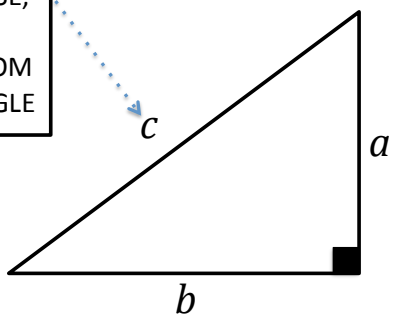
TRIGONOMETRY

(Calculator must be in “DEGREE” mode)

PYTHAGORAS

ONLY FOR RIGHT TRIANGLES

"c" IS THE HYPOTENUSE, ALWAYS ACROSS FROM THE 90° ANGLE



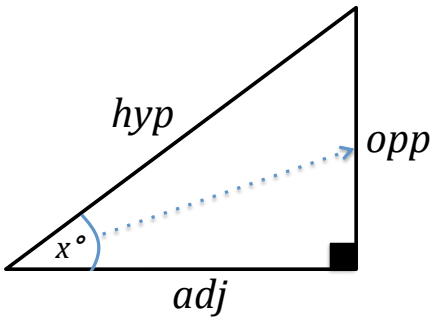
$$a^2 + b^2 = c^2$$

$$c = \sqrt{a^2 + b^2}$$
$$b = \sqrt{c^2 - a^2}$$
$$a = \sqrt{c^2 - b^2}$$

NOTES/EXAMPLES/REMINDERS

SOH CAH TOA

ONLY FOR RIGHT TRIANGLES



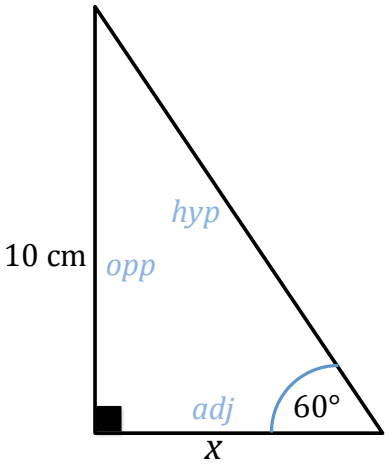
$$\frac{\sin x^\circ}{1} = \frac{opposite}{hypotenuse}$$

$$\frac{\cos x^\circ}{1} = \frac{adjacent}{hypotenuse}$$

$$\frac{\tan x^\circ}{1} = \frac{opposite}{adjacent}$$

NOTES/EXAMPLES/REMINDERS

SOH CAH TOA (SIDE)



STEPS TO FIND THE MISSING SIDE

1. IDENTIFY THE ANGLE (not the 90°)
2. LABEL THE SIDES OF THE TRIANGLE ACCORDING TO THE ANGLE
3. CHOOSE "SOH", "CAH" or "TOA"
4. SOLVE FOR THE MISSING SIDE

HAVE: *opp*
NEED: *adj*
USE: "TOA"

$$\frac{\tan x^\circ}{1} = \frac{opp}{adj}$$

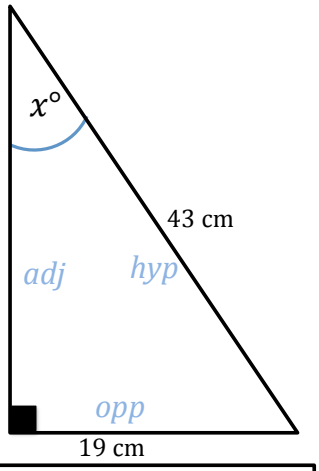
$$\frac{\tan 60}{1} = \frac{10}{x}$$

$$\frac{(1)(10)}{\tan 60} = x$$

$$5.77 = x$$

NOTES/EXAMPLES/REMINDERS

SOH CAH TOA (ANGLE)



HAVE: *opp* and *hyp*
NEED: *angle "x"*
USE: "SOH"

$$\frac{\sin x°}{1} = \frac{opp}{hyp}$$

$$\frac{\sin x°}{1} = \frac{19}{43}$$

$$(\sin x°)(43) = (19)(1)$$

$$\sin x° = \frac{19(1)}{43}$$

$$\sin x° = 0.441860465$$

$$x = 26.22°$$

Don't forget to take the $\sin^{-1}$ to find the angle ($x°$)!!

