Geometry 1st Semester Final: Free Response Review   Name: **Mrs. MacDonald**
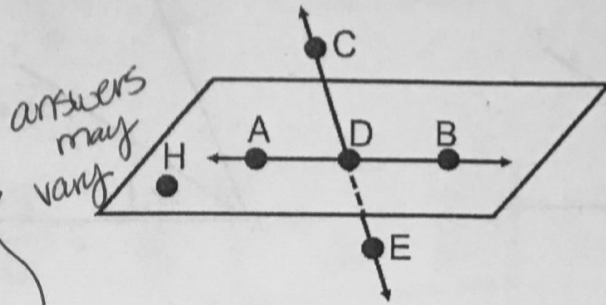
Unit 1: General Geometry

Use the diagram to name the figures.

1. Three collinear points **A, D, B**

2. Three noncollinear points **H, A, C**   *answers may vary*

3. Four noncoplanar points **H, A, D, C**

4. Two intersecting lines **$\overleftrightarrow{AB}$ & $\overleftrightarrow{CE}$**

Find the coordinates of the midpoint of a segment with the given endpoints and the segment length.

5. C(2, 9), D(-2, -9)

$$\left(\frac{2+-2}{2}\right) = \frac{0}{2} = 0 \quad \boxed{(0,0)}$$
$$\frac{9+-9}{2} = \frac{0}{2} = 0$$

6. E(4, -8), F(-6, 6)

$$\frac{4+-6}{2} = \frac{-2}{2} = -1 \quad \boxed{(-1,-1)}$$
$$\frac{-8+6}{2} = \frac{-2}{2} = -1$$

Use what you know about segments to complete the following problems.

7. M is a point located on the line JK = 16, JM = 6x – 7 and MK = 2x + 3, determine if M is the midpoint of JK.
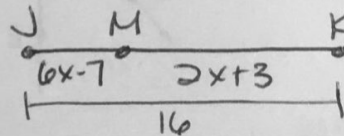
$$6x-7+2x+3=16 \qquad 6(2.5)-7=8$$
$$8x-4=16 \qquad\qquad 2(2.5)+3=8$$
$$8x=20 \qquad\qquad \text{yes, midpoint}$$
$$x=2.5$$

8. R is the midpoint between Q and L. If QR = 4x – 5 and RL = 2x + 7, find the length of QL
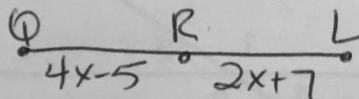
$$4x-5=2x+7 \qquad 4(6)-5=19$$
$$2x=12 \qquad\qquad 2(6)+7=19$$
$$x=6 \qquad\qquad 19+19=38$$
$$\boxed{QL=38}$$

Solve for the missing side.

9.

12 ____ 5

$$5^2+12^2=x^2$$
$$25+144=x^2$$
$$169=x^2$$
$$\boxed{x=13}$$

10.

10 ____ 3

$$3^2+x^2=10^2$$
$$9+x^2=100$$
$$x^2=91$$
$$\boxed{x=9.54}$$

Find the area and perimeter of the figures described.

11. Triangle with height 4 cm and base 5 cm

$$A=\tfrac{1}{2}(5)(4)=\boxed{10\,cm^2}$$
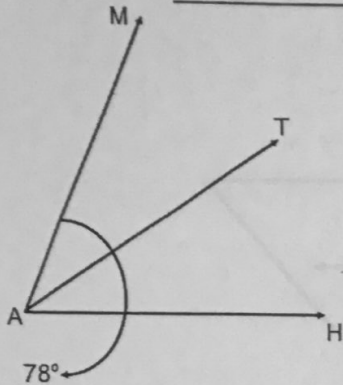
not enough info for perimeter

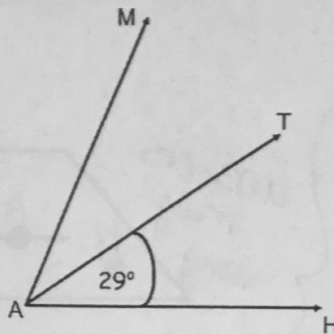12. Square with side length 3 ft

$$A=3\times3=\boxed{9\,ft^2} \qquad P=3+3+3+3=\boxed{12\,ft}$$

For 13 and 14, $\overrightarrow{AT}$ is the angle bisector of $\angle MAH$. Find the angle measure.

