Geometry/Trig Name: Answer Key

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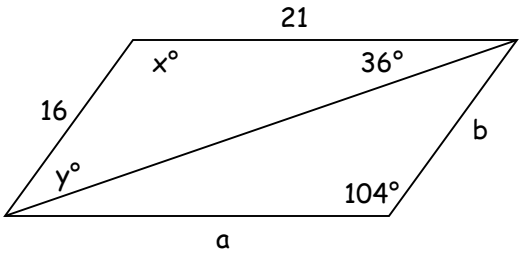
For each problem (1-4) a and b are segment lengths; x and y are angle measures.

1. Figure is a Parallelogram



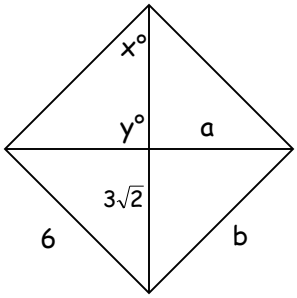
a = 21

b = 16

x = 104

y = 40

2. Figure is a Square



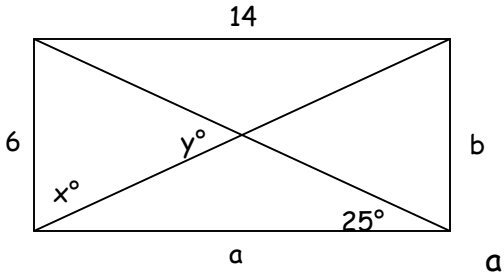
a = $3\sqrt{2}$

b = 6

x = 45

y = 90

3. Figure is a Rectangle



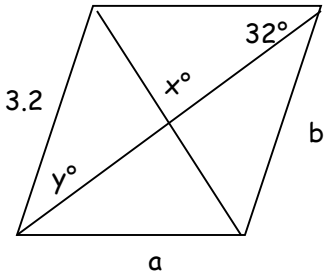
a = 14

b = 6

x = 65

y = 50

4. Figure is a Rhombus



a = 3.2

b = 3.2

x = 90

y = 32

5. TR + TR = RN

2x + 2x = 5x – 9

4x = 5x – 9

-x = -9

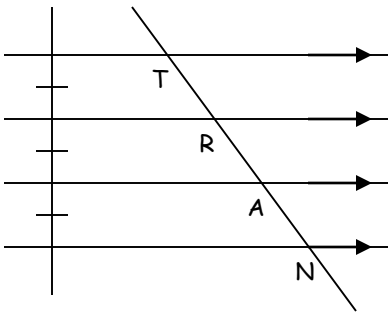
x = 9

6. TA = RN

4x + 9 = 9x + 6

3 = 5x

x = 3/5

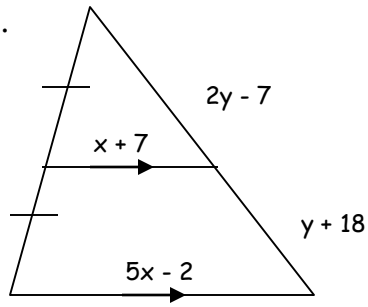


5. If TR = 2x and RN = 5x - 9, then x = 9.

6. If TA = 4x + 9 and RN = 9x + 6, then x = 3/5.

7. If TA = 16, then TN = 24. (Each piece is 8).

8.



2y – 7 = y + 18

y = 25

x + 7 + x + 7 = 5x – 2

2x + 14 = 5x – 2

16 = 3x

x = 16/3

x = 16/3

y = 25

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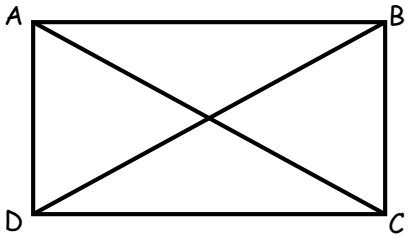
1.



ABCD is a rectangle

$AC = x^2$

$BD = x + 72$

$x^2 = x + 72$

$x^2 - x - 72 = 0$

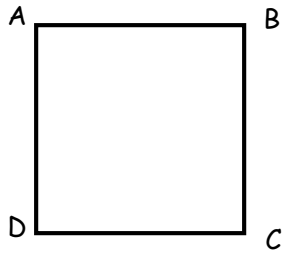
$(x - 9)(x + 8) = 0$

$x = 9, x = -8$

$x = 9$

$x = -8$

2.



