HOMEWORK QUESTIONS...
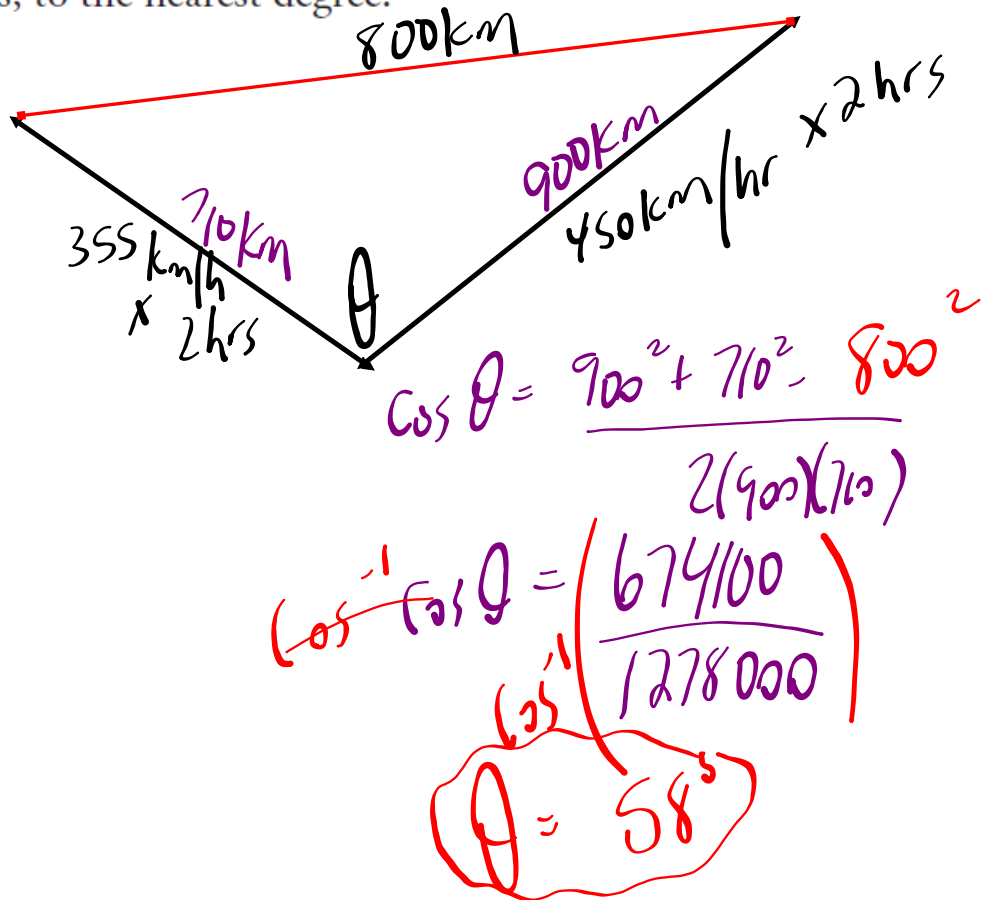
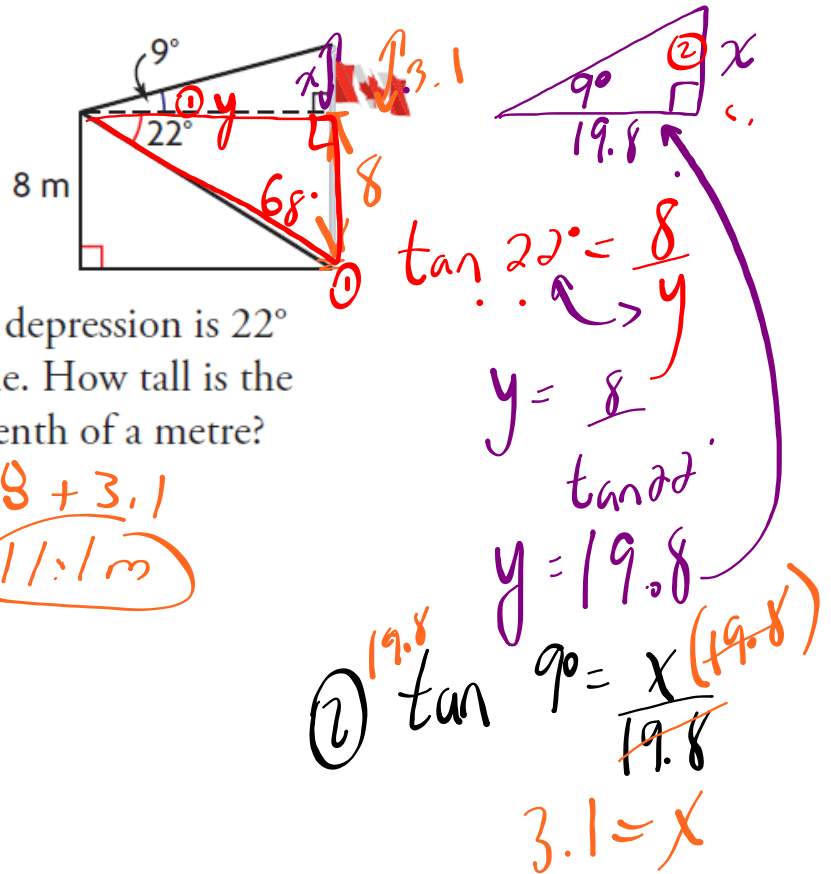### HOMEWORK: More Applications/Word Problems

