VideoText *Interactive*

Homeschool and Independent Study Sampler

Print Materials

for

"Geometry: A Complete Course"

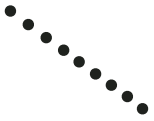
Unit I, Part B, Lesson 1 – "Undefined Terms"

Course Notes (2 pages)
Student WorkText (5 pages)
Solutions Manual (1 pages)
Quizzes – Forms A and B (4 pages)
Quiz Solutions (4 pages)

Undefined Terms

Discrete Geometry (“separate”)

point - dot •

line - set of points 

Synthetic Geometry (“put together”)

point - exact location •

line - set of points, extending in both directions, containing the shortest path between any two points on it.

Coordinate Geometry (“ordered together”)

point - ordered pair (x, y)

line - set of all ordered pairs (x, y) satisfying $Ax + By = C$, where A, B, and C are integers, and A and B are not both zero.

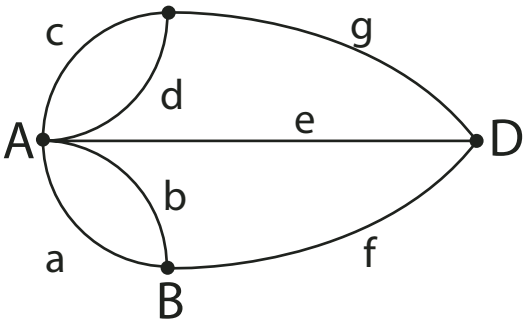
$$\left\{ (x,y) \,\middle|\, \begin{array}{l} Ax + By = C, \quad A,B,C \text{ are integers} \\ A,B \text{ not both zero} \end{array} \right\}$$

Network Geometry (“graph”)

point - node

line - arc 

Ex. Konigsburg Bridge Problem



Not Traversable!

Plane Geometry

(from Euclidean Geometry)

~~Discrete Geometry~~

✓ Synthetic Geometry

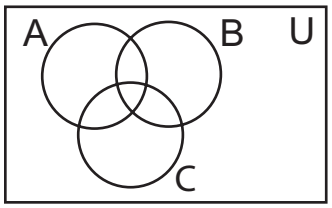
✓ Coordinate Geometry

~~Network Geometry~~

Lesson 5 — Exercises: (cont'd)

9. Using the given sets, place the appropriate letters of the alphabet in the proper sections of the following Venn diagram. (remember to start on the inside and work outward)

   The universal set contains the letters in the word Washington.
   Set A contains the letters in the word Iowa.
   Set B contains the letters in the word Hawaii.
   Set C contains the letters in the word Ohio.



10. A survey of 195 people indicated that 90 read *Time* magazine, 45 read *Sports Illustrated*, 15 read *TV Guide*, 3 read *Time* and *Sports Illustrated*, 5 read *Time* and *TV Guide*, 1 read *Sports Illustrated* and *TV Guide*, and 1 read all three. How many people read none of the three? (use a Venn diagram)

Unit I — The Structure of Geometry
Part B — The Scope of Our Geometry

Lesson 1 — *Undefined Terms*

Objective: To explore various geometries, using the perspective of undefined terms, and decide on "our Geometry."

Important Terms:

Discrete Geometry – This is a Geometry in which every point is a "dot" and every line is made up of separate points, with a space between them. We use the word "discrete", because it means "detached from, separate, or distinct."

Synthetic Geometry – This is a Geometry in which every point is an "exact location," having no real size, and every line is a set of continuous points, with no space between them. We use the word "synthetic", because it means "to put together", and we are putting points together to make continuous geometric figures.

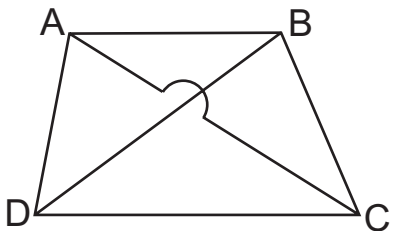
Coordinate Geometry – This is a Geometry in which every point is an "exact location, represented algebraically by an ordered pair of coordinates denoting its position", and a line is a set of continuous points, with no space between them. We use the word "coordinate" because we treat all plane geometric figures as sets of points, which can be represented in a Cartesian "coordinate" system.