ABCD is a square

$m\angle DAB = 4x + 4y$

$m\angle ADC = 8x - 4y$

$4x + 4y = 90$

$8x - 4y = 90$

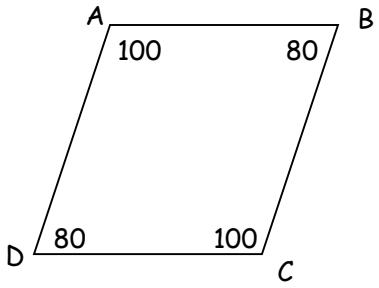
$12x = 180$ $\quad x = 15$

$4(15) + 4y = 90$

$4y = 30$ $\quad x = 15$

$y = 7.5$ $\quad y = 7.5$

3.



ABCD is a rhombus

$m\angle DAB = 15y - 35$

$m\angle DCB = 20x$

$m\angle ADC = 80$

$15y - 35 = 100$

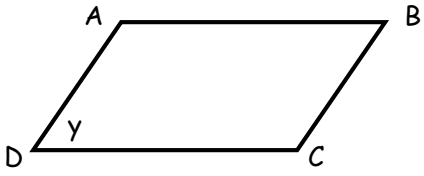
$15y = 135$

$y = 9$

$20x = 100$ $\quad x = 5$

$x = 5$ $\quad y = 9$

4.



ABCD is a parallelogram

$m\angle A = 5x + 9$

$m\angle B = 7x + 3$

$5x + 9 + 7x + 3 = 180$

$12x + 12 = 180$

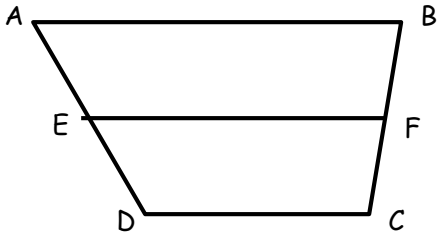
$12x = 168$

$x = 14$

$x = 14$

$y = 101$

5.



ABCD is a trapezoid; EF is the median

$AE = 5x - 7$ $\quad BF = y^2$

$AD = 6x + 2$ $\quad FC = -y + 6$

$AE + AE = AD$

$5x - 7 + 5x - 7 = 6x + 2$

$10x - 14 = 6x + 2$

$4x = 16$

$x = 4$

$y^2 = -y + 6$

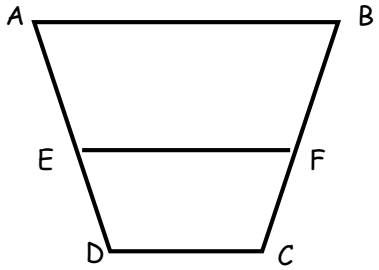
$y^2 + y - 6 = 0$

$(y + 3)(y - 2) = 0$ $\quad x = 4$

$y + 3 = 0;\ y = -3$ $\quad y = -3$

$y - 2 = 0;\ y = 2$ $\quad y = 2$

6.



ABCD is an isosceles trapezoid

EF is the median

$AB = 8x - 2$

$EF = 3x + 7$

$DC = 3x + 6$

$$\frac{AB + DC}{2} = EF$$

$$\frac{8x - 2 + 3x + 6}{2} = 3x + 7$$

$$11x + 4 = 6x + 14$$

$$5x = 10$$

$$x = 2$$

$x = 2$

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Property	Parallelogram	Rectangle	Rhombus	Square
All angles are right angles		x		x
Both Pairs of Opposite sides are parallel	x	x	x	x
All sides are congruent			x	x
Both Pairs of Opposite angles are congruent	x	x	x	x
Diagonals bisect interior angles of quadrilateral			x	x
Diagonals are perpendicular			x	x
Diagonals are congruent		x		x
Diagonals bisect one another	x	x	x	x
Both Pairs of Opposite sides are congruent	x	x	x	x

True and False

False 1. All quadrilaterals are parallelograms.

True 2. All parallelograms are quadrilaterals.

True 3. All squares are rhombi.

True 4. All rectangles are parallelograms.

False 5. If a parallelogram has $\perp$ diagonals and four congruent sides it must be a square.

False 6. If diagonals of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

False 7. An isosceles trapezoid has two congruent bases.

