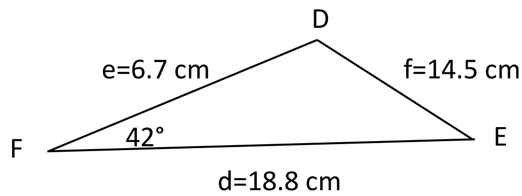
Ambiguous Case of Sine Law

From last day, (Example 2 In ΔEFD, e = 6.7 cm, d = 18.8 cm, and F = 42 degrees.)



Using cosine law, we found D = 120°.
Now, try using the sine law:

$$\frac{\sin D}{d} = \frac{\sin F}{f}$$

Try these… Use calculator:

Sin10°= sin20° sin1°=
Sin170°= sin160°= sin179°=

What is the pattern?

Now, try: $\sin^{-1}(0.1736)$= $\sin^{-1}(0.3420)$= $\sin^{-1}(0.0175)$=

*The calculator does not know whether you are looking for the _______angle or the _______ angle so you MUST consider BOTH possibilities.

* The calculator always gives the ________angle when using the $\sin^{-1}$ button.

Back to example above,

If D = 60° then E = 180° - 42° - 60° =

Recall: The largest angle is across from the largest side, the smallest angle is across from the smallest side, etc.

Example 1: b = 4, a = 3, A = 30° in ΔABC. Solve the triangle.
*We cannot use cosine law. Why?
*Side b is larger than side a so angle B will be larger than A. It is possible that B is Obtuse.
Write solution on reverse.

Example 2: b = 4, a = 1, A = 20° in ΔABC. Solve the triangle.
Write solution on reverse.

Example 3: In ΔPQR, Q = 38° , q = 28 cm, r = 45 cm. Determine the values of angles P and R.
Try on your own after the lesson.

Example 4: b = 4, a = 5, A = 53° in ΔABC. B = ? , C = ?
Write solution on reverse.

The Ambiguous Case:

If you are using the sine law and you are looking for an angle…

If there is ANY possibility that the angle you are looking for is obtuse then you MUST check for the ambiguous case (where two triangles are possible)…

To consider the ambiguous case given a, b, A…

- Solve for B_1 using the sine law
  Then use ASTT to solve for C_1
- The second case is:
  $B_2 = 180^o - B_1$
  $C_2 = 180^o - A - B_2$ (ASTT)
  If this gives you a positive C_2 value
  ($A + B_2 < 180^o$ and $C_2 > 0^o$)
  Then this IS the ambiguous case and there are two possible triangles: A, B_1, C_1 and A, B_2, C_2
  (if the C_2 value is negative then there is only one possible triangle: A, B_1, C_1.

For homework number #19. Bearing is measured clockwise from North. So a bearing of 240° is the same as S60°W.

U5D3 Homework: p. 308 #2de, 3ce, 7a, 11 (answer 12 km or 3 km), 12, 19, **15**