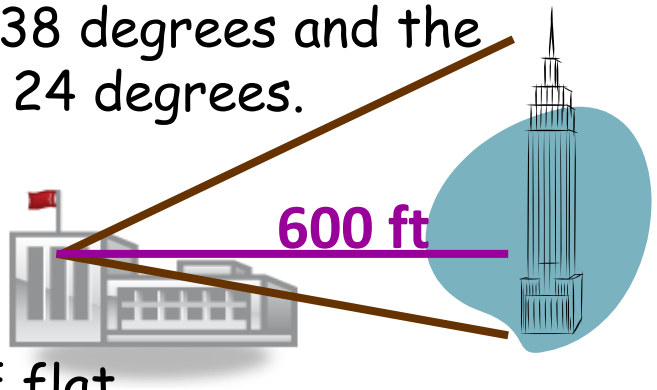
Unit 5 Day 5:
Law of Sines and the Ambiguous Case

Warm Up: Day 5

Draw a picture and solve. Label the picture with numbers and words including the angle of elevation/depression and height/length.

1. The straight line horizontal distance between a window in a school building and a skyscraper is 600ft. From a window in the school, the angle of elevation to the top of the skyscraper is 38 degrees and the angle of depression to the bottom of the tower is 24 degrees.

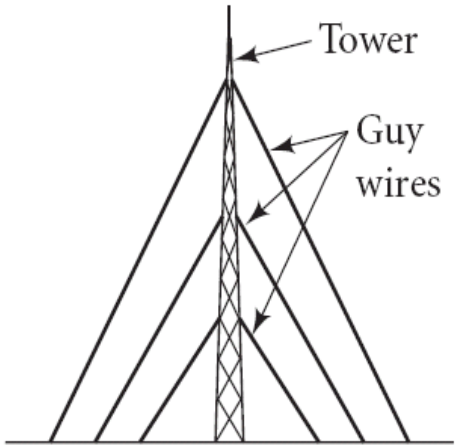
Approximately how tall is the skyscraper?



2. A communications tower is located on a plot of flat land. It is supported by several guy wires.

You measure that the longest guy wire is anchored to the ground 112 feet from the base of the tower and that it makes an 76° angle with the ground.

How long is the longest guy wire and at what height is it connected to the tower?



Warm-Up: Day 5 ANSWER

1. The straight line horizontal distance between a window in a school building and a skyscraper is 600ft. From a window in the school, the angle of elevation to the top of the skyscraper is 38 degrees and the angle of depression to the bottom of the tower is 24 degrees. ***Approximately*** how tall is the skyscraper?

