**NAME : JUNAID MASOOD**

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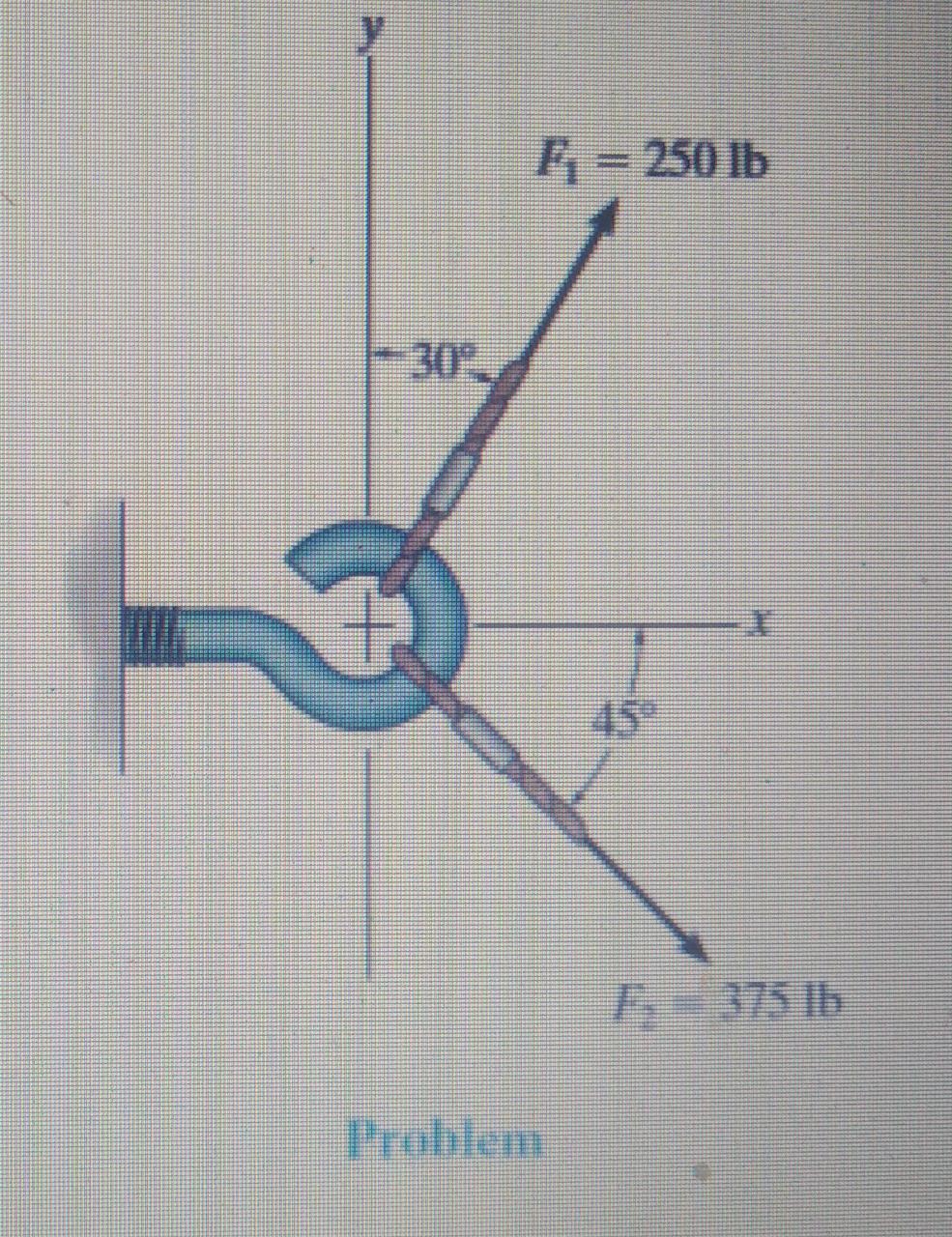
**DEGREE : B TECH CIVIL**

