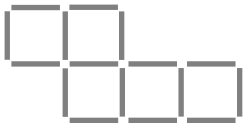
10th Grade Assignment – Week #1

Group Assignment: To be done either on Tuesday or Thursday

- See how much you can do from the group work sections from the *Geometry Basics* unit, **Problem Sets #1-3.** Specifically, this means:
    - Problem Set #1: #1-17
    - Problem Set #2: #1-5
    - Problem Set #3: #1-13

- *Puzzle!*
  Move two sticks into a new position, so that you end up with exactly four squares. every stick must be part of a square. No two sticks may be placed on top of each other or side by side. ***Challenge!*** **Find all 9 solutions!**



Individual Work

- See how much you can do from the homework sections from the *Geometry Basics* unit, **Problem Sets #1-3.**

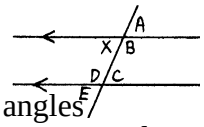
Geometry Basics

Problem Set #1

Group Work

Note: In this unit you need a compass, protractor, and ruler.

Look at the drawing below. With #1 through #5, fill in the sentence with the proper words given the choices below.



- vertical angles
- supplementary angles
- corresponding angles
- alternate interior angles
- same-side interior angles

1) X and B are _____.
2) X and C are _____.
3) X and A are _____.
4) X and D are _____.
5) X and E are _____.

Angle Theorems

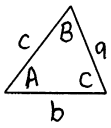
Complete the sentence either with "are congruent" or "add to 180°."

6) *Vertical Angle Theorem.* Vertical angles always…
7) *Supplementary Angle Theorem.* Supplementary angles always…
8) *Corresponding Angle Theorem.* Corresponding angles always…
9) *Alternate Interior Angle Theorem.* Alternate interior angles always…
10) *Same-Side Interior Angle Theorem.* Same-side interior angles always…
11) *Triangle Interior Angle Theorem.* The angles in a triangle always…

Triangle Constructions (by measuring)

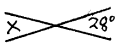
With the below table, each row represents a triangle, with three given measurements. Use a ruler and protractor (and perhaps a compass) to construct each triangle on a clean sheet of paper. Then measure (accurately!) to fill in the rest of the table.

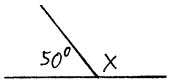
	a	b	c	A	B	C
12)	5cm	7cm	6cm			
13)	7cm	7cm	3cm			
14)	6cm	4cm				110°
15)			7cm	40°	20°	
16)			7cm	40°		120°
17)	7cm			40°	20°	

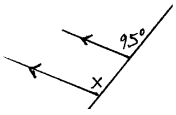


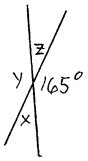
Homework

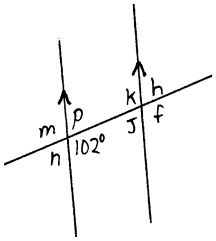
Find the variable.

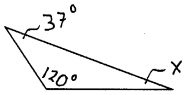
18) 

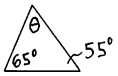
19) 

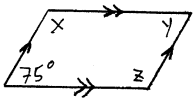
20) 

21) 

22) 

23) 

24) 

25) 

Simplifying Square Roots

Note: There are two rules for simplifying square roots:

- No square roots are allowed in the denominator of a fraction.
- The number inside the square root must be as small as possible.

Example: Simplify $\frac{5}{\sqrt{3}}$

Solution: Multiply top and bottom by $\sqrt{3}$, giving us: $\frac{5\sqrt{3}}{3}$

Example: Simplify $\sqrt{75}$

Solution: We can make the inside number smaller by recognizing that 25 divides evenly into 75. Therefore,

$\sqrt{75} \rightarrow \sqrt{25 \cdot 3} \rightarrow \sqrt{25} \cdot \sqrt{3} \rightarrow 5\sqrt{3}$

Simplify:

26) $\sqrt{8}$

27) $\frac{4}{\sqrt{7}}$

28) $\sqrt{300}$

29) $\frac{3}{\sqrt{6}}$

30) $\sqrt{28}$

31) $\frac{\sqrt{2}}{\sqrt{5}}$

32) $\sqrt{99}$

33) $\frac{5}{\sqrt{5}}$

Problem Set #2

Group Work

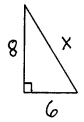
1) *The Quadrilateral Interior Angle Theorem.* Draw two irregular, fairly large quadrilaterals, and then measure the interior angles of each one. What can be said about the angles in a quadrilateral?

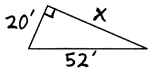
2) *Pythagorean Theorem.* In your own words, state the Pythagorean Theorem.

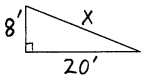
A *Pythagorean triple* is three whole numbers that can be the lengths of the three sides of a right triangle. All of the *primitive* (i.e., reduced) Pythagorean triples (less than 100) are listed below:

3, 4, 5
5, 12, 13
8, 15, 17
7, 24, 25
20, 21, 29
12, 35, 37
9, 40, 41
28, 45, 53
11, 60, 61
16, 63, 65
33, 56, 65
48, 55, 73
13, 84, 85
36, 77, 85
39, 80, 89
65, 72, 97

Find x, either by using
The Hypotenuse Formula
$c^2 = a^2 + b^2$
or *The Leg Formula*
$a^2 = c^2 - b^2$
or Pythagorean triples.

