Activity: **Charlotte's Web**

GRADE LEVELS: 3-5

SUMMARY:

As Charlotte uses her web to communicate, the students will also create a web to send a small message. The students will learn how a spider creates its web. They will learn about the different types of webs spiders make. With this knowledge the students need to design and create their own web and incorporate a message.

LEVEL OF DIFFICULTY [1 = Least Difficult: 5 = Most Difficult]

5 - most difficult (easier if modified as described in directions)

TIME REQUIRED

45-60 minutes (1 class period)

COST

Approximately $10 for an entire class

Foamboard: $9.00

Extruded Foam Insulation: $7.00 (purchased at hardware store)

String $1.00-$2.00

Thread $0.59

Popsicle Sticks $1.00

STANDARDS:

1.1 Identify materials used to accomplish a design task based on a specific property (i.e. weight, strength, hardness, and flexibility).

1.2 Identify and explain the appropriate materials and tools (hammer, screwdriver pliers, tape measure, screws, nails and other mechanical fasteners) to construct a given prototype.

2.1 Identify a problem that emanates from the need for shelter, storage or convenience.

2.2 Identify ways in which a problem can be represented (e.g. sketches, diagrams, graphic organizers, and lists).

2.3 Identify relevant design features (e.g. size, shape) for building a prototype of a solution to a given problem.

2.4 Compare natural systems with mechanical systems that are designed to serve similar purposes (e.g. bird's wings as compared to an airplane's wings).

WHAT WILL THE STUDENTS LEARN?

How spider webs are made and what they are used for

how to sketch a design before constructing a product

construction and design of their own spider webs

BACKGROUND INFORMATION:

Spider knowledge:

Silk is used for travel, to catch prey, to construct a home, to cover eggs, to enclose young, and for flight.

Design: a sketch or drawing to represent an idea to be made into a prototype.

A characteristic of silk- spider silk is the strongest natural and man-made fiber. Spider silk can be stretched 20-25% with out breaking and will return to its original shape.

Different types of webs, orb, funnel, etc. (see Pictures of Web types worksheet)

RESOURCES:

http://www.science.edu

Search silk for lots of good information

http://www.beakman.com/spider/spider.html.

http://www.bonus.com/beakman/spider/spider.html

Pictures of different web designs, uses, etc.

http://www.conservation.state.mo.us/conmag/1996/decoi/1.html

Background on spiders, webs, etc.

http://www.reptilepark.com.au/animals/spiders/SpiderWebs.html

Different kinds of webs

http://www.ufsia.ac.be/Arachnology/Pages/Silk.html

GREAT site with lots of links on pictures, characteristics of silk, spiders, spider webs, etc.

MATERIALS:

2-9" x 12" pieces of foam board per student OR 1-9" x 12" piece of 3/4" thick extruded foam insulation

30-pushpins per student

75' of white string or thread per student

1-piece of black construction paper per student

Glue

1-popsicle stick per student

PREPARATION:

IF USING FOAMBOARD:

Pre-cut 2-9" x 12" pieces of foam board per student

Glue the two pieces of foam board together and allow drying

IF USING EXTRUDED FOAM INSULATION:

pre-cut to 9" x 12" pieces; each student has one piece

Measure the string; it is easier to wind the string around a ruler and once the desired length is achieved, cut the string, and then wind it around a popsicle stick as you take it off of the ruler. (Takes about 1 minute to measure, cut, and wind around Popsicle stick.)

DIRECTIONS:

PROBLEM: Communicate without using sounds, and preferably without using pen and paper.

1. On the first day introduce Spiders. Why webs are needed and how they are created. Also introduce the basic types of webs--orb webs, triangle webs, or random webs. A discussion about forms of communication (a brief look at the

history of communication might be very interesting) and Charlotte's Web is encouraged.

2. On the second day, have students pick a type of web to build. Have them draw a preliminary design for their web.

3. Give each student his or her materials. Have them glue the black piece of construction paper to the foam board/foam insulation.