**SUBJECT : APPLIED MECHANICS**

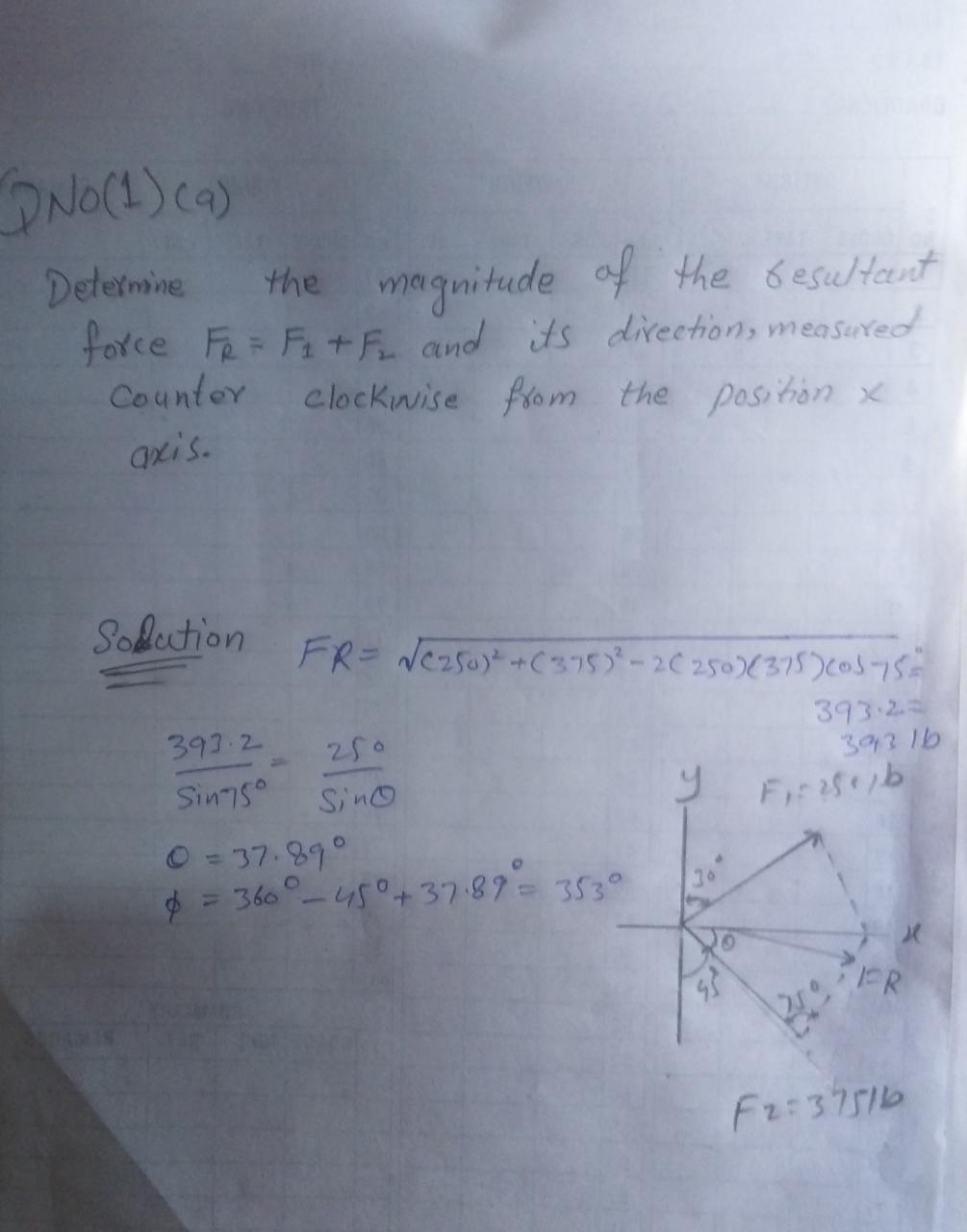
**SUMITTED TO : Engr Khurshid Alam**

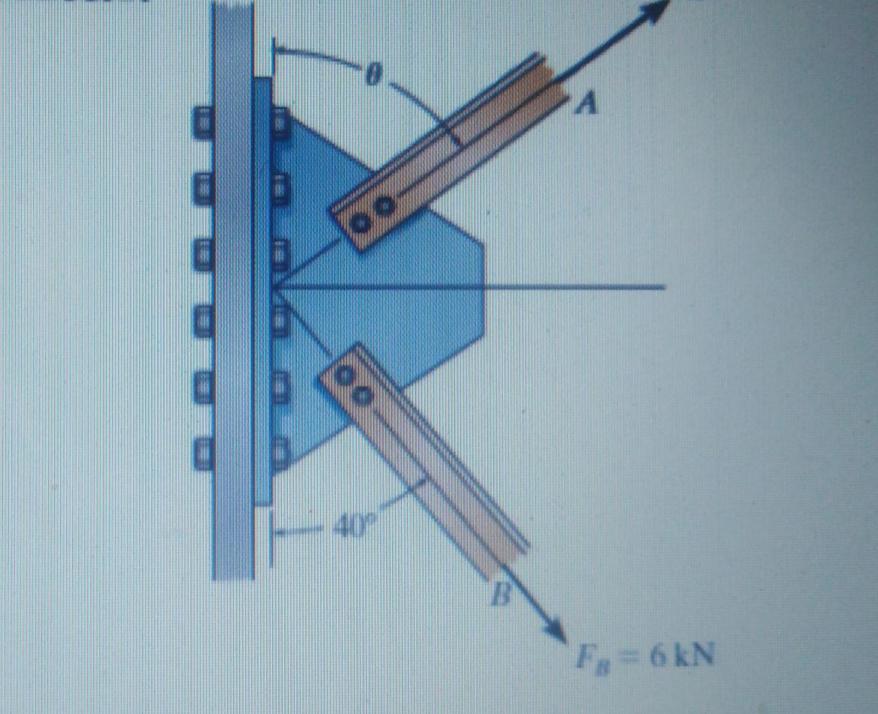
**FINAL EXAMINATION SUMMER 2020**

Q1(A)

