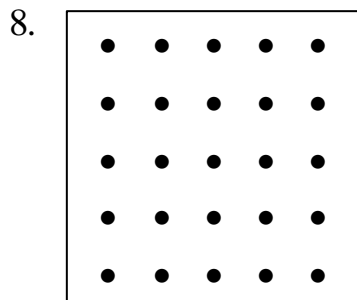
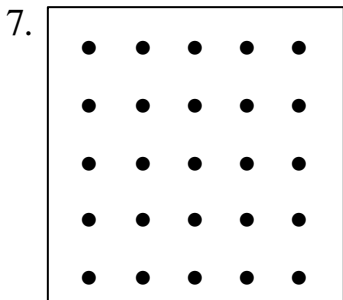
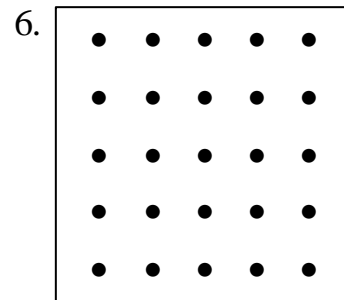
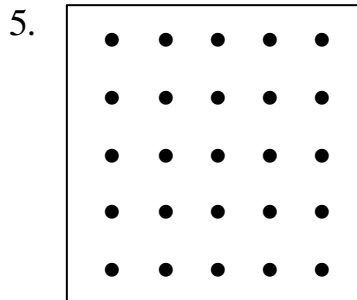
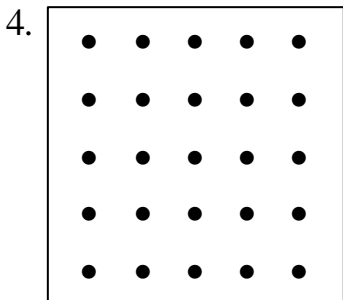
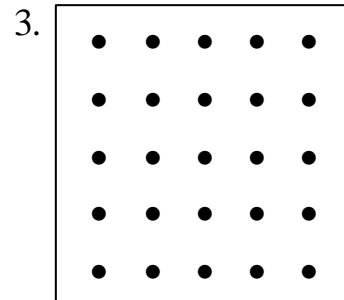
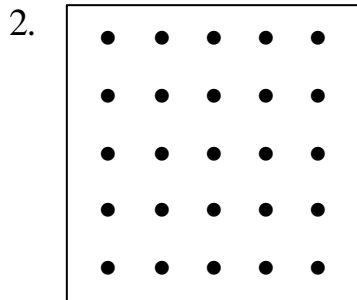
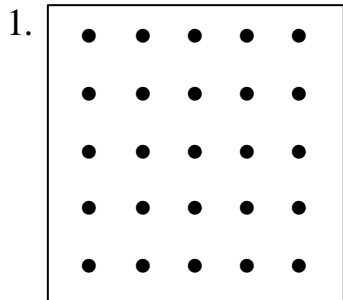
Answers:

1. triangle or some may say right triangle or scalene right triangle
2. rectangle, parallelogram, quadrilateral
3. hexagon
4. parallelogram, quadrilateral
5. octagon
6. square, rhombus, rectangle, parallelogram, quadrilateral
7. triangle, isosceles triangle
8. quadrilateral, trapezoid
9. quadrilateral, trapezoid
10. pentagon
11. hexagon
12. hexagon

Have one student summarize today's lesson. Using dot paper can help students understand the properties of two-dimensional figures.

Student Sheet 105 (Geometry: Lesson 9)

Dot Paper



Student Sheet 106 (Geometry: Lesson 9)

Draw these figures on your dot paper and then write the name of your figure underneath. You have already drawn figures in Squares 1 and 2, so start with Square 3.

Draw a figure with...

3. 3 sides: no equal sides
4. 3 sides: 1 right angle
5. 3 sides: only 2 equal sides
6. 4 sides: all sides equal
7. 4 sides: no right angles
8. 4 sides: opposite sides parallel
9. 4 sides: two sides measuring 4 units, 2 sides measuring 2 units, opposite sides parallel, 4 right angles
10. 4 sides: all sides measuring 2 units
11. 4 sides: no equal sides
12. 5 sides

Student Sheet 107 (Geometry: Lesson 9)

Write all of the names for each figure below.