3) 

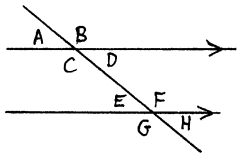
4) 

5) 

Homework

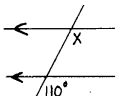
6) What are the measures of each of the angles in an equilateral triangle?

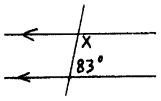
Given the drawing below, name a pair of angles that are:

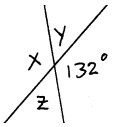


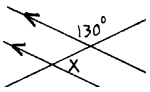
7) Corresponding.
8) Vertical.
9) Supplementary.
10) Same-side interior.
11) Alternate interior.

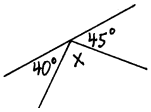
Find each variable:

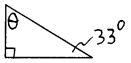
12) 

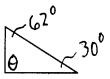
13) 

14) 

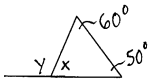
15) 

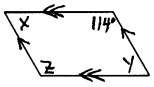
16) 

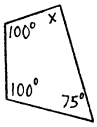
17) 

18) 

19) 

20) 

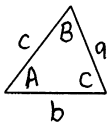
21) 

22) 

Triangle Constructions (by measuring)

With the below table, each row represents a triangle, with three given measurements. Use a ruler and protractor (and perhaps a compass) to construct each triangle on a clean sheet of paper. Then measure (accurately!) to fill in the rest of the table.

	a	b	c	A	B	C
23)	9cm	6cm	5cm			
24)	9cm	6cm	2cm			
25)		8cm		20°		135°
26)	6cm	9cm				28°
27)		6cm	9cm			28°
28)		6cm	5cm			28°
29)		6cm	2cm			28°



Note: We have just determined the lengths of the missing sides and measures of the missing angles for each triangle by doing constrctions and measuring with a ruler and protractor. However, there is a better and more accurate method – trigonometry – that enables you to simply calculate all the missing sides and angles without taking a single measurement. You will begin to study trigonometry later in this workbook.

Problem Set #3

Group Work

Triangle Constructions

Each triangle construction problem (on the previous two problem sets) began by giving you three measurements of the triangle. These three measurements defined the shape and size of the triangle. After constructing the triangle as specified, you then measured in order to find the other missing angles and sides.

For reasons that will become apparent only later, we need to be able to categorize the triangles. These categories are based upon which sides and angles are given. One way to do this is to look at the given measurements on a labeled triangle, see how it is that these three elements are next to one another, and then ask what the order is.

The different types of triangle constructions are:

- **SSS**. All three sides of the triangle are given.
- **ASA**. Two angles are given, and so is the side between the two angles.
- **AAS** (or SAA). Two angles are given, and one of the sides *not* between the two given angles. (This is essentially the same as ASA because once you know two angles, you know the third as well.)
- **SAS**. Two sides are given, and so is the angle between the given sides.
- **SSA**. Two sides are given, and so is one angle that is *not* between the two given sides. (You will soon learn why you should beware of SSA.)

1) Look at the triangle construction table at the end of the last problem set. Which type of construction was each one?

State under what circumstances an impossible construction can result from an…

2) SSS construction.

3) ASA (or AAS) construction.

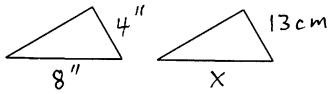
4) SAS construction.

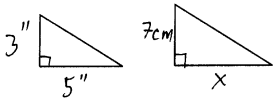
5) SSA construction.

Similar Figures

6) What can be said about any two similar figures?

Find each variable given that each pair of figures is similar.

7) 

8) 

Euclidean Constructions

On the previous two problem sets we constructed triangles by measuring with a ruler and a protractor. We will now put our protractor aside and only use our ruler as a straight edge (for drawing straight lines – not for measuring), as we follow the path of the Greek geometers. The only tools they permitted themselves to use were the compass and the straight edge.

Use a compass and straight edge to accurately construct each of the following:

9) Draw a circle with a radius of about 5cm, and then construct a regular hexagon inside that circle.

10) Construct an angle of about 80° (without a protractor) and then bisect that angle.

11) Draw a line that goes diagonally halfway across the page and then bisect it.

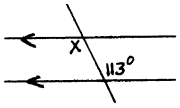
12) Mark a point about 4cm away from the line you just drew, and then draw a line through that point that is perpendicular to the line.

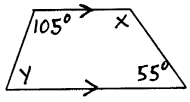
Polygon Interior Angle Th.

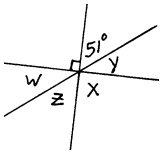
13) The angles in a triangle add to 180°. The angles in a quadrilateral add to 360°. Derive a formula that calculates the sum of the angles inside any polygon with n sides.

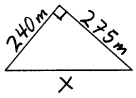
Homework

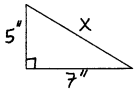
Find each variable.

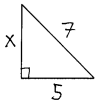
14) 

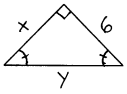
15) 

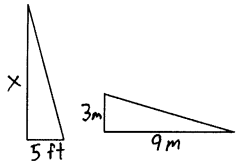
16) 

17) 

18) 

19) 

20) 

21) 

22)