Important Terms: (cont'd)

Network Geometry – This is a Geometry made up of a graph of "paths", or arcs, in which every point, called a "node," is the endpoint of a line, called an "edge." In this Geometry, we study geometric figures from the perspective of "walking along paths" of the graph, in an effort to determine if they are "traversable." In other words, to see if they can be covered by walking along all of the edges only once, and still cover the whole graph. We use the word "network" because these points and lines resemble an open framework, or "net."

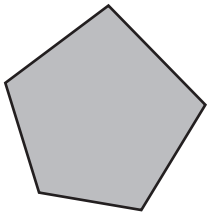
Example 1: Describe the geometries represented by the following illustrations.

a.

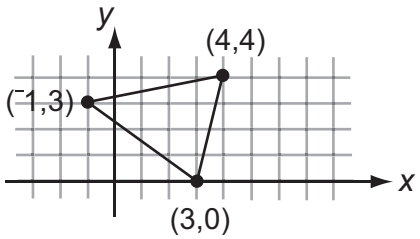


b.

c.



d.



Solution:

a. This is an illustration you might find while studying Network Geometry. It includes four nodes, connected by three arcs each. Notice that arcs AC and BD do not intersect.

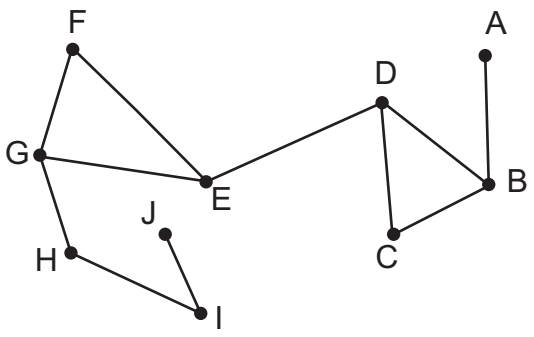
b. This is an illustration you might find while studying Discrete Geometry. It represents two lines which "intersect" without having a point in common.

c. This is an illustration you might find while studying Synthetic Geometry. It consists of a pentagon and the area inside it.

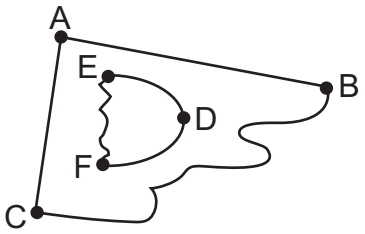
d. This is an illustration you might find while studying Coordinate Geometry. Each point on the triangle can be represented with an ordered pair, relative to the Cartesian Coordinate plane.

Example 2: Determine whether the following graphs are networks.

a.



b.



Solution:

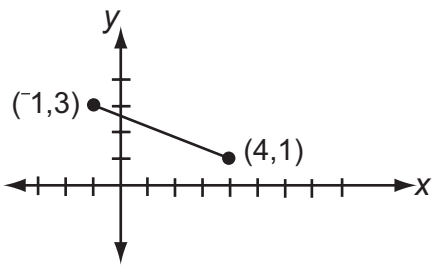
a. This graph is a network, because each node (or point) is linked to each other node by some path of edges (or lines). By the way, in this case, the network is not traversable because you cannot walk along every edge only once and still cover the entire network.

b. This graph is not a network, because each node (or point) is not linked to each other node by some path of edges (or lines). For example, there is no way to get from node A to node F. This graph actually consists of two separate and distinct networks.