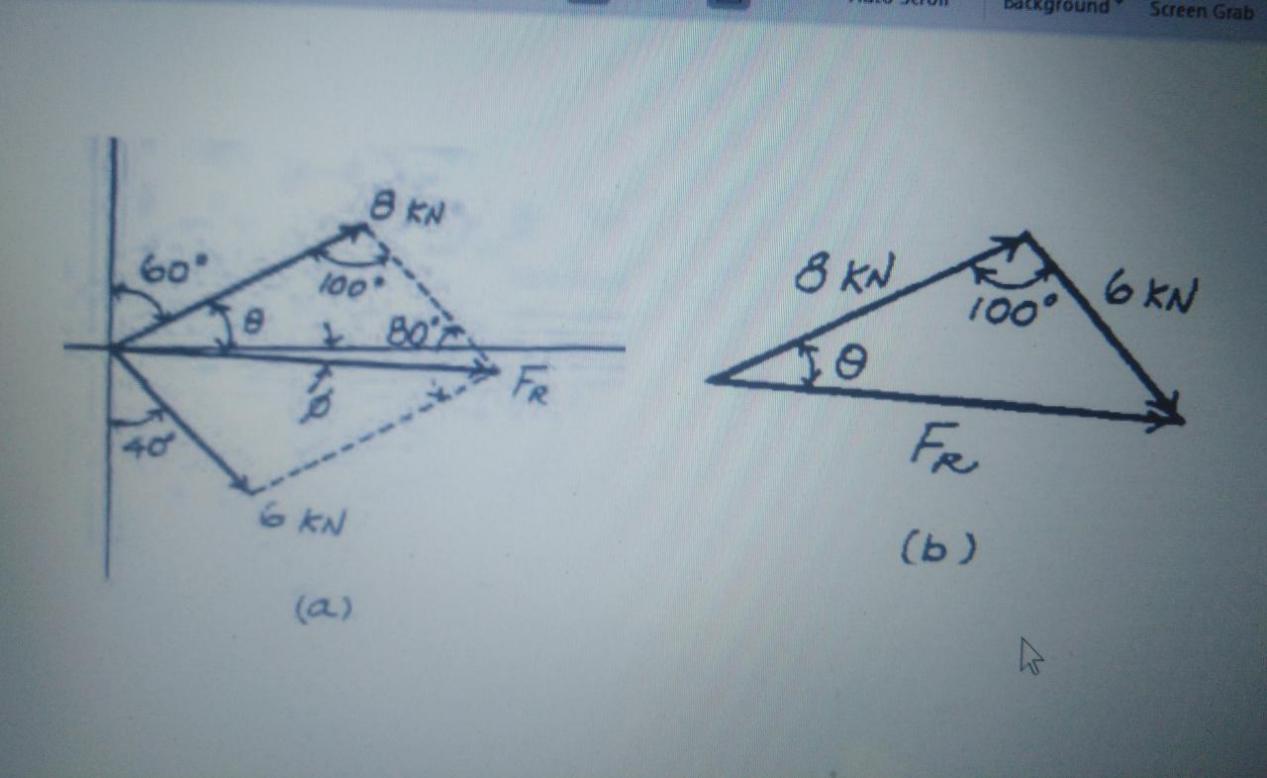


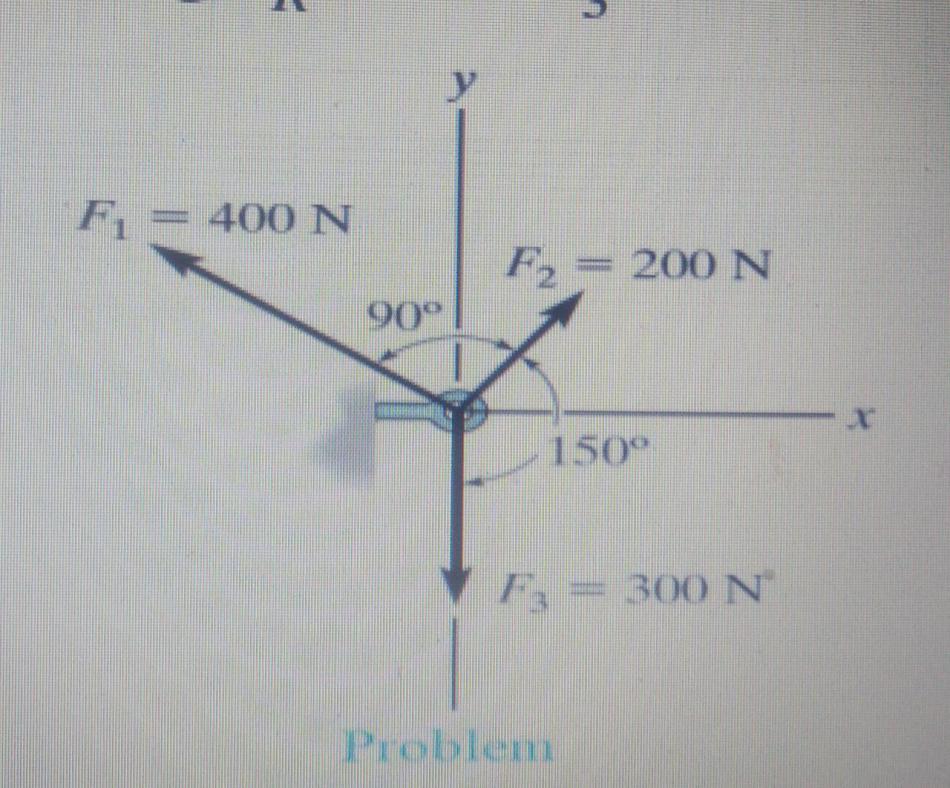
SOLUTION



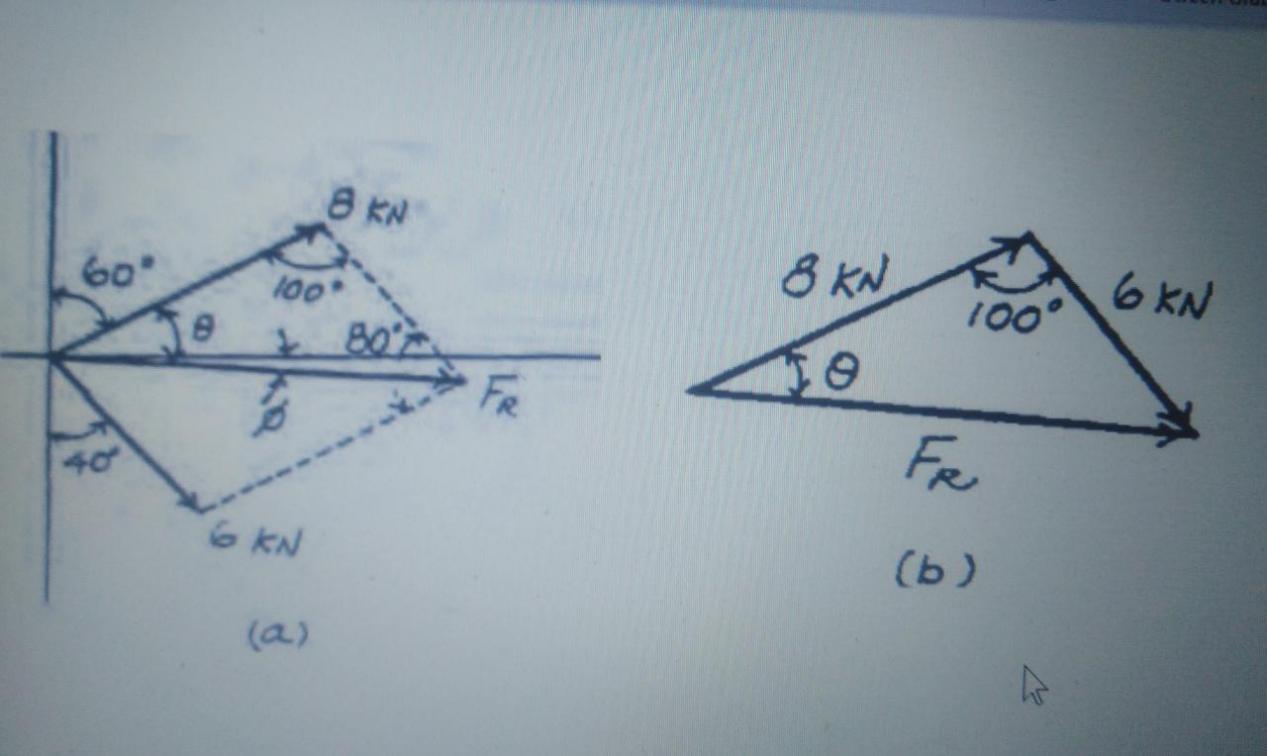


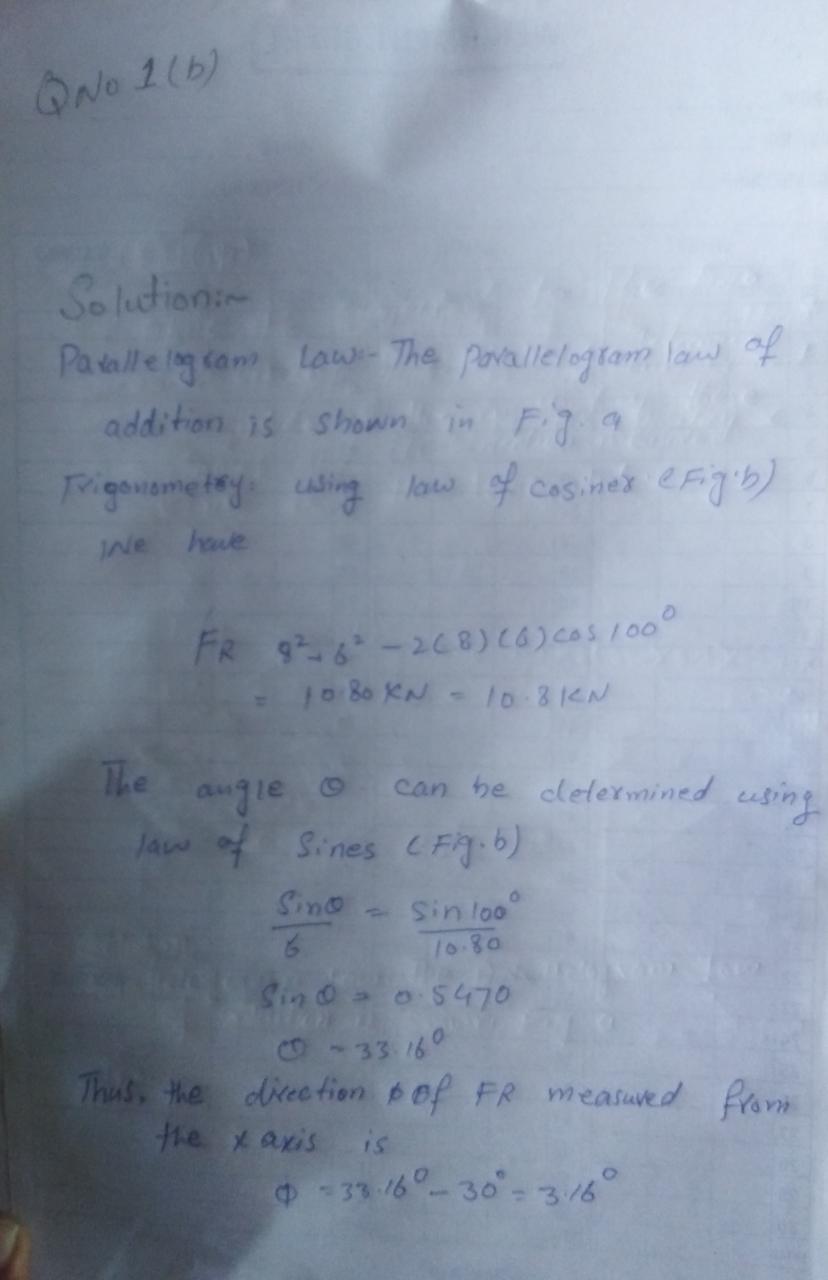
ANSWER

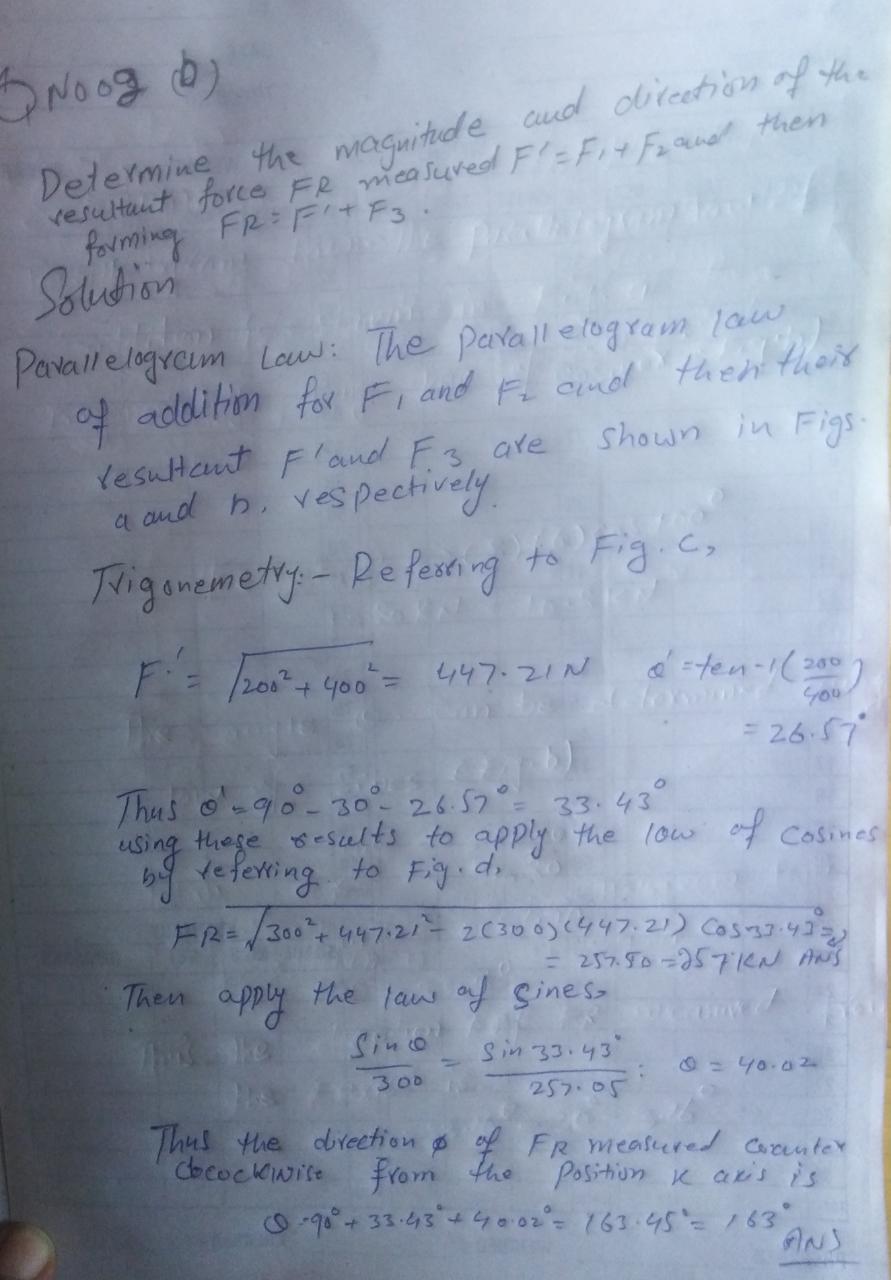




SALUTION







Q2b)

ANSWER

**Equilibrium,**When a rigid body is in ***equilibrium***, both the resultant force and the

resultant couple must be zero.

EQUILIBRIUM OF RIGID BODIES

• Forces and moments acting on a rigid body could be *external*

forces/moments or *internal* forces/moments.

• Forces acting from one body to another by direct physical contact or

from the Earth are examples of external forces.

• Fluid pressure acting to the wall of a water tank or a force exerted by

the tire of a truck to the road is all external forces.

