

Geometry -
Special Parallelograms Practice

Name: Key
Date: _____ Period: _____

For 1-8, complete the following charts by putting checks in the boxes that are true.

	4 Sides	Opp. Sides	Opp. Sides \cong	All Sides \cong	Opp. Angles \cong	All Angles \cong
1. Parallelogram	✓	✓	✓		✓	
2. Rectangle	✓	✓	✓		✓	✓
3. Rhombus	✓	✓	✓	✓	✓	
4. Square	✓	✓	✓	✓	✓	✓

The diagonals ...	bisect each other	are congruent	bisect opposite angles	are perpendicular
5. Parallelogram	✓			
6. Rectangle	✓	✓		
7. Rhombus	✓		✓	✓
8. Square	✓	✓	✓	✓

For 9-17, determine if the statement is true or false.

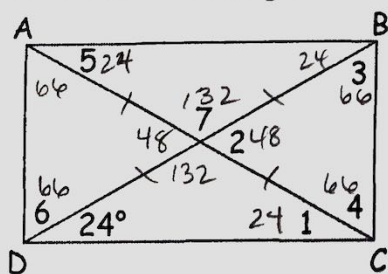
sometimes \downarrow always \uparrow

- F 9. All quadrilaterals are parallelograms.
T 10. All parallelograms are quadrilaterals.
T 11. A square is a parallelogram.
F 12. A parallelogram with a right angle is a square. - could be a rectangle
T 13. All rectangles are parallelograms.
F 14. All rhombuses are squares.
T 15. All squares are rectangles.
F 16. A parallelogram with four congruent sides is a square. \square could be a rhombus
F 17. A parallelogram with perpendicular diagonals is a square. could be a rhombus

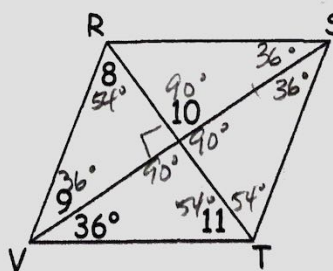
For 18-21, find the measure of the numbered angles in the figures.

- $m\angle 1 = 24^\circ$
 $m\angle 2 = 48^\circ$
 $m\angle 3 = 66^\circ$
 $m\angle 4 = 66^\circ$
 $m\angle 5 = 24^\circ$
 $m\angle 6 = 66^\circ$
 $m\angle 7 = 132^\circ$
 $m\angle 8 = 54^\circ$
 $m\angle 9 = 36^\circ$
 $m\angle 10 = 90^\circ$
 $m\angle 11 = 54^\circ$
 $m\angle 12 = 45^\circ$

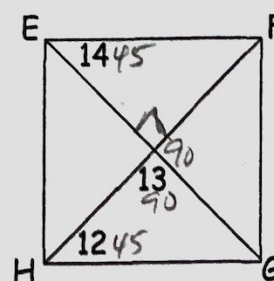
18. ABCD is rectangle



19. RSTV is a rhombus

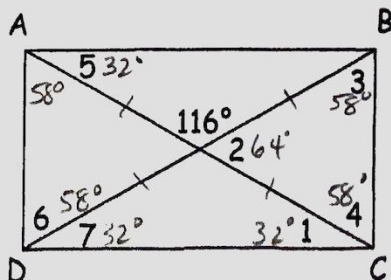


20. EFGH is a square



#30 $m\angle 13 = 90^\circ$
 $m\angle 14 = 45^\circ$

21. ABCD is a rectangle



$180 - 64 = 116$
 $\frac{116}{2} = 58^\circ$

- $m\angle 1 = 32^\circ$
 $m\angle 2 = 64^\circ$
 $m\angle 3 = 58^\circ$
 $m\angle 4 = 58^\circ$
 $m\angle 5 = 32^\circ$
 $m\angle 6 = 58^\circ$
 $m\angle 7 = 32^\circ$

For 22-23, for the following parallelograms, (a) choose the best name, (b) find the value of each variable.

39 22. **No right angle markings*

Use Pythagorean Theorem

$$8^2 + x^2 = 17^2$$

$$64 + x^2 = 289$$

$$x^2 = 225$$

$$x = 15$$

name: Rhombus

23.