Page 154 #5, 6, 9, 10, 11 (bearings - see example from Friday)
**Page 172 #9, 10, 12, 13, 14**

9. Two airplanes leave the Hay River airport in the Northwest Territories at the same time. One airplane travels at 355 km/h. The other airplane travels at 450 km/h. About 2 h later, they are 800 km apart. Determine the angle between their paths, to the nearest degree.

800km

900km

450km/hr × 2hrs

355km/h
710km
× 2hrs

θ

$$\cos\theta = \frac{900^2 + 710^2 - 800^2}{2(900)(710)}$$

$$\cos^{-1}\cos\theta = \cos^{-1}\left(\frac{674100}{1278000}\right)$$

$$\theta = 58°$$

10. From a window in an apartment building, the angle of elevation to the top of a flagpole across the street is 9°. The angle of depression is 22° to the base of the flagpole. How tall is the flagpole, to the nearest tenth of a metre?

8 m

9°

22°

68°

Height = 8 + 3.1

= 11.1 m

$\tan 22° = \dfrac{8}{y}$

$y = \dfrac{8}{\tan 22}$

$y = 19.8$

② $\tan 9° = \dfrac{x}{19.8}(19.8)$

$3.1 = x$

90° 19.8 x

x 3.1

11. A bush pilot delivers supplies to a remote camp by flying 255 km in the direction N52°E. While at the camp, the pilot receives a radio message to pick up a passenger at a village. The village is 85 km S21°E from the camp. What is the total distance, to the nearest kilometre, that the pilot will have flown by the time he returns to his starting point?
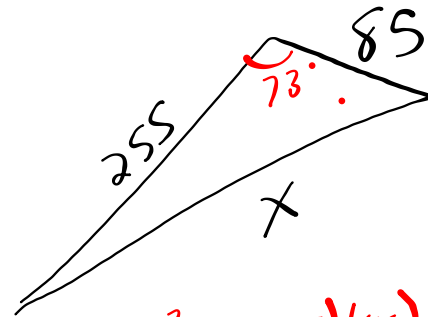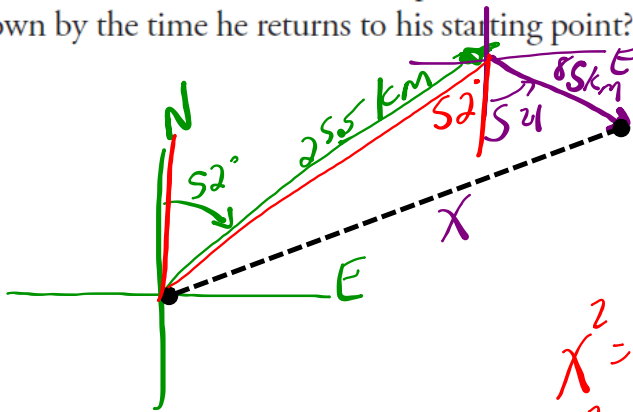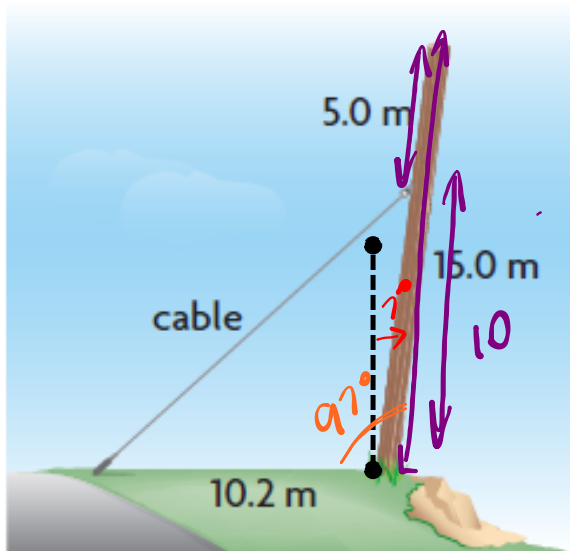
