

# ARCH 314 STRUCTURE I

RECITATION SESSION 2  
FACULTY: Prof. Peter Von Buelow  
GSI: Faezeh Choobkar  
FALL 2025

# Welcome to recitation session

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## Introduction:

Faezeh Choobkar (PhD student)

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Office hours: by appointment

## Outline:

Quick Recap

Provide the solution for the assignment (Problem set 3)

Answering student's questions

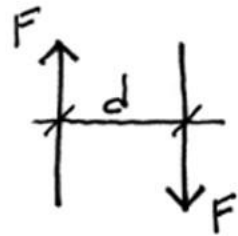
Recitation lab: Adding Forces

## Problem Set 3

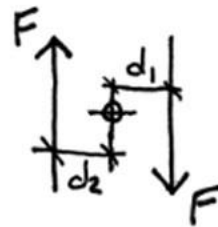
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### Recap of the week

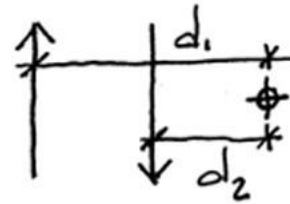
#### Force Couple



$$M = F \times d$$



$$\begin{aligned} M &= F \times d_1 + F \times d_2 \\ &= F \times (d_1 + d_2) \\ &= F \times d \end{aligned}$$



$$\begin{aligned} M &= F \times d_1 - F \times d_2 \\ &= F \times (d_1 - d_2) \\ &= F \times d \end{aligned}$$

## Problem Set 3

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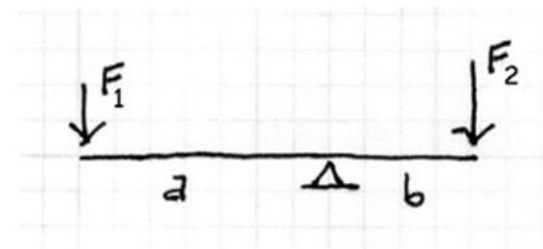
### Recap of the week

#### Archimedes Lever

Two forces will balance at distances reciprocally proportional to their magnitudes.

$$\mathbf{F_1 \times a = F_2 \times b}$$

$$\mathbf{F_1 = F_2 \frac{b}{a}}$$



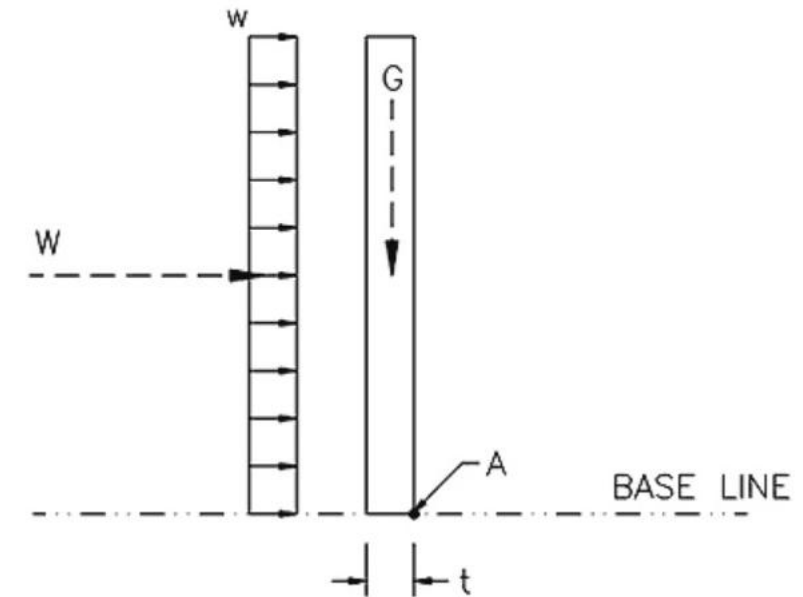
## Problem Set 3

### 3. Moment of a Force

Find the total wind force ( $W$ ) in LBS normal to the wall that would cause an overturning moment equal to the resisting moment from gravity ( $G$ ).