Use Pythagorean Theorem

$$7^2 + 24^2 = C^2$$

$$49 + 576 = C^2$$

$$625 = C^2$$

$$25 = C$$

$$\frac{25}{2} = 12.5$$

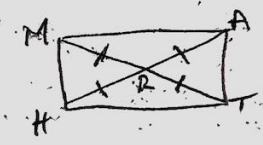
name: Rectangle

x = 15 y = 15 z = 17

x = 12.5 y = 12.5 z = 25

24. In quadrilateral MATH, \overline{MT} and \overline{AH} bisect each other at R and $\overline{MR} \cong \overline{HR}$. MATH must be a

- I. parallelogram
- II. rectangle
- III. square



- A. I only B. II only C. I and II D. II and III E. I, II and III

25. Cindy is making the design shown below with silver wire. It consists of a rectangle and its two diagonals. How much wire does she need to make this design?

$$9^2 + 40^2 = C^2$$

$$81 + 1600 = C^2$$

$$1681 = C^2$$

$$41 = C$$

$$9 + 9 + 40 + 40 + 41 + 41 = 180 \text{ in}$$

Classify each of the following statements as always, sometimes, or never true.

Always 26. Opposite sides of a square are congruent.

Sometimes 27. Diagonals of a rectangle are perpendicular. -when a rectangle is a square

Sometimes 28. A parallelogram is a rectangle.

Always 29. A square is a rhombus.

Sometimes 30. A rhombus is a square.

Always 31. Diagonals of a rhombus bisect opposite angles.

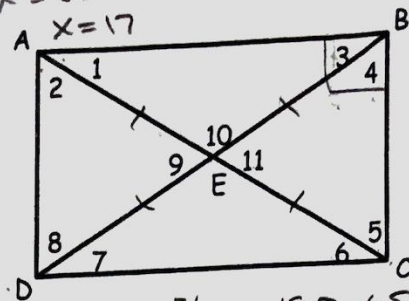
$$32. 2x + 7 + 3x - 2 = 90$$

$$5x + 5 = 90$$

$$5x = 85$$

$$x = 17$$

Complete the following using rectangle ABCD.



32. If $m\angle 3 = 2x + 7$ and $m\angle 4 = 3x - 2$, then $x = 17$.

33. $m\angle ABC = 90^\circ$

34. If $m\angle 7 = 54^\circ$, then $m\angle 6 = 54^\circ$.

35. If $AC = 15$, then $BD = 15$.

36. If $m\angle 11 = 65^\circ$, then $m\angle 5 = 57.5$.

37. If $AB = 2x - 5$, $BC = 12$, and $DC = 17$, then $x = 11$.

38. If $AE = 18$ and $DE = 3x + 6$, then $x = 4$.

39. If $m\angle 3 = 34^\circ$, then $m\angle 6 = 34^\circ$.

40. If $m\angle 2 = 63^\circ$, then $m\angle 1 = 27^\circ$.

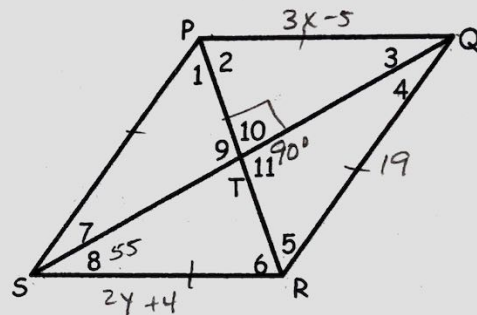
$\rightarrow 90 - 63 = 27$

36. $180 - 65 = 115$
 $\frac{115}{2} = 57.5$

37. $2x - 5 = 17$
 $2x = 22$
 $x = 11$

38. $3x + 6 = 18$
 $3x = 12$
 $x = 4$

Complete the following using rhombus PQRS.



41. If $m\angle QSR = 55^\circ$, then $m\angle PQR = 110^\circ$.

42. $m\angle 11 = 90^\circ$.

43. If $PT = 24$, then $PR = 48$.

44. If $m\angle 1 = 30^\circ$, then $m\angle QPS = 60^\circ$.

45. If $m\angle 4 = 23^\circ$, then $m\angle 5 = 67^\circ$. $90 - 23 =$

46. If $PQ = 3x - 5$, $QR = 19$, and $SR = 2y + 4$, then $x = 8$ and $y = 7.5$.

$3x - 5 = 19$
 $3x = 24$
 $x = 8$
 $2y + 4 = 19$
 $2y = 15$
 $y = 7.5$

Complete the following using the square MATH.