4. Illustrate how to create a web as follows:

> Push the pushpins into the foam board/foam insulation at every point you need to change directions. The pushpins act as the "skeleton" of the web. Wind string around the pushpins to create your web. (Hint: pull the pushpins up a little bit to expose a tiny bit of the metal post. Wrap the string around the post once and then push the pushpin down. It will help secure the web. You can then also wind the string around the upper part.)

5. Have the students create their own web following one of the styles of web-design employed by a spider. Show them how they can use the string on the Popsicle stick to easily wrap around the pushpins. (The string will pull off easily, just like thread off of a spool.)

6. Once the student has created their web tell them that now they must create a word in their web just as in Charlotte's Web. Confine the words to three or four letters.

7. Share the completed webs and read the words contained within them.

MODIFICATION:

(1.) Introduce the concept of Spiders, Webs, communication styles (verbal and non-verbal), and Charlotte's Web. Then, demonstrate how to create a web. However, rather than have the students create the web first and then their message, have them create their message and then a random spider "web-like" design. (This is much easier and still has the same end effect.)

(2.) Introduce the concept of Spiders, Webs, communication styles (verbal and non-verbal), and Charlotte's Web. Then, demonstrate how to create a web. Have the students design and create a web, as in the unmodified directions. To simplify

the project, have the students then write their message on a piece of paper and tape to the web. (This is much easier, not as neat of an end result, but the emphasis remains on web-design and is more realistic.)

INVESTIGATING QUESTIONS:

What is communication?

What are different ways to communicate?

How do babies communicate?

What resembles a spider web in our world? (fishing nets, crochet, bridge trusses)

What materials can we use to create our own web?

What are the advantages of spider's silk?

Why do spiders build webs?

REFERENCES:

Church, Jok R., Spider Webs. http://www.beakman.com/spider/spider.html. August 9, 2001. [online].

Portions of activity from *Animals in the Classroom* by David C. Kramer. © 1989 by Addison Wesley Longman Inc., published by Dales Seymour Publications, a division of Pearson Education Inc.

E.B. White. Charlotte's Web. Harper Trophy. April 1999. ISBN:0064400557 Permission granted by HarperCollins Publishers Inc.

Rubric for Performance Assessment

Activity Title: Charlotte's Web

Grade Level: 3-5

	1	2	3	4		
Criteria	Beginning	Developing	Proficient	Advanced	Weight (X factor)	Subtotal
Construction of message	Message designed	Pasted message	Message has 1 letter	Message has 2 or more letters	1	
Performance on worksheet	Minimal effort	1 out of three questions answered correctly	2 out of 3 correct	Answers all three questions with several examples		
Construction of web	String not wound around pushpins correctly; does not resemble a spider web of a given type	String wound around pushpins correctly; does not resemble a spider web of a given type	Mirrors a spider web of a given type (orb, random, triangle)	3-D effect of a spider web achieved by winding the string at different heights of the pushpins; looks like a spider web of a given type given the materials available		

