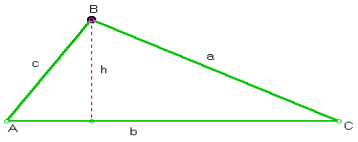
MATH 170 – CHAPTER 7 Name: .

7.1 Law of Sine

Need To Know

- Solving triangle theory
- Law of Sine
- Application

Theory on Solving Triangles



Solving Oblique Triangles	
Case	**Method**
AAA	
AAS ASA SSA = ASS	
SAS SSS	

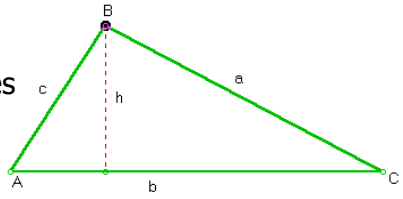
Law of Sine

Consider ΔABC:

h has two sub-triangles

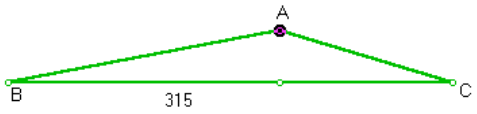
sin A =

sin C =



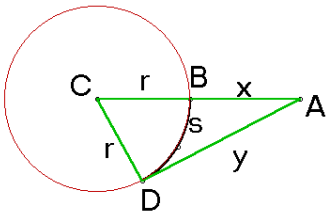
Application

Solve the triangle
given two angles
$\angle B = 13.4°$, $\angle C = 24.8°$ and $a = 315$ cm



Application

$\angle A = 51°$,
$s = 21$ and $r = 22$
Find x



Application

#30 150 ft antenna
$\angle$ of elevation to the top of antenna = 28.5
$\angle$ of elevation to bottom of antenna = 23.5
Find the height of hill

end

7.2 The Ambiguous Case

Need To Know

- Solving Triangles with 2 Sides
- The Ambiguous Case
- Test for solutions
- Practice/Application

The Ambiguous Case

Examine the SketchPad illustration to determine if given an angle and the next two consecutive sides, will a triangle be solvable?

See SSA.gsp

Solve SSA Triangles

$\angle A = 55°$, $b = 36$ and $a = 18$

Solve SSA Triangles

$\angle A = 112.0°$, a = 43.0 and b = 22.0

Solve SSA Triangles

$\angle C = 65°$, b = 7.6 and c = 7.1

end

7.3 Law of Cosine

Need To Know

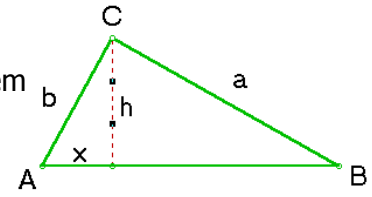
- Law of Cosine
- Practice and Applications

Set Up

- Can we use the Law of Sine to solve SAS?

Law of Cosine

Look at side ***a***
with Pythagorean theorem



Solve Triangles

∠B = 23°, a = 3.7m and c = 6.4m
Find side b.

Solve Triangles

a = 51 cm, b = 24 cm and c = 31 cm
Find the largest angle.

Application

#24 Two ships leave the harbor at the same time. One goes 14 mph S13°W, the other 12 mph N75°E. Find the distance between them after 3 hours.

end

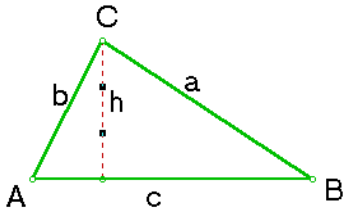
7.4 The Area of a Triangle

Need To Know

- Three formulas for triangle area
- Practice and application
- You **don't** need to memorize the formulas

The Area of a Triangle - SAS

Find the area formula without reference to h.



Area = ½ bc sin A

= ½ ab sin C

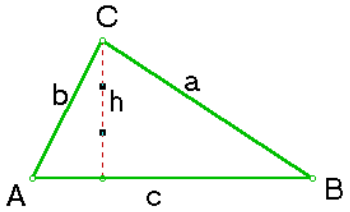
= ½ ac sin B

The Area of a Triangle - ASA

Given: ASA = ∠A, c, ∠B

Area = ½ (h)c

Note: h = b sin A



$$Area = \frac{a^2 \sin B \sin C}{\sin A}$$

$$= \frac{b^2 \sin A \sin C}{\sin B}$$

$$= \frac{c^2 \sin A \sin B}{\sin C}$$

The Area of a Triangle - SSS

Heron's Formula

$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

where a, b, & c are the sides and s = ½ (a + b + c)

Practice

Find the area a triangle.

∠A = 14°20′, ∠C = 75°40′

and b = 2.72 ft.

Area = ½ bc sin A

= ½ ab sin C

= ½ ac sin B

$$Area = \frac{a^2 \sin B \sin C}{\sin A}$$

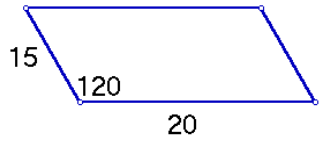
$$= \frac{b^2 \sin A \sin C}{\sin B}$$

$$= \frac{c^2 \sin A \sin B}{\sin C}$$

$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

Practice

Find the area a parallelogram



Area = ½ bc sin A
= ½ ab sin C
= ½ ac sin B

$$Area = \frac{a^2 \sin B \sin C}{\sin A}$$

$$= \frac{b^2 \sin A \sin C}{\sin B}$$

$$= \frac{c^2 \sin A \sin B}{\sin C}$$

$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

end

7.5 Vector – Algebraic Approach

Need To Know

- Unit Vectors
- Notation and Magnitude
- Vector Operations
  1. Addition
  2. Subtraction
  3. Scalar multiplication

Definitions and Notation

Unit Vectors

i = _____

j = _____

Notation

V = $2i - 3j$ or <2, -3>

Magnitude

If V = $ai + bj$ or <a, b>

then _____

Add and Subtract Vectors

If $U = 4i + 5j$ and $V = 7i - 4j$, then find

U + V

U – V

Scalar Multiplication number*vector = ?

If $U = 4i + 5j$ and $V = 7i - 4j$, then find

2U

3U – 4V

Review Applications

Luke and Beth are rollerblading. Luke is pushing Beth up a hill with an 8.5 incline. He stops and hold Beth in place. If Beth weighs 85 lbs. Find the force that Luke must push to keep Beth from rolling backwards.

7.6 Vector – The Dot Product

Need To Know

- Dot product
- Vector Angle Theorem
- Work

Dot Product

vector•vector = ?

Definition:

If U = $a\mathbf{i} + b\mathbf{j}$ and V = $c\mathbf{i} + d\mathbf{j}$

Then U•V = _____

Example:

If U = $4\mathbf{i} + 5\mathbf{j}$ and V = $7\mathbf{i} - 4\mathbf{j}$, then find

U•V

Vector Angle Theorem

Theorem 7.1

_____

where θ is the angle between U and V.

Example:

If U = $4\mathbf{i} + 5\mathbf{j}$ and V = $7\mathbf{i} - 4\mathbf{j}$, then find θ.

Vector Angle Theorem

Theorem 7.2

U•V = 0 is the same thing as U ⊥ V.

Proof:

Determine if U is perpendicular to V or W:

U = $4i - 5j$ and V = $7i - 4j$ and W = -10i – 8j

WORK

Theorem 7.3

Work = F • d,

a dot product where F is a constant force exerted over a displacement vector d. The resulting units are ft-lbs. if F is lb and d is ft.

Ex: A car is pushed down a level street by exerting a force of 75 lbs at an angle of 10 with the horizontal. How much work is done to push the car 50ft?

end