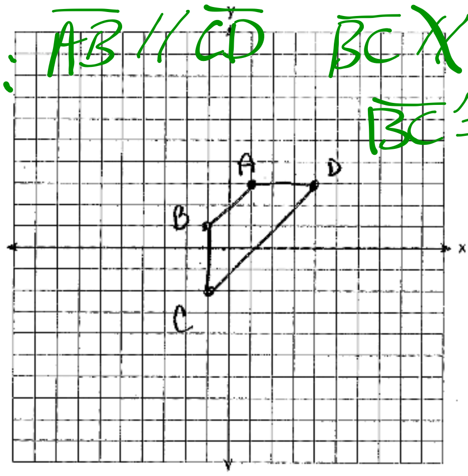
Name: ______________________________ Geometry

HW 11-11: Proving a Quadrilateral is a Trapezoid

1. Given quadrilateral ABCD with A(1, 3) B(-1, 1) C(-1, -2) D(4, 3)

Show: $\overline{AB} \parallel \overline{CD}$ $\overline{BC} \nparallel \overline{AD}$ $\overline{BC} \cong \overline{AD}$

Prove quadrilateral ABCD is an isosceles trapezoid



m of $\overline{AB} = \frac{2}{2} = 1$

m of $\overline{AD} = 0$

m of $\overline{BC}$ = undefined

m of $\overline{CD} = \frac{5}{5} = 1$

$BC = 3$

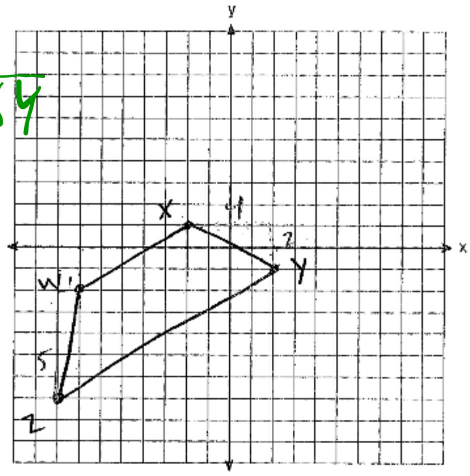
$AD = 3$

ABCD is an isosceles trapezoid since it has 1 pair ∥ 1 pair ∦ and the non-parallel sides are ≅

2. Given quadrilateral WXYZ with W(-7, -2) ~~X(-2, 1) Y(2, -1)~~ Z(-8, -7)

Show $\overline{WX} \parallel \overline{ZY}$, $\overline{WZ} \nparallel \overline{XY}$

Prove quadrilateral WXYZ is a trapezoid



m of $\overline{WX} = 3/5$ } ∥

m of $\overline{ZY} = 6/10 = 3/5$

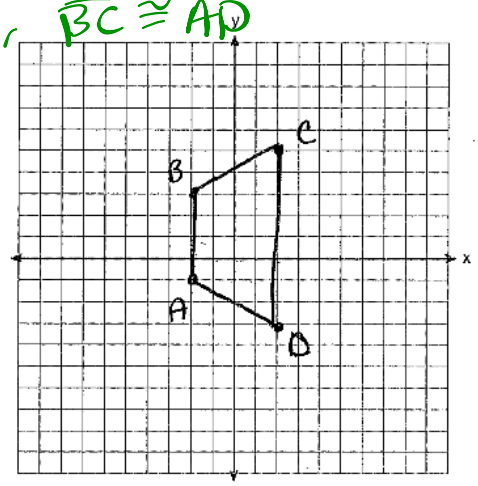
m of $\overline{WZ} = 5/1$ } ∦

m of $\overline{XY} = -\frac{2}{4} = -\frac{1}{2}$

Since quad WXYZ has one pair of opp sides ∥ and one pair opp. sides ∦, it is a trapezoid

3. The vertices of trapezoid ABCD are A(-2,-1), B(-2,3), C(2,5), and D(2,-3). Prove that ABCD is an isosceles trapezoid.

Show: $\overline{AB} \parallel \overline{CD}$, $\overline{BC} \nparallel \overline{AD}$, $\overline{BC} \cong \overline{AD}$



m of $\overline{AB}$ = undefined
m of $\overline{CD}$ = undefined $\}$ $\parallel$

m of $\overline{BC} = \frac{2}{4} = \frac{1}{2}$
m of $\overline{AD} = \frac{-2}{4} = -\frac{1}{2}$ $\}$ $\nparallel$

Since ABCD has one pair of opp. sides $\parallel$ and one pair of opp sides $\nparallel$ and the non-parallel sides are $\cong$, ABCD is an isosceles trapezoid.

