Date: ______________________

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) solve a triangle involving the Cosine Law and obtuse angles.

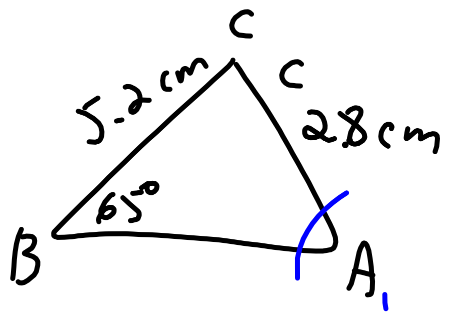
Last day's work: pp. 318-319 #1, 2, 3a, 4, 5ac, 7 [15,17]

4a

p. 318 #3a

3. Determine whether it is possible to draw a triangle, given each set of information. Sketch all possible triangles where appropriate. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

a) $a = 5.2$ cm, $b = 2.8$ cm, $\angle B = 65°$



$\angle A_1$

$$\frac{\sin A_1}{5.2} = \frac{\sin 65°}{2.8}$$

$$A_1 = \sin^{-1}\left(5.2 \times \frac{\sin 65°}{2.8}\right)$$

NOT POSSIBLE

$\therefore$ NO triangles are possible.

Another Analysis Using p. 317

if $h = b \sin A$

in this case $h = 5.2 \sin 65°$

$\doteq 4.71$

$\because a < h$

ie $2.8 < 4.7$

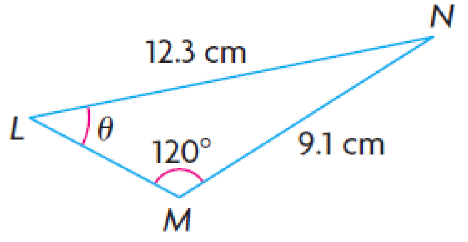
$\therefore$ no triangle exists

* Top Left box under "Need to Know".

p. 318 #4a

4. Determine the measure of angle θ to the nearest degree.

a)



$$\frac{\sin\theta}{9.1} = \frac{\sin 120^\circ}{12.3}$$

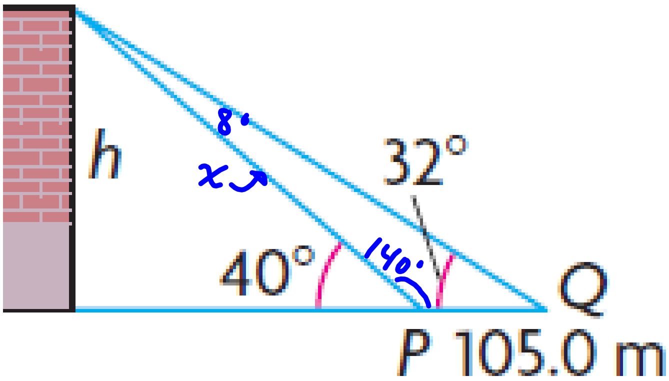
$$\theta = \sin^{-1}\left(9.1 \times \frac{\sin 120^\circ}{12.3}\right)$$

$$\doteq 39.8$$

$$\doteq 40^\circ$$

p. 319 #7

7. A building of height h is observed from two points, P and Q, that are 105.0 m apart as shown. The angles of elevation at P and Q are 40° and 32°, respectively. Calculate the height, h, to the nearest tenth of a metre.



$$\frac{x}{\sin 32^\circ} = \frac{105}{\sin 8^\circ}$$

$$x = \sin 32^\circ \times \frac{105}{\sin 8^\circ}$$

$$\doteq 399.80$$

$$\sin 40^\circ \doteq \frac{h}{399.8}$$

$$h \doteq 399.8 \sin 40^\circ$$

$$\doteq 256.98$$

$$\doteq 257.0$$

∴ the height of the building is 257.0 m.

