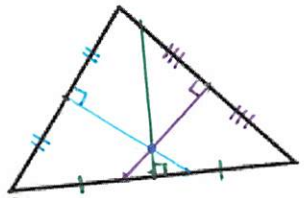
SM2 Chapter 6&7 Practice Test

Name Answer key

Date _____ Period _____

Sketch the given segments in triangles. Then label the point of intersection by the correct name.

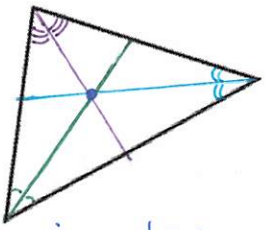
1) Perpendicular Bisectors (perpendicular to midpoint of each side)



point of concurrency: Circumcenter

Special prop: * equidistant from each vertex *

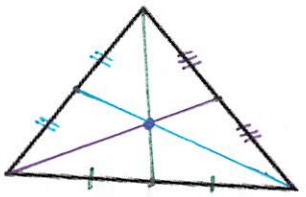
2) Angle Bisectors (bisect each vertex angle)



incenter

* equidistant from each side *

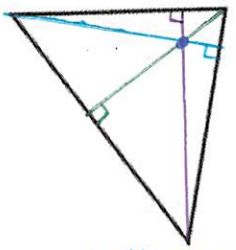
3) Medians (from each vertex to the midpoint of the opposite side)



centroid

* 2/3 distance from vertex to midpoint of opposite side *

4) Altitudes (from each vertex, perpendicular to opposite side)



orthocenter

* where the altitudes meet (that's about it) *

Use the given information to find the following.

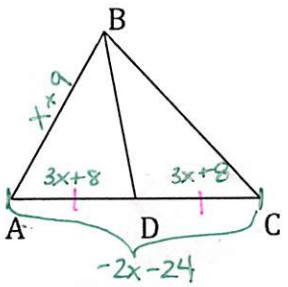
5) Given: $\overline{BD}$ is a median of ΔABC → goes through midpoint so AD = DC

$AD = 3x+8$

$AC = -2x-24$

$AB = x+9$

Find: AB



$2(3x+8) = -2x-24$

$6x+16 = -2x-24$

$+2x \quad +2x$

$8x+16 = -24$

$-16 \quad -16$

$\frac{8x}{8} = \frac{-40}{8}$

$x = -5$

now plug −5 in for x to find AB

$AB = x+9 = -5+9$

$AB = 4$

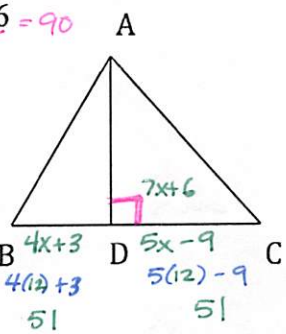
6) Given: $\overline{AD}$ is an altitude of ΔABC → perpendicular to side so $\angle ADB = \angle ADC = 90°$

$\angle ADC = 7x+6 = 90$

$\overline{BD} = 4x+3$

$\overline{DC} = 5x-9$

Find: BC



$7x+6 = 90$

$-6 \quad -6$

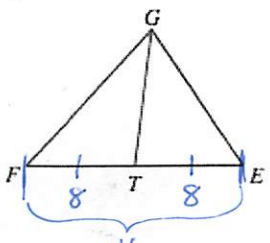
$\frac{7x}{7} = \frac{84}{7}$

$x = 12$

$BC = 102$

Each figure shows a triangle with one or more of its medians.

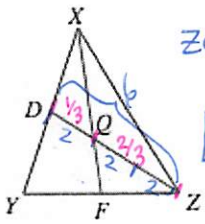
7) Find FE if $TE = 8$



16

$FE = 16$

8) Find ZQ if $ZD = 6$

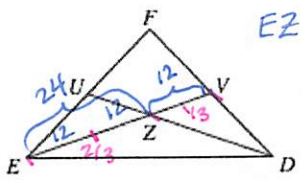


$ZQ = \frac{2}{3}(6)$

$ZQ = 4$

or $\frac{6}{3} = 2$, then $2 \cdot 2 = 4$

9) Find EZ if $ZV = 12$



$EZ = 2(ZV)$

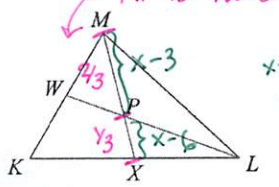
$2(12)$

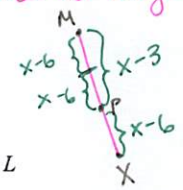
$EZ = 24$

10) The figure shows a triangle with one or more of its medians.