AD:
$2^2 + 4^2 = c^2$
$4 + 16 = c^2$
$20 = c^2$
$AD = \sqrt{20} = 2\sqrt{5}$
$BC = 2\sqrt{5}$ $\}$ $\cong$

Test Tomorrow!

Skip #'s 14,17,21,25,30,31,34,37

Do them only after you've finished the rest of the review for more practice!

Proof: prove 2 $\triangle$'s $\cong$
use cpctc
then <u>something</u> $\rightarrow$ ▱

For 1 - 15, write the letter of the correct choice on the answer blank.

__D__ 1. Which of the following properties is ***never*** true for all parallelograms?

A) ~~Opposite sides are ≅~~

B) ~~Opposite ∠s are ≅~~

C) ~~Consecutive ∠s are supplementary~~

D) Diagonals are ≅

__D__ 2. Which of the following statements about a parallelogram is ***sometimes*** true?

A) Opposite sides are ≅ A

B) Opposite ∠s are ≅ n

A ~~C) Consecutive~~ ∠s are supplementary

D) Diagonals are ⊥

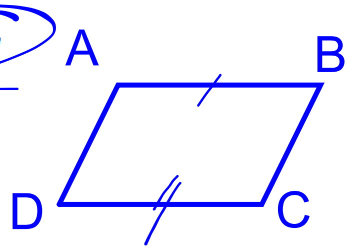
__C__ 3. Which one of the following statements is ***never*** true for any given parallelogram ABCD?

A) ~~$\overline{AB} \cong \overline{DC}$~~

B) ~~$\angle B + \angle C = 180^\circ$~~

C) $\overline{AB} \perp \overline{DC}$

D) ~~$\angle A \cong \angle C$~~

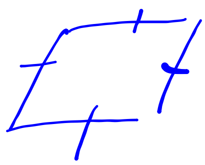


D 4. In which one of the following quadrilaterals are the diagonals ***always*** perpendicular?
A) rectangle B) trapezoid C) parallelogram D) square

Rhombus

B 5. Which one of the following quadrilaterals has only one pair of parallel sides?
~~A) rectangle~~ B) trapezoid C) parallelogram ~~D) rhombus~~

D 6. A quadrilateral with four congruent sides and an angle measuring 60° ***must*** ~~***be a***~~
A) rectangle B) trapezoid C) square D) rhombus



C 7. Which one of the following figures ***sometimes*** has congruent diagonals?

A) ~~isosceles trapezoid~~ B) ~~rectangle~~ C) rhombus D) ~~square~~

A A A

A 8. If the diagonals of a parallelogram are perpendicular and not congruent, then the parallelogram is a(n)

A) rhombus B) ~~isosceles trapezoid~~ C) ~~square~~ D) ~~rectangle~~

C 9. Which of the following polygons is not a quadrilateral?

A) trapezoid B) square C) hexagon D) rectangle

4 4 6 4

C ______ 10. Which one of the following statements is ***always*** true?

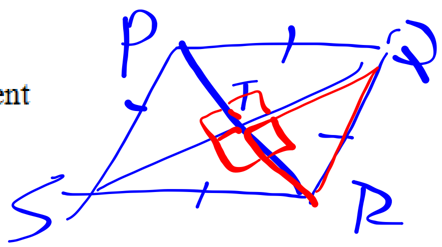
A) ~~A trapezoid is a parallelogram.~~
B) ~~A rhombus is a square.~~
C) A rectangle is a parallelogram.
D) ~~A quadrilateral is a trapezoid.~~

C ______ 11. Which one of the following statements is ***always*** true?

A) ~~Rectangles are squares.~~ S
B) ~~Parallelograms are rectangles.~~ S
C) Squares are rectangles. A
D) ~~Rhombuses are squares.~~ S

C ______ 12. In rhombus PQRS, diagonals $\overline{PR}$ and $\overline{QS}$ intersect at T. Which one of the following statements is ***always*** true?

