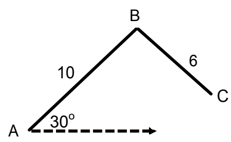
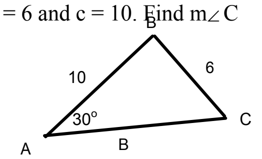
Aim: How do we handle the ambiguous case (SSA)?

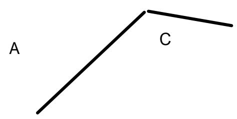
Do Now: Given AB = 10 inches , BC = 6 inches
Angle A = 30°
How many different triangles can you draw?
Remember we don't know the length of AC.



1) In ΔABC m∠A = 30°, a = 6 and c = 10. Find m∠C
to the nearest degree.



Angle C is 56. Since this is an SSA situation could Angle C be another angle?



180 - 56 = 124

Check 124 + 30 < 180
154 < 180
180 - 154 = 26
Another triangle with the angles of {26,30, 124}
besides {30,56, 94}

THUS the AMBIGUOUS CASE!!!!

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2) If in ΔABC a = 15, m ∠ A = 30° and c =12
a) find m∠C
b) How many triangles may be drawn?

Answer:

$$\frac{15}{\sin 30°} = \frac{12}{\sin C}$$

$$\frac{15}{\frac{1}{2}} = \frac{12}{\sin C}$$

$15 \sin C = \frac{1}{2}(12)$
$15 \sin C = 6$
$\sin C = 6/15$
$\sin C = .4$
so m∠C = 24° or 156°

So that sort of answers part a)
however we must remember that
the given angle was 30° and
156° + 30° = 186° and that is too
much for one triangle to hold.
This means that for a) only 24° is
a valid answer and for b) we
can draw only ONE triangle.

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3) If in ΔABC, a = 4, $m\angle A$ = 30, and c = 12
a) find $m\angle C$
b) how many triangles can be drawn?

Answer:

$$\frac{4}{\sin 30°} = \frac{12}{\sin C}$$

$$\frac{4}{\frac{1}{2}} = \frac{12}{\sin C}$$

4 sin C = ½(12)
4 sin C = 6
sin C = 6/4
sin C = 1.5

a) Since sin C = 1.5 we cannot have an angle measure for C so for a) $m\angle C = \{\ \}$

b) Since there is NO measure for $\angle C$ we cannot draw any triangles so for b) we say there are 0 triangles that can be drawn.

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4) If in ΔABC a= 8, $m\angle A$ = 150°, and c = 12
a) find $m\angle C$
b) how many triangles can be drawn?

ANSWER:

$$\frac{8}{\sin 150°} = \frac{12}{\sin C}$$

$$\frac{8}{\frac{1}{2}} = \frac{12}{\sin C}$$

8 sin C = ½(12)
8 sin C = 6
sin C = 6/8
sin C = .75
$m\angle C$ = 49° or 131°

a) If the given angle is 150° then 150° + 49° = 199° too much for 1 and then certainly 150° + 131° is way too much so neither answer is good and then the answer for b) is that there are 0 triangles that can be drawn.

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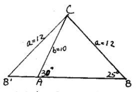
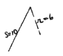


APPLICATIONS:

1. How many different triangles can be constructed if m∡R = 45°, r = 6, s = 10?
2. In triangle LMN, m∡L = 55°, n = 8, ℓ = 7. Find m∡N to the nearest degree.
3. In △ ABC, a = 10, b = 11, sin ∡A = 0.8660. Find m∡B to the nearest ten minutes.
4. If, in △ ABC, m∡A = 30, a = $\sqrt{5}$ and b = 4, then ∡B
   a) may be either obtuse or acute
   b) must be obtuse, only
   c) must be acute, only
   d) may be a right angle

SOLUTIONS TO APPLICATION PROBLEMS:

1.

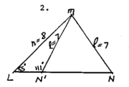


$\frac{\sin ∡S}{s} = \frac{\sin ∡R}{r} =$

$\sin ∡S = \frac{s \sin ∡R}{r} = \frac{10 \sin 45°}{6}$

$= 1.1785$

2.



$\frac{\sin ∡N}{n} = \frac{\sin ∡L}{\ell} =$

$\sin ∡N = \frac{n \sin ∡L}{\ell} = \frac{8 \sin 55°}{7} = 0.9362$

Also n > ℓ, therefore ∡N > ∡L.

m∡N = 69° or 111°

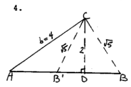
TWO SOLUTIONS ARE POSSIBLE.

3. $\frac{\sin ∡B}{11} = \frac{0.8660}{10}$

   sin ∡B = 0.9526

   m ∡ B ≈ 72°20' or 180°-72°20' = 107°40'

4.



First find CD=2 (30°-60°rt.△)
since 2 < $\sqrt{5}$ < 4, two triangles are possible and choice (a) is correct.

or

$\frac{\sin A}{a} = \frac{\sin B}{b}$;

$\sin B = \frac{4\sin 30}{\sqrt{5}} = \frac{2}{\sqrt{5}} = .8944$

a < b, so ∡A < ∡B
and ∡B may be 63° or 117°

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