True 8. If diagonals of a quadrilateral bisect one another, then the quadrilateral is a parallelogram.

False 9. All trapezoids are parallelograms.

False 10. All parallelograms are rectangles.

True 11. If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

True 12. All trapezoids are quadrilaterals.

False 13. If one pair of opposite sides in a quadrilateral are parallel, then the quadrilateral is a parallelogram.

False 14. All rhombi are squares.

True 15. The sum of the interior angles of a trapezoid is 360.

True 16. A square has congruent diagonals.

False 17. A trapezoid can have four congruent sides.

False 18. The diagonals of a rhombus are always congruent.

True 19. If one pair of opposite sides in a quadrilateral are parallel and congruent, then the quadrilateral is a parallelogram.

False 20. All rectangles have perpendicular diagonals.

True 21. Diagonals of a rhombus bisect one another.

True 22. An isosceles trapezoid has congruent legs.

True 23. A trapezoid can have no congruent sides.

False 24. The legs of a trapezoid are parallel.

False 25. If two lines have equal slopes, then the lines are perpendicular.

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Complete the blank with the word always, sometimes or never.

1. A square is ALWAYS a rhombus.
2. The diagonals of a parallelogram ALWAYS bisect one another.
3. A parallelogram with four congruent sides is SOMETIMES a rectangle.
4. The diagonals of a rhombus are SOMETIMES congruent.
5. A rectangle ALWAYS has opposite sides that are congruent.
6. A parallelogram SOMETIMES has perpendicular diagonals.
7. A rectangle is SOMETIMES a square.
8. A square is ALWAYS a rectangle.
9. A parallelogram ALWAYS has opposite congruent angles.
10. A rhombus is SOMETIMES a rectangle.
11. A rhombus ALWAYS has perpendicular diagonals.
12. A trapezoid is NEVER a parallelogram.
13. A rectangle ALWAYS has congruent diagonals.
14. A square ALWAYS has four congruent sides.
15. A parallelogram SOMETIMES congruent diagonals.
16. A parallelogram is SOMETIMES a square.
17. A rectangle SOMETIMES has perpendicular diagonals.
18. A rectangle is SOMETIMES a rhombus.
19. A trapezoid NEVER has two pairs of opposite parallel sides.
20. A square is ALWAYS a rhombus.
21. A rhombus is SOMETIMES a square.
22. A rhombus SOMETIMES has four right angles.
23. A parallelogram with congruent diagonals and four right angles is ALWAYS a rectangle.
24. Opposite sides of a parallelogram are ALWAYS congruent.
25. The legs of a trapezoid are SOMETIMES congruent.
26. A rhombus SOMETIMES has four congruent angles.
27. A parallelogram has interior angles that ALWAYS add up to 360°.
28. A square is NEVER a trapezoid.
29. The bases of a trapezoid are ALWAYS parallel.
30. A trapezoid is NEVER a rhombus.
31. A rhombus SOMETIMES has congruent diagonals.
32. A square is ALWAYS a parallelogram.
33. The legs of a trapezoid are NEVER parallel.
34. The bases of a trapezoid are NEVER congruent.

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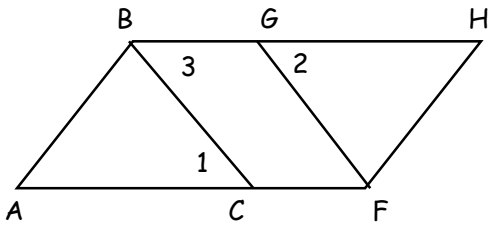
Given: BGCF is a parallelogram; $AC \cong GH$

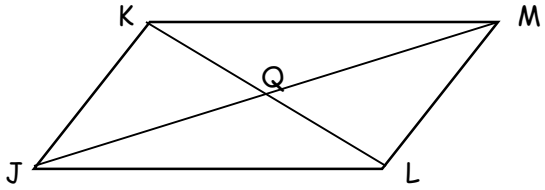
Prove: $\angle A \cong \angle H$



Statements	Reasons
1. BGCF is a parallelogram	1. Given
2. $BC \cong GF$	2. Opposite sides of a parallelogram are congruent.
3. $BC \parallel GF$; $BG \parallel CF$	3. Definition of a Parallelogram
4. $\angle 1 \cong \angle 3$	4. If two parallel lines are cut by a transversal, then alternate interior angles are congruent.
5. $\angle 3 \cong \angle 2$	5. If two parallel lines are cut by a transversal, then corresponding angles are congruent.
6. $\angle 1 \cong \angle 2$	6. Substitution
7. $AC \cong GH$	7. Given
8. $\Delta BAC \cong \Delta FHG$	8. SAS
9. $\angle A \cong \angle H$	9. CPCTC