A) Quadrilateral PQRS is a square
B) ~~Diagonals $\overline{PR}$ and $\overline{QS}$~~ are congruent
C) ΔRTQ is a right triangle
D) ΔPQS is equilateral



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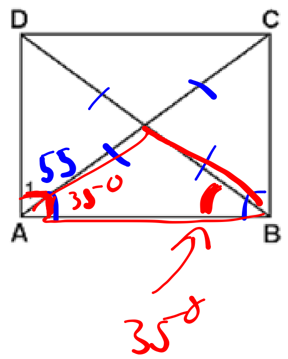
For 13 - 33, write the correct answer on the answer blank.

35° 13. In rectangle ABCD, $\overline{AC}$ and $\overline{BD}$ are diagonals. If $\angle 1 = 55°$, find the measure of $\angle ABD$.

$90 - 55 = 35^{\circ}$



14. 50°
15. 107°
16. 52
17. 140°

1. D	7. C	13. 35	19. 40
2. D	8. A	14. 50	20. 50
3. C	9. C	15. 107	21. 32
4. D	10. C	16. 52	22. 19
5. B	11. C	17. 140	23. 25
6. D	12. C	18. 7	24. 10

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24. 10
25. 5
26. 18
27. 15
28. 10
29. 10

30. 54
31. 10
32. 40
33. 50

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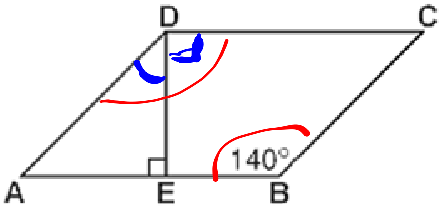
50°

14. In the diagram below, ABCD is a parallelogram with altitude $\overline{DE}$ drawn to side $\overline{AB}$. If $\angle B = 140°$, find the measure of $\angle ADE$.

opp ∠'s ≅

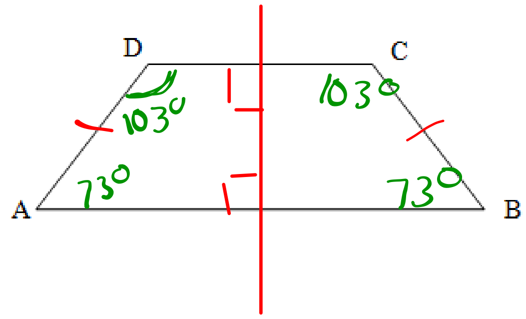


$$\begin{array}{r} 140 \\ -\ 90 \\ \hline 50° \end{array}$$

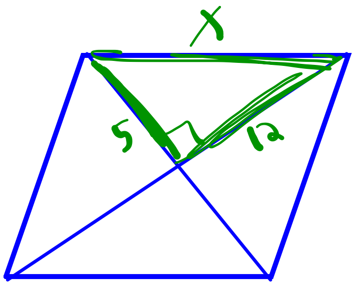
$\underline{103^{\circ}}$ 15. In the diagram below, ABCD is an isosceles trapezoid with bases $\overline{AB}$ and $\overline{DC}$. If $\angle A = 73^{\circ}$, find the measure of $\angle C$.

$m\angle D + m\angle A = 180$

$$\begin{array}{r} 180 \\ -73 \\ \hline 103 \end{array}$$



52 16. If the diagonals of a rhombus are 10 cm and 24 cm, find the perimeter.



$\perp$ diags

$5^2 + 12^2 = x^2$

$x = 13$ (side)

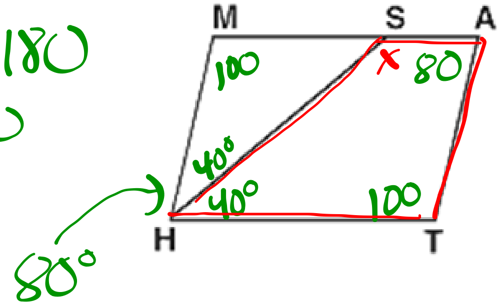
P: $= 4(13) = 52$ (P)

140°

17. In the diagram, parallelogram MATH has $\angle T = 100°$ and $\overline{SH}$ bisects $\angle MHT$. Find the measure of $\angle HSA$.