13. $m\angle HAT = $ __39°__

78°

14. $m\angle HAM = $ __58°__
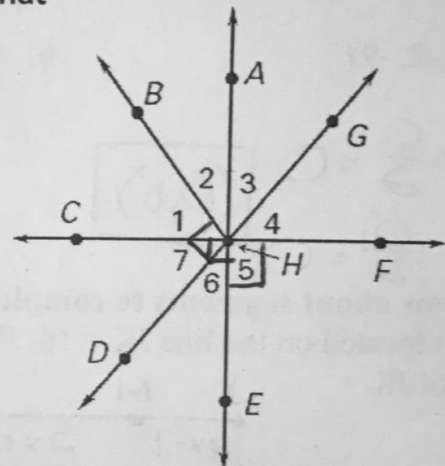
29°

In exercises 15-18, complete the following statements given that
$$m\angle BHD = m\angle CHE = m\angle EHF = 90°$$

15. If $m\angle GHC = 160°$, then $m\angle 4 = $ __20°__.

16. If $m\angle 1 = 50°$, then $m\angle 7 = $ __40°__.

17. If $m\angle FHD = 107°$, then $m\angle 3 = $ __17°__.
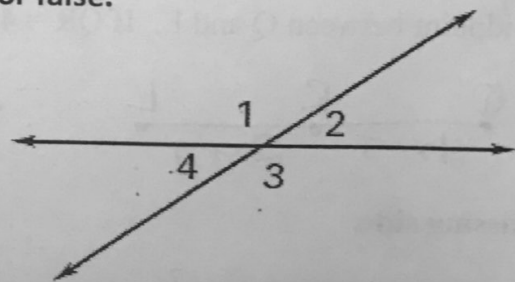
18. If $m\angle 1 = 42°$, then $m\angle 6 = $ __42°__.

Use the diagram to decide whether the statement is true or false.

19. $m\angle 4 + m\angle 1 = m\angle 1 + m\angle 2$ true

20. If $m\angle 4 = 30°$, then $m\angle 3 = 150°$. true

21. $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 4$ false

22. If $m\angle 1 = 110°$, then $m\angle 3 = 110°$. true

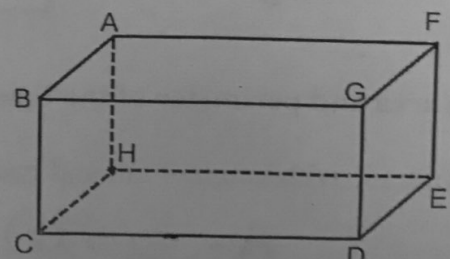**In Exercises 23-26, use the diagram of a rectangular box to the right.**

23. A line perpendicular to $\overleftrightarrow{AB}$ is $\overrightarrow{AH}$.

24. A line skew to $\overleftrightarrow{GF}$ is $\overleftrightarrow{BC}$.   answers

25. A line parallel to $\overleftrightarrow{HE}$ is $\overleftrightarrow{CD}$.   may vary

26. Plane BCD is parallel to plane AHE

Determine if $\overline{AB} \parallel \overline{CD}$.

27. $A(3,-4), B(-1,4)$

$C(2,7), D(5,1)$

$$m_{AB} = \frac{-4-4}{3-(-1)} = \frac{-8}{4} = -2$$

$$m_{CD} = \frac{7-1}{2-5} = \frac{6}{-3} = -2$$

(parallel)

Find the slope of the line that is perpendicular to $\overline{AB}$.

28. $A(4,-3), B(-2,5)$

$$m_{AB} = \frac{-3-5}{4-(-2)} = \frac{-8}{6} = -\frac{4}{3} \qquad \boxed{m_\perp = \frac{3}{4}}$$

Decide whether the lines with the given equations are *perpendicular*, *parallel*, or *neither*.