Find MP if $MP = x - 3$ and $PX = x - 6$

MP is twice as long as PX





$2(x-6) = x-3$

$2x - 12 = x - 3$

$-x \quad -x$

$x - 12 = -3$

$+12 \quad +12$

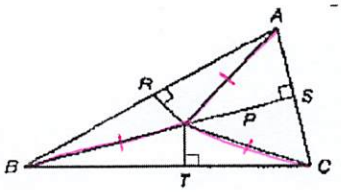
$x = 9$

Need to plug x in now!

$MP = 9 - 3$ $\quad \boxed{MP = 6}$

12) Point P is the circumcenter. Name any segments that are congruent to $\overline{CP}$.

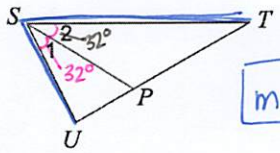
↳ equidistant from each vertex



$\overline{AP}$ and $\overline{BP}$

11) $\overline{SP}$ is an angle bisector in the triangle.

Find $m\angle UST$ if $m\angle 2 = 32°$.

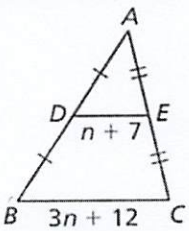


$m\angle UST = 64°$

13) $\overline{DE}$ is a midsegment of $\triangle ABC$. Find the value of n.

↳ half the length of the side its parallel to ($DE = \frac{1}{2}BC$)

(which means $BC = 2DE$)



$2(n+7) = 3n + 12$

$2n + 14 = 3n + 12$

$-2n \quad -2n$

$14 = n + 12$

$-12 \quad -12$

$\boxed{2 = n}$

14) Give the name for the polygon described.

Twelve-sided polygon: Dodecagon

Ten-sided polygon: Decagon

15) What is the formula to find the sum of the interior angles for any polygon?

$180(n-2)$ or $(n-2) \cdot 180$

(where n is the number of sides)

16) What is the sum of the interior angles of a 26-gon?

$n = 26$ $\quad 180(26-2)$

$180(24) = \boxed{4320°}$

17) What is the measure of one interior angle in a regular 18-gon?

all angles are the same

Total interior: $180(18-2)$

$180(16)$

$= 2880°$

one angle: $\frac{2880}{18} = \boxed{160°}$

(you could also find that one exterior ∠ is 20° and subtract from 180)

18) How many sides does a heptagon have?

seven

How many sides does a nonagon have?

nine

19) What properties of a polygon make it a regular polygon?

All of the sides are congruent and all of the angles are congruent.

(equilateral and equiangular)

20) What is the measure of an exterior angle for a regular 18-gon?

all angles are ≅

always have a total sum of 360°

Total: 360°

one exterior angle:

$\frac{360}{18} = \boxed{20°}$

21) Is there a regular polygon with an interior angle sum of 9000°? If so, how many sides does it have?

$\frac{180(n-2)}{180} = \frac{9000}{180}$

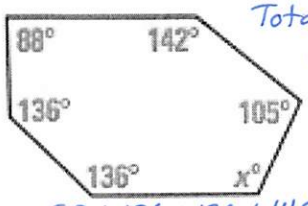
$n - 2 = 50$

$+2 \quad +2$

$n = 52$

yes! 52 sides

22) Find x.



