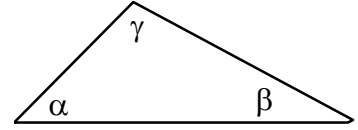


Answers must be clearly legible, simplified and boxed or circled. When possible, write answer as an exact value otherwise use two decimal accuracy. Units required.

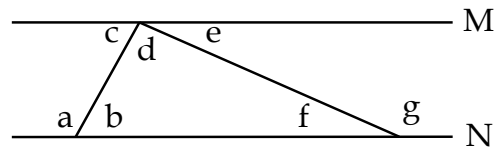
- 1) Find the missing angle in DMS (nearest whole second):
 $\alpha = 48^\circ 23' 48''$
 $\beta = 33^\circ 24' 55''$
 $\gamma =$



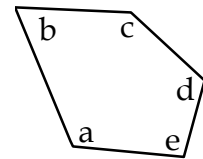
- 2) A ratchet turns a bolt $37^\circ 35'$ with each pull. How many revolutions will occur after 42 pulls? (answer in rev to two decimal places)



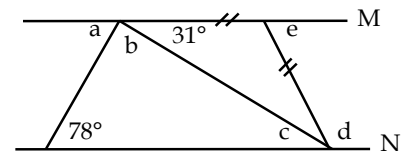
- 3) $M \parallel N$. $a = 112^\circ$. $d = 92^\circ$. Find angle g .



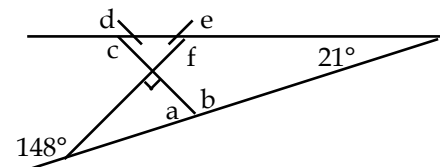
- 4) $a = 124^\circ$, $b = 58^\circ$, $c = 138^\circ$, $d = 113^\circ$. Find angle e .



- 5) $M \parallel N$. Find angle b :

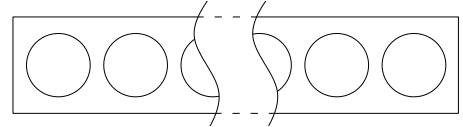


- 6) Find angle c :



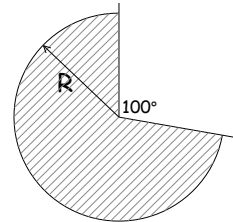
- 7) Convert $\theta = 225^\circ$ to equivalent (a) Azimuth (b) Bearing

- 8) A 26' 10" x 0' 10" beam has 6" holes punched with a 2" border around each hole. (a) How many holes are punched in the beam?



What percentage weight reduction is achieved by punching holes in this beam?

- 9) A farmer's field is irrigated by a pivot irrigation system with $R = 480'$. How many acres are being irrigated?



- 10) Convert 20 rpm to deg/sec.

BONUS

A vehicle with 30" wheels has the wheels rotating at 400 rpm. How fast is the vehicle going on the highway?