$m\angle A + 100 = 180$

$m\angle A = 80$

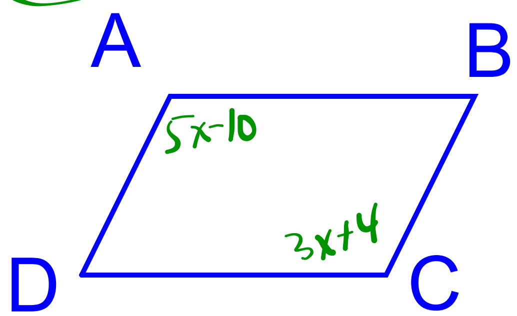


$x + 80 + 100 + 40 = 360$

$x + 220 = 360$

$x = 140°$

7 18. In parallelogram ABCD, $\angle A = (5x - 10)^\circ$ and $\angle C = (3x + 4)^\circ$. Find x.



opp ∡'s ≅

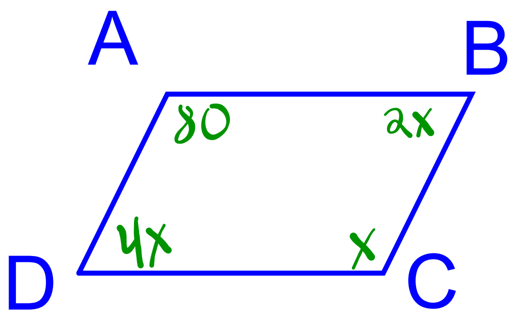
$5x - 10 = 3x + 4$

$2x = 14$

$x = 7$

19. 40
20. 50
21. 32
22. 19
23. 25

40 ______ 19. In quadrilateral ABCD, $\angle A = 80^{\circ}$, $\angle B = (2x)^{\circ}$, $\angle C = x^{\circ}$ and $\angle D = (4x)^{\circ}$. Find x.

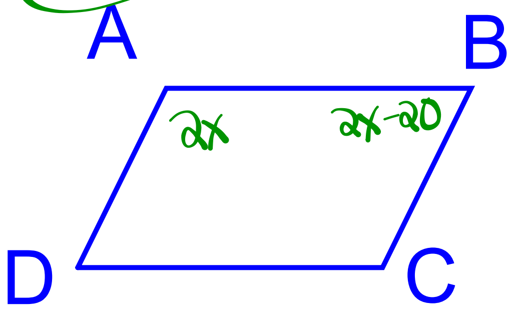


$$x + 2x + 4x + 80 = 360$$

$$\frac{7x}{7} = \frac{280}{7}$$

$$x = 40$$

50 20. In parallelogram ABCD, $\angle A = (2x)^\circ$ and $\angle B = (2x - 20)^\circ$. Find x.



$$2x + 2x - 20 = 180$$

$$\frac{4x}{4} = \frac{200}{4}$$

$$x = 50$$

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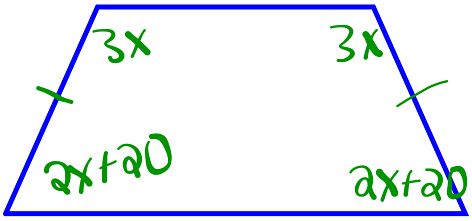
32

21. If the measures of two opposite angles of an isosceles trapezoid are $(2x + 20)^{\circ}$ and $(3x)^{\circ}$, find the value of x.



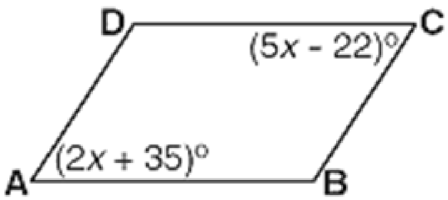
$3x + 3x + 2x + 20 + 2x + 20 = 360$

$10x + 40 = 360$

$\frac{10x}{10} = \frac{320}{10}$

$x = 32$

19 22. Given parallelogram ABCD, find x.



opp ∡'s are ≅

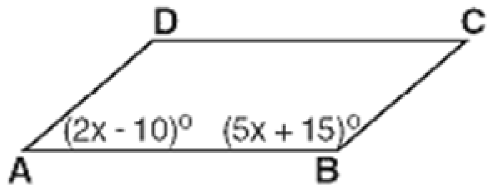
$5x - 22 = 2x + 35$

$\frac{3x}{3} = \frac{57}{3}$

$x = 19$

25 23. Given parallelogram ABCD, find x.

consec ∡'s supp.



