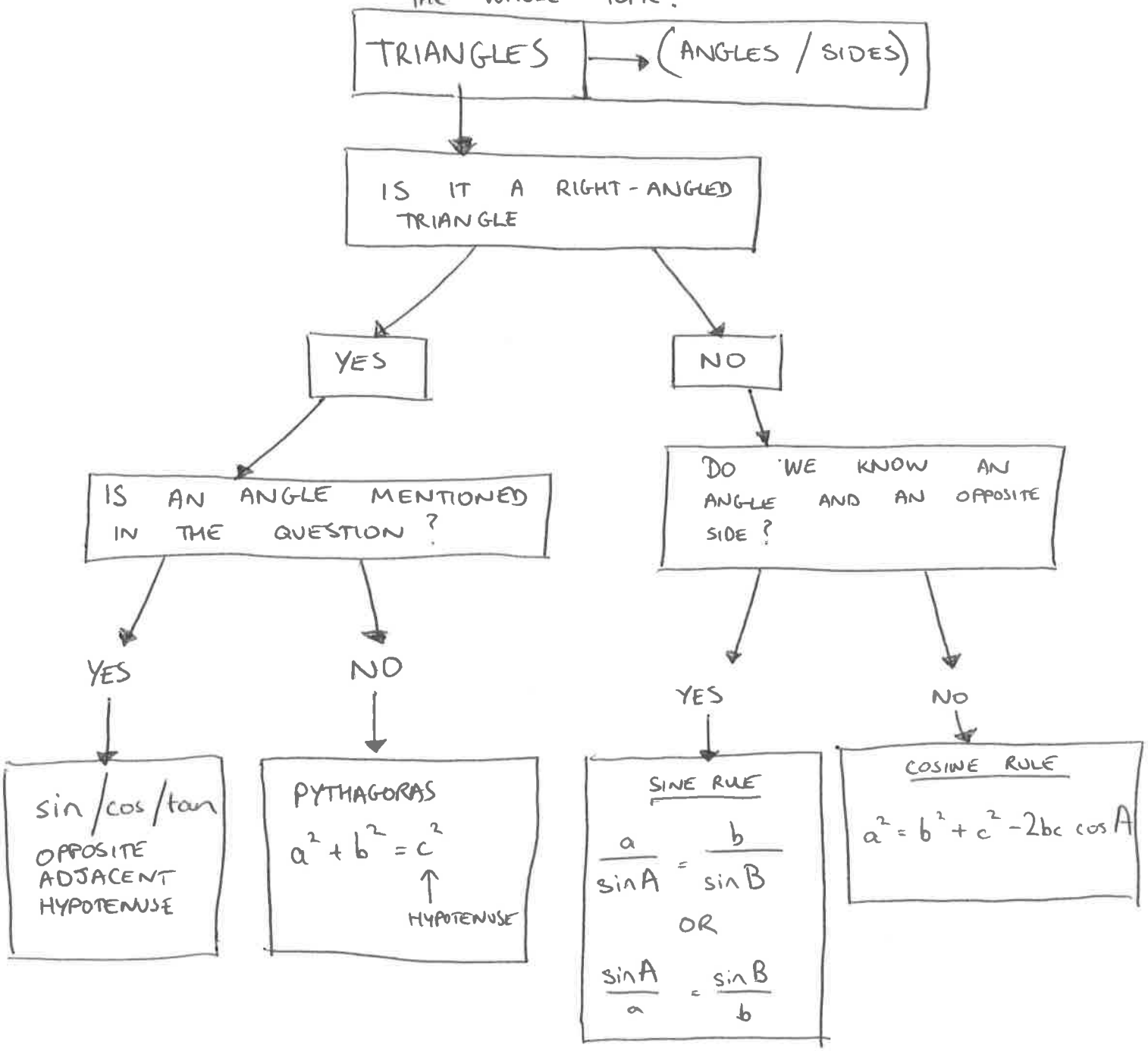
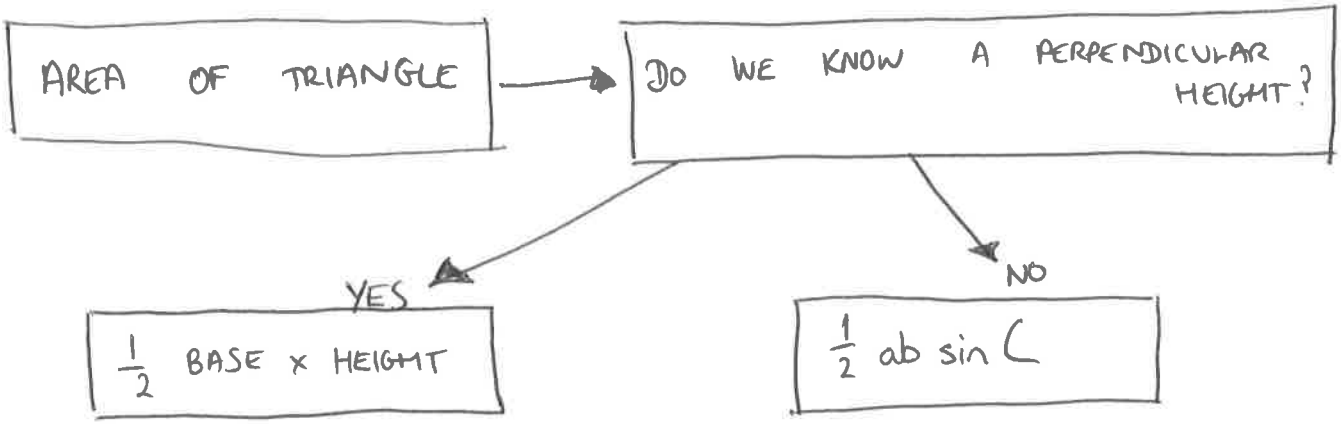
TRIGONOMETRY

