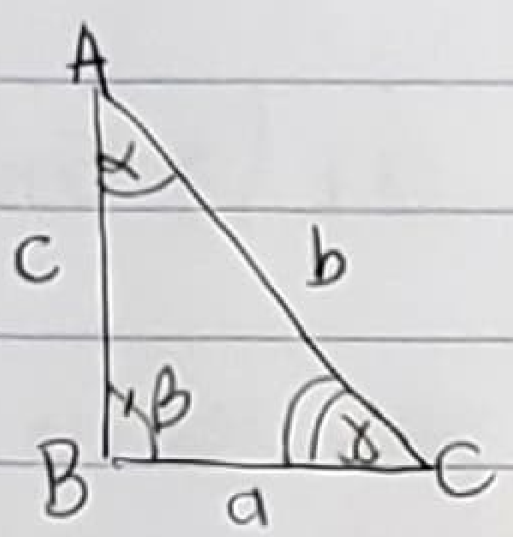
23 may 2023

$\sin(x+y) = \sin x \cos y + \cos x \sin y$

→ difficult to show by triangles, easier to show using unit circle

(a,α), (b,β), (c,γ) } angle-side opposite pairs



☆constraints☆

$\alpha + \beta + \gamma = 180°$

$a+b>c$

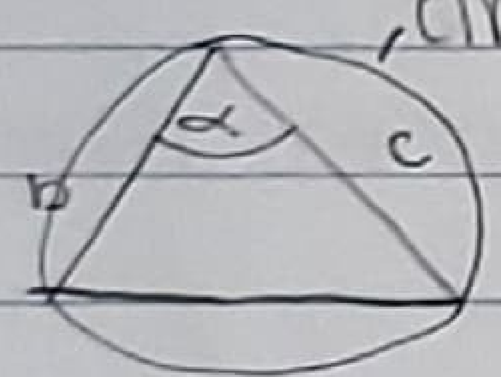
$b+c>a$

$c+a>b$

-observations:

- two angles determine the other angle
- two side lengths <u>don't</u> determine the other side length

circumscribed circle



- knowing 2 sides + the angle between them will determine the other side + other angles

famous trig iden. in a triangle

1) Law of sines: $\dfrac{a}{\sin\alpha} = \dfrac{b}{\sin\beta} = \dfrac{c}{\sin\gamma} =$ diameter of the circumscribed circle

2) Law of cosines:

$$\cos\alpha = \frac{b^2+c^2-a^2}{2bc} \qquad \cos\beta = \frac{c^2+a^2-b^2}{2ca}$$

$$\cos\gamma = \frac{a^2+b^2-c^2}{2ab}$$

- observations:
  - If we know a, α, β then we know $a/\sin\alpha$, so then we know $b/\sin\beta$, so we know b

    $\gamma = 180° - \alpha - \beta$

we know $c/\sin\gamma$, so we know c

  - If we know b, c, α, then $2bc\cos(\alpha) = b^2 + c^2 - a^2$

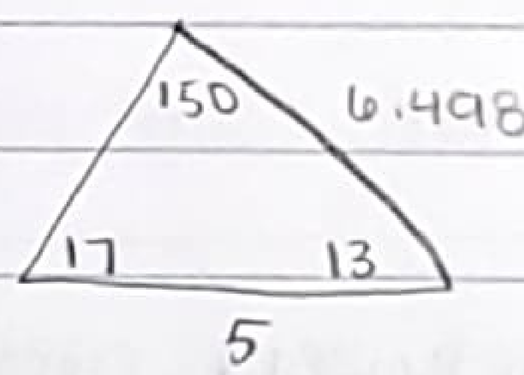
    $a^2 = b^2 + c^2 - 2bc\cos(\alpha)$

    $a = \sqrt{b^2+c^2-2bc\cos(\alpha)}$ → then we know $a/\sin\alpha$, then we know $\sin\beta$ + $\sin\gamma$