6 sides

Total interior:

$180(6-2)$

$180(4) = 720°$

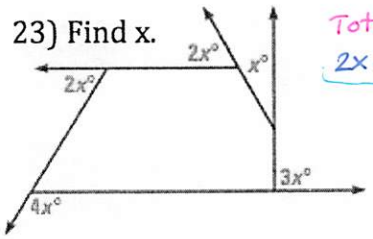
$88 + 136 + 136 + 142 + 105 + x = 720$

$607 + x = 720$

$-607 \quad -607$

$x° = 113°$

23) Find x.



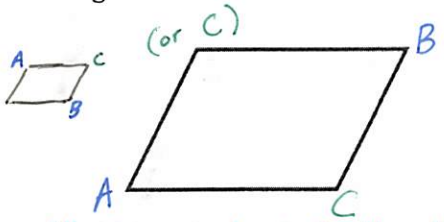
Total exterior: 360°

$2x + 2x + x + 3x + 4x = 360$

$\frac{12x}{12} = \frac{360}{12}$

$x = 30$

24) Label two opposite angles A and B. Locate an angle consecutive to A and label it C.

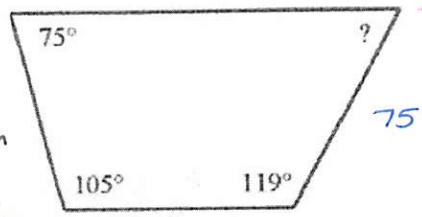


Relationship between ∠A and ∠B?
They're congruent.

Relationship between ∠A & ∠C?
They're supplementary (sum 180°)

(there are technically 4 different arrangements that are correct)

25) Find the measure of the missing angle.



Total interior: 360° $(180 \cdot 2)$

$75 + 105 + 119 + ? = 360$

$299 + ? = 360$

$-299 \quad -299$

$61°$

26) Fill in the blank.

a) If the quadrilateral is a parallelogram, then the opposite sides are parallel and congruent.

b) If the quadrilateral is a parallelogram, then the opposite angles are congruent.

c) If the quadrilateral is a parallelogram, then its consecutive angles are supplementary.

d) If the quadrilateral is a parallelogram, then the diagonals bisect each other.

e) If a quadrilateral has four congruent sides, then it is a rhombus.

f) If a quadrilateral has four right angles, then it is a rectangle.

27) Fill each blank with *always, sometimes,* or *never* to make each statement true.

a) The opposite angles of a parallelogram can never have different measures.
(because they're congruent)

b) The base angles of an isosceles trapezoid are never supplementary.
(because they're congruent and if they were both 90° it would be a rectangle)

c) Parallelograms are sometimes squares.
(when they have 4 congruent sides and 4 right angles)

d) Squares are always rectangles.

e) A rhombus is never a trapezoid.
(because a rhombus has two pairs of parallel opposite sides and trapezoids can only have one pair)

f) One pair of opposite angles in a kite is always congruent.

g) A quadrilateral whose diagonals are perpendicular is sometimes a rhombus.
(it could also be a kite)

h) A quadrilateral whose diagonals are congruent is sometimes a rectangle.
(could also be an isosceles trapezoid)

28) Circle the quadrilaterals which have the property described. You may need to circle more than one.

a) Both pairs of opposite sides are congruent. (property of a parallelogram)

Kite *Rhombus* *Square* *Isosceles Trapezoid* *Parallelogram*

(because they're parallelograms)

b) Has at least one pair of consecutive (adjacent) sides that are congruent.

Kite *Rhombus* *Square* *Isosceles Trapezoid* *Parallelogram*

2 pairs

c) Diagonals are perpendicular. (property of kites and rhombi)

Kite *Rhombus* *Square* *Isosceles Trapezoid* *Parallelogram*

(because its a rhombus)

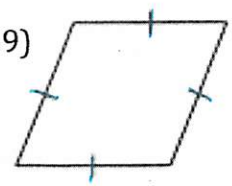
d) Diagonals bisect one another. (property of parallelograms)

Kite *Rhombus* *Square* *Isosceles Trapezoid* *Parallelogram*

(because they're parallelograms)

State the most specific name for each figure.

