Given: Isosceles Trapezoid LOVE

Prove:

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| Statements | Reasons |
| **1. LOVE is an Isosceles Trapezoid** | 1. Given |
| 2. | **2. The legs of an isosceles trapezoid are of equal length** |
| **3.** | 3. Base angles of isosceles trapezoid are congruent |
| 4. EV | **4. Reflexive Property** |
| **5.** | 5. SAS Congruence |
| 6. | **6. CPCTC** |

1) Given: Quadrilateral WISH is a parallelogram

a)

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| Statements | Reasons |
| 1. Quadrilateral WISH is a parallelogram | 1. Given |
| 2. m | 2. Given |
| 3. | 3. Opposite angles of a parallelogram are congruent |
| 4. | 4. Congruent angles have the same angle measure in degrees. |
| 5. | 5. Substitution Property of Equality |
| 6. | 6. Subtraction Property of Equality |
| 7. x = 10 | 7. Symmetric Property of Equality |
| 8. | 8. Substitution Property of Equality |
| 9. **m** | 9. Simplification |

Given: Quadrilateral WISH is a parallelogram

b) If WI = 3y +3 and HS = y + 13, how long is HS?

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| Statements | Reasons |
| 1. Quadrilateral WISH is a parallelogram | 1. Given |
| 2. | 2. Given |
| 3. | 3. Opposite sides of a parallelogram are congruent. |
| 4. | 4. Congruent segments have the same length. |
| 5. | 5. Substitution Property of Equality |
| 6. | 6. Subtraction Property of Equality |
| 7. y = 5 | 7. Division Property of Equality |
| 8. | 8. Substitution Property of Equality |
| 9. **length of HS = 18 units** | 9. Simplification |

Given: Quadrilateral WISH is a rectangle

c) WISH is a rectangle, and its perimeter is 56 cm. One side is 5 cm less than twice the other side. What are its dimensions and how large is its area?

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| Statements | Reasons |
| 1. Quadrilateral WISH is a rectangle | 1. Given |
| 2.  One side of it is 5 cm less than twice the other side. | 2. Given |
| 3. | 3. Defining variables |
| 4. l = 2x – 5 cm; w = x cm | 4. Assigning values to the defined variables |
| 5. | 5. Formula of the perimeter of a rectangle |
| 6. | 6. Substitution Property of Equality |
| 7. 2x – 5 + x = 28 | 7. Division Property of Equality |
| 8. | 8. Simplify the left-hand side of the equation |
| 9. 3x = 33 | 9. Addition Property of Equality |
| 10. x = 11 | 10. Division Property of Equality |
| 11. l = 2(11) – 5 cm; w = 11 cm | 11. Substitution Property of Equality |
| 12. **l = 17 cm; w = 11 cm**  **17 cm x 11 cm – dimension of the rectangle** | 12. Simplify |
| 13. area of a rectangle = l\*w cm2 | 13. Formula of the area of a rectangle |
| 14. area of a rectangle = (17 cm \* 11 cm) | 14. Substitution Property of Equality |
| 15. **area of a rectangle = 187 cm2** | 15. Simplify |

d) What is the **perimeter** and the **area of the largest square** that can be formed from rectangle WISH in 1.c.?

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| Statements | Reasons |
| 1. Quadrilateral WISH is a rectangle | 1. Given |
| 2. | 2. Given |
| 3. | 3. Defining variables |
| 4. l = 2x – 5 cm; w = x cm | 4. Assigning values to the defined variables |
| 5. | 5. Formula of the perimeter of a rectangle |
| 6. | 6. Substitution Property of Equality |
| 7. 2x – 5 + x = 28 | 7. Division Property of Equality |
| 8. | 8. Simplify the left-hand side of the equation |
| 9. 3x = 33 | 9. Addition Property of Equality |
| 10. x = 11 | 10. Division Property of Equality |
| 11. l = 2(11) – 5 cm; w = 11 cm | 11. Substitution Property of Equality |
| 12. l = 17 cm; w = 11 cm | 12. Simplify |
| 13. Let *s* be the side of the largest square that can be formed from rectangle WISH. | 13. Defining a variable |
| 14. Length of s = Length of w | 14. Because if the side s is greater than the shortest side w of the rectangle, the area of the square will go beyond (not within) the area of the rectangle |
| 15. **Length of s = 11 cm** | 15. Transitive Property of Equality |
| 16. Area of Square = (s cm)2 | 16. Formula for the area of the square |
| 17. Area of Square = (11 cm)2 | 17. Substitution Property of Equality |
| 18. **Area of Square = 121 cm2** | 18. Simplify |
| 19. Perimeter of Square = 4s | 19 Formula for the perimeter of square |
| 20. Perimeter of Square = 4(11 cm) | 20. Substitution Property of Equality |
| **21. Perimeter of Square = 44 cm** | 21. Simplify |

Area of Square

Area of Rectangle1

Illustration for no. 14 (This is assuming that the instruction meant that the largest square that can be formed within (from) the rectangle.

