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CHAPTER 4—GEOMETRY

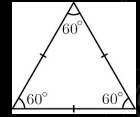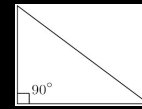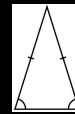THE COSINE LAW

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THE COSINE LAW
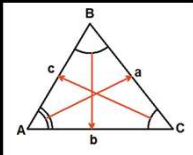
• For any type of triangle

To find:
➢ Length of sides
➢ Measure of angles

60°
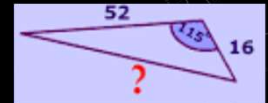90°
60°   60°

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LABEL YOUR TRIANGLE

➢ Angles: upper case
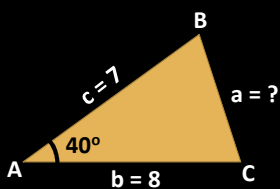➢ Sides: lower case

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TO FIND THE LENGTH OF A SIDE:

When given: Side—Angle—Side

• $a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot cosA$
• $b^2 = a^2 + c^2 - 2 \cdot a \cdot c \cdot cosB$
• $c^2 = a^2 + b^2 - 2 \cdot a \cdot b \cdot cosC$

52
115°
16
?

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EXAMPLE 1:

B
c = 7
a = ?
40°
A   b = 8   C

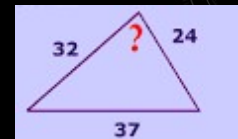Given: b = 8, c = 7, A = 40°
Looking for: a
Must use:

Remember:
BEDMAS

$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot cosA$
$\quad = 8^2 + 7^2 - 2 \cdot 8 \cdot 7 \cdot cos40$
$\quad = 64 + 49 - 112 \cdot cos40$
$\quad = 113 - 112 \cdot cos\,40$
$\quad = 113 - 85.796977$
$\sqrt{a^2} = \sqrt{27.2030}$
$\quad a = 5.22\ units$

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TO FIND THE MEASURE OF AN ANGLE:
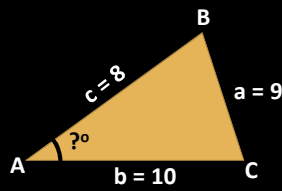
When given: Side—Side—Side

• $A = cos^{-1}\left(\frac{b^2+c^2-a^2}{2 \cdot b \cdot c}\right)$
• $B = cos^{-1}\left(\frac{a^2+c^2-b^2}{2 \cdot a \cdot c}\right)$
• $C = cos^{-1}\left(\frac{a^2+b^2-c^2}{2 \cdot a \cdot b}\right)$

32   ?   24
37

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EXAMPLE 2:

Given: a = 9, b = 10, c = 8,

Looking for: A   Remember: BEDMAS

Must use:

$$A = cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2 \cdot b \cdot c}\right)$$

$$A = cos^{-1}\left(\frac{10^2 + 8^2 - 9^2}{2 \cdot 10 \cdot 8}\right)$$

$$A = cos^{-1}\left(\frac{100 + 64 - 81}{160}\right)$$

$$A = cos^{-1}\left(\frac{83}{160}\right)$$

$$A = cos^{-1}(0.51875)$$

$$A = 58.75$$

C

CLASSWORK/HOMEWORK

- Math 3000 p.107 #1&2
- MHS Worksheet "Chapter 4—The Cosine Law p.238 # 1-8
- Online Assignment Cosine Law #1