

\* Remember: Capital letters represent angles  
 lower case letters represent sides

Name \_\_\_\_\_

Date \_\_\_\_\_

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Chptr. 9

Advanced Algebra

Assignment #11

The Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cos A$$

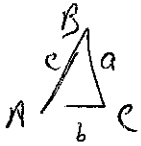
Use Law of Cosines with  
 SAS or SSS

The side "by itself" and  
 its corresponding angle are in  
 the "a" position.

Set up the Triangles and find the length of the remaining side (These problems are basic use of the Law of Cosines)

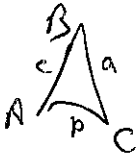
- 1) In Triangle ABC, Angle A is  $105^\circ$ ,  $c=15\text{cm}$ ,  $b=21\text{cm}$
- 2) In Triangle PRQ, Angle R is  $32^\circ$ ,  $p=4.8\text{km}$ , and  $q=6.3\text{km}$
- 3) In Triangle KLM, Angle L is  $72^\circ$ ,  $m=6.2\text{meters}$ , and  $k=14.8\text{meters}$

For the following problems, use the law of cosines to find the measure of all the angles of the triangle. You will need to do the law of cosines twice. Then you may subtract from  $180^\circ$



- 4) In Triangle ABC  $\overline{AC}=12\text{cm}$ ;  $\overline{CB}=11\text{cm}$ ; and  $\overline{AB}=13\text{cm}$
- 5) In Triangle PQR  $\overline{PQ}=5\text{cm}$ ;  $\overline{PR}=10\text{cm}$ ; and  $\overline{QR}=7\text{cm}$
- 6) Find the smallest angle of a triangle with sides  $11\text{cm}$ ,  $13\text{cm}$ , and  $17\text{cm}$
- 7) Find the largest angle of a triangle with sides  $4\text{cm}$ ,  $7\text{cm}$ , and  $9\text{cm}$

For the following problems, set up the triangles, and find the length of the missing side. These problems involve the quadratic formula  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  This is the hardest case involving the law of Cosines. It requires some work!



- 8) In triangle ABC Angle A is  $60^\circ$ ,  $\overline{AB}=6\text{cm}$ ;  $\overline{BC}=7\text{cm}$  Find the missing side  $\overline{AC}=x$
- 9) In Triangle EGF, angle E is  $120^\circ$ ,  $\overline{GE}=3\text{cm}$ ,  $\overline{GF}=5\text{cm}$ , find the missing side  $\overline{EF}=x$
- 10) In Triangle ABC, angle A =  $70^\circ$ ,  $\overline{BC}=11\text{cm}$ ,  $\overline{AC}=8\text{cm}$  find  $\overline{AB}$
- 11) In Triangle ABC, angle B =  $130^\circ$ ,  $\overline{AB}=5\text{cm}$ ,  $\overline{AC}=13\text{cm}$ ; find  $\overline{BC}$
- 12) In Triangle QRS, angle S =  $40^\circ$ ,  $\overline{QR}=5\text{cm}$ ,  $\overline{SR}=6\text{cm}$ ; find  $\overline{SQ}$
- 13) In Triangle MNO, angle M is  $60^\circ$ ,  $\overline{NO}=5\text{cm}$ ,  $\overline{MN}=x\text{cm}$ , and  $\overline{MO}=2x\text{cm}$
- 14)

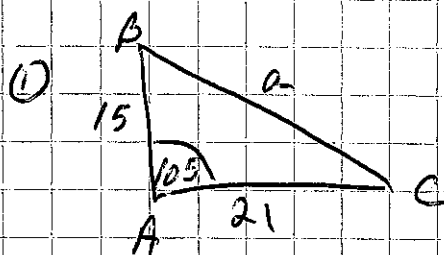
Review problems with the Law of Sines:

For the following Problems, the Triangle is ABC find:

- 15) a if  $A = 63^\circ$ ,  $B=49^\circ$  and  $b = 18\text{cm}$
- 16) b is  $A = 82^\circ$ ,  $C=25^\circ$ , and  $c=34\text{cm}$