\*Area of Rectangle WISH = Area of Square + Area of Rectangle1

2) Given quadrilateral POST is an isosceles trapezoid with OS || PT. ER is its median

a) If OS = 3x – 2, PT = 2x + 10 and ER = 14, how long is each base?

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| Statements | Reasons |
| 1. Quadrilateral POST is an isosceles trapezoid with OS || PT. ER is its median | 1. Given |
| 2. | 2. Given |
| 3. | 3. Theorem 6. The median of a trapezoid is parallel to each base and its length is one half the sum of the lengths of the bases. |
| 4. (3x – 2+2x+10) = 28 | 4. Multiplication Property of Equality |
| 5. | 5. Simplify the left-hand side of the equation |
| 6. | 6. Subtraction Property of Equality |
| 7. x = 4 | 7. Division Property of Equality |
| 8. L  Length of PT = 2(4) + 10 | 8. Substitution Property of Equality |
| **9. Length of OS = 10 units**  **Length of PT = 18 units** | 9. Simplify |

b)

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| Statements | Reasons |
| 1. Quadrilateral POST is an isosceles trapezoid with OS || PT. ER is its median | 1. Given |
| 2. | 2. Given |
| 3. | 3. The angles adjacent to each non-parallel side of an isosceles trapezoid are supplementary |
| 4. | 4. Supplementary angles have their measures add up to 180**°** |
| 5. | 5. Substitution Property of Equality |
| 6. | 6. Simplify the left-hand side of the equation |
| 7. 5x = 185 | 7. Addition Property of Equality |
| 8. x = 37 | 8. Division Property of Equality |
| 9. | 9. Substitution Property of Equality |
| 10. | 10. Simplify |
| 11. | 11. Theorem 7. The base angles of an isosceles trapezoid are congruent |
| 12. | 12. Congruent angles have the same angle measure in degrees. |
| **13.** | 13. Transitive Property of Equality |

c) One base is twice the other and ER is 6 cm long. If its perimeter is 27 cm. How long is each leg?

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| Statements | Reasons |
| 1. Quadrilateral POST is an isosceles trapezoid with OS || PT. ER is its median | 1. Given |
| 2. One base is twice the other and ER is 6 cm long. Its perimeter is 27 cm. | 2. Given |
| 3. Let x be the length of the shorter base (OS) of the trapezoid.  Let 2x be the length of the longer base (PT) of the trapezoid. | 3. Defining variables |
| 4. | 4. Theorem 6. The median of a trapezoid is parallel to each base and its length is one half the sum of the lengths of the bases. |
| 5. | 5. Multiplication Property of Equality |
| 6. | 6. Simplify the left-hand side of the equation |
| 7. x = 4 | 7. Division Property of Equality |
| 8. x = OS = 4 cm; 2x = PT = 2(4) cm | 8. Substitution Property of Equality |
| 9. OS = 4 cm; PT = 8 cm | 9. Simplify |
| 10. | 10. Formula of the isosceles trapezoid |
| 11. | 11. Substitution Property of Equality |
| 12. | 12. Simplify the right-hand side of the equation |
| 13**.** 15 | 13. Subtraction Property of Equality |
| 14. PO ST | 14. Legs of an isosceles trapezoid are congruent |
| 15. length of PO = length of ST | 15. Congruent segments are segments of equal measure |
| 16. 15 cm = PO + PO | 16. Substitution Property of Equality |
| 17. 15 cm = 2(PO) | 17. Simplify the right-hand side of the equation |
| 18. 7.5 cm = PO | 18. Division Property of Equality |
| 19. PO = 7.5 cm | 19. Symmetric Property of Equality |
| **20. Length of PO = Length of ST = 7.5 cm** | 20. Transitive Property of Equality |

d) ER is 8.5 in long and one leg is measure 9 in. What is its perimeter if one of the bases is 3 in more than the other?