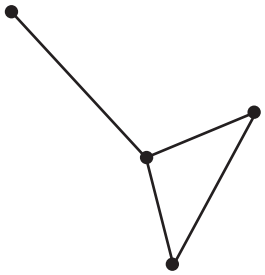
Lesson 1 — Exercises:

1. Briefly describe the geometries represented by each of the following illustrations.

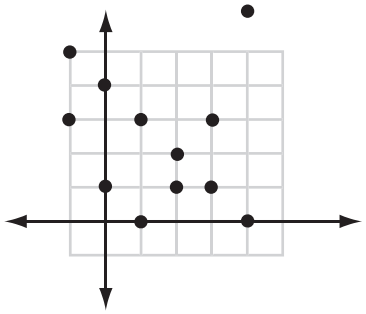
a)



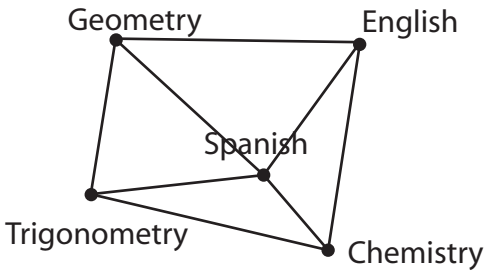
b)



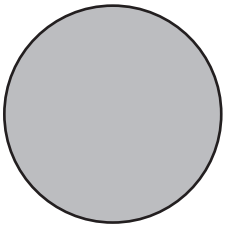
c)



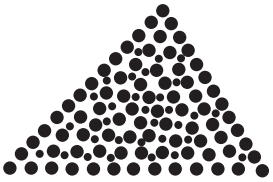
d)



e)

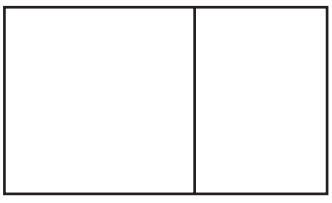


f)

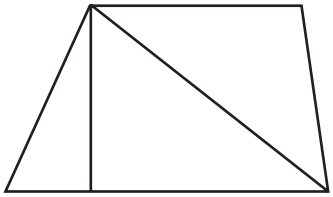


2. Try to trace each of the following networks without lifting your pencil or retracing an edge. If a network is not traversable (i.e. not traceable in this way), explain why.

a)

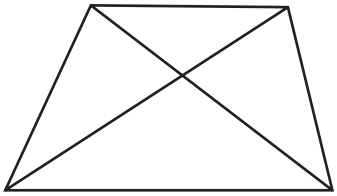


b.

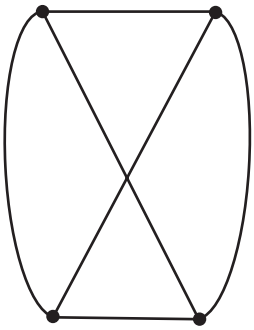


Lesson 1 — Exercises: (cont'd)

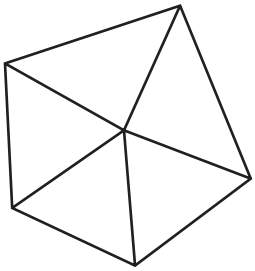
c)



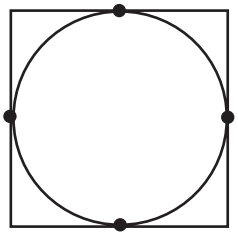
d)



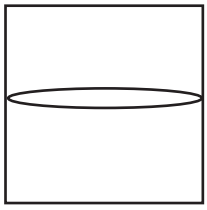
e)



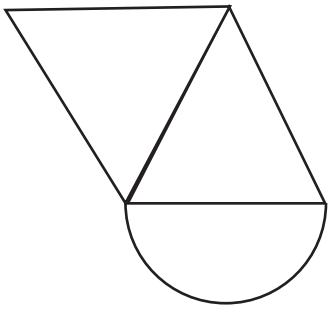
f)



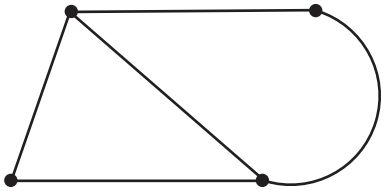
g)



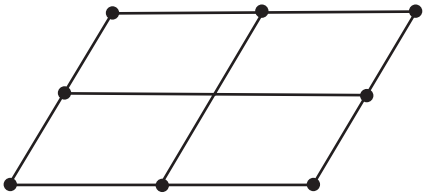
h)



i)



j)