DATASET: 1   -2-   -3-

Wall thickness	12 IN
Density of wall	80 PCF
Height of wall	6 FT



## Problem Set 3

#	Question	Your Response	Correct Answer	Score
1	Total weight of 1 linear foot length of wall (G)	<input type="text"/> PLF	<input type="button" value="SUBMIT"/>	
2	Moment arm length for resisting gravity moment	<input type="text"/> INCH	<input type="button" value="SUBMIT"/>	
3	Resisting moment of 1 linear foot length of wall about point A (absolute value)	<input type="text"/> FT-LBS	<input type="button" value="SUBMIT"/>	
4	Moment arm length for overturning wind moment	<input type="text"/> FT	<input type="button" value="SUBMIT"/>	
5	Overturning wind force W acting on a 1 linear foot length of wall area	<input type="text"/> LBS	<input type="button" value="SUBMIT"/>	
6	Wind pressure on wall	<input type="text"/> PSF	<input type="button" value="SUBMIT"/>	

Q1:

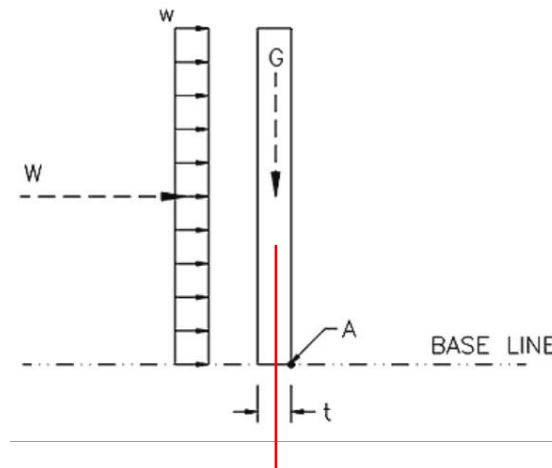
$$M_r = M_o$$
$$\text{Density} = \frac{\text{weight}}{\text{volume}}$$

$$V = (12/12) \times 6 \times 1 = 6$$
$$80 = \frac{m}{6} = 480$$

## Problem Set 3

#	Question	Your Response	Correct Answer	Score
1	Total weight of 1 linear foot length of wall (G)	<input type="text"/> PLF	SUBMIT	
2	Moment arm length for resisting gravity moment	<input type="text"/> INCH	SUBMIT	
3	Resisting moment of 1 linear foot length of wall about point A (absolute value)	<input type="text"/> FT-LBS	SUBMIT	
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6	Wind pressure on wall	<input type="text"/> PSF	SUBMIT	

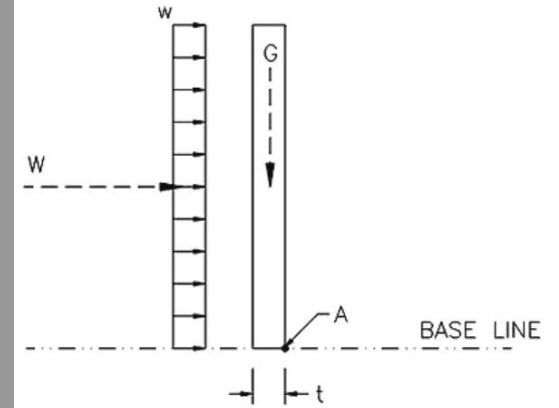
Q2:



$$t/2=12/2=6$$

## Problem Set 3

#	Question	Your Response	Correct Answer
1	Total weight of 1 linear foot length of wall (G)	<input type="text"/> PLF	SUBMIT
2	Moment arm length for resisting gravity moment	<input type="text"/> INCH	SUBMIT
3	Resisting moment of 1 linear foot length of wall about point A (absolute value)	<input type="text"/> FT-LBS	SUBMIT
4	Moment arm length for overturning wind moment	<input type="text"/> FT	SUBMIT
5	Overturning wind force W acting on a 1 linear foot length of wall area	<input type="text"/> LBS	SUBMIT
6	Wind pressure on wall	<input type="text"/> PSF	SUBMIT



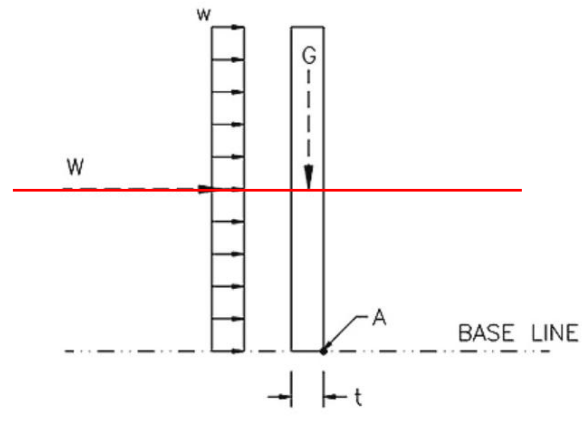
Q3:

$$M_r = F \times D$$
$$480 \times (6/12) = 240$$

## Problem Set 3

#	Question	Your Response	Correct Answer	Score				
1	Total weight of 1 linear foot length of wall (G)	<input type="text"/> PLF	SUBMIT					
2	Moment arm length for resisting gravity moment	<input type="text"/> INCH	SUBMIT					
3	Resisting moment of 1 linear foot length of wall about point A (absolute value)	<input type="text"/> FT-LBS	SUBMIT					
4	Moment arm length for overturning wind moment	<input type="text"/> FT	SUBMIT					
5	Overturning wind force W acting on a 1 linear foot length of wall area	<input type="text"/> LBS	SUBMIT </tr <tr> <td>6</td> <td>Wind pressure on wall</td> <td><input type="text"/> PSF</td> <td>SUBMIT</td> <td></td> </tr>	6	Wind pressure on wall	<input type="text"/> PSF	SUBMIT	
6	Wind pressure on wall	<input type="text"/> PSF	SUBMIT					