29. $y = \frac{3}{5}x + 2$

$y = \frac{-5}{3}x + 3$

perpendicular

30. $y = \frac{1}{4}x + 3$

$y = \frac{1}{4}x - 3$

parallel

31. $y = 4x$

$y = \frac{1}{4}x$

neither

Write the equations of the lines that passes through the given point and is a)parallel and b)perpendicular to the given line.

32. $(2,-3)$; $y = -2x + 5$

a) Parallel: $m = -2$

$y = mx + b$

$-3 = -2(2) + b$

$-3 = -4 + b$

$b = 1$

$\boxed{y = -2x + 1}$

b) Perpendicular: $m = \frac{1}{2}$

$y = mx + b$

$-3 = \frac{1}{2}(2) + b$

$-3 = 1 + b$

$b = -4$

$\boxed{y = \frac{1}{2}x - 4}$

Unit 2: Reasoning and Proof

Write the conditional statement, its converse and the biconditional of the given statement.

1. A point on a line is in a plane.

Conditional Statement: If a point is on a line, then it is in a plane

Converse: If a point is in a plane, then it is on a line.

Biconditional: A point is on a line if and only if it is in a plane.

2. We use a calculator when we are in math class.

Conditional Statement: _If we use a calculator, then we are in math class_

Converse: _If we are in math class, then we use a calculator_

Biconditional: _We use a calculator if and only if we are in math class._

What is a counterexample to the above statement?

we could use a calculator in science

Describe the pattern below. Fill in the blanks and write the pattern.

3. 17, 23, 15, 21, _13_, _19_   +6 -8 +6 -8

4. _1_, _.5_, 0.25, 0.125, 0.0625, ... ÷2 or ×$\frac{1}{2}$

Write the logical statement that follows from the following pair of statements.

5. If a triangle is equilateral, then it has congruent angles.
   If a triangle has congruent angles, then it is regular.

   If a triangle is equilateral, then it is regular.

6. If I study for my Geometry Final Exam, I will pass the class. If I pass the class, then I will have a wonderful winter break.

   If I study for my Geometry final Exam, then I will have a wonderful winter break

State what can be logically concluded from the following statements.

7. Hilda only does her math homework when she is bored. Hilda is doing her math homework.

   Hilda is bored.

Find the Flaw in the logic of the following statements:

8. If an animal is a chimpanzee, then it lives in the forest.

   Chimpanzees could live in the zoo.

9. If you eat too much spam, then you will get sick. Mr. Rodgers got sick.
   Therefore, Mr. Rodgers ate too much spam.

   Mr. Rodgers could have gotten sick from something else.

Name the property used to make the conclusion.

10. If $x = 6$, then $3x = 18$. _multiplication_

11. If $a = b$ and $b = c$, then $a = c$. _transitive_

12. If $x = 7$ and $y = 3x - 5$, then $y = 3(7) - 5$. _substitution_

Solve the equation, giving a reason for each step.

13. $3(x+7) = x-5$ Given

$3x + 21 = x - 5$ Distribution

$2x + 21 = -5$ Subtraction

$2x = -26$ Subtraction

$x = -13$ Division

Unit 3: Angles and Lines

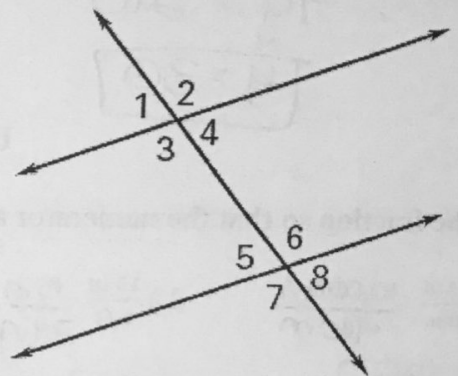In Exercises 1-5, identify the angle pair relationship created.

1. $\angle 3$ and $\angle 6$ are __Alt. Interior__ angles.

2. $\angle 4$ and $\angle 6$ are __Consecutive Interior__ angles.
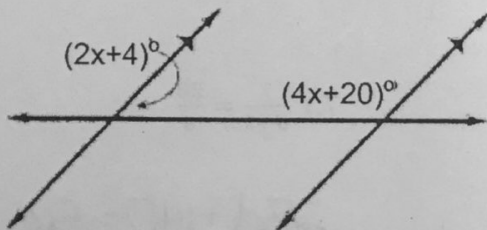
3. $\angle 2$ and $\angle 7$ are __Alt. Exterior__ angles.