Unit I — The Structure of Geometry

Part B — The Scope of Our Geometry

p. 28 – Lesson 1 — Undefined Terms

1. **a)** coordinate geometry **b)** network geometry **c)** discrete geometry
d) network geometry **e)** synthetic geometry **f)** discrete geometry

Note: Traversable Network **1)** only even vertices
2) two odd vertices with all others even

2. **a)** Traversable – Start at an odd node as in the upper middle of the box or lower middle of the box. Answers (or tracings) could vary.
b) Traversable – There are two odd nodes. Start at one of them. Traceable patterns are different.
c) Not Traversable – The network has four odd nodes. More than two odd nodes are not traversable.
d) Not Traversable – Actually same figure as "C".
e) Not Traversable – The figure has all odd nodes.
f) Traversable – Start at any node.
g) Traversable – Start at any node.
h) Traversable – The network has two odd nodes. Start at either odd node.
i) Traversable – Start at an odd node, either upper left or lower right. Answers may vary.
j) Not Traversable – The network has four odd nodes. More than two odd nodes are not traversable.

Unit I — The Structure of Geometry

Part B — The Scope of Our Geometry

p. 32 – Lesson 2 — Simple Plane Closed Curves

1.

Geometric Figure	Curve	Plane Curve	Closed Plane Curve	Simple Closed Plane Curve	Simple Closed Plane Curve Made Up Of Only Straight Line Segments
1					1
2	Not Continuous				
3				3	
4	Not Continuous				
5					5
6	6	6			
7			7		
8					
9			9		
10					
11					
12			12		

Unit I — The Structure of Geometry

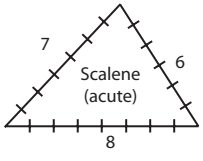
Part B — The Scope of Our Geometry

p. 36 – Lesson 3 — Undefined Terms

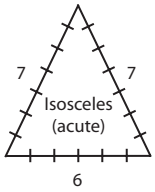
1. A, E, H

2. **a)** Pentagon (5 sides) **b)** Kite (quadrilateral - 4 sides) **c)** Heptagon (7 sides)
d) Hexagon (6 sides) **e)** Octagon (8 sides) **f)** Quadrilateral (4 sides)

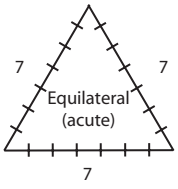
3.



4.



5.



Quiz Form A

Name _____

Class _____ Date _____ Score _____

Unit I - The Structure of Geometry
Part B - The Scope of Our Geometry
Lessons 1 - Undefined Terms

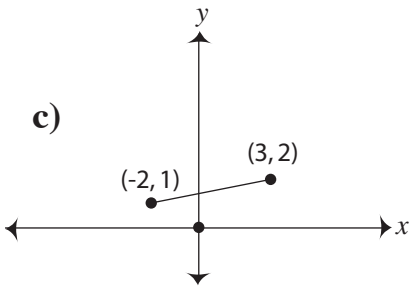
1. Name the Geometry illustrated by each of the following illustrations.

a) 

_____

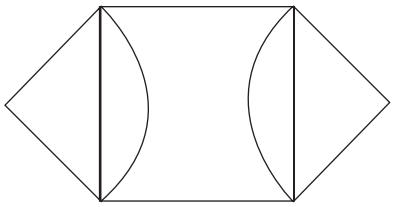
b) 

_____

c) 

_____

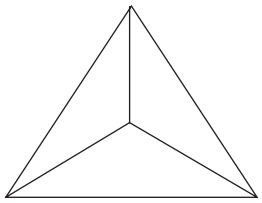
Which of the networks in exercises 2 through 4 are traversable? For the networks which are traversable, find a corresponding path. Label the starting and stopping nodes.



Traversable?_____

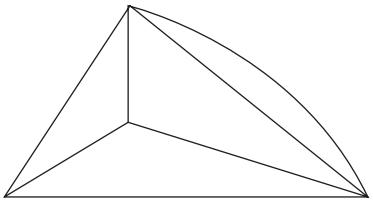
Name _____

3.



Traversable?_____

4.