$\tan(38) = t / 600$

$t = 600 \tan(38)$

$t = 468.77$ ft

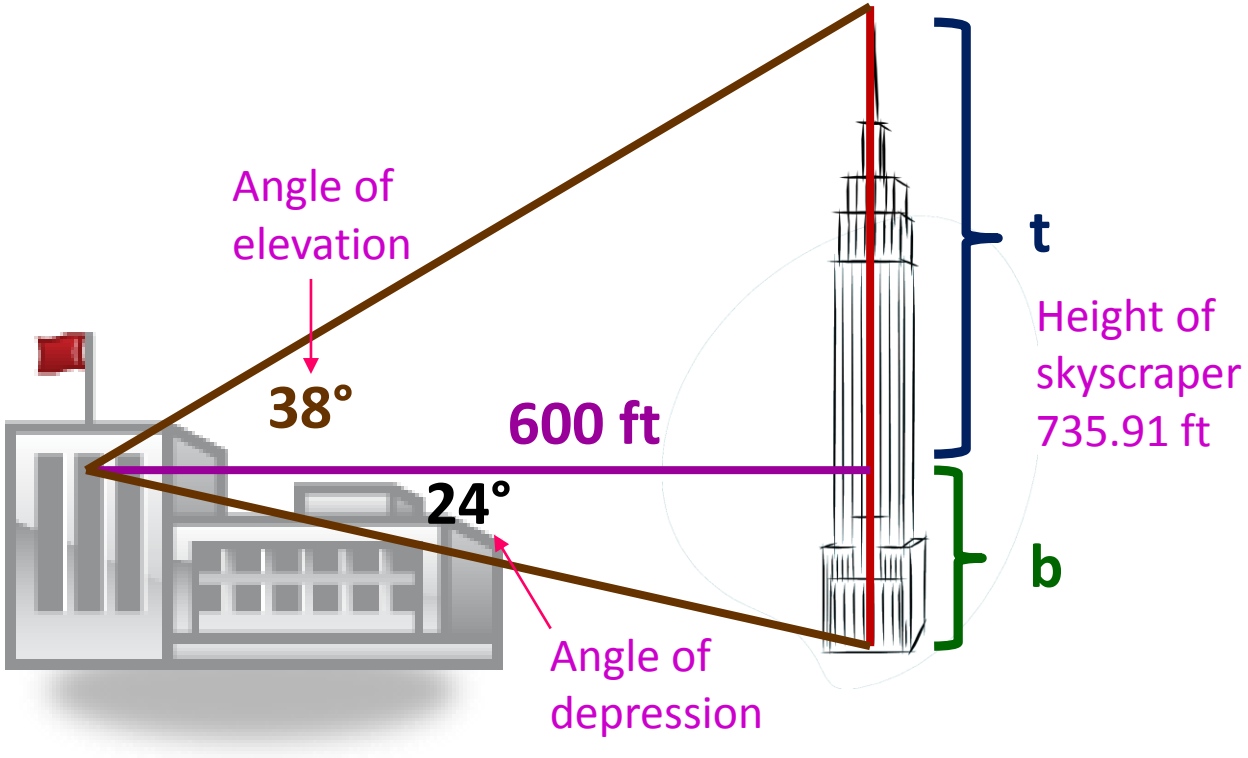
$\tan(24) = b / 600$

$b = 600 \tan(24)$

$b = 267.14$ ft

Height = t + b

= 735.91 ft



Warm-Up: Day 5 ANSWERS

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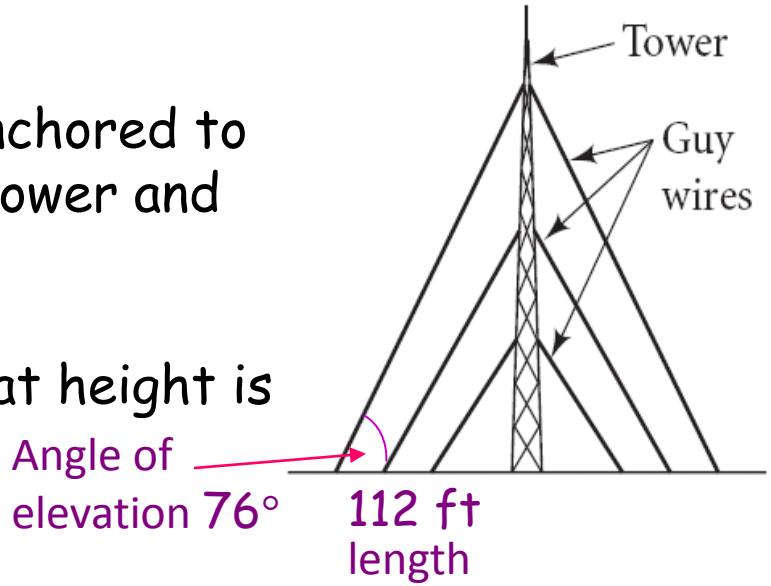

tan(76) = t / 112

t = 112 tan(76)

tower = 449.2 ft

cos(76) = 112 / w

w = 112/ cos(76)

wire = 462.96 ft

HW Packet p. 7 odds

1. $24.0\ cm^2$
3. $11.9\ yd^2$
5. $1.0\ yd^2$
7. $12.6\ cm^2$
9. $37.6\ m^2$
11. $55.4\ km^2$
13. $9.7\ mm^2$
15. $54.5\ cm^2$
17. $80.9\ m^2$

HW Packet p. 8 ALL

1. 101°, 41.1, 52.6
2. 98°, 15.49, 44.86
3. 83°, 24.1, 10.2
4. 19°, 179.37, 90.85
5. Perimeter = 89.7

Homework

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Start studying for the quiz!

Have you made flash cards for studying the formulas?

For Today's Notes

We're doing longer problems with multiple diagrams and multiple triangles possible, so

You Need

- Notes Printout
- AND Notebook Paper

The Ambiguous Case:

If two sides and an angle opposite one of them is Given (SSA), three possibilities can occur.

(1) No such triangle exists.