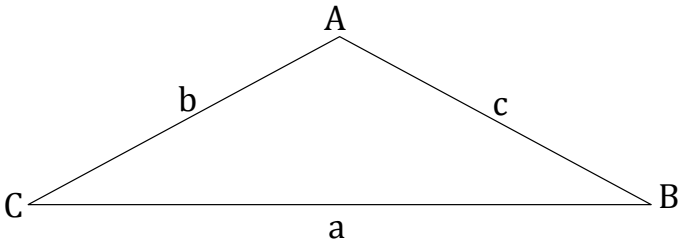
NOTES/EXAMPLES/REMINDERS

SINE LAW

WE USE SINE LAW TO FIND MISSING
SIDE LENGTHS AND MISSING ANGLES IN NON-RIGHT TRIANGLES

$$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$$

choose two of the three fractions to work with, remember you need 3 of 4 things to be able to cross-multiply

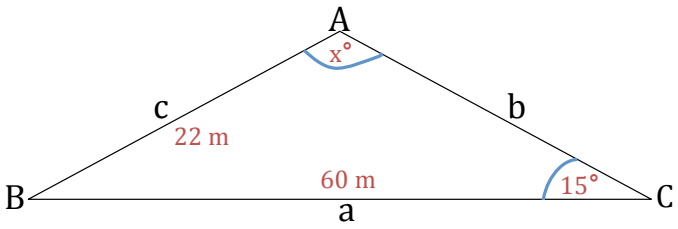


DON'T FORGET

OBTUSE ANGLES = 180 – acute angle

NOTES/EXAMPLES/REMINDERS

SINE LAW (obtuse angle example)



$$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$$

we don't use this middle fraction, since we don't know side b or angle B

$$\frac{60}{sinx} = \frac{b}{sinB} = \frac{29}{sin15}$$

$$\frac{60}{sinx} = \frac{29}{sin15}$$

$$x = 32.4°$$

BUT… since angle A is obviously obtuse, we do

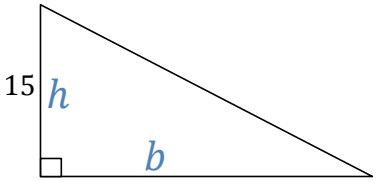
180 – 32.4 = 147.6°

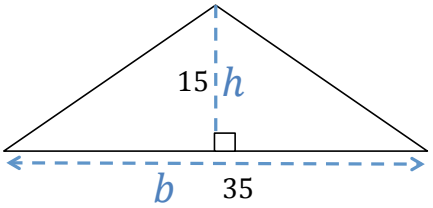
therefore, x = 147.6°

NOTES/EXAMPLES/REMINDERS

AREA OF A TRIANGLE $\left(\frac{b \cdot h}{2}\right)$

TO FIND THE AREA OF A TRIANGLE, WE CAN USE THIS FORMULA
IF BASE AND HEIGHT MEET AT A RIGHT ANGLE





$$Area = \frac{b \cdot h}{2} \longrightarrow \frac{15 \cdot 35}{2} \longrightarrow \frac{525}{2} \longrightarrow 262.5\ units^2$$

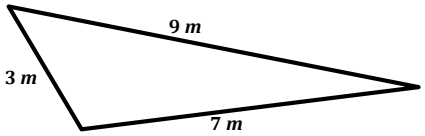
NOTES/EXAMPLES/REMINDERS

AREA OF A TRIANGLE (Hero's Formula)

TO FIND THE AREA OF A TRIANGLE, WE CAN USE THIS FORMULA
IF WE KNOW THE THREE SIDE LENGTHS OF A TRIANGLE

HERO'S FORMULA: $area = \sqrt{s(s-a)(s-b)(s-c)}$

... where s represents half the perimeter of the triangle: $s = \frac{(a + b + c)}{2}$



$$s = \frac{(a + b + c)}{2}$$

$$s = \frac{(7 + 3 + 9)}{2}$$

$$s = \frac{(19)}{2} \longrightarrow \boldsymbol{s = 9.5}$$

"a", "b," and "c" are the side lengths (in any order!)

$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{area} = \sqrt{9.5(9.5-7)(9.5-3)(9.5-9)}$$

$$\text{area} = \sqrt{9.5(2.5)(6.5)(0.5)}$$

$$\text{area} = \sqrt{77.1875}$$

$$\textbf{area} = \boldsymbol{8.79\ m^2}$$

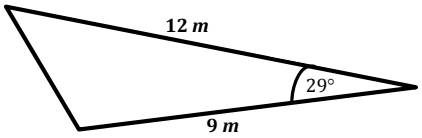
NOTES/EXAMPLES/REMINDERS

AREA OF A TRIANGLE (Trig Formula)

TO FIND THE AREA OF A TRIANGLE, WE CAN USE THIS FORMULA
IF WE KNOW THE TWO SIDE LENGTHS OF A TRIANGLE
AND THE ANGLE BETWEEN THOSE TWO SIDES

TRIG FORMULA: $area = \frac{a \cdot b \cdot sinC}{2}$

... where "a" and "b" are side lengths and "C" is the angle between those sides



$$area = \frac{a \cdot b \cdot sinC}{2}$$

$$area = \frac{12 \cdot 9 \cdot sin29}{2}$$

$$area = \frac{52.35943899}{2}$$

$$\boldsymbol{area = 26.18\ m^2}$$

NOTES/EXAMPLES/REMINDERS