Traversable?_____

Quiz Form B

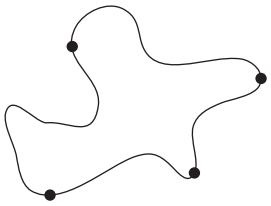
Name _____

Class _____ Date _____ Score _____

Unit I - The Structure of Geometry
Part B - The Scope of Our Geometry
Lessons 1 - Undefined Terms

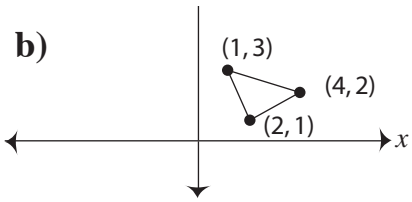
1. Name the Geometry illustrated by each of the following illustrations.

a)



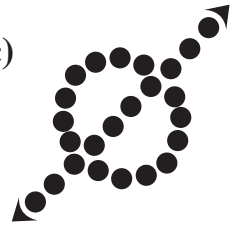
_____

b)



_____

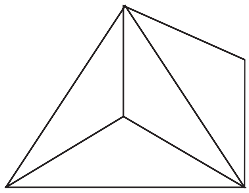
c)



_____

Which of the networks in exercises 2 through 4 are traversable? For the networks which are traversable, find a corresponding path. Label the starting and stopping nodes.

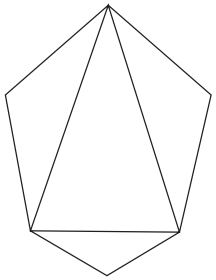
2.



Traversable?_____

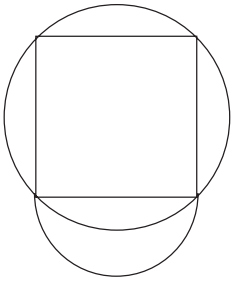
Name _____

3.



Traversable?_____

4.



Traversable?_____

Quiz Form A

Name _____

Class _____ Date _____ Score _____

Unit I - The Structure of Geometry
Part B - The Scope of Our Geometry
Lesson 1 - Undefined Terms

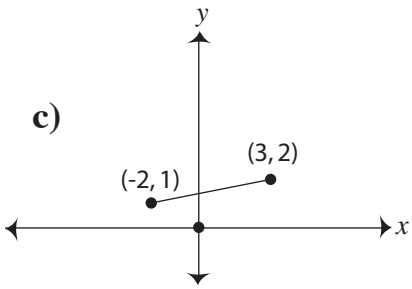
1. Name the Geometry illustrated by each of the following illustrations.

a) 

Synthetic Geometry

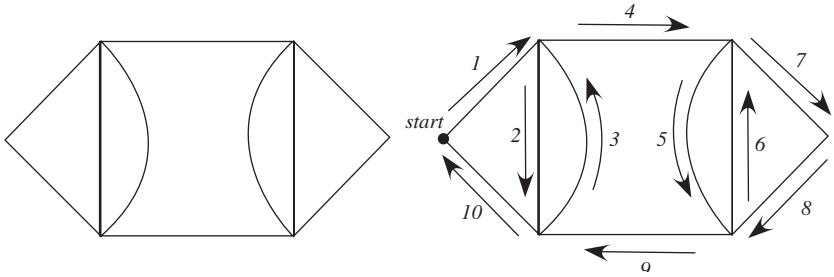
b) 

Discrete Geometry

c) 

Coordinate Geometry

Which of the networks in exercises 2 through 4 are traversable? For the networks which are traversable, find a corresponding path. Label the starting and stopping nodes.

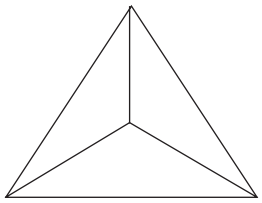
2. 

Traversable? *yes*

It has only even nodes. Answers may vary on the traversable path. Start at any node.