4. $\angle 1$ and $\angle 5$ are __Corresponding__ angles.

5. $\angle 1$ and $\angle 8$ are __Alt. Exterior__ angles.

Find the value of x.

6.

$(2x+4)^{\circ}$

$(4x+20)^{\circ}$

$2x+4 + 4x+20 = 180$

$6x + 24 = 180$

$6x = 156$

$\boxed{x = 26}$

7.

$(3x - 10)^{\circ}$

38°
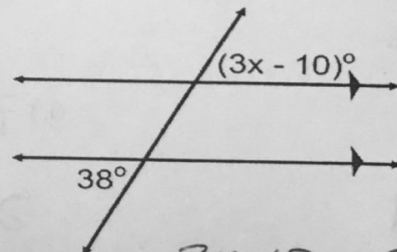
$3x - 10 = 38$

$3x = 48$

$\boxed{x = 16}$

8. Use the diagram to the right.

a. $a \perp k$ solve for x.

$4x + 2 = 90$

$4x = 88$

$\boxed{x = 22}$

a   b

$(4x+2)^{\circ}$ $(2x+32)^{\circ}$

b. Determine if $a \parallel b$. Why or why not?

$4(22) + 2 = 90$ $2(22) + 32 = 76$

not parallel, corresponding angles not congruent
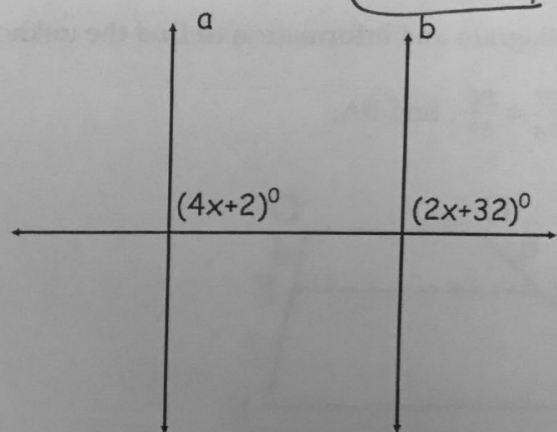
9. Set up two equations with two unknowns and solve the system.

$$3x+5=y+2x \qquad y+2x+4y-20=180$$
$$5=y-x \qquad 5y+2x=200$$

$$5y+2x=200$$
$$+ \begin{cases} 2(y-x=5) \\ 2y-2x=10 \end{cases}$$
$$\overline{\qquad\qquad}$$
$$7y=210$$
$$\boxed{y=30}$$

$$y-x=5$$
$$30-x=5 \qquad \boxed{x=25}$$

$(3x+5)^\circ$
$(y+2x)^\circ$
$(4y-20)^\circ$
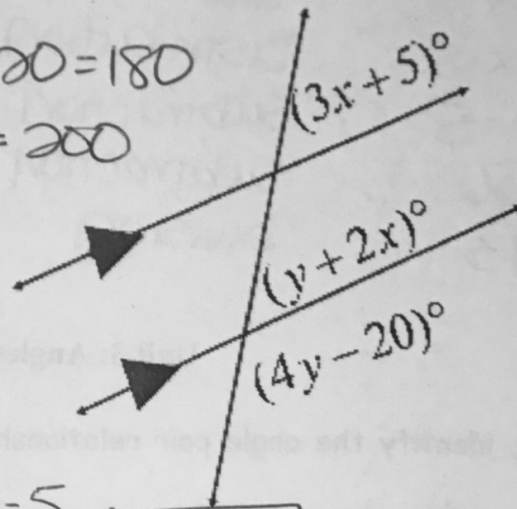
Unit 4: Similar Triangles

Rewrite the fraction so that the numerator and denominator have the same units. Then simplify.