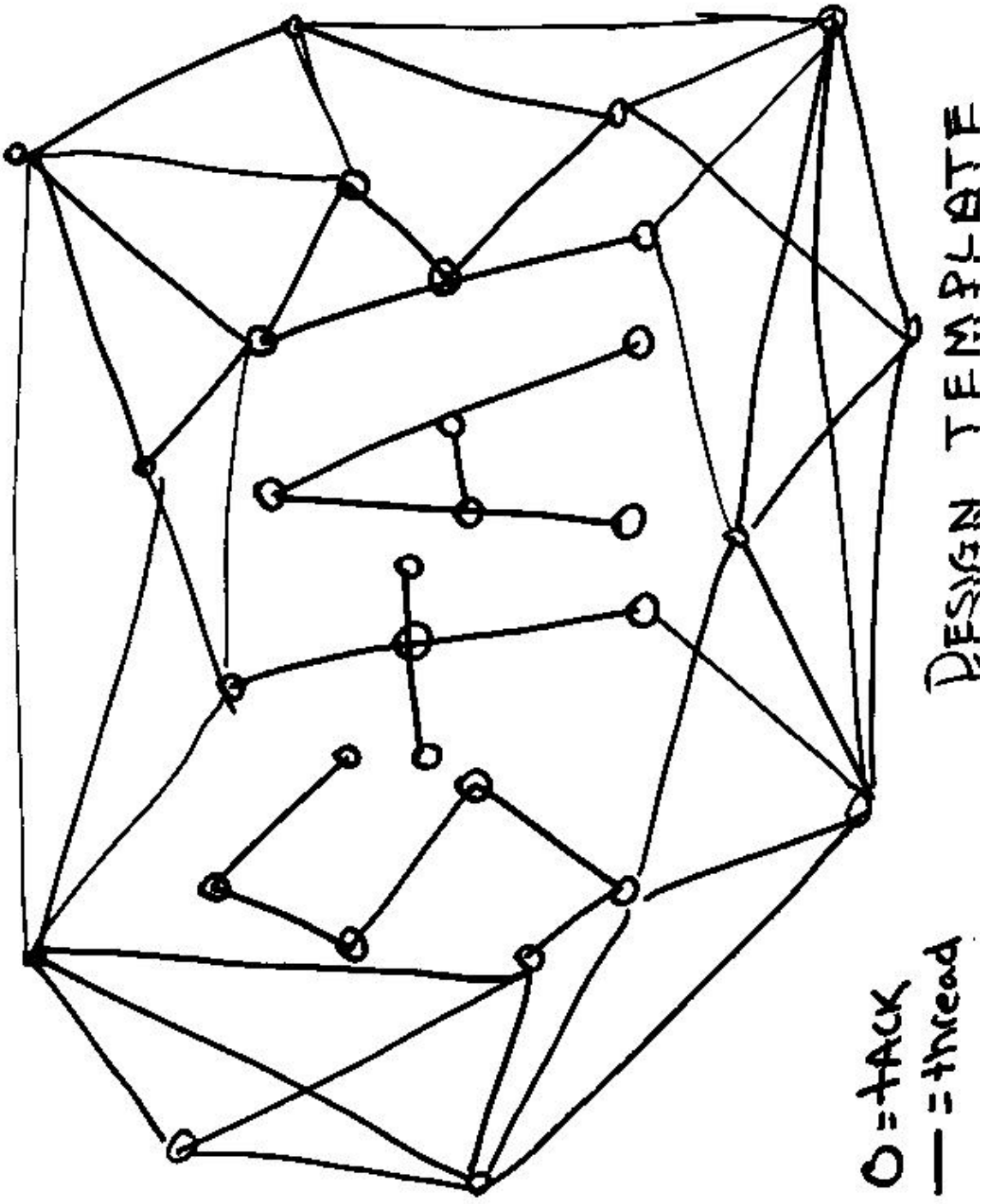
Teacher Comments:

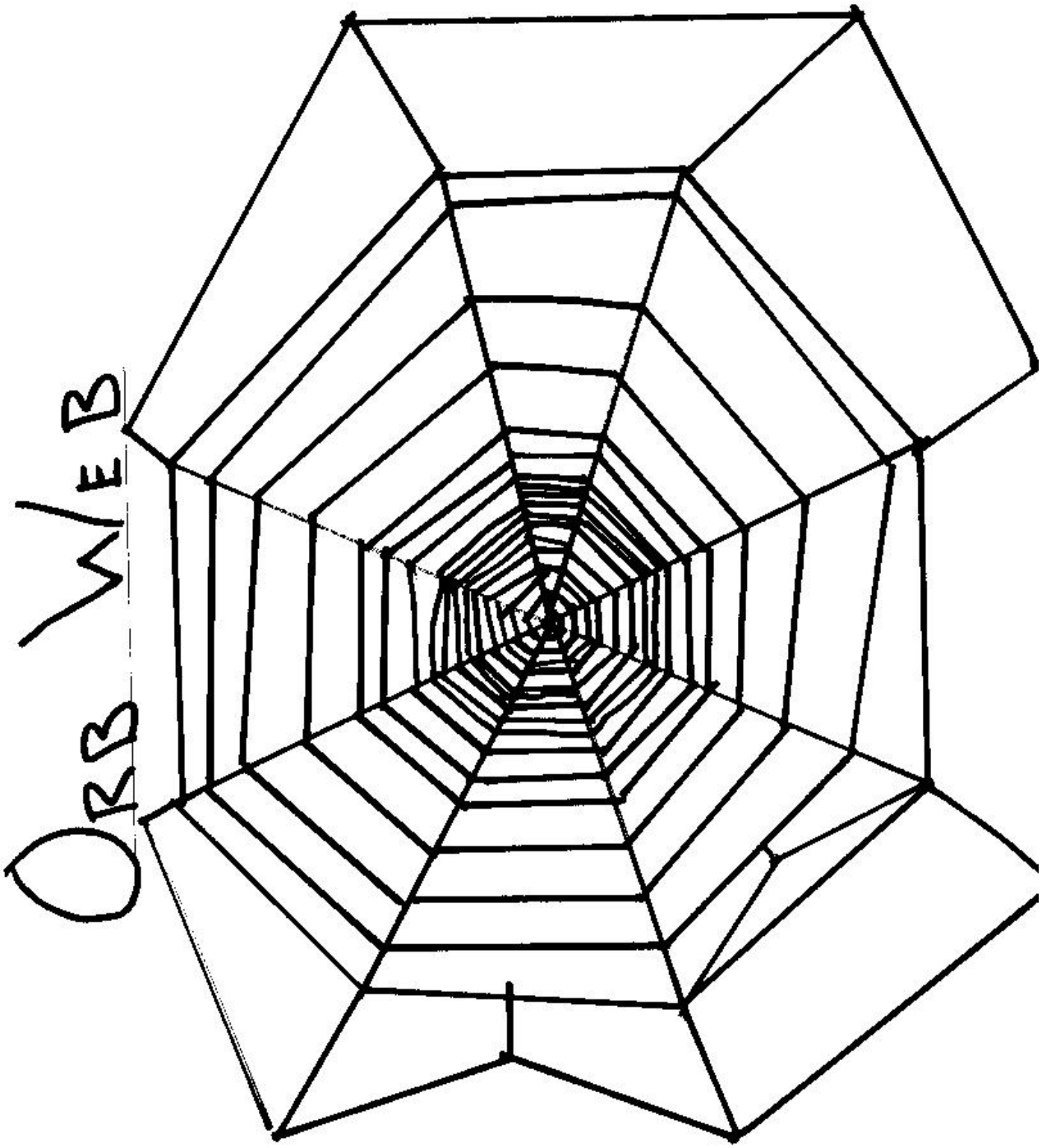
Communication Worksheet **Name**_____

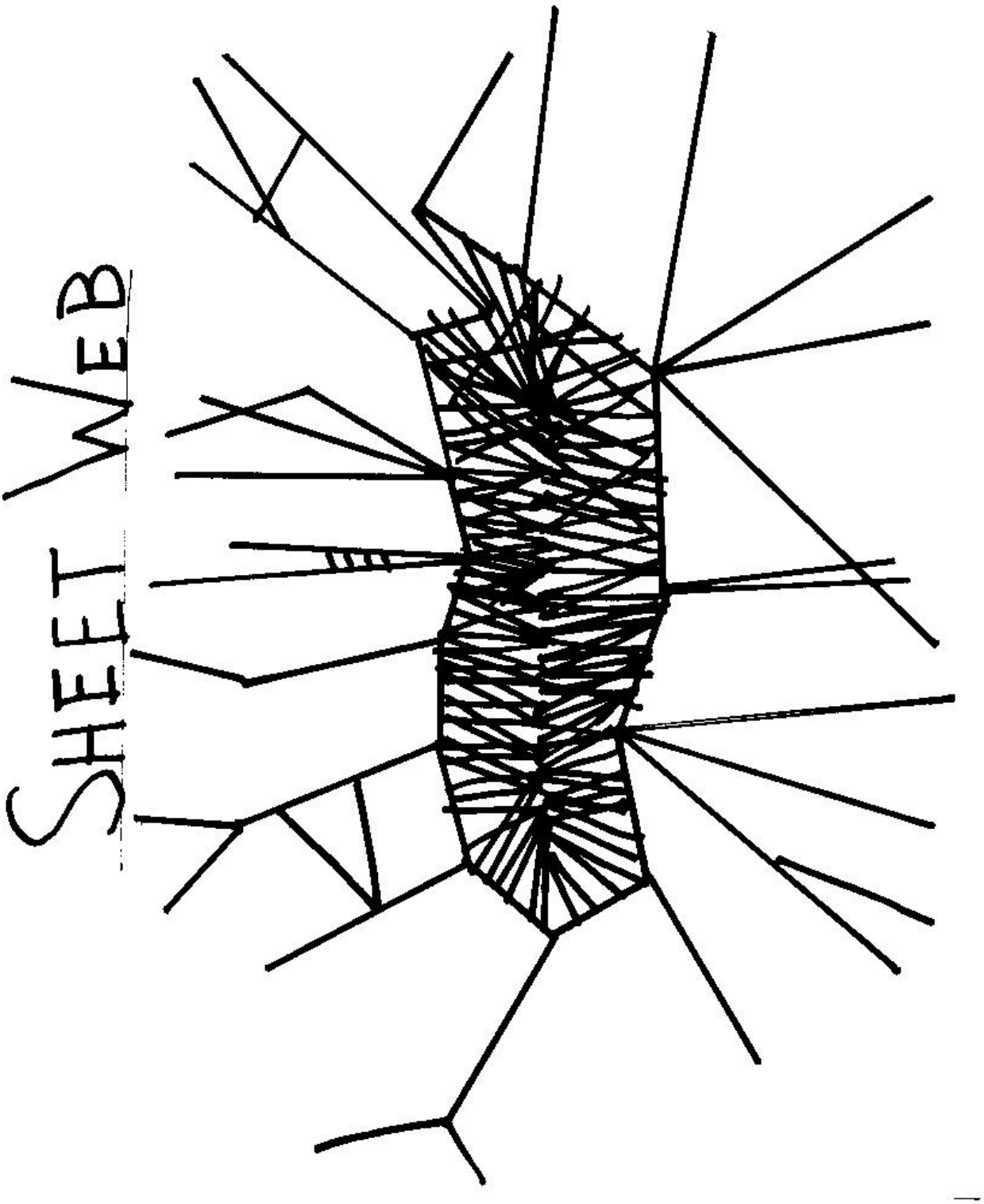
How did Charlotte and the other characters communicate in the book Charlotte's Web?