Name _____

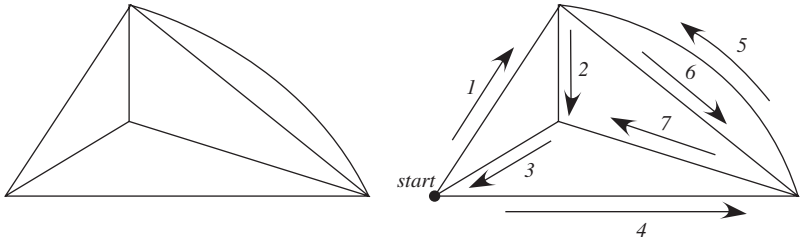
3.



Traversable?_____*no*_____

It has all odd nodes. Traversable networks can have at most 2 odd nodes.

4.



Traversable?_____*yes*_____

It has two odd nodes and all other even nodes. Answers may vary on the traversable path. Start at either odd node.

Quiz Form B

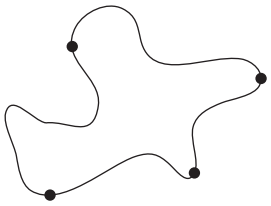
Name _____

Class _____ Date _____ Score _____

Unit I - The Structure of Geometry
Part B - The Scope of Our Geometry
Lesson 1 - Undefined Terms

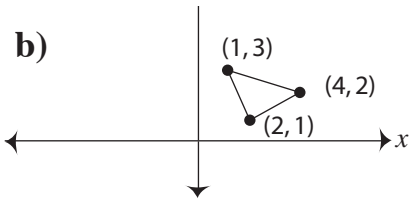
1. Name the Geometry illustrated by each of the following illustrations.

a)



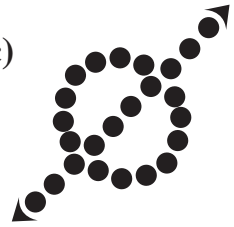
Network Geometry

b)



Coordinate Geometry

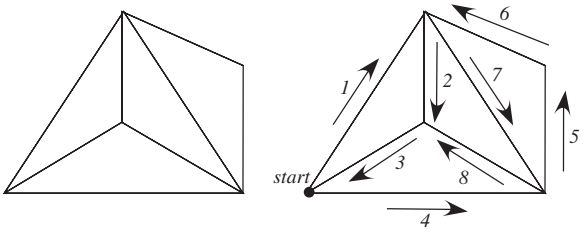
c)



Discrete Geometry

Which of the networks in exercises 2 through 4 are traversable? For the networks which are traversable, find a corresponding path. Label the starting and stopping nodes.

2.

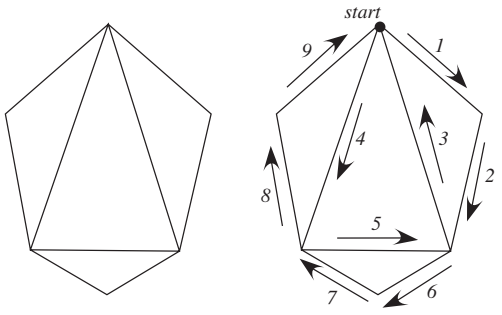


Traversable? *yes*

It has two odd vertices with all other nodes even. Start at either node. Answers may vary on the traversable path.

Name _____

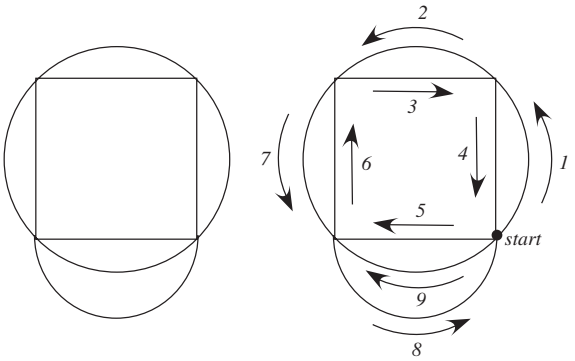
3.



Traversable?_____*yes*_____

It has only even nodes. Answers may vary on the traversable path. Start at any node.

4.



Traversable?_____*yes*_____

It has two odd nodes and all other nodes even. Answers may vary on the traversable path. Start at either odd node.