$2x-10+5x+15=180$

$7x+5=180$

$7x=175$

$\frac{7x}{7}=\frac{175}{7}$

$x=25$

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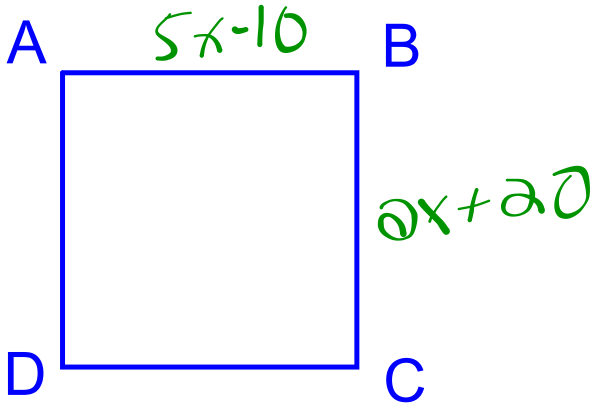
__10__ 24. In square ABCD, AB = $5x - 10$ and BC = $2x + 20$. Find x.



4 ≅ sides

$$5x - 10 = 2x + 20$$

$$\frac{3x}{3} = \frac{30}{3}$$

$$x = 10$$

25. 5
26. 18
27. 15
28. 10
29. 10

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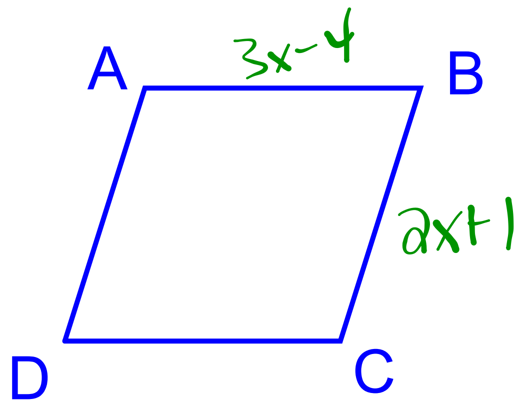
5 25. Rhombus ABCD has sides $\overline{AB} = 3x - 4$ and $\overline{BC} = 2x + 1$. Find x.



Rhombus ⇒ 4 ≅ sides

$3x - 4 = 2x + 1$

$x = 5$

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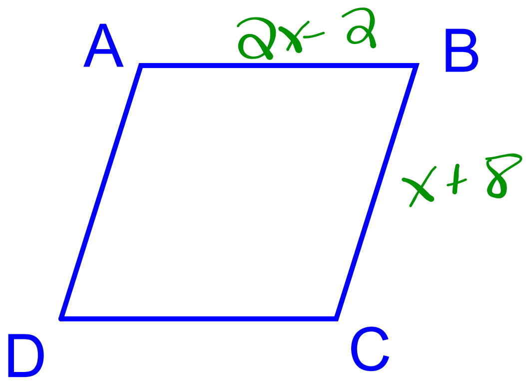
18 26. In rhombus ABCD, AB = $2x - 2$ and BC = $x + 8$. Find the length of BC.



$$2x - 2 = x + 8$$
$$x = 10$$
$$BC = 10 + 8$$
$$BC = 18$$

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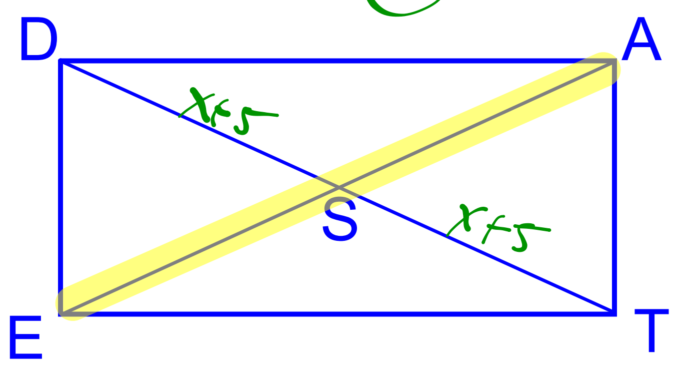
15

27. In rectangle DATE, diagonals $\overline{DT}$ and $\overline{AE}$ intersect at S. If AE = 40 and ST = $x + 5$, find x.