Given: $\Delta KQJ \cong \Delta LQM$

Prove: KMLJ is a parallelogram



Statements	Reasons
1. $\Delta KQJ \cong \Delta LQM$	1. Given
2. $\angle JKQ \cong \angle MLQ$	2. CPCTC
3. $KJ \parallel LM$	3. If two lines are cut by a transversal and alternate interior angles are congruent, then the lines are parallel.
4. $KJ \cong LM$	4. CPCTC
5. KMLJ is a parallelogram	5. If one pair of opposite sides of a quadrilateral are both parallel and congruent, then the quadrilateral is a parallelogram.

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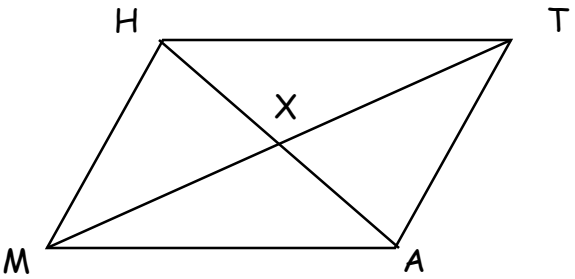


1. MA ≅ TH and MH ≅ AT: If both pairs of opposite sides are congruent, then the quadrilateral is a parallelogram.

2. MA // TH and MA ≅ TH: If one pair of opposite sides are both congruent and parallel, then the quadrilateral is a parallelogram.

3. TX ≅ XM and AX ≅ HX: If the diagonals bisect one another, then the quadrilateral is a parallelogram.

4. HM ≅ AT and HT // MA: NO

5. ∠MAT ≅ ∠MHT and ∠HMA ≅ ∠HTA: If both pairs of opposite angles are congruent, then the quadrilateral is a parallelogram.

6. ∠MXH ≅ ∠TXA and ∠HMA ≅ ∠HTA: NO

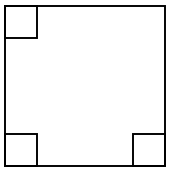
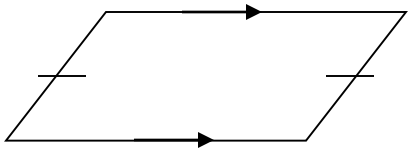
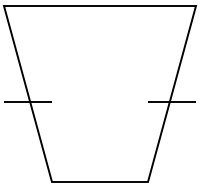
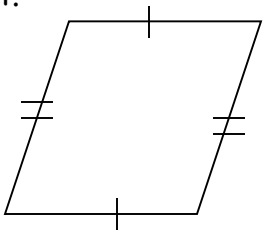
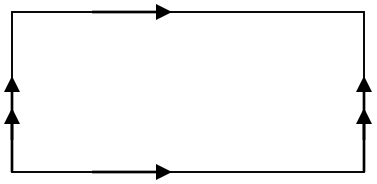
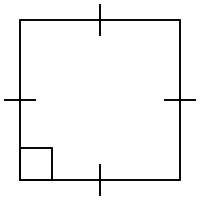
7. X is the midpoint of MT and HA: If the diagonals bisect one another, then the quadrilateral is a parallelogram.

8. ∠MHA ≅ ∠HAT and ∠THA ≅ ∠MAH: Because the pairs of alternate interior angles are congruent, you can conclude that the opposite sides are parallel – then: If both pairs of opposite sides of a quadrilateral are parallel, then the quadrilateral is a parallelogram. (OR Definition of a Parallelogram)

9. HA ≅ MT: NO

10. ∠MHA ≅ ∠HAT and HT // MA Definition of a Parallelogram (Similar to #8)

Classify each figure as specifically as you can based on the markings in the diagram.

1.  Rectangle	2.  Isosceles Trapezoid	3.  Quadrilateral
4.  Parallelogram	5.  Parallelogram	6.  Square