47. $m\angle 6 = 45^\circ$.

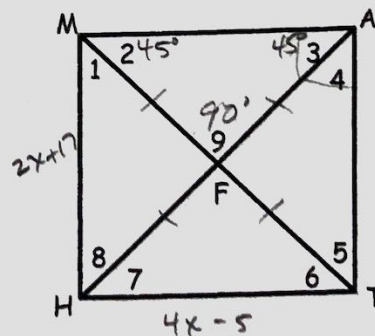
48. $m\angle 9 = 90^\circ$.

49. If $TH = 4x - 5$ and $MH = 2x + 17$, then $MA = 39$.

50. If $MT = 18$, then $AF = 9$.

51. $m\angle MAT = 90^\circ$.

49. $2x + 17 = 4x - 5$
 $22 = 2x$
 $11 = x$
 $2(11) + 17 =$



Find the measure of each of the following using parallelogram ABCD.

52. $x = 12$

56. $r = 50^\circ$

53. $y = 8$

57. $s = 60^\circ$

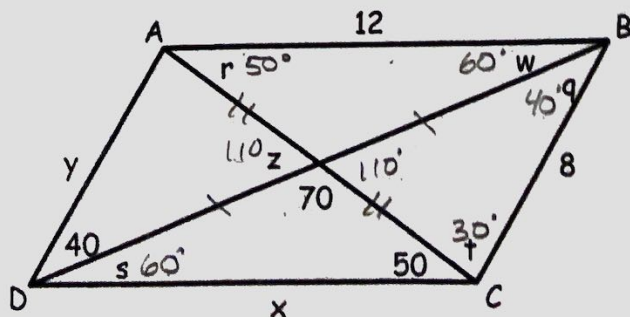
54. $z = 110^\circ$

58. $t = 30^\circ$

55. $q = 40^\circ$

59. $w = 60^\circ$

* Use Alternate interior \angle 's

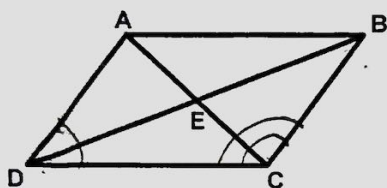


Geometry Parallelogram

Date Kay

<p>Parallelogram Properties</p> <ol style="list-style-type: none"> Opposite sides are parallel. Opposite sides are congruent. Opposite angles are congruent. Consecutive angles are supplementary. Diagonals bisect each other. 	<p>Rectangle Properties</p> <ol style="list-style-type: none"> Rectangles have all properties of parallelograms. All angles are right angles. Diagonals are congruent. Diagonals form isosceles triangles.
<p>Rhombus Properties</p> <ol style="list-style-type: none"> Rhombi have all properties of parallelograms. All sides are congruent. Diagonals are perpendicular. Each diagonal bisects a pair of opposite angles. 	<p>Square Properties</p> <ol style="list-style-type: none"> Squares have all properties of parallelograms. Squares have all properties of rectangles. Squares have all properties of rhombi.

Justify each statement using a postulate, theorem or property for parallelogram ABCD.

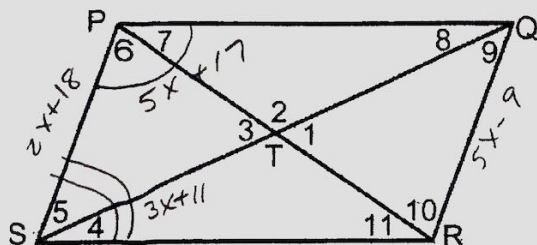


- $\overline{AD} \parallel \overline{BC}$ opposite sides are parallel
- $\overline{DE} \cong \overline{EB}$ diagonals bisect each other
- $m\angle ADC + m\angle DCB = 180^\circ$ consecutive angles are supplementary

Check the quadrilateral(s) for which the property applies.

	Parallelogram	Rectangle	Rhombus	Square
4. Diagonals are congruent.		✓		✓
5. Opposite angles are congruent.	✓	✓	✓	✓
6. Diagonals are perpendicular.			✓	✓
7. All angles are right.		✓		✓
8. Diagonals bisect each other.	✓	✓	✓	✓
9. All sides are congruent.			✓	✓

Given that PQRS is a **parallelogram**, complete the following.