Q4:

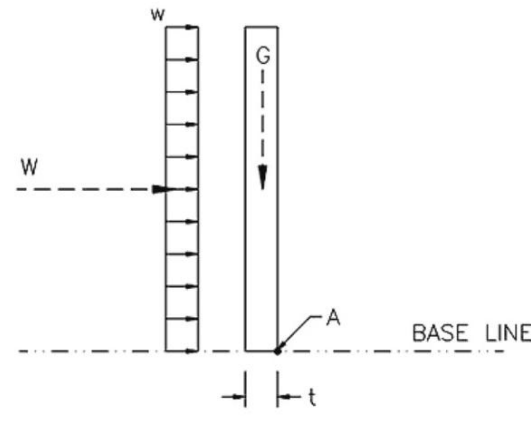


$$h/2=6/2=3$$

## Problem Set 3

#	Question	Your Response	Correct Answer	Score
1	Total weight of 1 linear foot length of wall (G)	<input type="text"/> PLF	SUBMIT	
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3	Resisting moment of 1 linear foot length of wall about point A (absolute value)	<input type="text"/> FT-LBS	SUBMIT	
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6	Wind pressure on wall	<input type="text"/> PSF	SUBMIT	

Q5:



$$M_o = M_r$$

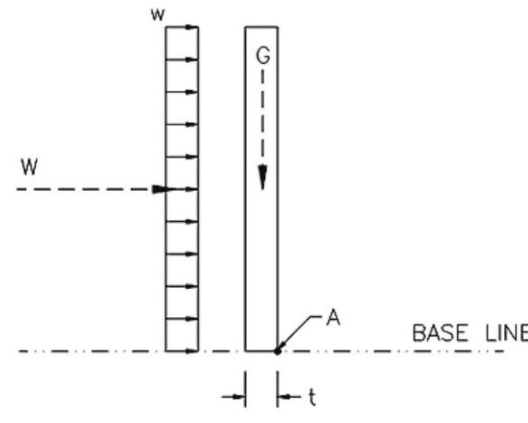
$$240 = W \times 3$$

$$W = 80$$

## Problem Set 3

#	Question	Your Response	Correct Answer	Score
1	Total weight of 1 linear foot length of wall (G)	<input type="text"/> PLF	SUBMIT	
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3	Resisting moment of 1 linear foot length of wall about point A (absolute value)	<input type="text"/> FT-LBS	SUBMIT	
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5	Overturning wind force W acting on a 1 linear foot length of wall area	<input type="text"/> LBS	SUBMIT </td <td></td>	
6	Wind pressure on wall	<input type="text"/> PSF	SUBMIT	

Q6:



$$\text{Wind pressure} = \text{wind force} / \text{wall surface}$$

$$80 / (6 \times 1) = 13.33$$

# LAB

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## Moment of a Force

### Description

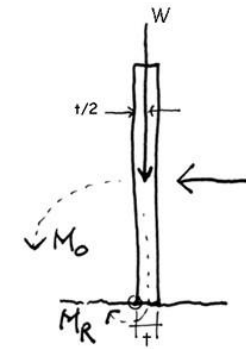
This project is intended to give a sense the moment of a force. It looks at the effect of distance on the magnitude of an overturning moment

### Goals

- To review dead load calculation
- To observe the effect of position on an overturning moment using a physical model
- To show calculate a moment based on equilibrium

### Procedure

1. Calculate the total weight ( $W$ ) in pounds of the wooden block. The block measures 6"x2"x1.5" and has a density of 48 PCF.
2. Place the block on a surface so that  $t=2"$  and apply a load  $P$  with your finger at 1" above the surface to tip the block. You may need to restrain the block from sliding.
3. Make a sketch of the system and calculate first the resisting moment of the wall  $M_r$ . Then set this resisting moment equal to the overturning moment  $M_o$ . Next solve for the force  $P$  needed to overturn the block.
4. Now move your finger to the mid height of the block at 3".
5. Again make a sketch of the system and calculate the force  $P$  needed to overturn the block.
6. Move your finger to the top of the block at 6" and again calculate the force  $P$  needed to overturn the block.
7. Finally, press hard on the top of the block and again try to tip it from the side. Now it is much different. What has changed? Approximately what is the resisting moment,  $M_r$  now?



### Due

During recitation