EQUILIBRIUM OF RIGID BODIES

In rigid bodies subjected to two dimensional force systems, the forces

exerted from supports and connection elements are shown in the free

body diagram as follows:

It should be kept in mind that reaction will occur along the direction in

which the motion of the body is restricted.

in phsics, the condition of a system when neither its state of motion nor its internal energy state tends to change with time. A simple mechanical body is dody is said to be in equilibrium if it experiences neither linear acceleration nor angulan acceleration; unless it is disturbed by an outside force, it will continue in that condition indefinitely, For a single particle, equilibrium arises if the vector sum of all forces acting upon the particle is zero. A rigid body (by definition distinguished from a particle in having the property of extension) is considered to be in quilibrium if, in addition to the states listed for the particle above, the vector sum of all torques acting on the body equals zero so that its state of rotational motion remains constant. An equlibrium is said to be stable if small. Externally indueed displacements from that state produce forces that tend to oppose the displacement and return the body or particle to the equilibrium state. Examples include a weight suspended by a spring or a brick lying on a level surfase. An equilibrium is unstable if the least

departure produces forces that tend to inerease the displacement. An example is a ball bearing balanced on the edge of a rezor blade.

Q3(a)

ANSWER

Q3(b)

TWO-FORCE MEMBER

Members which are subjected to only two forces are named as “***two***

***force members***”. Forces acting on these members are equal in

magnitude, opposite in direction and are directed along the line joining

the two points where the forces are applied

Weight is neglected. If

weight is considered, the

member will not be a

two force member!

**P**

**By**

**Bx**

**Ax**

**Ay**

**FB**

**FA=FB**

**FA**

**B**

**A**

Examples of Two Force Member

THREE-FORCE MEMBER

In rigid bodies acted on by only three forces, the lines of action of the

forces must be concurrent; otherwise the body will rotate about the

intersection point of the two forces due to the third force which is not

concurrent. If the forces acting on the body are parallel, then the point of

concurrency is assumed to be in infinity.

THREE-FORCE MEMBER

**A**

**P**

**B**

**FA**

**FB**

**P**

FREE BODY DIAGRAM

The procedure for drawing a free body diagram which isolates a body or

system consists of the following steps:

▪ If there exists, identify the two force members in the problem.

▪ Decide which system to isolate.

▪ Isolate the chosen system by drawing a diagram which represents its

*complete external boundary*.

FREE BODY DIAGRAM

▪ If not given with the problem, select a coordinate system which

appropriately suits with the given forces and/or dimensions.

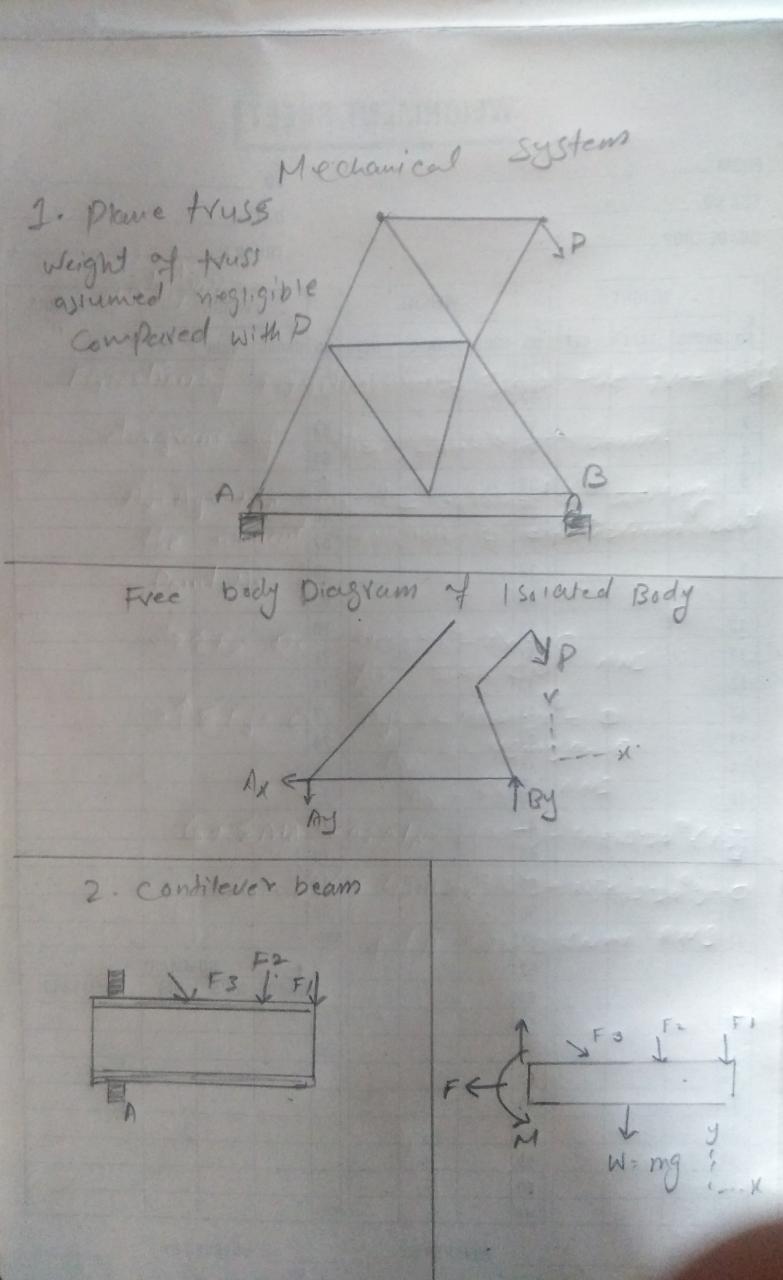
▪ Identify ***all*** forces which act ***on*** the isolated system applied by