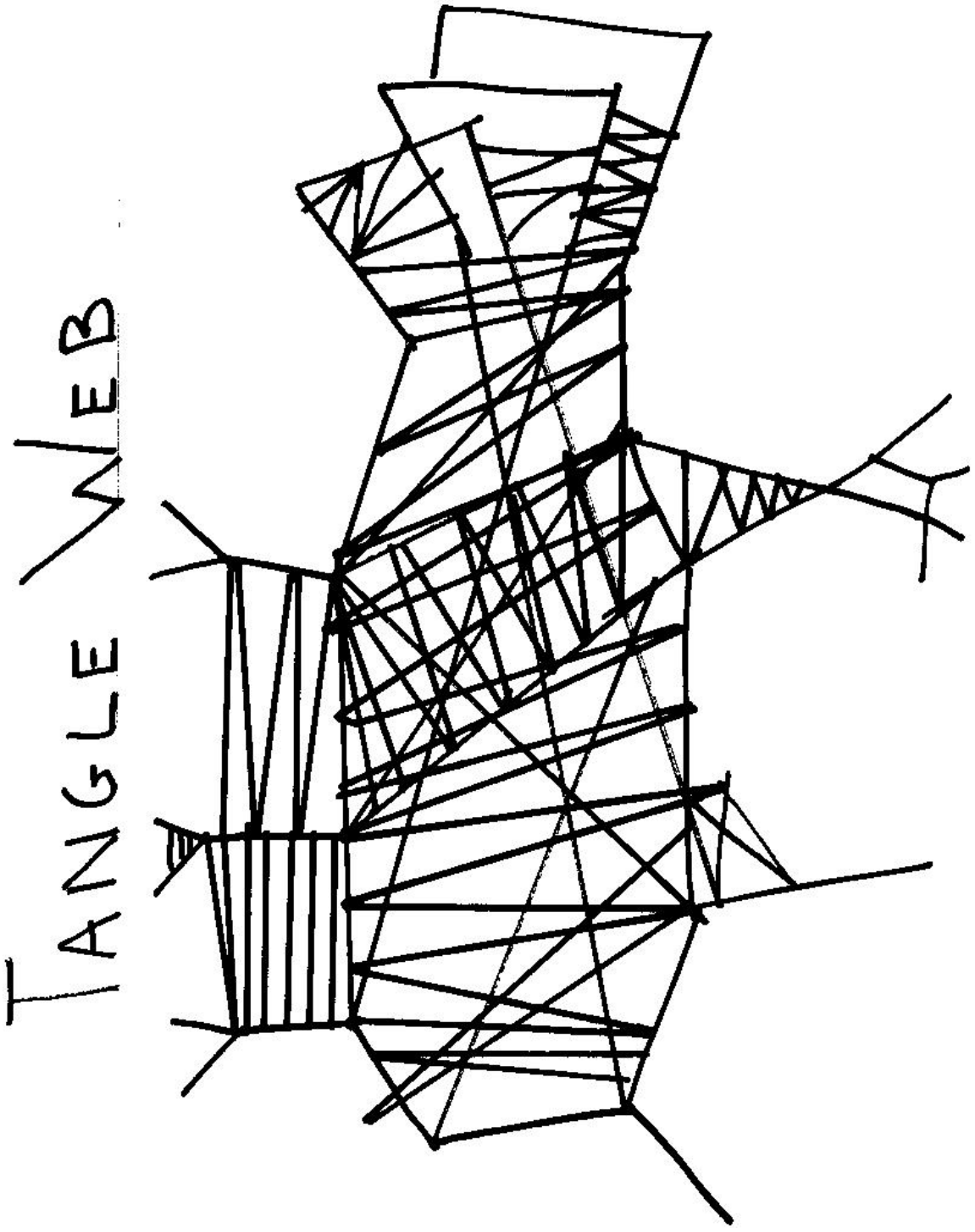
How did people 100 years ago communicate?

