Shear Stress/Strength Homework Name_____

Part I:

Fill in the following table. You may need to look these up in your AAA book.

Term	**Symbol**	**Definition (Brief)**	**Units**
Mass			
Area			
Density			
Force			
Pressure			
Stress			
Strength			
Shear			
Tension			

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Part II:

A good tool to evaluate the stability of layers once you know the shear strength and shear stress is *the Stability Index*:

$$StabilityIndex = \frac{ShearStrength}{ShearStress} = \frac{T}{\tau_{total}}$$

A higher stability index indicates a more stable layer, while a lower stability index indicates a less stable layer.
Using your shear stress notes, fill in the pit data below. For σ_i and σ_t assume a flat plane, and for τ_i and τ_{total} use a slope angle of 30 degrees:

H_{total}	R	F	ρ	H_i	σ_i	σ_{total}	τ_i	τ_{total}	T	Stability Index
cm			kg/m3	m	Pa	kPa	Pa	kPa	kPa	
320										
	F	⟋	120						.34	
290										
	4F	⟋	150						.85	
240										
	1F	●	240						2.20	
140										
	1F	□	130						2.00	
120										
	P	⧈	200						3.80	
0										

1. Which layer will fail first? At what slope angle will failure in shear occur?

2. Using the resultant layer from question 1, and given the current snowpack conditions, how much new snow (with a density of 80kg/m^3) is needed to cause the slope to become unstable?

3. Do the stability indices match up with the other snowpit attributes? Explain your conclusions.

4. What is a better indicator for strength – hardness or density? Why?