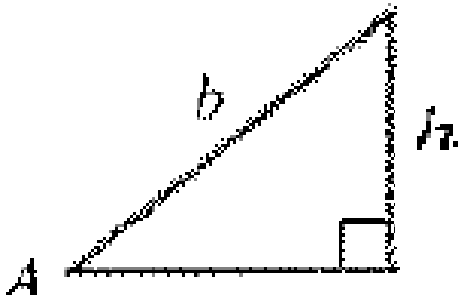
(2) Exactly one triangle exists.

(3) Two different triangles exist.

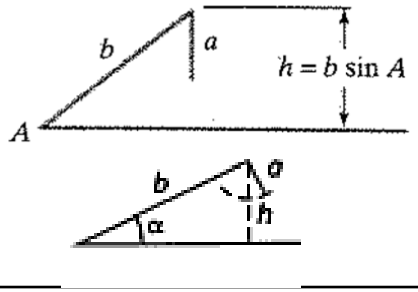
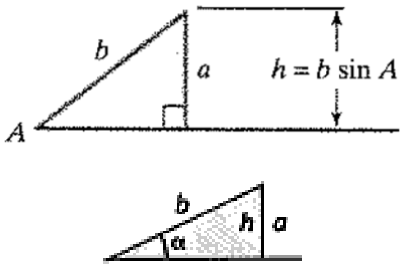
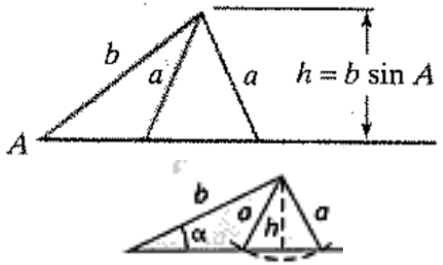
The Ambiguous Case:

Before we look at the cases, let's use what we know about right triangles to set up the ratio for the following triangle.

sinA = $\frac{h}{b}$



When we solve for h, we get h = $b \cdot \sin A$

Figures			
Number of Triangles Possible	0	1	2
Occurs when….	a < h	a = h	a > h And a < b
Why it occurs….	Side across from the angle is smaller than the height needed to make a triangle	Just gives us one right Triangle	Ambiguous Case… The side across from the angle can "swing" to form an acute triangle AND an obtuse triangle

Summary:

If the side across from the given angle is smaller than the other side AND it is a SSA scenario, then check for the ambiguous case!

Use a separate piece of paper to write examples!!

Law of Sines
Ambiguous Case (SSA)

Example 1:

Solve ΔABC if $m\angle A = 25°$, $a = 125$, and $b = 150$.

Round to the nearest tenth.

Case 1:
$m\angle C = 124.5^o$
$m\angle B = 30.5^o$
$c = 243.8$

Case 2:
$m\angle C = 5.5^o$
$m\angle B = 149.5^o$
$c = 28.3$

Law of Sines
Ambiguous Case (SSA)

Example 2:

Solve a triangle when one side is 27 meters, another side is 40 meters and a non-included angle **across from the 27 meter** side is 33°. **Round to the nearest tenth.**

Case 1:
$m\angle C = 93.2^o$
$m\angle B = 53.8^o$
$c = 49.5$

Case 2:
$m\angle C = 20.8^o$
$m\angle B = 126.2^o$
$c = 17.6$

You Try!

Law of Sines
Ambiguous Case (SSA)

Example 3: m∠C = 48, c = 93, b = 125

Round to the nearest tenth.

Case 1:
B = 87.3 °
A = 44.7°
a = 88.0

Case 2:
B = 92.7 °
A = 39.3°
a = 79.3

You Try!

Law of Sines
Ambiguous Case (SSA)

Example 4: m∠A = 24, a = 9.8, b = 17

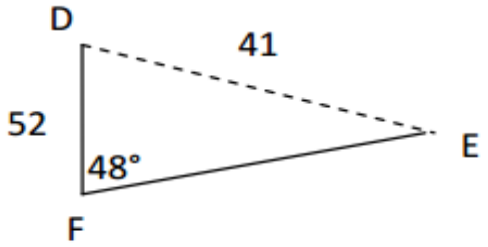
Round to the nearest tenth.

Case 1:	Case 2:
B = 44.9°	B = 135.1°
C = 111.1°	C = 20.9°
c = 22.5	c = 8.6

You Try! Law of Sines Practice p. 14-15

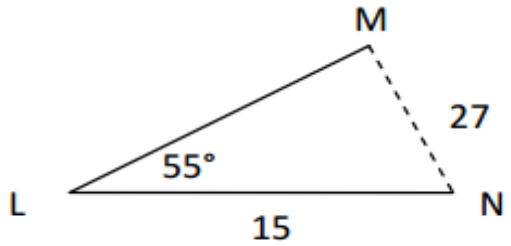
Round to the nearest tenth.

