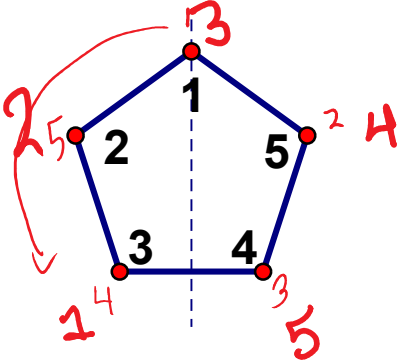


**Things to study: Abstract Algebra**

Dihedral group practice problems answers

Some more dihedral group practice problems. In  $D_5$  let  $r$  be a  $72^\circ$  rotation counter-clockwise. Let  $v$  be the vertical reflection (given the orientation shown).

<p>a. Show the result of <math>r^2v</math></p> <p>Do <math>v</math> first and then rotate twice:</p> 	<p>b. What is the order of <math>r</math>? 5</p> <p>c. What is the order of <math>v</math>? 2</p> <p>d. Given that <math>vr</math> is a reflection, and therefore <math>vr = (vr)^{-1}</math>, find <math>n</math> so that <math>vr = r^n v</math></p> <p>First notice that <math>r^{-1} = r^4</math> because <math>r \circ r^4 = r^5 = e</math>          Also <math>v^{-1} = v</math> because <math>v \circ v = e</math>          So now, <math>(vr)^{-1} = r^{-1}v^{-1} = r^4v</math>          Since <math>vr</math> is a reflection, we know get <math>vr = (vr)^{-1} = r^4v</math></p>
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e. Using the equation you found in d, find  $n$  and  $m$  so that

$$vr^3vr = vr^3r^4v = vr^7v = vr^2v = vrrv = r^4vrv = r^4r^4vv = r^8v^2 = r^5r^3e = r^3$$