

ARCH 331: Example Note Page for Quiz Use

ENDS 231: Practice Quiz 2

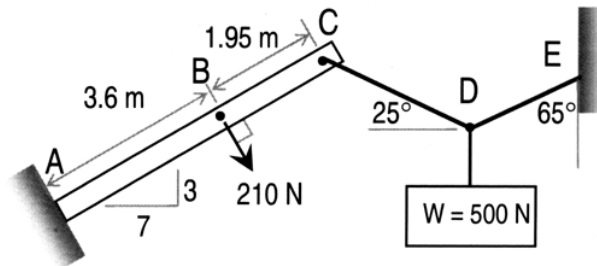
Note: No aids are allowed for part 1. The text (reference charts) and one side of a letter sized paper with notes are allowed during part 2, along with a silent, non-programmable calculator.

Clearly show your work and answer.

Part 1) Worth 5 points (conceptual questions)

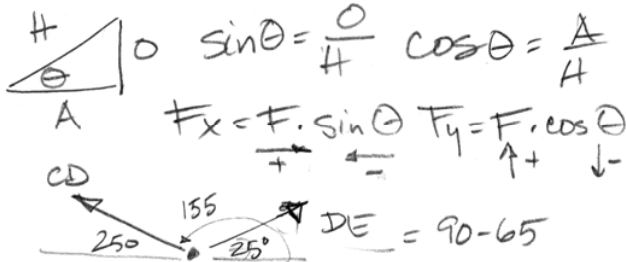
Part 2) Worth 45 points

The structure shown is supporting a cable system with a force due to a mass. (NOTE: The support configuration for the non-cables in the system and the slopes of the cables can be changed for the quiz!)



Using clear free body diagrams, determine:

- a) the forces in cables CD and DE. → equilibrium of a point = Free the point with cables, weight or struts or truss members. Draw forces away if unknown. Get angle or geometry of forces.  $\sum F_x = 0$   $\sum F_y = 0$ . Algebra → divide both sides by same # to cancel. Move to other side by changing sign.
- b) the support reactions (with direction). → equilibrium of a rigid body

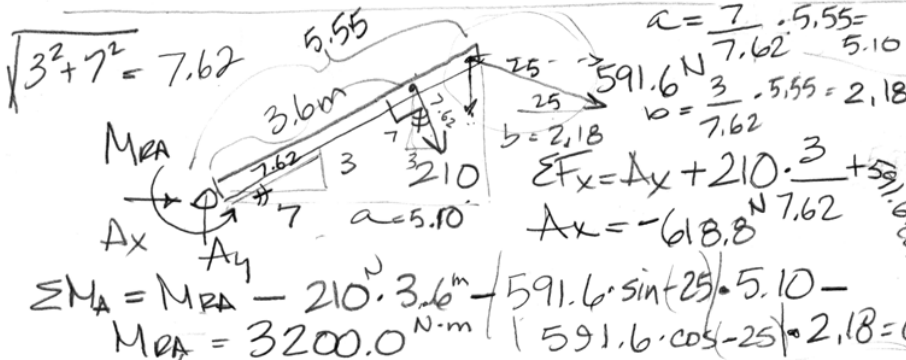


Free the point with cables, weight or struts or truss members. Draw forces away if unknown. Get angle or geometry of forces.  $\sum F_x = 0$   $\sum F_y = 0$ . Algebra → divide both sides by same # to cancel. Move to other side by changing sign.

$H = \sqrt{A^2 + O^2}$

$\sum F_x = CD \cdot \cos 155 + DE \cdot \cos 25 = 0 \implies DE = CD$

$\sum F_y = CD \sin 155 + (CD) \cdot \sin 25 - 500 = 0 \implies 0.845 CD = 500 \implies CD = 591.6 \text{ N}$



draw the body freed - put all loads on. Look up supports. IF  $F_x$  &  $F_y$  can put them in my coordinate system. Fixed connections have a REACTION MOMENT. Use  $\sum M$  at TWO unknowns intersection.  $\sum F_x$   $\sum F_y$  and  $\sum M$

$\sum M_A = M_{RA} - 210 \cdot 3.6 - 591.6 \cdot \sin(25) \cdot 5.10 - 591.6 \cdot \cos(25) \cdot 2.18 = 0$

$M_{RA} = 3200.0 \text{ N}\cdot\text{m}$

Similar triangles  $\frac{A}{a} = \frac{B}{b} = \frac{C}{F}$

Answers Not provided on actual quiz!

Look for perpendicular distances to forces. IF NOT use the component for 2 moments. Careful with geometry.

- a)  $CD = 591.6 \text{ N}$ ,  $DE = 591.6 \text{ N}$
- b)  $A_x = -618.9 \text{ N}$ ,  $A_y = 443.0 \text{ N}$ ,  $M_{RA} = +3203.4 \text{ N}\cdot\text{m}$

Disclaimer: Answers have NOT been painstakingly researched.