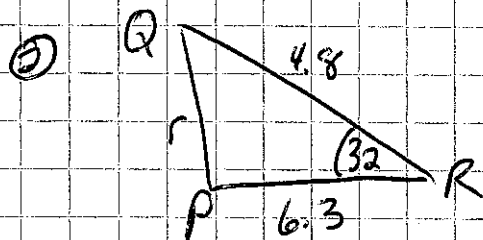
# Assignment #11

## The Law of Cosines



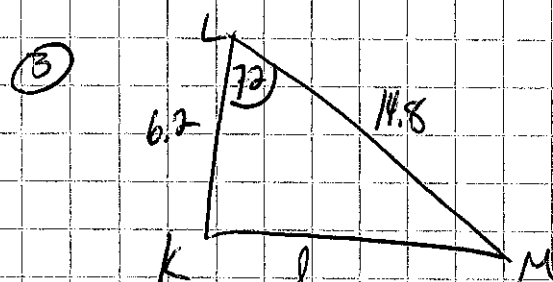
$$a^2 = 15^2 + 21^2 - 2(15)(21)\cos 105$$

$$a = 28.8$$



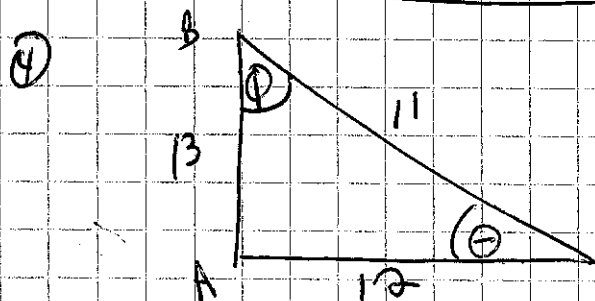
$$r^2 = 4.8^2 + 6.3^2 - 2(4.8)(6.3)\cos 32$$

$$r = 3.38$$



$$l^2 = 6.2^2 + 14.8^2 - 2(6.2)(14.8)\cos 72$$

$$l = 14.2$$



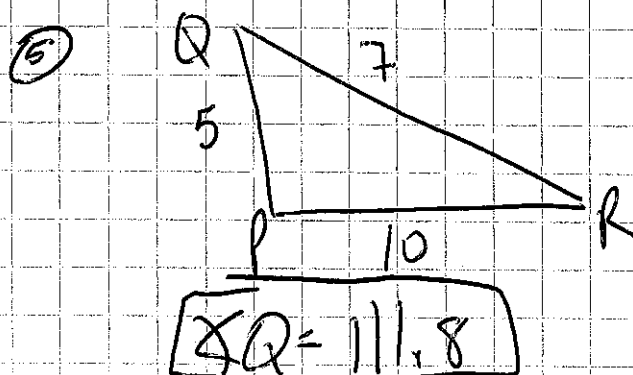
$$13^2 = 11^2 + 12^2 - 2(11)(12)\cos \theta$$

