Exterior Angle Theorem

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| **Exterior Angle Theorem** |

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| Given:Prove: $m∠ABC=m∠BCD+m∠CDB$ |
| Statements | Reasons |
| $$m∠ABC=m∠BCD+m∠CDB$$ | Ext. $∠$ Thm. |

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| The measure of an exterior angle on a triangle is equal to the added measures of the two remote (far away) interior angles. |

**Fill in the blanks on the proofs below.**

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| 1. |  | 2. |
| Given: $m∠FGH=62˚, m∠GHF=51˚$ Prove: $m∠EFH=113˚$ |  | Given: $m∠FGH=62˚, m∠GHF=51˚$ Prove: $m∠EFH=113˚$ |
| Statements | Reasons |  | Statements | Reasons |
| $$m∠FGH=62˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $m∠FGH=62˚, m∠GHF=51˚,$ $∠EFH \& ∠HFG $are a lin. pair | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠GHF=51˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠FGH+m∠GHF+m∠HFG=180˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠EFH=m∠FGH+m∠GHF$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$62+51+m∠HFG=180˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠EFH=62+51$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$113+m∠HFG=180˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠EFH=113˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠HFG=67˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  |  |  | $$m∠HFG+m∠EFH=180˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  |  |  | $$67˚+m∠EFH=180˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  |  |  | $$m∠EFH=113˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 3. |  | 4. |
| Given: $m∠LMN=50˚, m∠MNL=70˚$ Prove: $m∠KLN=120˚$ |  | Given: : $m∠KLN=120˚, m∠MNL=70˚$ Prove: $m∠LMN=70˚$ |
| Statements | Reasons |  | Statements | Reasons |
| $$m∠KLN=m∠LMN+m∠MNL$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠KLN=120˚, $$$$m∠MNL=70˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠LMN=50˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠KLN=m∠LMN+m∠MNL$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠MNL=70˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$120=m∠LMN+70$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠KLN=50+70$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$50=m∠LMN$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠KLN=120˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠LMN=70˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Write proofs for each of the following. You may use any of the 42 reasons that you now know.**

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| 5. |  | 6. |
| Given: On $△LMN$, $m∠L=\left(5x\right)˚, m∠M=\left(4x\right)˚, $and  $m∠N=72˚$Prove: $x=12$ |  | Given: $ $ On $△ABC \& △PQR, ∠A≅∠P, \& ∠B≅∠Q$Prove: $m∠C=m∠R$ |

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| 7. |  | 8. |
| Given:  Prove: $∠F≅∠H$ |  | Given: $△BDG$ is equiangular. Prove: $m∠G=60˚$ |

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| 9. |  | 10. |
| Given: $m∠K=m∠L, ∠KGH \& ∠LHG$ are \_\_\_\_\_\_\_\_\_\_\_\_\_\_$∠s$ Prove: $△GHK≅△HGL$ |  | Given: $MP=SP \& P$ is the midpoint of $\overbar{NR}$ Prove: $MN=RS$  |