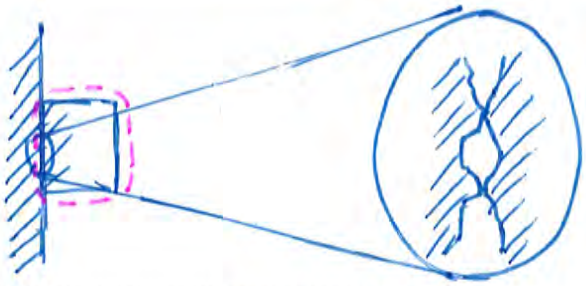
D4

Title | Normal force with which a flat surface presses

Ingredients

Sketch	
At/Through	t
Owner	System
Quantity	Normal force
Variable	$\vec{F}_{N,SURF\to SYS}$
Giver	Flat surface touching system

Recipe

Diagram the relationship	(No memorized formula for $F_{N,SURF\to SYS}$)
Graphically present quantities	Force diagram $F_{N,SURF\to SYS}$ directed perpendicularly away from contact plane
Mathematical relationship	(No memorized formula for $F_{N,SURF\to SYS}$) Direction of $\vec{F}_{N,SURF\to SYS}$ = Perpendicular press, away from contact plane

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Title: Normal force with which a flat surface presses

The top half of this sheet consists of an "**Ingredients**" section with a row labeled "Sketch", a row labeled "At/Through", a row labeled "Owner", a row labeled "Quantity", a row labeled "Variable", and a row labeled "Giver."

Sketch: Block, in contact with vertical wall at left. Block is surrounded by dashed system bubble. Magnified view of portion of region of contact between block and wall shows that the block and wall are bumpy at the molecular scale and in contact only where a bump from the block and a bump from the wall touch. Otherwise, there are gaps.

Remaining rows of Ingredients section are used for a flowchart illustrating the following: At time t, Owner System exists and receives Quantity Normal force, denoted by Variable F-vector-sub-N,SURF-on-sys, given by Giver Flat surface touching system.

The bottom half of this sheet consists of a "**Recipe**" section with a row labeled "Diagram the relationship", a row labeled "Graphically present quantities", and a row labeled "Mathematical relationship".

Diagram the relationship
Note in parentheses: No memorized formula for F-sub-N,SURF-on-sys

Graphically present quantities
Title: Force diagram
Dot represents system. Normal-force arrow originates from dot, points to the right, and is labeled F-sub-N,SURF-on-sys. Direction of normal-force arrow is emphasized by a caption that reads, "directed perpendicularly away from contact plane", with an arrow pointing from the caption to the tip of the normal-force arrow.

Mathematical relationship
Note in parentheses: No memorized formula for F-sub-N,SURF-on-sys
Direction of F-vector-sub-N,SURF-on-sys = Perpendicular press, away from contact plane