≅ diagonals

$$x+5+x+5=40$$
$$2x+10=40$$
$$2x=30$$
$$x=15$$

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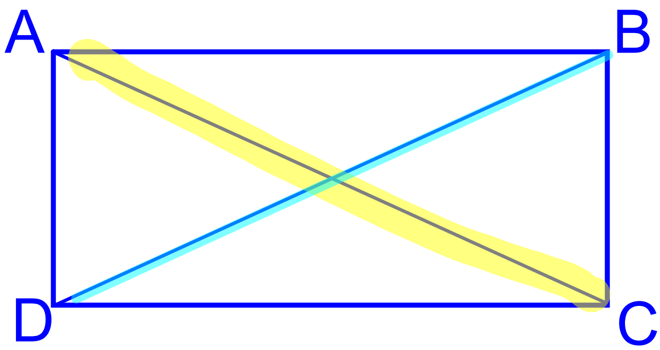
10 28. In rectangle ABCD, AC = $2x + 15$ and BD = $4x - 5$. Find x.



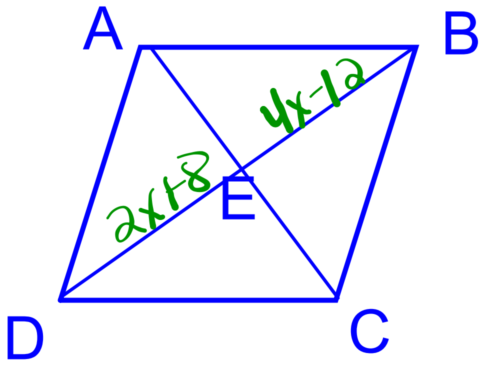
$\cong$ diagonal's

$2x + 15 = 4x - 5$

$20 = 2x$

$x = 10$

10 29. In parallelogram ABCD, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. if BE = $4x - 12$ and DE = $2x + 8$, find x.



diagonals bisect

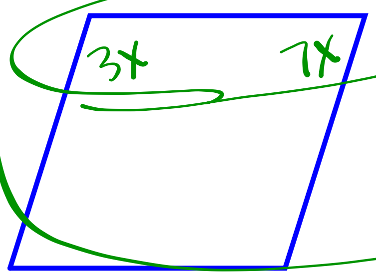
$2x + 8 = 4x - 12$

$20 = 2x$

$10 = x$

54° 30. The measures of two consecutive angles of a parallelogram are in the ratio of 3:7. Find the measure of an acute angle of the parallelogram.

$3x \quad 7x$

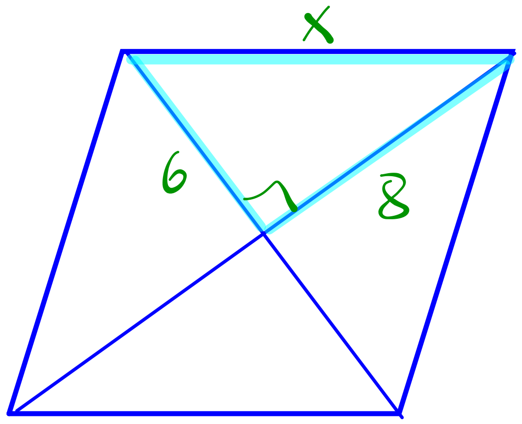


$$3x + 7x = 180$$
$$10x = 180$$
$$x = 18$$

$$3(18) = 54^\circ$$
$$7(18) = 126^\circ$$

10 31. The diagonals of a rhombus have lengths of 12 cm and 16 cm. Find the length of one side of the rhombus.

$\frac{12}{2}$ $\frac{16}{2}$



$6^2 + 8^2 = x^2$

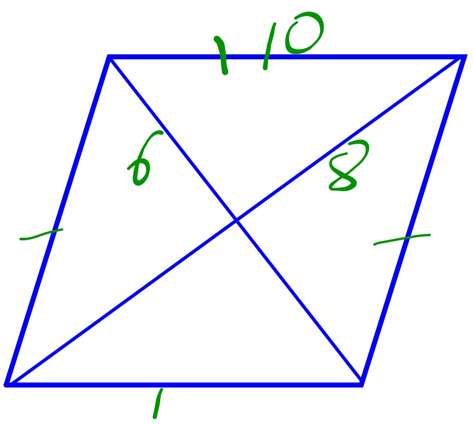
$36 + 64 = x^2$

$\sqrt{100} = \sqrt{x^2}$

$x = 10$

side = 10

40 32. If the lengths of the diagonals of a rhombus are 12 and 16, find the perimeter of the rhombus.