- $m\angle 6 = 68^\circ, m\angle 7 = 45^\circ, m\angle 10 = \underline{68^\circ}$ Alternate Int \angle 's
- If $m\angle 1 = 85^\circ$ and $m\angle 6 = 52^\circ$, then $m\angle 9 = \underline{43^\circ}$
- If $PS = 2x + 18$ and $QR = 5x - 9$, then $x = \underline{9}$
- If $m\angle SPQ = 5x + 17$ and $m\angle PSR = 3x + 11$, then $x = \underline{19}$
- $PT = 24$ and $PR = 2x - 10$, then $x = \underline{29}$

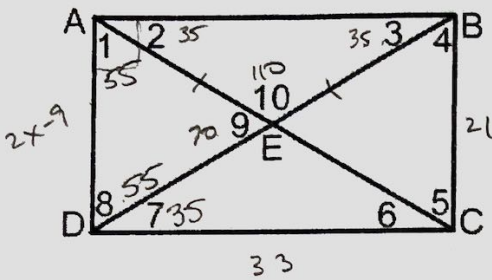
1. $180 - 85 - 52 = 43$

2. $2x + 18 = 5x - 9$
 $27 = 3x$
 $9 = x$

13. $5x + 17 + 3x + 11 = 180$
 $8x + 28 = 180$
 $8x = 152$
 $x = 19$

14. $2(24) = 2x - 10$
 $48 = 2x - 10$
 $58 = 2x$
 $29 = x$

Use **rectangle** ABCD to complete the following.



15. If $AC = 52$, then $BE = \underline{26}$.

16. If $m\angle 3 = 35^\circ$, then $m\angle 9 = \underline{70^\circ}$.

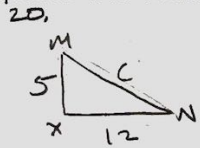
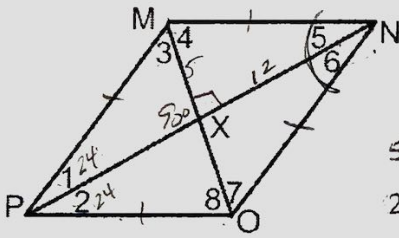
17. If $AD = 2x - 9$, $BC = 21$ and $DC = 33$, then $x = \underline{15}$.

18. $m\angle 1 = 3x + 11$ and $m\angle 2 = 2x + 14$, then $x = \underline{13}$.

17. $2x - 9 = 21$
 $2x = 30$
 $x = 15$

18. $3x + 11 + 2x + 14 = 90$
 $5x + 25 = 90$
 $5x = 65$
 $x = 13$

Use **rhombus** MNOP to complete the following.



$5^2 + 12^2 = c^2$
 $25 + 144 = c^2$
 $169 = c^2$
 $c = 13$

19. If $m\angle 1 = 24^\circ$, then $m\angle MNO = \underline{48^\circ}$.

20. If $MO = 10$ and $PN = 24$, then $MN = \underline{13}$.

21. If $m\angle 5 = 25^\circ$, then $m\angle 4 = \underline{65^\circ}$.

$180 - 90 - 25 = 65^\circ$

22. If $MN = 5x - 23$ and $NO = 2x + 10$, then what is the length of MP ? 32

22. $5x - 23 = 2x + 10$

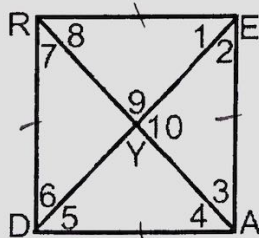
$3x = 33$

$x = 11$

$\rightarrow 5(11) - 23 = 32$

$\rightarrow 2(11) + 10 = 32$

If READ is a **square**, then complete the following.



23. If $m\angle 10 = 4x - 6$, then $x = \underline{24}$.

24. $m\angle 2 = \underline{45^\circ}$.

25. If $RA = 3x - 11$ and $EY = 20$, then $x = \underline{17}$.

23. $4x - 6 = 90$
 $4x = 96$
 $x = 24$

25. $2(20) = 3x - 11$
 $40 = 3x - 11$
 $51 = 3x$
 $17 = x$