$$\theta = 68.7^\circ$$

$$12^2 = 11^2 + 13^2 - 2(11)(13)\cos \phi$$

$$\angle B (\phi) = 59.3$$

$$\angle A = 180 - (59.3 + 68.7) = 52^\circ$$



$$7^2 = 5^2 + 10^2 - 2(5)(10)\cos \theta$$

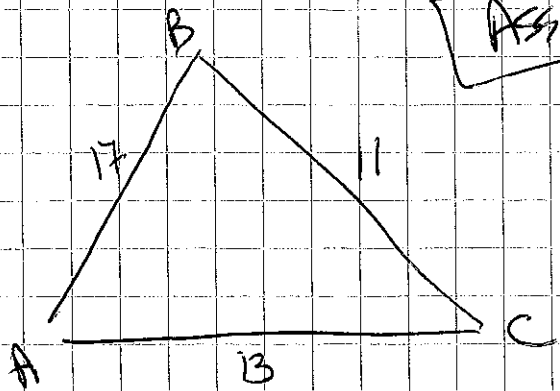
$$\angle P = 40.5$$

$$25 = 7^2 + 10^2 - 2(7)(10)\cos R$$

$$\angle R = 27.7$$

Assignment #11

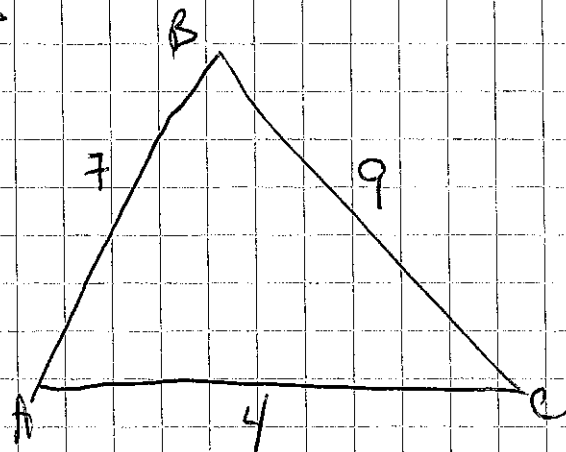
6



$$11^2 = 17^2 + 13^2 - 2(17)(13) \cos A$$

$$A = 40.3^\circ$$

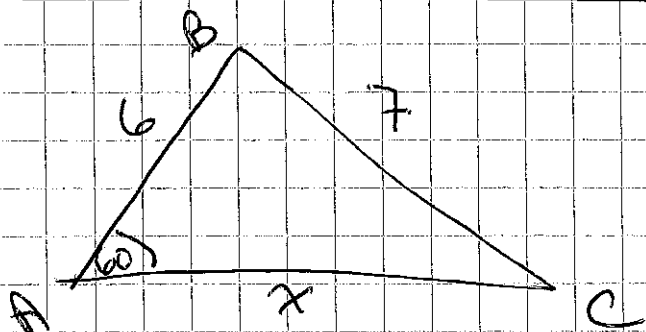
7



$$9^2 = 7^2 + 4^2 - 2(7)(4) \cos A$$

$$\angle A = 106.6$$

8

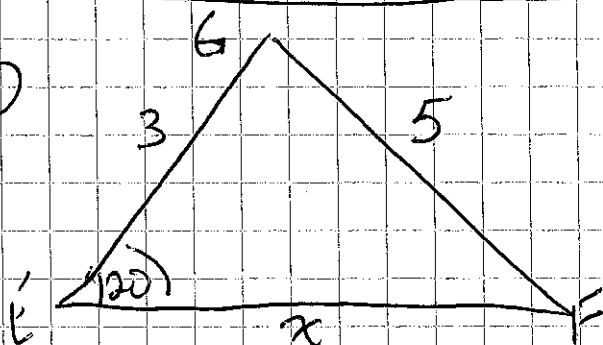


$$7^2 = 6^2 + x^2 - 2(6)(x) \cos 60$$

$$0 = x^2 - 6x - 13$$

$$7.69$$