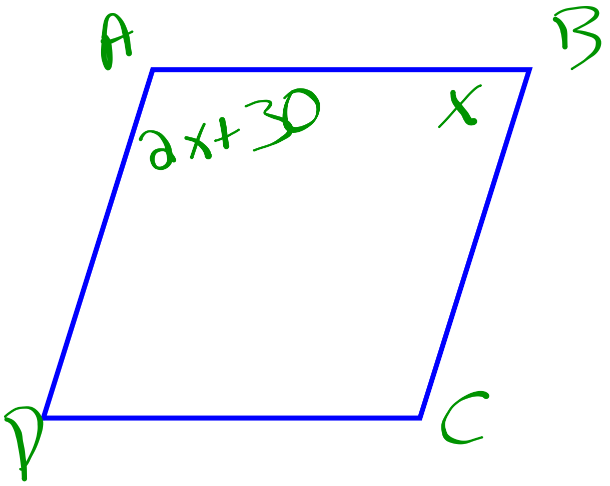


P = 4(10)

50° 33. In rhombus ABCD, the measure of $\angle A$ is 30° more than twice the measure of $\angle B$. Find the measure of $\angle B$.

+30

·2



$$x + 2x + 30 = 180$$
$$3x = 150$$
$$x = 50$$
$$m\angle B =$$

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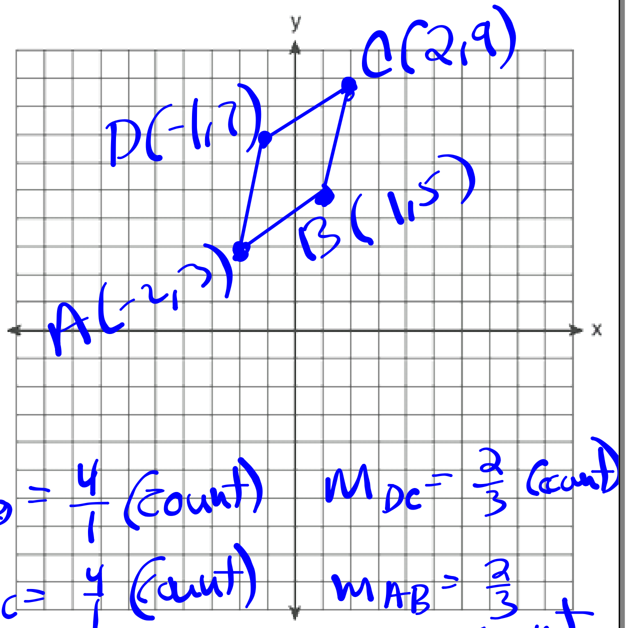
30. 54
31. 10
32. 40
33. 50

34. Given quadrilateral ABCD with A(-2, 3), B(1, 5), C(2, 9) and D(-1, 7)

Prove ABCD is a parallelogram



GSUMS
✓ ✓ ✓ ✓ ✓

$\overline{AD} \parallel \overline{BC}$, $\overline{DC} \parallel \overline{AB}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m_{AD} = \frac{4}{1}$ (count) $m_{DC} = \frac{2}{3}$ (count)

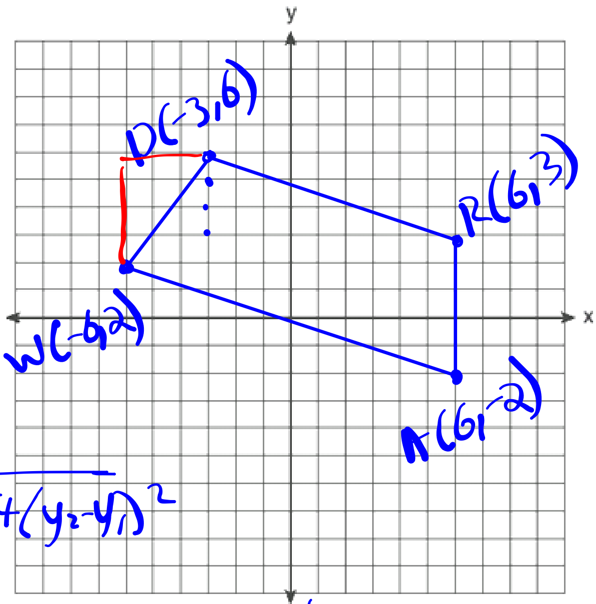
$m_{BC} = \frac{4}{1}$ (count) $m_{AB} = \frac{2}{3}$ count

▱ABCD because $\overline{AD} \parallel \overline{BC}$ $\overline{DC} \parallel \overline{AB}$

both pairs opp sides $\parallel$.