Last Day's Quesons p. 300 #6c

6. Angle θ is a principal angle that lies in quadrant 2 such that $0^\circ \leq \theta \leq 360^\circ$.
K Given each trigonometric ratio,

- **i)** determine the exact values of x, y, and r
- **ii)** sketch angle θ in standard position
- **iii)** determine the principal angle θ and the related acute angle β to the nearest degree

c) $\cos\theta = -\dfrac{1}{4}$ $\quad \dfrac{x}{r}$

$\therefore x = -1,\ r = 4$

$x^2 + y^2 = r^2$

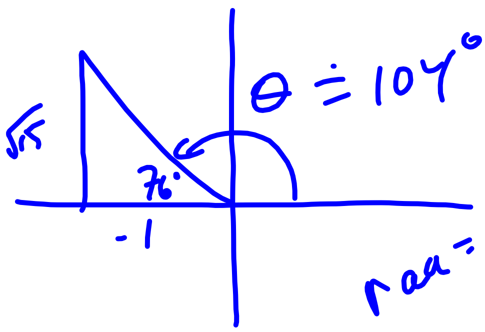
$y^2 = 4^2 - (-1)^2$

$= 16 - 1$

$= 15$

$y = \pm\sqrt{15}$

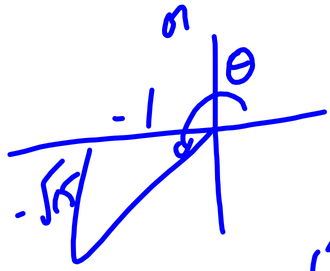
(ii)



$\theta \doteq 104^\circ$

raa $= 76^\circ$

or



$\theta = 180^\circ + 76^\circ$

$= 256^\circ$

p. 304 #12 & 13

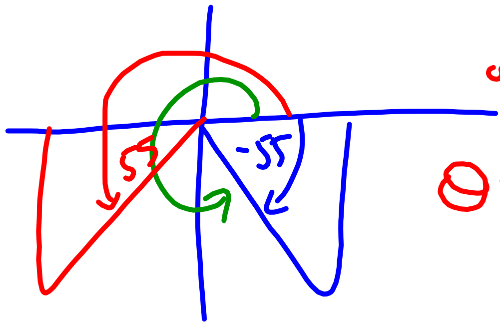
12. If $\sin\theta = -0.8190$ and $0° \leq \theta \leq 360°$, determine the value of θ to the nearest degree.

$\therefore \theta \doteq 305°$

$\theta = \sin^{-1}(-0.819)$

$\doteq -54.9°$

$\doteq -55°$



or

$\theta \doteq 235°$

13. Angle θ lies in quadrant 2. Without using a calculator, which ratios must be false? Justify your reasoning.

a) $\cos\theta = 2.3151$ F

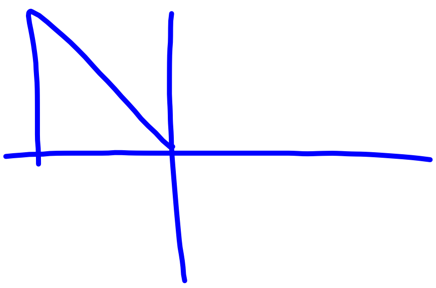
b) $\tan\theta = 2.3151$ X F

c) $\sec\theta = 2.3151$ X F

d) $\csc\theta = 2.3151$ ✓ T

e) $\cot\theta = 2.3151$ X F

f) $\sin\theta = 2.3151$ X F



5.7 The Cosine Law

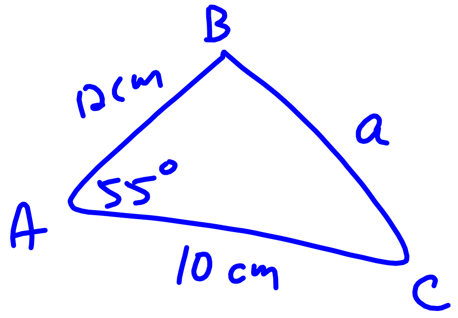
Date: May 2/17

Recall: We use the Cosine Law when we are given:

