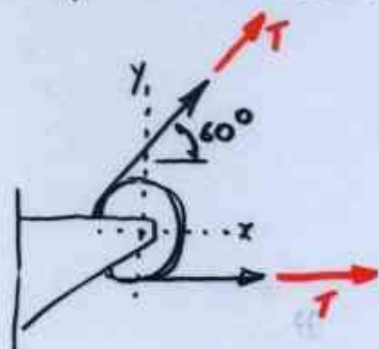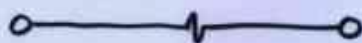SAMPLE PROBLEM 2/3 from M.& K.

Tensions HAVE MAGNITUDE 400N
WHAT IS FORCE $\vec{R}$ exerted on pulley?
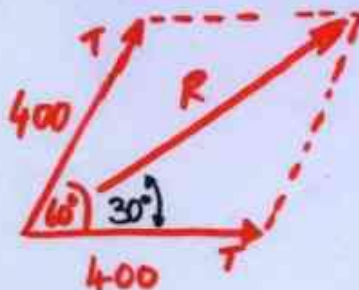
Again, more than one way to solve this ...

Parallelogram/graphical ...
IF YOU DRAW TO SCALE YOU can measure from DIAGRAM
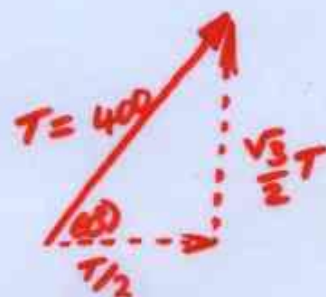$\|R\| \approx 693N$, DIRECTION IS as SHOWN.

Components: use x-y axES as SHOWN:

lower tension is EASY : $\boxed{400\hat{\imath}}$

UPPER one needs A LITTLE TRIG
$\Rightarrow \boxed{200\hat{\imath} + 200\cdot\sqrt{3}\,\hat{\jmath}}$

ADD to get $\vec{R} = 600\hat{\imath} + 346\hat{\jmath} \Rightarrow \|R\| = 693N$

TRIANGLE RULE / TRIG :

cosine RULE:

$\|R\|^2 = \|T\|^2 + \|T\|^2 - 2\|T\|\|T\|\cos(120°)$
$= 1600 + 1600 - 2(400)(400)(-\tfrac{1}{2})$
$= 1600 + 1600 + 1600 = 4800$

$\Rightarrow \|R\| = \sqrt{4800} = 693N$

DIRxn: 30° to HORIZONTAL