$$x^2 = 255^2 + 85^2 - 2(255)(85)\cos 73°$$

$$x^2$$

```
255²+85²-2*255*8
5*cos(73
          59575.6866
√(Ans
          244.0813115
```

$x =$

TOTAL DISTANCE
= 244 + 85 + 255
= 584 km

12. A 15.0 m telephone pole is beginning to lean as the soil erodes.
A cable is attached 5.0 m from the top of the pole to prevent the pole
from leaning any farther. The cable is secured 10.2 m from the base of
the pole. Determine the length of the cable that is needed if the pole is
already leaning $7°$ from the vertical.

5.0 m

15.0 m

cable

10.2 m

x

97

10

10.2

$$x^2 = 10.2^2 + 10^2 - 2(10.2)(10)\cos 97°$$

$$x^2 = \begin{array}{|l|} \hline 10.2^2 + 10^2 - 2*10.2 \\ *10*\cos(97 \\ \qquad\qquad 228.9013461 \\ \sqrt{}(Ans \\ \qquad\qquad 15.12948598 \\ \hline \end{array}$$

$x =$

$\boxed{x = 15.1\,m}$

Warm Up

Determine the measure of the obtuse angle B:
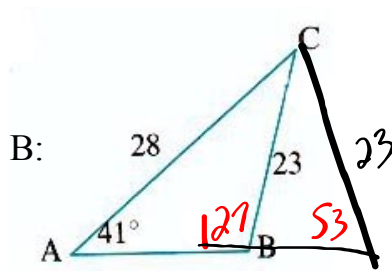
$$\frac{28}{\sin B} = \frac{28}{\sin 41}$$

$$\sin^{-1}\sin B = \sin^{-1}(0.7987)$$

$$\angle B = 53°$$

OR $\angle B = 180 - 53$

$\angle B = 127°$

The Ambiguous Case of the Law of Sines

Ambiguous Case Slide Show.ppt

am·big·u·ous [am-**big**-yoo-*uh* s] ? Show IPA

adjective

1. open to or having several possible meanings or interpretations; equivocal: *an ambiguous answer.*

2. *Linguistics* . (of an expression) exhibiting constructional homonymity; having two or more structural descriptions, as the sequence *Flying planes can be dangerous.*