removing the contacting or attracting bodies, and represent them in

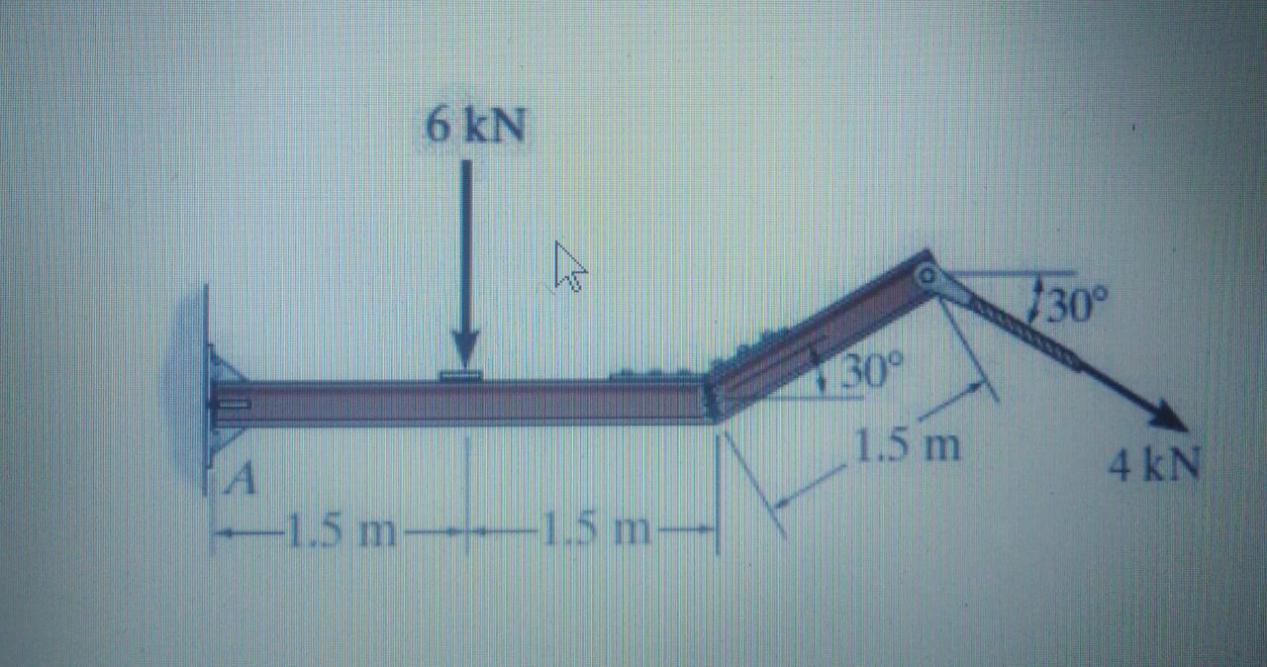
their proper positions on the diagram.

▪ Write the equations of equilibrium and solve for the unknowns.

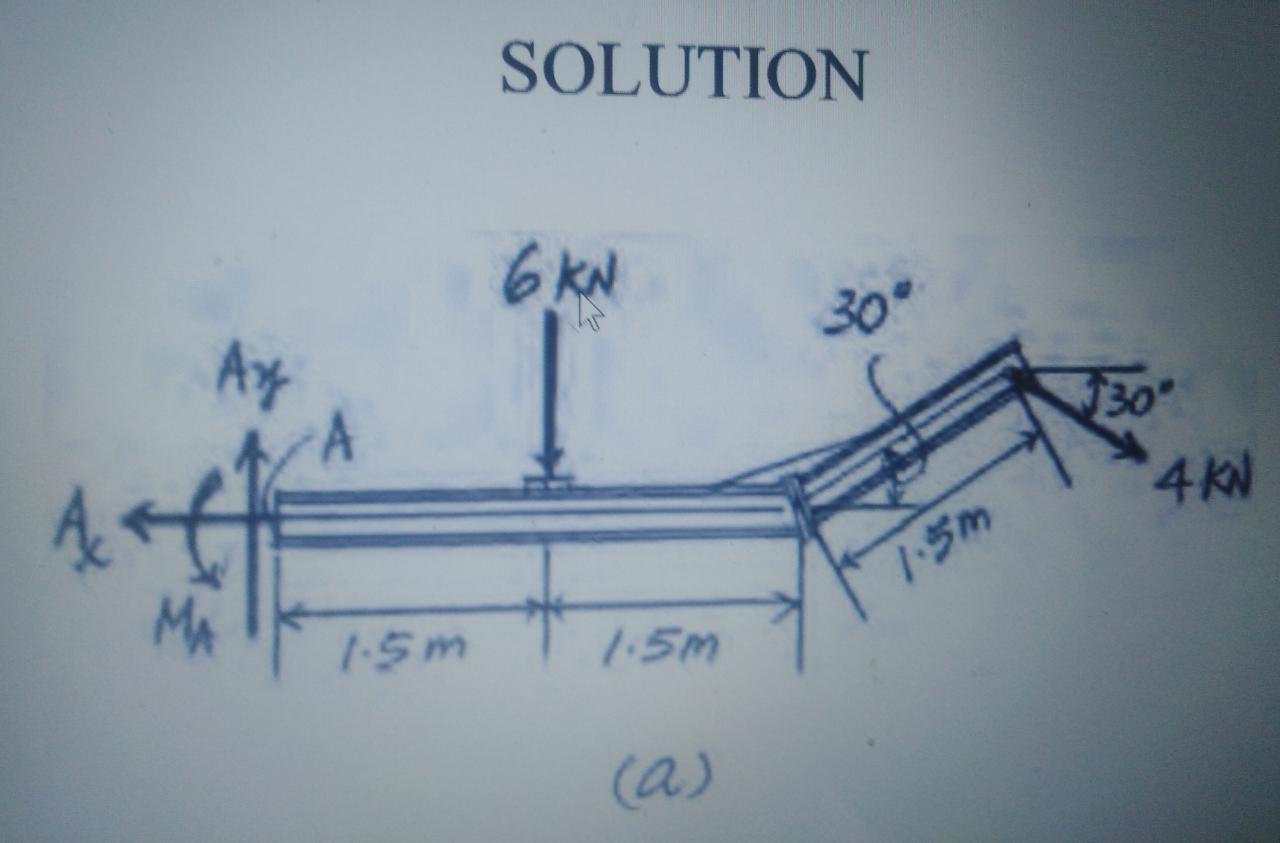
Q3(B)