1. For ΔDEF, $e = 52, f = 41$, and $m\angle F = 48°$. Find all possible $m\angle E$ to the nearest degree.



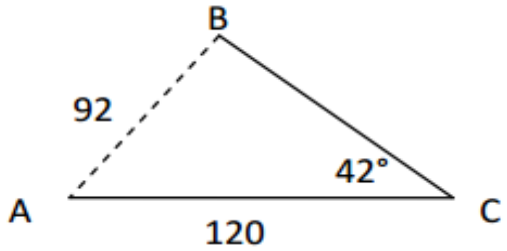
m ∠ E = 70.5° or 109.5°

2. For ΔLMN, $l = 27, m = 15$, and $m\angle L = 55°$. Find all possible $m\angle M$ to the nearest degree.



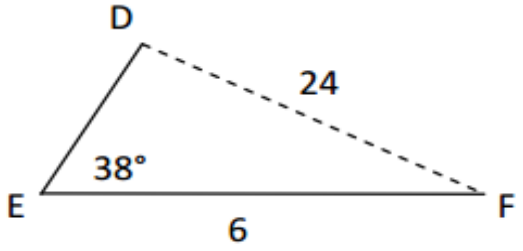
m ∠ M = 27.1°

3. For ΔABC, $b = 120, c = 92$, and $m\angle C = 42°$. How many triangles can be formed?



m ∠ B = 60.8° or 119.2°

4. For ΔDEF, $d = 6, e = 24$, and $m\angle E = 38°$. How many Triangles can be formed?



m ∠ D = 8.9°

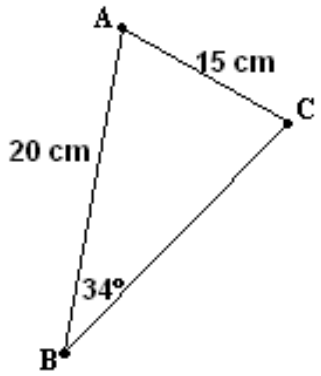
You Try! Law of Sines Practice p. 14-15

6-7 Round to the nearest tenth.

5. For triangle DEF, d = 25, e = 30, and m∠ E = 40°. Find all possible measurements of f to the nearest whole number.

f = 44.48, so f ≈ 44

6. Given with , b = 15cm, and , solve the triangle.



Case 1:	Case 2:
C = 48.2°	C = 131.8°
A = 97.8°	A = 14.2°
a = 26.6	a = 6.6

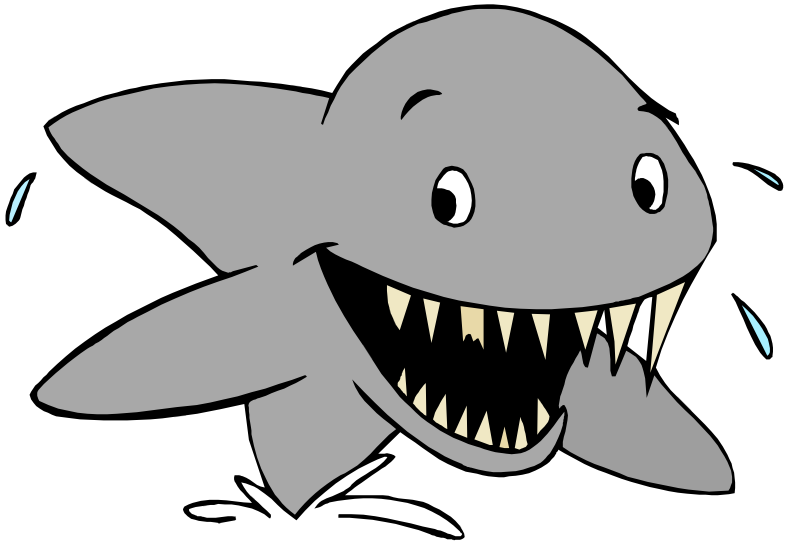
7. Given triangle ABC, a = 8, b = 10, and m∠A = , the triangle.

Case 1:	Case 2:
B = 44.3°	B = 135.7°
C = 101.7°	C = 10.3°
c = 14.0	c = 2.6

Puzzle Time!

Law of Sine

What do you call an unemployed jester?



Homework

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Start studying for the QUIZ!