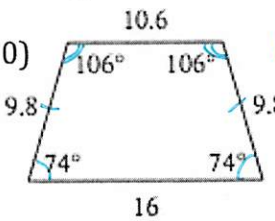
29)



4 congruent sides

Rhombus

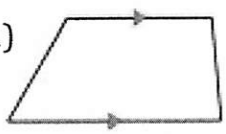
30)



base ∠s ≅, legs ≅

Isosceles Trapezoid

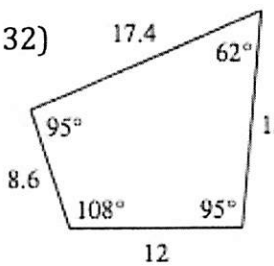
31)



exactly (only) one pair of parallel sides

Trapezoid

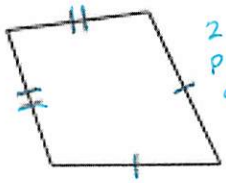
32)



polygon with 4 sides

Quadrilateral

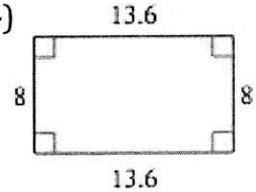
33)



2 (distinct) pairs of adjacent ≅ sides

Kite

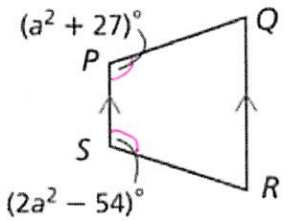
34)



4 right angles

Rectangle

35) Find the value of **a** so that PQRS is an isosceles trapezoid. → base angles are congruent



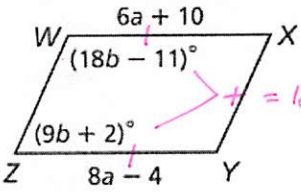
$a^2+27 = 2a^2-54$
$-a^2 \quad -a^2$
$27 = a^2 - 54$
$+54 \quad +54$
$\sqrt{81} = \sqrt{a^2}$

$a = 9$

(not just a and b)

36) Find $\angle Z$ and $\overline{ZY}$ if WXYZ is a parallelogram.

- opposite sides congruent
- consecutive angles supplementary



$6a+10 = 8a-4$
$-8a \quad -8a$
$-2a+10 = -4$
$-10 \quad -10$
$\frac{-2a}{-2} = \frac{-14}{-2}$
$a = 7$

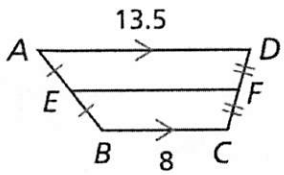
$18b-11 + 9b+2 = 180$
$27b - 9 = 180$
$+9 \quad +9$
$\frac{27b}{27} = \frac{189}{27}$
$b = 7$

$ZY = 8(7) - 4$
$56 - 4$
$ZY = 52$

$\angle Z = 9(7) + 2$
$63 + 2$
$m\angle Z = 65°$

37) Find the length of EF.

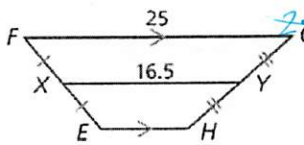
↳ midsegment of the trapezoid: The length is one-half the sum of the bases (the length is the average of the base lengths)



$\frac{13.5+8}{2} = \frac{21.5}{2}$

$EF = 10.75$

38) Find the length of EH.



$\frac{25+EH}{2} = 16.5 \cdot 2$

$25+EH = 33$
$-25 \quad -25$

$EH = 8$

39) FGHE is a parallelogram. → diagonals bisect each other

a) Find FH.

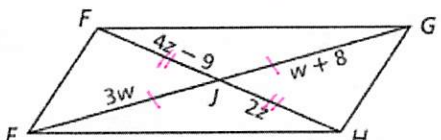
$JH = 2(\frac{9}{2}) = 9$
so $FJ = 9$

$FH = 18$

b) Find JG.