35. Given quadrilateral DRAW with D(-3, 6), R(6, 3), A(6, -2) and W(-6, 2)

Prove DRAW is an isosceles trapezoid



G S U M S

Show: $\overline{DR} \parallel \overline{WA}$, $\overline{DW} \nparallel \overline{RA}$

$\overline{DW} \cong \overline{RA}$

USE: $m = \frac{y_2 - y_1}{x_2 - x_1}$ $d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

M: $m_{DR} = -\frac{3}{9} = -\frac{1}{3}$ $\overline{DR} \parallel \overline{WA}$

$m_{WA} = -\frac{3}{9} = -\frac{1}{3}$

$m_{WD} = \frac{4}{3}$ $\overline{WD} \nparallel \overline{RA}$

$m_{RA} =$ und.

$RA = 5$ (count)

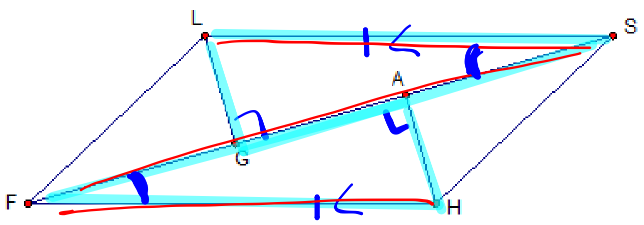
$WD^2 = 3^2 + 4^2$

$WD = 5$ $\overline{WD} \cong \overline{RA}$

DRAW is isoscl. trap because one pair opp. sides //, one pair not //, and non // sides are ≅.

36. Given: Parallelogram $FLSH$
$\overline{LG} \perp \overline{FS}$
$\overline{HA} \perp \overline{FS}$

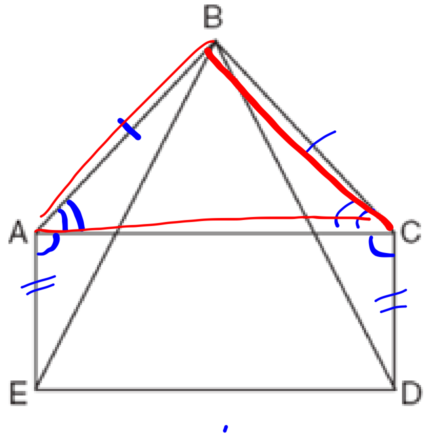
Prove: $\Delta LGS \cong \Delta HAF$



▱FLSH, $\overline{LG} \perp \overline{FS}$, $\overline{HA} \perp \overline{FS}$	Given
$\overline{LS} \cong \overline{FH}$	▱ → opp sides ≅
$\overline{LS} \parallel \overline{FH}$	▱ → opp side //
∡LSF ≅ ∡HFS	// lines → ≅ alt int ∡'s
∡LGS, ∡HAF Rt ∡'s	⊥ lines → Rt ∡'s
∡LGS ≅ ∡HAF	Rt ∡'s are ≅
ΔLGS ≅ ΔHAF	AAS

37. Given: $ACDE$ is a rectangle
$\overline{AB} \cong \overline{CB}$

Prove: $\overline{BE} \cong \overline{BD}$



Rectangle ABCD, $\overline{AB} \cong \overline{CB}$	Given
$\overline{AE} \cong \overline{CD}$	Rectangle → opp sides ≅
∡ EAC ≅ ∡ DCA	Rectangle → 4 ≅ ∡'s
∡BCA ≅ ∡ BAC	≅ legs → ≅ base ∡'s
∡BCA + ∡EAC ≅ ∡DCA + ∡BAC	Addition
∡ BAE ≅ ∡BCD	Substitution
△BAE ≅ △BCD	SAS
$\overline{BE} \cong \overline{BD}$	CPCTC

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