1.) $\frac{10\ km}{900\ m}$ $\frac{10,000m}{900m}$

$\boxed{\dfrac{100}{9}}$

2.) $\frac{15\ in}{2\ ft}$ $\frac{15in}{24in}$

$\boxed{\dfrac{5}{8}}$

3.) $\frac{15\ ft}{4\ yd}$ $\frac{15ft}{12ft}$

$\boxed{\dfrac{5}{4}}$

4.) $\frac{5\ m}{250\ cm}$ $\frac{500cm}{250cm}$

$\boxed{2}$

Solve the proportion.

5.) $\frac{a}{21}=\frac{1}{3}$

$$3a=21$$
$$\boxed{a=7}$$

6.) $\frac{-5}{b}=\frac{20}{8}$

$$20b=-40$$
$$\boxed{b=-2}$$

7.) $\frac{7}{d+5}=\frac{28}{8}$

$$28d+140=56$$
$$28d=-84$$
$$\boxed{d=-3}$$

Use the given diagram and information to find the unknown lengths.

8.) Given $\frac{CB}{BA}=\frac{DE}{EF}$, find BA.

C D
6 4
B E
x 7
A F
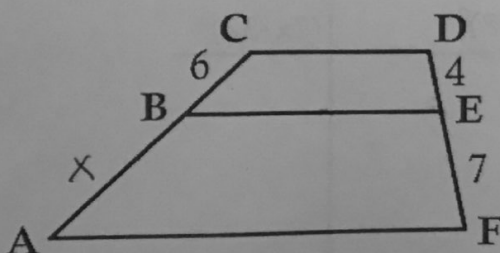
$$\frac{6}{x}=\frac{4}{7} \qquad 4x=42$$
$$\boxed{x=10.5}$$

9.) Given $\frac{XW}{XV}=\frac{YW}{ZV}$, find ZV.

X
12
Y 24 W
5
Z x V
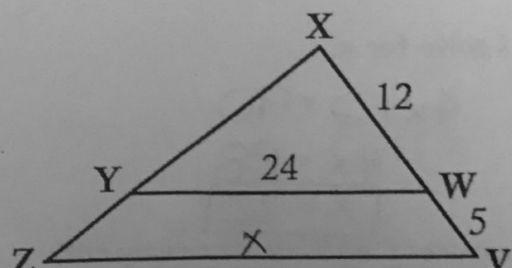
$$\frac{12}{17}=\frac{24}{x} \qquad 12x=408$$
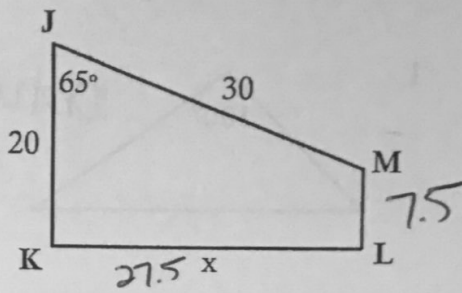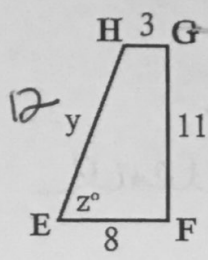$$\boxed{x=34}$$

Using Similar Polygons: In the diagram, JKLM~EFGH.

10.) Find the scale factor of JKLM to EFGH

$$\frac{20}{8} = \boxed{\frac{5}{2}}$$

11.) Find the values of x, y, and z.

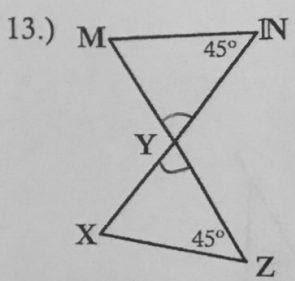$$\frac{y}{30} = \frac{8}{20} \qquad 20y = 240 \qquad \boxed{y=12}$$

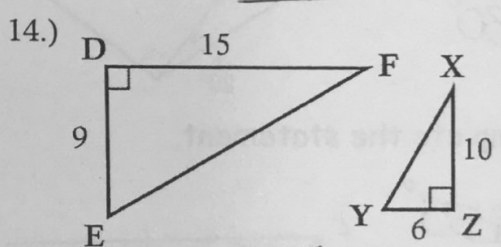$$\frac{11}{x} = \frac{8}{20} \qquad 8x = 220 \qquad \boxed{x=27.5} \qquad \boxed{z=65°}$$