$4+8 = 12$

$JG = 12$

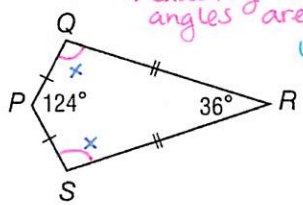


$4z-9 = 2z$
$-4z \quad -4z$
$-9 = -2z$
$\frac{-9}{-2} = \frac{-2z}{-2}$
$\frac{9}{2} = z$

$3w = w+8$
$-w \quad -w$
$\frac{2w}{2} = \frac{8}{2}$
$w = 4$

40) $PQRS$ is a kite. Find $m\angle S$

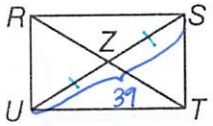
↳ exactly one pair of opposite angles are $\cong$



$36+124+x+x = 360$
$160+2x = 360$
$-160 \quad -160$
$\frac{2x}{2} = \frac{200}{2}$
$x = 100$

$m\angle S = 100°$

41) Quadrilateral RSTU is a rectangle. → has congruent diagonals
If $US = x + 21$ and $RT = 3x - 15$, find ZS.



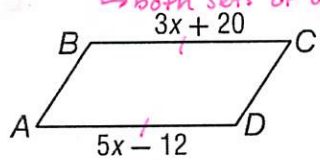
$US = RT$
$x+21 = 3x-15$
$-x \quad -x$
$21 = 2x-15$
$+15 \quad +15$
$\frac{36}{2} = \frac{2x}{2}$
$18 = x$
$18+21 = 39$

Rectangle is a parallelogram so diagonals bisect each other
$ZS = \frac{US}{2}$

$\frac{39}{2} = ZS$
$ZS = 19.5$

42) Find the values of x so that $ABCD$ will be a parallelogram.

↳ both sets of opposite sides are $\cong$



$3x+20 = 5x-12$
$-3x \quad -3x$
$20 = 2x-12$
$+12 \quad +12$
$\frac{32}{2} = \frac{2x}{2}$

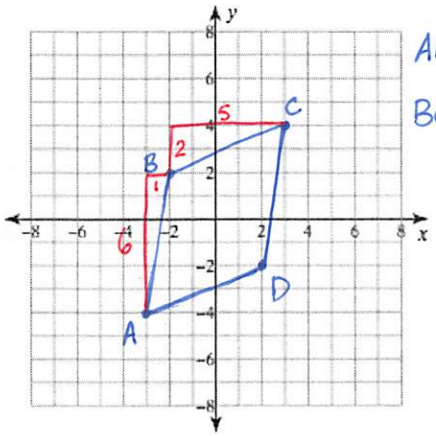
$x = 16$

Prove the following using the given formula.

whether or not

43) Prove $A(-3,-4), B(-2,2), C(3,4)$ and $D(2,-2)$ is a rhombus. **Distance Formula** → shows side lengths

show that all 4 sides are the same length



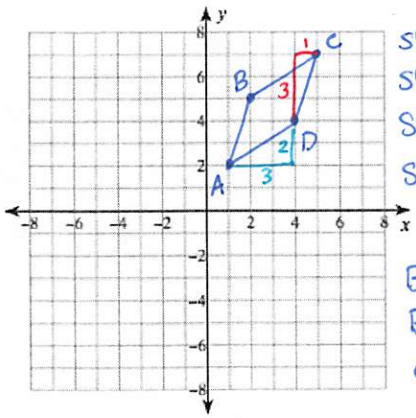
$AB = \sqrt{6^2 + 1^2} = \sqrt{37}$ ($36 + 1$)

$BC = \sqrt{2^2 + 5^2} = \sqrt{29}$ ($4 + 25$)

A rhombus must have four congruent sides.
Since $AB \neq BC$, ABCD is not a rhombus.

44) Prove A(1,2), B(2,5), C(5,7) and D(4,4)is a parallelogram. **Slope Formula** → shows lines parallel or perpendicular

Show that both pairs of opposite sides are parallel



Slope $AB = \frac{5-2}{2-1} = \frac{3}{1} = 3$

Slope $BC = \frac{7-5}{5-2} = \frac{2}{3}$

Slope $CD = \frac{3}{1} = 3$

Slope $AD = \frac{2}{3}$

Because they have the same slopes, $AB \parallel CD$ and $BC \parallel AD$. ABCD is a parallelogram because two pairs of opposite sides are parallel.