ex find the missing side lengths + angles

1) $\alpha = 13°$ $\beta = 17°$ $a = 5$

$\gamma = 180 - 13 - 17 = 150$



$\frac{5}{\sin 13} = 22.22$ $\frac{b}{\sin\beta} = 22.22$

$b = 22.22(\sin\beta)$

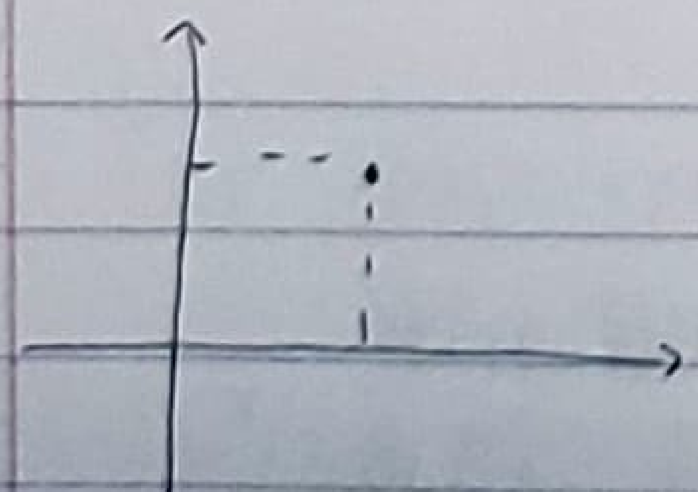
$= 22.22(\sin 17)$

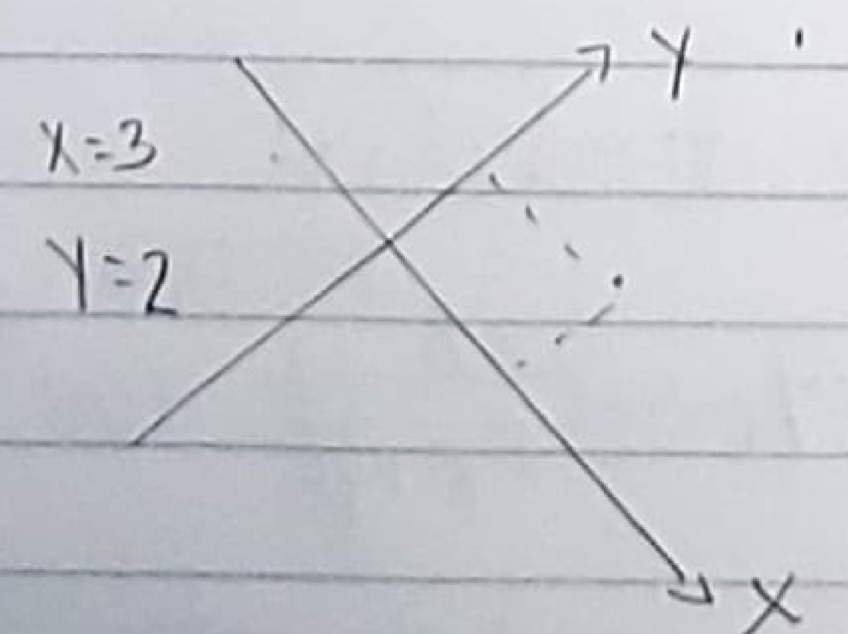
$= 6.498$

26 may 2023

Polar coordinates

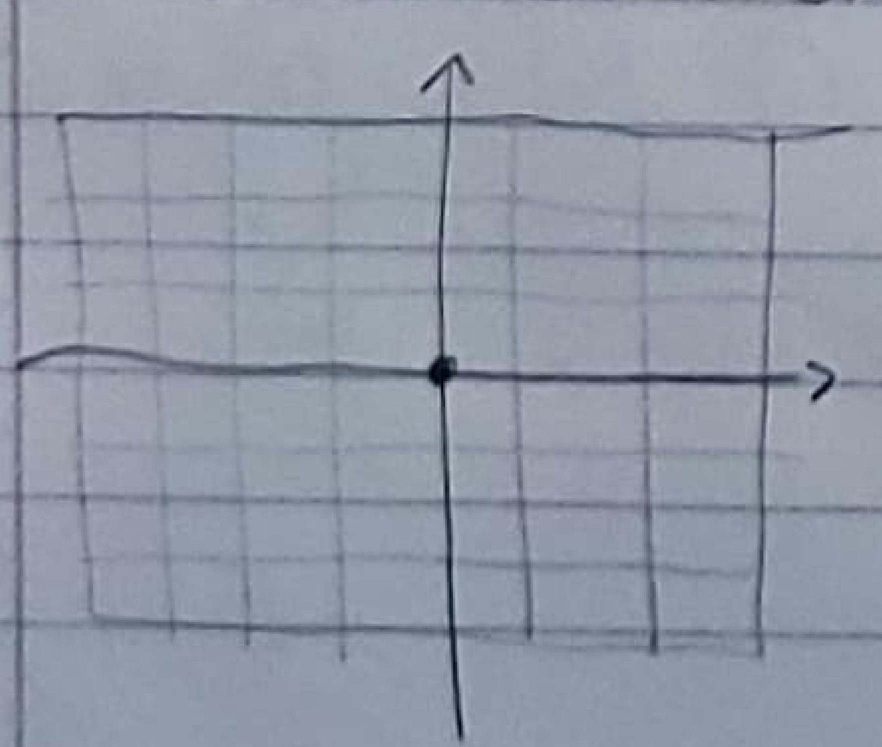
- to locate a position on a map, we give it an address





address/position depends on the coordinate system we use

(x,y) - coordinates are called cartesian coordinate



cartesian coordinate is suitable to assign an address in a rectangular shape