12.) Find the perimeter of each polygon.
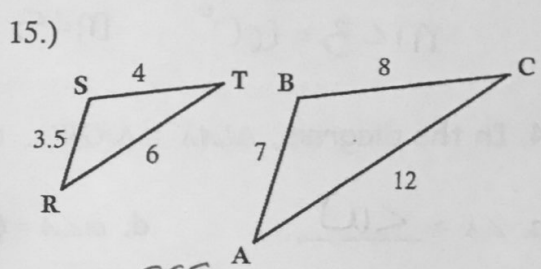
$$P_{EFGH} = 34 \qquad P_{JKLM} = 85$$

Determine whether the triangles can be proven similar. If so write the similarity statement.

13.)

yes, AA, $\triangle MNY \sim \triangle XZY$

14.)

yes, SAS
$\triangle EDF \sim \triangle YZX$

15.)

yes, SSS
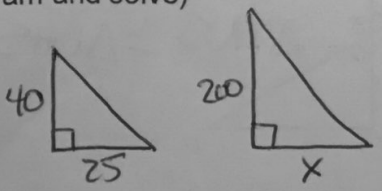$\triangle RST \sim \triangle ABC$

16.) Find the value of the variable.

$$\frac{28}{36} = \frac{16-g}{g}$$

$$28g = 576 - 36g$$

$$64g = 576$$
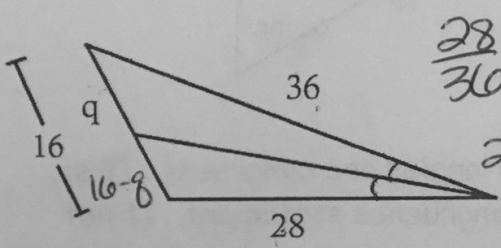
$$\boxed{g = 9}$$

17.) Find the length of $\overline{AB}$.
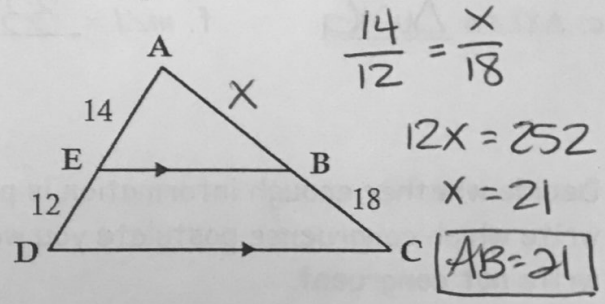
$$\frac{14}{12} = \frac{x}{18}$$

$$12x = 252$$

$$x = 21$$

$$\boxed{AB = 21}$$

18.) A 40-foot flagpole casts a 25-foot shadow. Find the shadow cast by a nearby building 200 feet tall. (draw a diagram and solve)

$$\frac{40}{25} = \frac{200}{x} \qquad 40x = 5000$$

$$\boxed{x = 125 ft}$$

19.) Two extension ladders are leaning at the same angle against a vertical wall. The 3-m ladder reaches 2.4 m up the wall. How much farther up the wall does the 8-m ladder reach? (draw a diagram and solve)
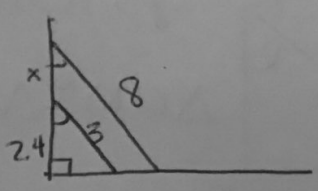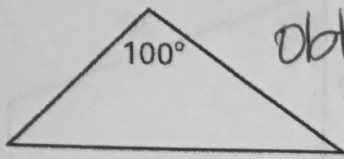
$$\frac{3}{2.4} = \frac{8}{x+2.4} \qquad 3x + 7.2 = 19.2$$

$$3x = 12$$

$$\boxed{x = 4m}$$

Classify the triangle.

1.

100°   obtuse
        scalene

2.

