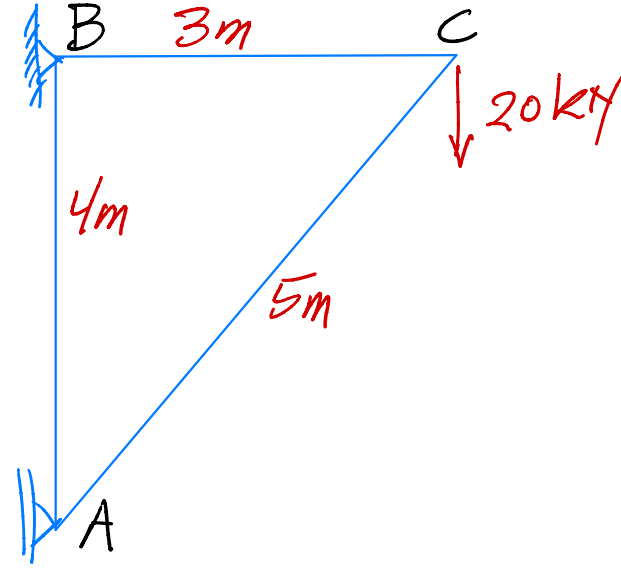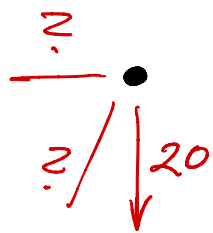Example: Determinate truss

Objective: Using geometry to find truss member forces by trigonometry

It is reasonable to start with by finding the reactions; however, it is not strictly necessary for this example, so skip that and go directly to a joint with two, or less, unknown forces.
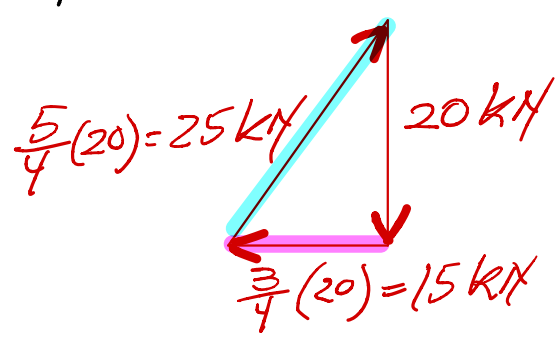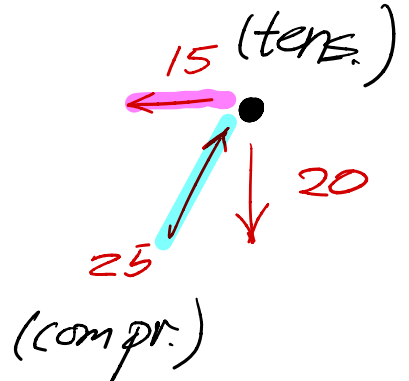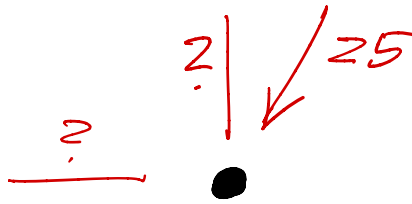
Equilibrium at Joint C:

step 1:

step 2:

$\frac{5}{4}(20) = 25\,kN$

$20\,kN$

$\frac{3}{4}(20) = 15\,kN$

Important to understand

step 3:

15 (tens.)

20

25 (compr.)

B   3m   C

20 kN

4m

5m

A

Equilibrium at Joint A:

① 

$$2$$
$$2 \quad | \quad \swarrow 25$$

② 

$$\frac{3}{5}(25) = 15$$

$$\frac{4}{5}(25) = 20 \qquad 25$$

③ 

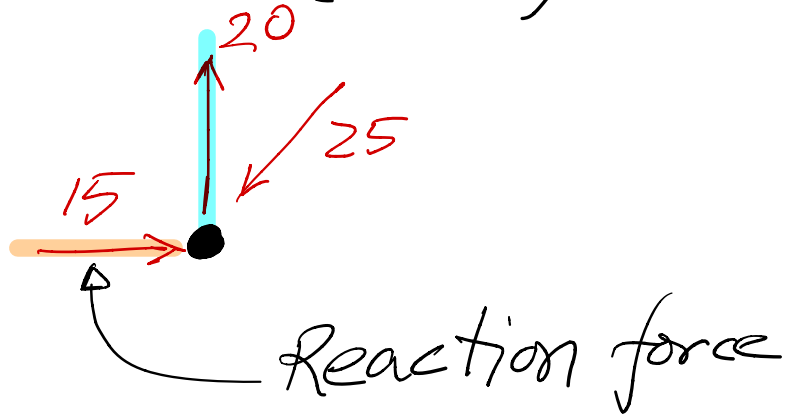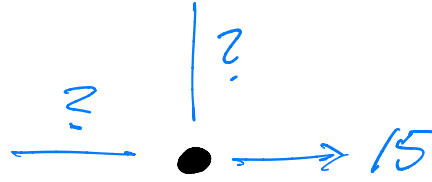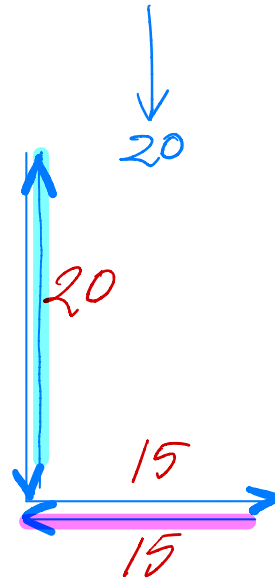$$20 \quad (\text{tension})$$
$$15 \qquad \swarrow 25$$
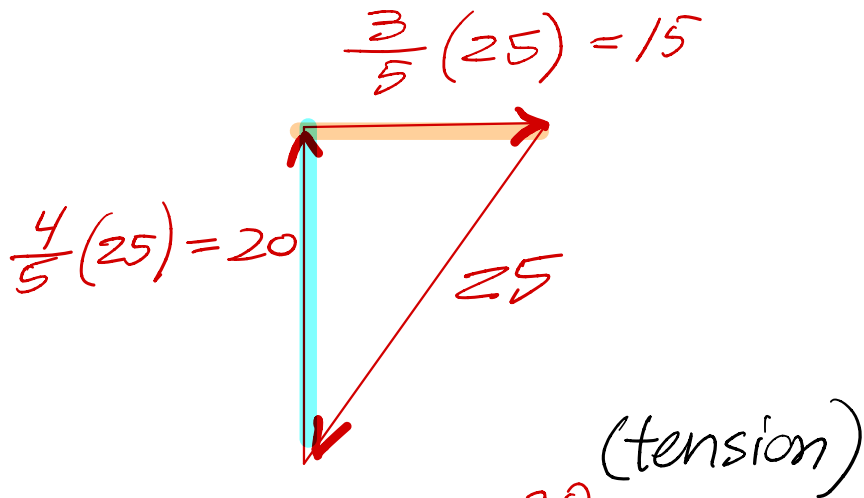
Reaction force

Equilibrium at Joint B:

(We already have all the member forces from above, so this is unnecessary. However, we do here get the reaction force at A and another practice at joint equilibrium using geometry.)
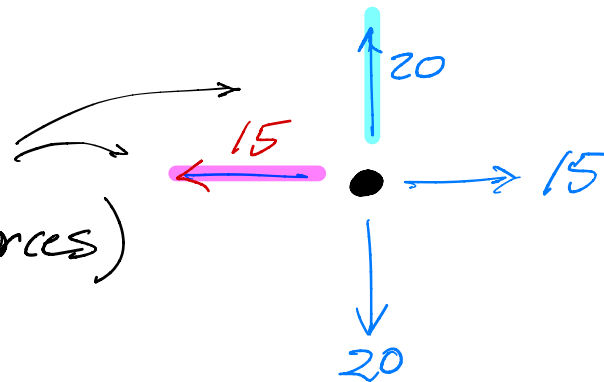
step 1:

?      ?      15

20

step 2:

20

15

15

step 3:

20

15      15

(Reaction forces)

20

Summarizing axial force diagram:

$+15\,kN$

$20\,kN$

$+20\,kN$

$-25\,kN$