3. of doubtful or uncertain nature; difficult to comprehend, distinguish, or classify: *a rock of ambiguous character.*

4. lacking clearness or definiteness; obscure; indistinct: *an ambiguous shape; an ambiguous future.*

# Notes - Ambiguous Case.pdf

In Summary

Key Idea

- The ambiguous case of the sine law may occur when you are given two side lengths and the measure of an angle that is opposite one of these sides. Depending on the measure of the given angle and the lengths of the given sides, you may need to construct and solve zero, one, or two triangles.
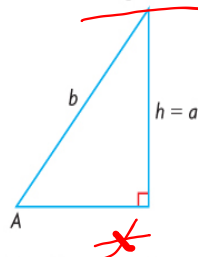
Need to Know

- In $\triangle ABC$ below, where h is the height of the triangle, $\angle A$ and the lengths of sides a and b are given, and $\angle A$ is acute, there are four possibilities to consider:
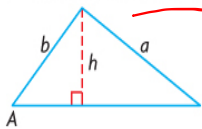
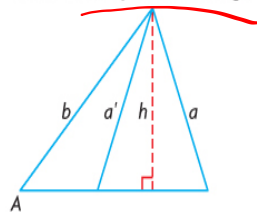If $\angle A$ is acute and $a < h$, there is **no triangle.**
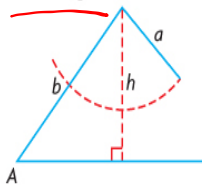
If $\angle A$ is acute and $a = h$, there is **one right triangle.**

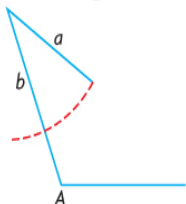If $\angle A$ is acute and $a > b$ or $a = b$, there is **one triangle.**

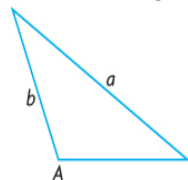If $\angle A$ is acute and $h < a < b$, there are **two possible triangles.**

- If $\angle A$, a, and b are given and $\angle A$ is obtuse, there are two possibilities to consider:

If $\angle A$ is obtuse and $a < b$ or $a = b$, there is **no triangle.**

If $\angle A$ is obtuse and $a > b$, there is **one triangle.**

Criteria for the Ambiguous Case...

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

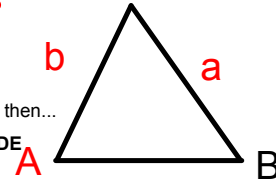*** If ALL 3 criteria are met, then...

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° - θ)

Back to the Warm-Up...

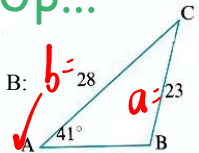Determine the measure of the obtuse angle B:

$b = 28$ $a = 23$ $41°$

- SSA ✓
- angle given acute ✓
- a < b ✓

$$h = b \sin A$$
$$h = 28 \sin 41°$$
$$h = 18.4$$

a vs h
$$23 > 18.4$$

① $a < h$ ② $a = h$ ③ $a > h$

Ambiguous
2 solutions
1) Acute (53°)
* 2) obtuse (127°)

MUST

MEMORIZE

THESE

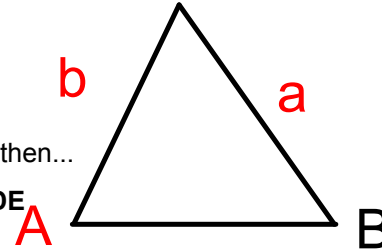**NOTES**

IN ORDER

TO KNOW

AMBIGUOUS

CASE

Criteria for the Ambiguous Case...

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- Given angle is acute
- a < b

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

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CASE 1: a < altitude; there is <u>NO SOLUTION</u>

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

     1) Acute Triangle (angle, θ, is found with Law of Sines)

     2) Obtuse Triangle (angle is $180^\circ - \theta$)

Attachments

Ambiguous Case Slide Show.ppt

Notes - Ambiguous Case.pdf