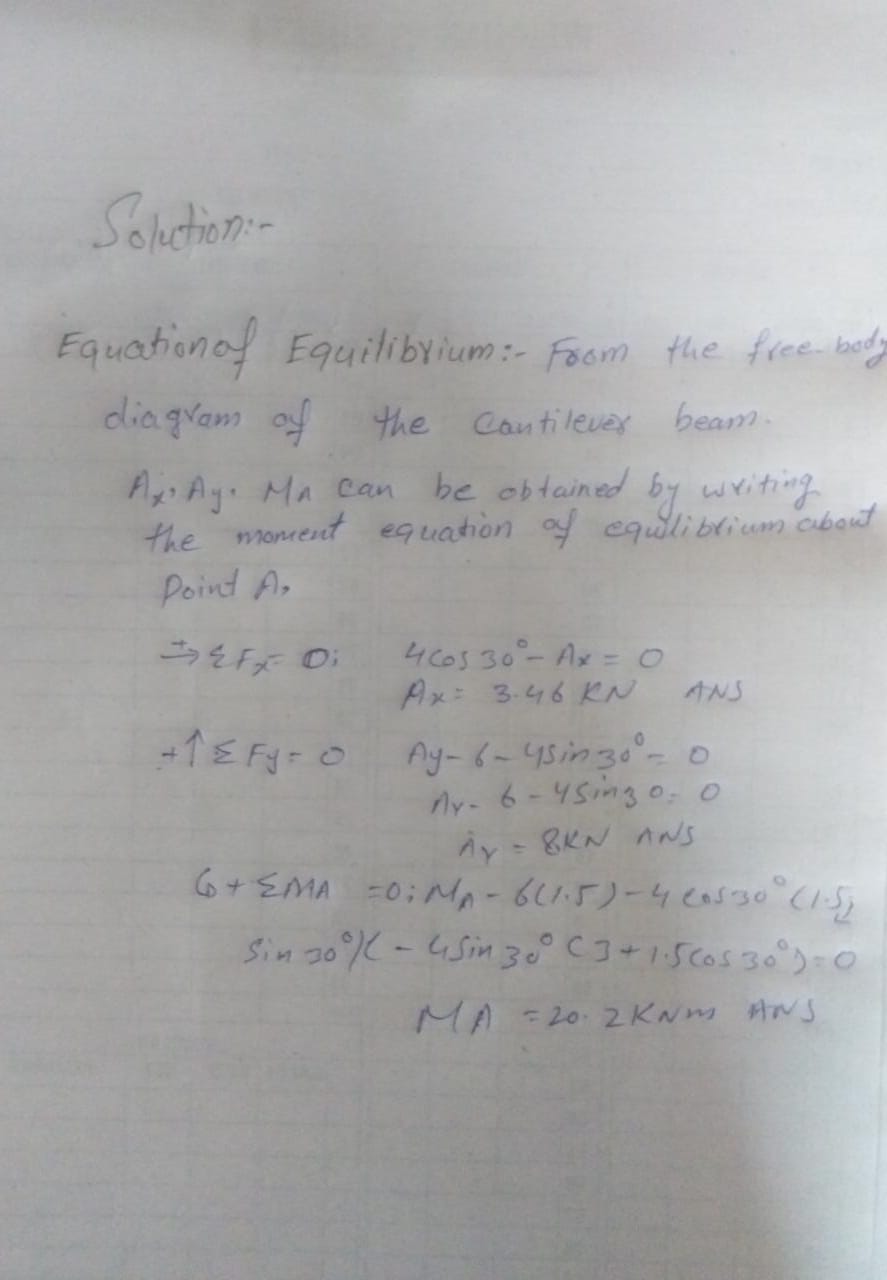


Q4(A)



Solution





Q4(b)

