HOMEWORK...

Worksheet - Ambiguous Case.pdf

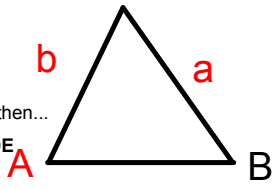
Do questions #1, 2 & 4

MEMORIZE!!!

Criteria for the Ambiguous Case...

- Must be given SSA
- Given angle is acute
- a < b

*** If ALL 3 criteria are met, then...



CALCULATE THE ALTITUDE

alt = b sin A

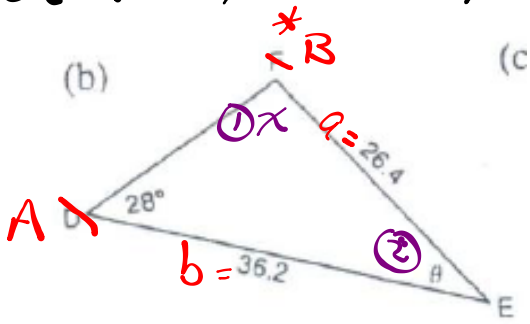
CASE 1: a < altitude; there is NO SOLUTION

CASE 2: a = altitude; there is ONE SOLUTION [Right Triangle]

CASE 3: a >altitude; this is the 'AMBIGUOUS CASE'...TWO SOLUTIONS

1) Acute Triangle (angle, θ, is found with Law of Sines)
2) Obtuse Triangle (angle is $180^{o} - \theta$)

Questions from Homework...



✓ SSA
✓ acute angle
✓ a < b

alt = b sin A

alt = 35.2 sin 28°
alt = 16.5

Case 1 → a < alt
No solution

Case 2 → a = alt
1 Right Triangle

a vs alt
26.4 > 16.5

*Case 3 → a > alt
2 solutions
Acute (calc) / 180 - θ

* Ambiguous Case

$\frac{\sin F}{36.2} = \frac{\sin 28°}{26.4}$

sin F = 36.2sin(28)/26.4
.6437450975
sin⁻¹(Ans
40.07165227

LF = 180 - 40
LF = 140

OR

LF = ...
LF = 40°

*LF = 40°

LE = 180 - 28 - 140
LE = 12°

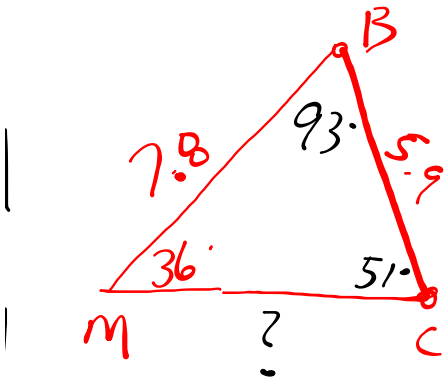
LE = 180 - 28 - 40
LE = 112°

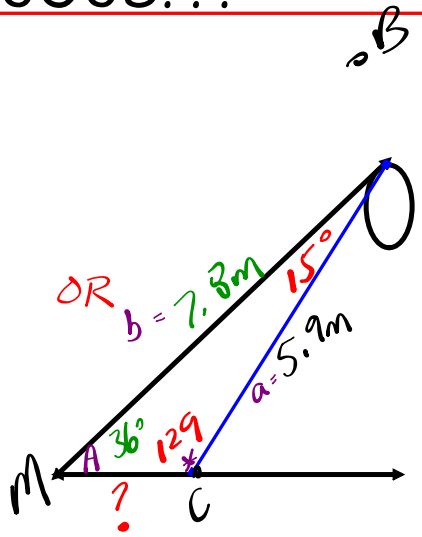
Example 4: Solving a problem using the sine law

p.178

Martina and Carl are part of a team that is studying weather patterns. The team is about to launch a weather balloon to collect data. Martina's rope is 7.8 m long and makes an angle of 36.0° with the ground. Carl's rope is 5.9 m long. Assuming that Martina and Carl form a triangle in a vertical plane with the weather balloon, what is the distance between Martina and Carl, to the nearest tenth of a metre?

AMBIGUOUS???