2 sides and the **contained** angle (SAS) or all 3 sides (SSS)

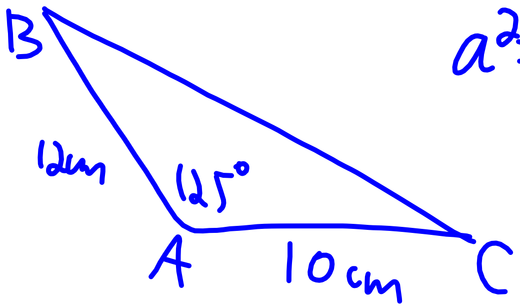
$$a^2 = b^2 + c^2 - 2bc\cos A \quad \textbf{or} \quad \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Ex. 1 Given ΔABC, where $\angle$A = 55°, b = 10 cm and c = 12 cm.
Determine the length a, to the nearest tenth.



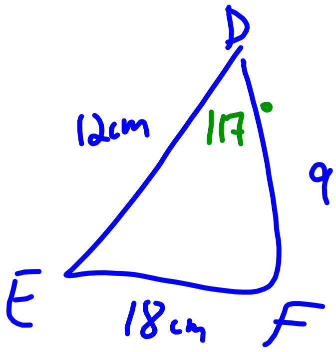
$$a^2 = 10^2 + 12^2 - 2(10)(12)\cos 55°$$
$$\doteq 106.34$$
$$a \doteq \sqrt{106.34}$$
$$\doteq 10.31$$
$$\doteq 10.3 \text{ cm}$$

Ex. 2: Repeat given $\angle$A = 125°.



$$a^2 = 10^2 + 12^2 - 2(10)(12)\cos 125°$$
$$\doteq 381.65$$
$$a \doteq \sqrt{381.65}$$
$$\doteq 19.53$$
$$\doteq 19.5 \text{ cm}$$

Ex. 3 Given $\triangle DEF$, where $d = 18$ cm, $e = 9$ cm and $f = 12$ cm.
Calculate the measure of ∠D, to the nearest degree.
If time, solve the triangle; if not, explain possible ambiguous case.



$$\cos D = \frac{12^2 + 9^2 - 18^2}{2(12)(9)}$$

$$D = \cos^{-1}\left(\frac{-99}{216}\right)$$

$$\doteq 117.2$$

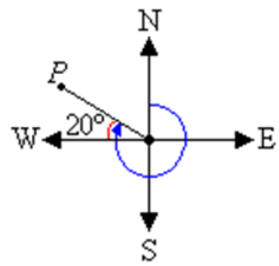
$$\doteq 117^\circ$$

Note:

A **true bearing** to a point is the angle between due north and the line of travel of an object measured in degrees in a clockwise direction. We will refer to this as **bearing**.

A **conventional bearing** of a point is stated as the number of degrees east or west of the north-south line. We will refer to this as **direction**.

In the diagram below, the bearing of point P is 290°.



The direction method can be stated in two ways:

- W20°N (point P is 20° north of west)
- N70°W (point P is 70° west of north)

Without isolating cos D first...

Ex. 3 Given $\triangle$DEF, where d = 18 cm, e = 9 cm and f = 12 cm.
Calculate the measure of $\angle$D, to the nearest degree.

$$d^2 = e^2 + f^2 - 2ef\cos D$$

$$18^2 = 9^2 + 12^2 - 2(9)(12)\cos D$$

$$\frac{18^2 - 9^2 - 12^2}{-2(9)(12)} = \frac{\cancel{-2(9)(12)}\cos D}{\cancel{-2(9)(12)}}$$

$$\frac{18^2 - 9^2 - 12^2}{-2(9)(12)} = \cos D$$

$$\frac{d^2 - e^2 - f^2}{-2ef} = \cos D$$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 318-319 #1, 2, 3a, 4, 5ac, 7 [15,17]

Today's Homework Practice includes:

pp. 325-327 #1b, 2b, 3bc, 4ac, 5, 6, 8 [12,14]