September 24, 2022.

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1. Dynamometer readings register values of 457 lb for cutting force (F_c) and 163 lb for the feed force (F_f). The cutting tool is found to have a rake angle of 10.8^0. From this information, determine:

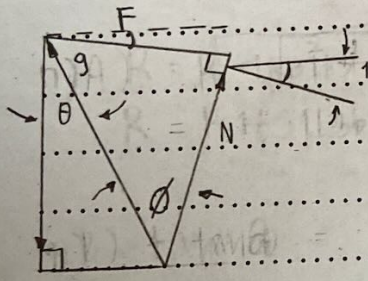
a) The resultant force

b) The angle θ at which the resultant force acts.

c) The friction force (F).

d) The normal force (N).

e) The coefficient of friction (μ).



A) $R = \sqrt{(F_c)^2 + (F_f)^2}$

$= \sqrt{457^2 + 163^2}$

$= 485.198$ N ✻

B) $\tan\theta = \frac{F_f}{F_c} = \frac{163}{457}$

$= 0.3566$

$\tan^{-1} 0.3566 = 21.8$ ✻

C) $21.8 + 9 + 10.8 = 90$

$21.8 + 10.8 - 90 = 9$

$57.4 = 9$ ✻

$\frac{F}{R} = \cos\hat{9} \rightarrow F = 485.198 \cos 57.4$

$F = 300$ ✻

d) $\frac{N}{R} = \sin\hat{9} \rightarrow N = 485.198 \sin 57.4$

$N = 380.56$ ✻

e) $\mu = \frac{F}{N} = \frac{300}{380.56}$

$\mu = 0.788$ ✻