✓SSA *
✓acute
✓a < b

alt = 7.8 sin 36°
alt = 4.58

a vs alt
5.9 > 4.58
*ambiguous

$\frac{\sin C}{7.8} = \frac{\sin 36°}{5.9}$

$\sin C =$ 7.8sin(36)/5.9 = .7770720285

$\sin^{-1}(\text{Ans}) =$ 50.99326934

$\angle C =$

* $\angle C = 51°$

OR

$\angle C = 180 - 51°$

$\angle C = 129°$

$\angle B = 180 - 36 - 129°$

$\angle B = 15°$

$\frac{b}{\sin 15°} = \frac{5.9 \sin 15°}{\sin 36°}$

$b = 2.6\text{m}$

$\angle B = 180 - 36 - 51°$

$\angle B = 93°$

$\frac{b}{\sin 93°} = \frac{5.9 \sin 93}{\sin 36}$

$b = 10\text{m}$

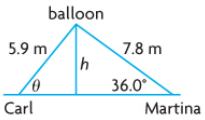
Example 4: Solving a problem using the sine law

Martina and Carl are part of a team that is studying weather patterns. The team is about to launch a weather balloon to collect data. Martina's rope is 7.8 m long and makes an angle of 36.0° with the ground. Carl's rope is 5.9 m long. Assuming that Martina and Carl form a triangle in a vertical plane with the weather balloon, what is the distance between Martina and Carl, to the nearest tenth of a metre?

Sandra's Solution: Using the sine law and then the cosine law

Let h represent the height of the weather balloon.
Let θ represent the angle for Carl's rope.

Situation 1:

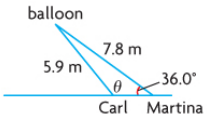


$$\sin 36.0 = \frac{h}{7.8}$$
$$7.8(\sin 36.0) = 7.8\left(\frac{h}{7.8}\right)$$
$$4.5847\ldots = h$$

I drew the triangle.

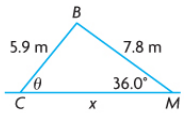
I noticed that this is a *SSA* situation. I had to determine the height of the triangle to determine if this is an ambiguous case.

Situation 2:



Carl's rope is longer than the height and shorter than Martina's rope, so there are two possible triangles. I drew the second triangle.

Situation 1:



$$\frac{\sin\theta}{7.8} = \frac{\sin 36^\circ}{5.9}$$
$$\sin\theta = \frac{7.8\sin 36^\circ}{5.9}$$
$$\sin\theta = 0.7770\ldots$$
$$\theta = \sin^{-1}(0.7770\ldots)$$
$$\theta = 50.9932\ldots^\circ$$

I substituted the side lengths and angles (including θ) into the formula for the sine law and isolated θ.

$$\angle B = 180^\circ - 36.0^\circ - 50.9932\ldots^\circ$$
$$\angle B = 93.0067\ldots^\circ$$

The measures of the angles in a triangle sum to 180°.

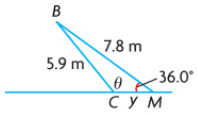
$$x^2 = 5.9^2 + 7.8^2 - 2(5.9)(7.8)\cos 93.0067\ldots^\circ$$
$$x^2 = 100.4777\ldots$$
$$x = 10.0238\ldots$$

In Situation 1, Martina and Carl are 10.0 m apart.

I used the cosine law to determine the distance, x, between Martina and Carl. I substituted the known measurements into the cosine law.

Situation 2:

I also considered the situation in which Carl is closer to Martina.



$$\frac{\sin\theta}{7.8} = \frac{\sin 36^\circ}{5.9}$$
$$\sin\theta = \frac{7.8\sin 36^\circ}{5.9}$$
$$\sin\theta = 0.7770\ldots$$
$$\theta = \sin^{-1}(0.7770\ldots)$$
$$\theta = 50.9932\ldots^\circ$$
$$\theta = 180^\circ - 50.9932\ldots^\circ$$
$$\theta = 129.0067\ldots^\circ$$

I used the sine law to determine θ.

I determined the measure of the supplementary angle, which is suitable for this situation.

$$\angle B = 180^\circ - 36.0^\circ - 129.0067\ldots^\circ$$
$$\angle B = 14.9932\ldots^\circ$$

The measures of the angles in a triangle sum to 180°.

$$y^2 = 5.9^2 + 7.8^2 - 2(5.9)(7.8)\cos 14.9932\ldots^\circ$$
$$y^2 = 6.7433\ldots$$
$$y = 2.5968\ldots$$

I can use $\angle B$ in the cosine law to determine the distance, y, between Martina and Carl.

I substituted the measure of $\angle B$ and the given side lengths into the cosine law.

In the second situation, Martina and Carl are 2.6 m apart.
Martina and Carl are either 10.0 m apart or 2.6 m apart.

HOMEWORK...

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#5, 6, & 7
Page 184: #7, 8

Attachments

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