Isosceles
acute

75°   75°

3. Find the measure of each numbered angle.

$m\angle 4 = 120°$
$m\angle 2 = 120°$
$m\angle 1 = 60°$ $m\angle 6 = 30°$
$m\angle 3 = 60°$ $m\angle 5 = 30°$

6 1 2   5
40° 4 3

20°
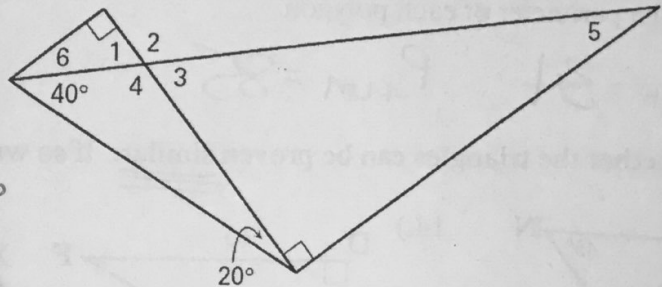
4. In the diagram, $\triangle LAX \cong \triangle IGW$. Complete the statement.

a. $\angle X \cong$ $\underline{\angle W}$

d. $m\angle A =$ $\underline{55°}$

b. $\overline{LA} \cong$ $\underline{\overline{IG}}$

e. $LX =$ $\underline{4cm}$

c. $\triangle XLA \cong$ $\underline{\triangle WIG}$

f. $m\angle I =$ $\underline{33°}$

L   33°   A
4 cm   92°   55°   33°
        X   W   92°
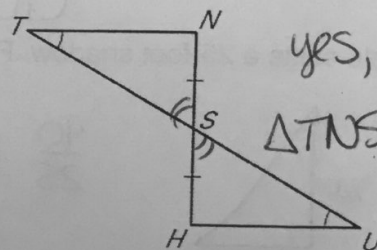   55°
                G
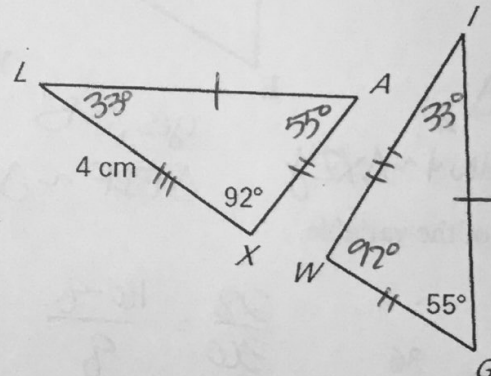
Decide whether enough information is provided to show the triangles are congruent. If so, write which congruence postulate you would use and write a congruence statement. If not, write **not congruent**.
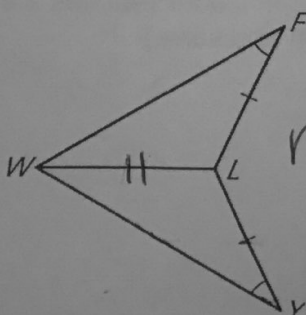
5.
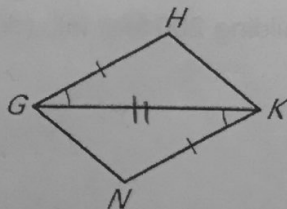
H   yes, SAS
G   K
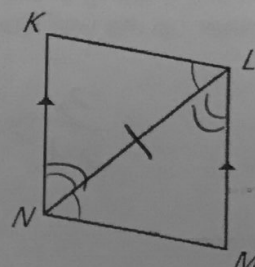 $\triangle GHK \cong \triangle KNG$
    N

6.

T   N   yes, AAS
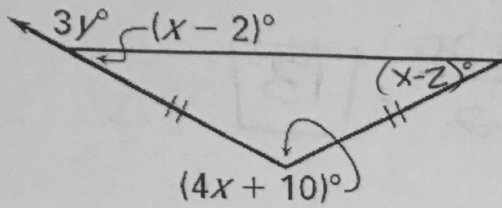   S $\triangle TNS \cong \triangle UHS$
H   U

7.

        F
W   L   not congruent
        Y

8.