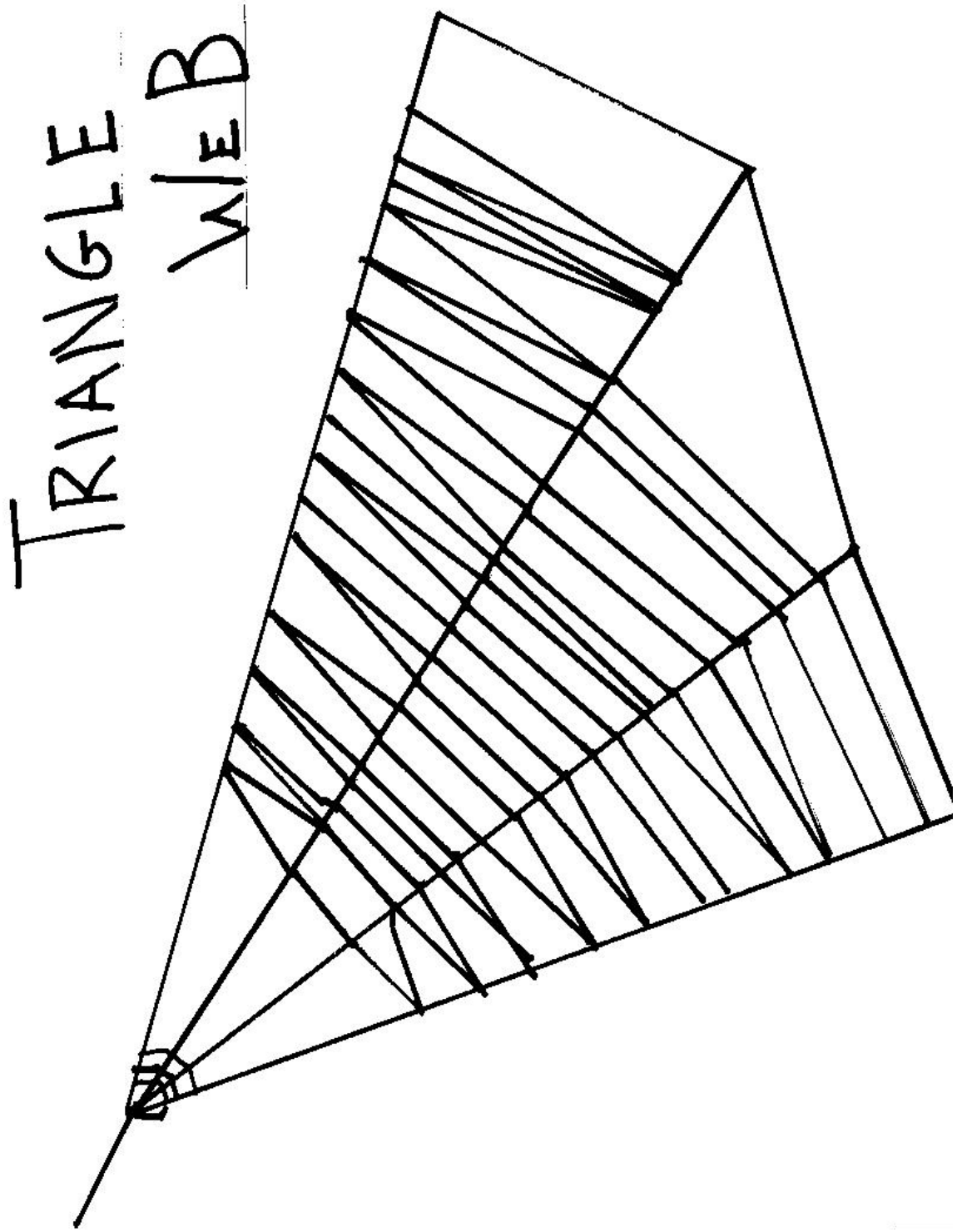
What tools do we use to communicate today?











PreK-12 ENGINEERING

Activity Evaluation Form www.k12engineering.org

Activity Name: _____

Grade Level the Activity was implemented at:_____

Was this Activity effective at this grade level (if so, why, and if not, why not)**?**

What were the Activity's strong points?

What were its weak points?

Was the suggested Time Required sufficient (if not, which aspects of the Activity took shorter or longer than expected)**?**

Was the supposed Cost accurate (if not, what were some factors that contributed to either lower or higher costs)**?**

Do you think that the Activity sufficiently represented the listed MA Framework Standards (if not, do you have suggestions that might improve the Activity's relevance)**?**

Was the suggested Preparation sufficient in raising the students' initial familiarity with the Activity's topic (if not, do you have suggestions of steps that might be added here)**?**

If there were any attached Rubrics or Worksheets, were they effective (if not, do you have suggestions for their improvement)**?**

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