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| Statements | Reasons |
| 1. Quadrilateral POST is an isosceles trapezoid with OS || PT. ER is its median | 1. Given |
| 2. ER is 8.5 in long and one leg is measure 9 in. One of the bases is 3 in more than the other. | 2. Given |
| 3. Let x be the length of the shorter base (OS) of the trapezoid.  Let x + 3 be the length of the longer base (PT) of the trapezoid. | 3. Defining variables |
| 4. | 4. Theorem 6. The median of a trapezoid is parallel to each base and its length is one half the sum of the lengths of the bases. |
| 5. | 5. Multiplication Property of Equality |
| 6. 2 | 6. Simplify the left-hand side of the equation |
| 7. 2x = 14 | 7. Subtraction Property of Equality |
| 8. x = 7 | 8. Division Property of Equality |
| 9. x = OS = 7 in; x + 3 = PT = 7 + 3 in | 9. Substitution Property of Equality |
| 10. OS = 7 in; PT = 10 in | 10. Simplify |
| 11. perimeter of an isosceles trapezoid = PO + OS + ST + PT | 11. Formula of the perimeter of an isosceles trapezoid |
| 12. perimeter of an isosceles trapezoid = PO + 7 in + ST + 10 in | 12. Substitution Property of Equality |
| 13**.** perimeter of an isosceles trapezoid = PO + 17 in + ST | 13. Simplify the right-hand side of the equation |
| 14. length of PO = 9 in | 14. It is said in the given that one leg of the isosceles is equal to 9 in Legs of an isosceles trapezoid are congruent |
| 15. PO ST | 15. Legs of an isosceles trapezoid are congruent |
| 16. length of PO = length of ST | 16. Congruent segments are segments of equal measure |
| 17. perimeter of an isosceles trapezoid = 9 in + 17 in + 9 in | 17. Substitution Property of Equality |
| **18. perimeter of an isosceles trapezoid = 35 in** | 18. Simplify |

3. Given: Quadrilateral LIKE is a kite with LI = IK and LE = KE.

a) LE is twice LI. If its perimeter is 21 cm, how long is LE?

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| Statements | Reasons |
| 1. Quadrilateral LIKE is a kite with LI = IK and LE = KE. | 1. Given |
| 2. LE is twice LI. Its perimeter is 21 cm. | 2. Given |
| 3. Perimeter of the kite = LI + IK + LE + KE | 3. Formula of the perimeter of a kite |
| 4. 21 = LI + LI + LE + LE | 4. Substitution Property of Equality |
| 5. 21 = 2LI + 2LE | 5. Simplify the right-hand side of the equation |
| 6. 21 = 2LI + 2(2LI) | 6. Substitution Property of Equality |
| 7. 21 = 6LI | 7. Simplify the right-hand side of the equation |
| 8. 3.5 = LI | 8. Division Property of Equality |
| 9. LI = 3.5 cm | 9. Symmetric Property of Equality |
| 10. LE = 2(3.5) | 10. Substitution Property of Equality |
| **11. LE = 7 cm** | 11. Simplify |

b) What is its area if one of the diagonals is 4 more than the other and IE + LK = 16 in?

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| Statements | Reasons |
| 1. Quadrilateral LIKE is a kite with one of the diagonals is 4 more than the other and IE + LK = 16 in | 1. Given |
| 2. Let x be the length of LK; Let x + 4 be the length of IE | 2. Defining variables |
| 3. x + x + 4 = 16 | 3. Substitution Property of Equality |
| 4. 2x + 4 = 16 | 4. Simplify the left-hand side of the equation |
| 5. 2x = 12 | 5. Subtraction Property of Equality |
| 6. x = 6 | 6. Division Property of Equality |
| 8. LK = 6 in; IE = 6 + 4 in | 8. Substitution Property of Equality |
| 9. LK = 6; IE = 10 in | 9. Simplify |
| 10. area of the kite = | 10. Theorem 11. The area of a kite is half the product of the lengths of its diagonals. |
| 11. area of the kite = | 11. Substitution Property of Equality |
| **12. area of the kite = 30 in2** | 12. Simplify |

c) IE = (x-1) ft. and LK = (x + 2) ft. If its area is 44 ft, how long are IE and LK?

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| Statements | Reasons |
| 1. Quadrilateral LIKE is a kite with IE = (x-1) ft. and LK = (x + 2) ft. Its area is 44 ft. | 1. Given |
| 2. area of the kite = | 2. Theorem 11. The area of a kite is half the product of the lengths of its diagonals. |
| 3. 44 = | 3. Substitution Property of Equality |
| 4. 88 = ((x-1)(x+2)) | 4. Multiplication Property of Equality |
| 5. 88 = (x2+x-2) | 5. Simplify the right-hand side of the equation |
| 6. 0 = x2+x-90 | 6. Subtraction Property of Equality |
| 7. 0 = (x-9)(x+10) | 7. Factor out |
| 9. 0 = x-9; 0 = x+10 | 9. Zero Product Property |
| 10. x – 9 = 0 | 10. Symmetric Property of Equality |
| 11. x = 9 | 11. Addition Property of Equality |
| 12. x + 10 = 0 | 12. Symmetric Property of Equality |
| 13. x = -10 | 13. Subtraction Property of Equality |
| 14. x = 9 | 14. The value of x must be 9 since a quadrilateral can’t have a negative length |
| 15. IE = 9 – 1 ft.; LK = 9 +2 ft. | 15. Substitution |
| **16. IE = 8 ft.; LK = 11 ft.** | 16. Simplify |