FIRST, LOOK AT THE FOLLOWING FLOW-CHART. IT DESCRIBES HOW TO APPROACH BASICALLY THE WHOLE TOPIC.



OR

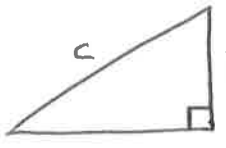


RIGHT - ANGLED TRIANGLES

USE WHEN WE DON'T CARE ABOUT ANGLES.

IF WE KNOW TWO SIDES, WE CAN WORK OUT THE LENGTH OF THE OTHER ONE.

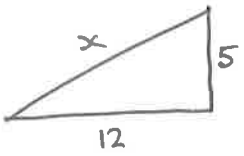
PYTHAGORAS THEOREM



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

HYPOTENUSE ALWAYS ON ITS OWN

eg ①



$5^2 + 12^2 = x^2$

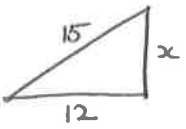
$25 + 144 = x^2$

$169 = x^2$

$x = \sqrt{169}$

$\boxed{x = 13}$

②



$x^2 + 12^2 = 15^2$

$x^2 + 144 = 225$

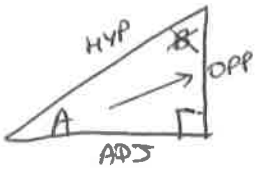
$-144 \quad -144$

$x^2 = 81$

$\boxed{x = 9}$

SIN / COS / TAN

- USE WHEN WE ARE GIVEN INFORMATION, OR WE WANT TO FIND OUT ABOUT, THE ANGLE



IMPORTANT: DECIDE WHICH ANGLE YOU'RE USING

① LABEL SIDES OPP / ADJ / HYP

② CHOOSE sin / cos / tan

③ WRITE AN EQUATION USING SIN / COS / TAN.

④ SOLVE.

$\sin A = \frac{OPP}{HYP} \quad \cos A = \frac{ADJ}{HYP} \quad \tan A = \frac{OPP}{ADJ}$

THIS IS IN TABLES BOOK, BUT NOT AS CLEAR AS THIS... SO REMEMBER RHYME:

SILLY OLD HARRY CAUGHT A HERRING TRAWLING OFF AMERICA

OR

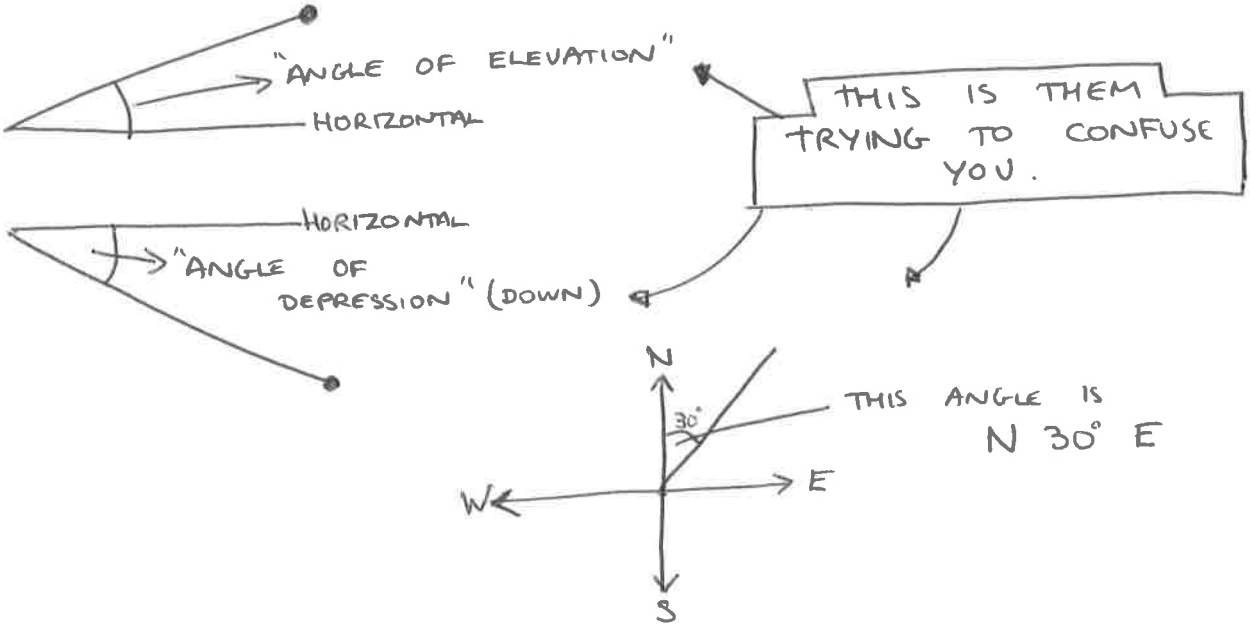
SOH CAH TOA

REMEMBER: USE INVERSE SIN / COS / TAN IF WE WANT TO CALCULATE THE ANGLE

eg $\sin^{-1} A$

"PRACTICAL" PROBLEMS

- **DRAW A PICTURE** (DON'T INCLUDE EXTRA STUFF LIKE TREES / BUILDINGS / RIVERS etc... JUST DRAW THE TRIANGLE(S)).

- 

THIS ANGLE IS N 30° E

AREA OF A TRIANGLE

IF WE DONT KNOW (+ CAN'T WORK OUT) THE PERPENDICULAR HEIGHT, THEN WE CAN'T USE THE

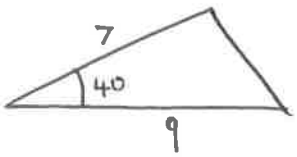
$\frac{1}{2}$ BASE × PERPENDICULAR HEIGHT FORMULA

So WE USE $\frac{1}{2}ab\sin C$ INSTEAD.

- $\frac{1}{2}$ × (ANY TWO SIDES MULTIPLYED TOGETHER) × SIN OF THE ANGLE [IN BETWEEN]

IT MUST BE THIS.

eg FIND THE AREA OF

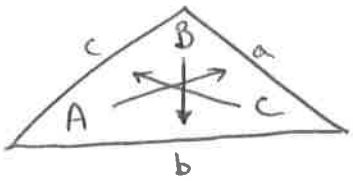


$$\text{AREA} = \frac{1}{2}ab\sin C$$

$$= \frac{1}{2}(7)(9)\sin 40$$

$$= \boxed{20.2}$$

NON RIGHT-ANGLED TRIANGLES



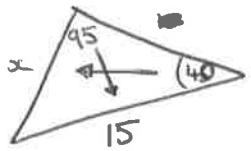
DO WE KNOW AN ANGLE AND THE LENGTH OF THE OPPOSITE SIDE?

YES → SINE RULE

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

- PUT THE BIT YOU'RE TRYING TO FIND ON THE TOP LEFT OF YOUR EQUATION
- GET RID OF THE FRACTION BY MULTIPLYING BY THE NUMBER ON THE BOTTOM.

eg



$$\frac{x}{\sin 40} = \frac{15}{\sin 95}$$

$$\frac{x}{0.6428} = \frac{15}{0.9962}$$

$$\frac{x}{0.6428} = 15.0573$$

$$x = (15.0573)(0.6428)$$

$$\boxed{x = 9.7}$$

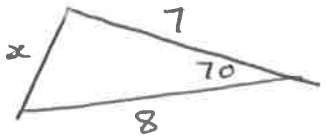
NO → COSINE RULE

$$a^2 = b^2 + c^2 - 2bc\cos A$$

- THE "ANGLE" AND THE CORRESPONDING SIDE ARE AT THE FAR ENDS OF THE EQUATION.

$$a^2 = b^2 + c^2 - 2bc\cos A$$

eg.



$$x^2 = 7^2 + 8^2 - 2(7)(8)\cos 70$$

$$= 49 + 64 - 38.3$$

$$x^2 = 74.7$$

$$x = \sqrt{74.7}$$

$$= \boxed{8.6}$$