Isosceles Triangle Theorem & its Converse

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| **Isosceles Triangle Theorem** | **Converse of Isosceles Triangle Theorem** |
| SETUP: If 2 **sides** are congruent, RESULT: Then the 2 **opposite angles** are congruent. | SETUP: If 2 **angles** are congruent, RESULT: Then the 2 **opposite sides** are congruent. |
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| Given:  Prove: $∠Z≅∠X$ |
| Statements | Reasons |
| $$\overbar{XY}≅\overbar{YZ}$$ | Given |
| $$∠Z≅∠X$$ | Isosceles Triangle Thm. |

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| Given:  Prove: $\overbar{YZ}≅\overbar{XY}$ |
| Statements | Reasons |
| $$∠X≅∠Z$$ | Given |
| $$\overbar{YZ}≅\overbar{XY}$$ | **Converse** Isosc. $△$Thm. |

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| 1. |  | 2. |
| Given:   Prove: $∠C≅∠B$ |  | Given:   Prove: $\overbar{AC}≅\overbar{BA}$ |
| Statements | Reasons |  | Statements | Reasons |
| $$\overbar{AB}≅\overbar{CA}$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$∠B≅∠C$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$∠C≅∠B$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$\overbar{AC}≅\overbar{BA}$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 3. |  | 4. |
| Given:  Prove: $\overbar{MN}≅\overbar{LM}$ |  | Given:  Prove: $∠N≅∠L$ |
| Statements | Reasons |  | Statements | Reasons |
| $$∠L≅∠N$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$\overbar{LM}≅\overbar{MN}$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$\overbar{MN}≅\overbar{LM}$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$∠N≅∠L$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 5. |  | 6. |
| Given:  Prove: $\overbar{DE}≅\overbar{FD}$ |  | Given:  Prove: $∠D≅∠E$ |
| Statements | Reasons |  | Statements | Reasons |
| $$∠F≅∠E$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$\overbar{EF}≅\overbar{FD}$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$\overbar{DE}≅\overbar{FD}$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$∠D≅∠E$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

Equiangular Triangle 🡪 60˚ Angles

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| **Equiangular Triangle 🡪 60˚ Angles** | **60˚ Angles 🡪 Equiangular Triangle** |
| SETUP: If a triangle is equiangular, RESULT: Then all of the angles are 60˚. | SETUP: If all of the angles are 60˚, RESULT: Then the triangle is equiangular. |
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| Given: $△ABC$ is equiangular Prove: $m∠A=60˚$ |
| Statements | Reasons |
| $△ABC$ is equiangular | Given |
| $$m∠A=60˚$$ | Equiang. $△$ 🡪 60˚ $∠s$ |

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| Given: $On△ABC, m∠A=60˚, m∠B=60˚, m∠C=60˚$ Prove: $△ABC$ is equiangular |
| Statements | Reasons |
| $$m∠A=60˚, m∠B=60˚, $$$$m∠C=60˚$$ | Given |
| $△ABC$ is equiangular | 60˚ $∠s$ 🡪 Equiang. $△$ |

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| 7. |  | 8. |
| Given: $△LMN$ is equiangular Prove: $m∠M=60˚$ |  | Given: $On△LMN, m∠M=60˚, m∠L=60˚, m∠N=60˚$ Prove: $△LMN$ is equiangular |
| Statements | Reasons |  | Statements | Reasons |
| $△LMN$ is equiangular | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠M=60˚, m∠L=60˚, $$$$m∠N=60˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $$m∠M=60˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $△LMN$ is equiangular | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 9. |  | 10. |
| Given: $On△DEF, m∠D=60˚, m∠E=60˚, m∠F=60˚$ Prove: $△DEF$ is equiangular |  | Given: $△DEF$ is equiangular Prove: $m∠F=60˚$ |
| Statements | Reasons |  | Statements | Reasons |
| $$m∠D=60˚, m∠E=60˚, $$$$m∠F=60˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $△DEF$ is equiangular | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| $△DEF$ is equiangular | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | $$m∠F=60˚$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 11. |  | 12. |
| Given: On $△ABC \&△DEF, ∠A≅∠D \& ∠C≅∠F $ Prove: $∠B≅∠E$ |  | Given: $△STV$ is equiangular Prove: $m∠V=60˚$ |
| Statements | Reasons |  | Statements | Reasons |
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| 13. |  | 14. |
| Given: On $△PQR, m∠P=60˚, m∠Q=60˚, m∠R=60˚$ Prove: $△PQR$ is equiangular |  | Given: On $△PQR, m∠Q=m∠R$ Prove: $m∠P+m∠R+m∠R=180˚$ |
| Statements | Reasons |  | Statements | Reasons |
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