9

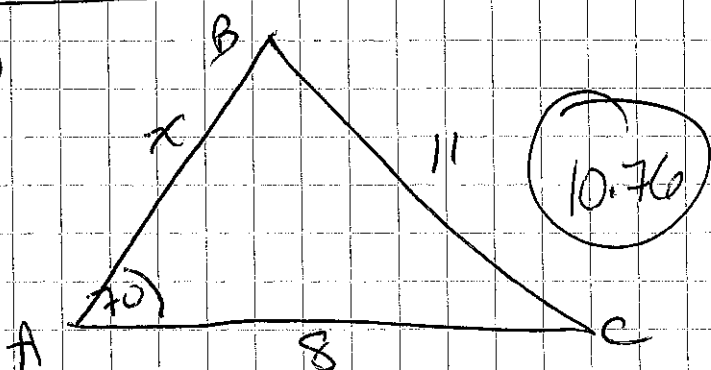


$$5^2 = 3^2 + x^2 - 2(3)(x) \cos 120^\circ$$

$$0 = x^2 + 3x - 16$$

$$2.77$$

10

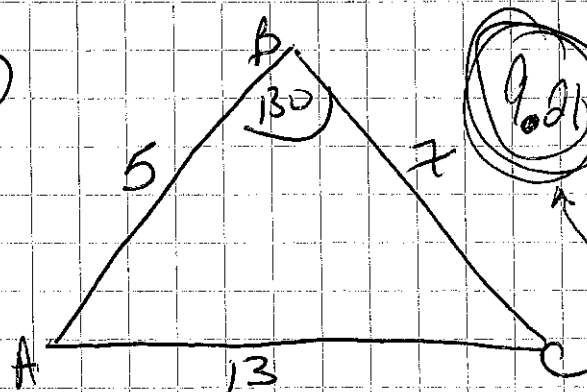


$$11^2 = x^2 + 8^2 - 2(x)(8) \cos 70$$

$$0 = x^2 - 5.47x - 57$$

$$10.76$$

11



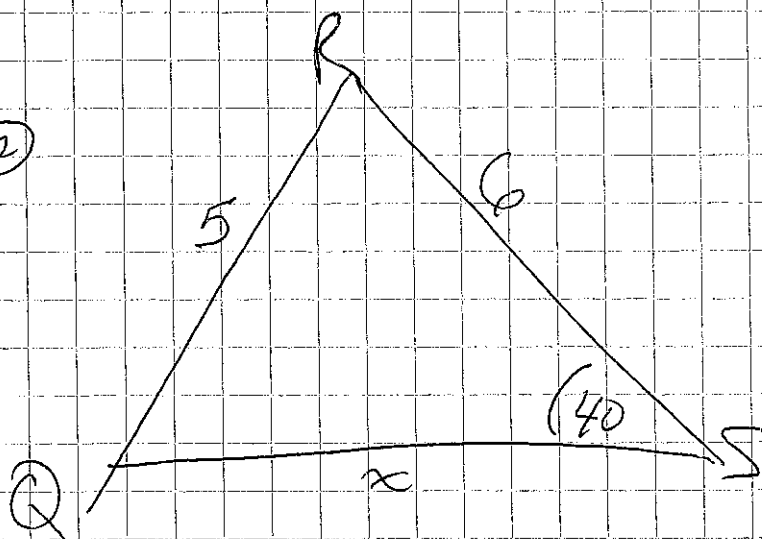
$$13^2 = 5^2 + x^2 - 2(5)(x) \cos 130$$

$$0 = x^2 + 6.427x - 144$$

$$9.06$$

Assignment #13

(12)



$$5^2 = 6^2 + x^2 - 2(6)(x) \cos 40$$

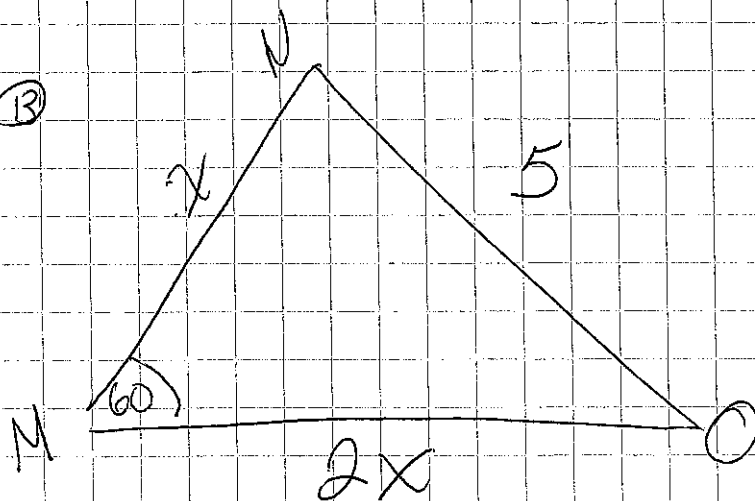
$$0 = x^2 - 9.19x - 11$$

10.26

Good  
Neq'n  
~~problem~~

\*\*

(13)



$$5^2 = x^2 + 4x^2 - 2(x)(2x) \cos 60$$

$$5x^2 - 2x^2$$

$$25 = 3x^2$$

$$8.33 = x^2$$

$x = 2.886$