K   L   yes, ASA
                    $\triangle KLN \cong \triangle MNL$
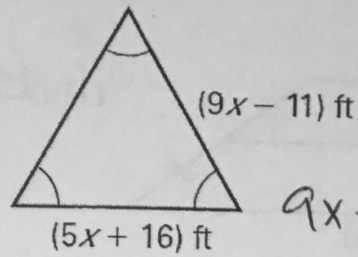   N
        M

9. Solve for x and y.

$3y° \quad (x-2)°$

$(x-2)°$

$(4x+10)°$

$x-2 + x-2 + 4x+10 = 180$

$6x + 6 = 180$

$6x = 174$

$\boxed{x = 29}$

10. Solve for x.

$(9x-11)$ ft

$(5x+16)$ ft

$9x-11 = 5x+16$

$4x-11 = 16$

$4x = 27$

$\boxed{x = 6.75}$

Unit 6: Using Congruent Triangles
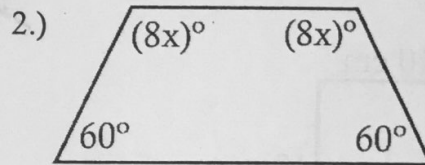
Use the information in the diagram to solve for x.

1.) $(7x)°$

$120°$

$80°$

$7x + 90 + 80 + 120 = 360 \quad 7x = 70$

$7x + 290 = 360 \quad \boxed{x = 10}$

2.) $(8x)° \quad (8x)°$
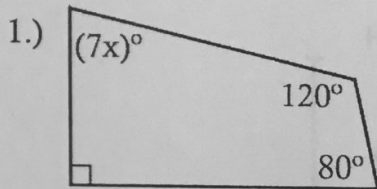
$60° \quad 60°$

$8x = 120$

$\boxed{x = 15}$

Find the value of each variable in the parallelogram.

3.) $(9x+2)°$

$70°$
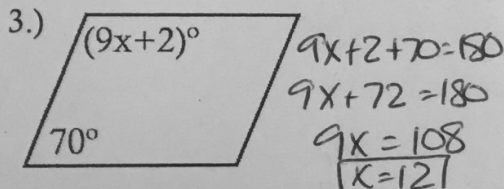
$9x + 2 + 70 = 180$

$9x + 72 = 180$

$9x = 108$

$\boxed{x = 12}$

4.) $4a+10 \quad 7a+7$

$4a+10 = 7a+7$

$3 = 3a$

$\boxed{a = 1}$

5.) 10
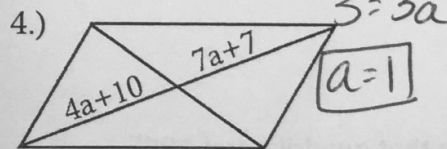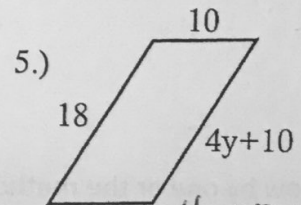
$18 \quad 4y+10$

$4y + 10 = 18$

$4y = 8$

$\boxed{y = 2}$

Describe how you would prove ABCD is a parallelogram.

6.) A   D

B   C

Alt. Int. Angles make $\overline{AD} \parallel \overline{BC}$ so then opposite sides parallel

7.) A   D

B   C

Alt. Int. Angles make $\overline{AD} \parallel \overline{BC}$ so then one pair of opposite sides is both congruent + parallel
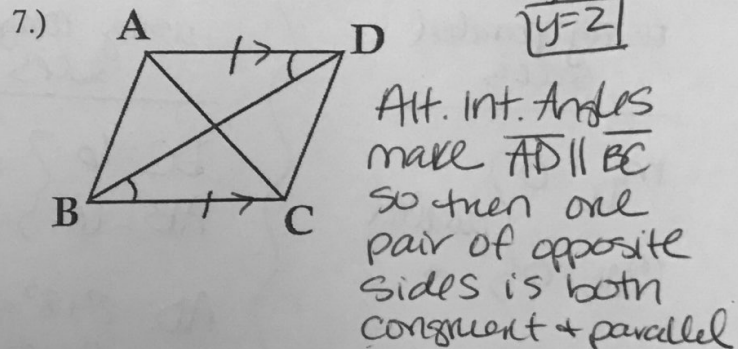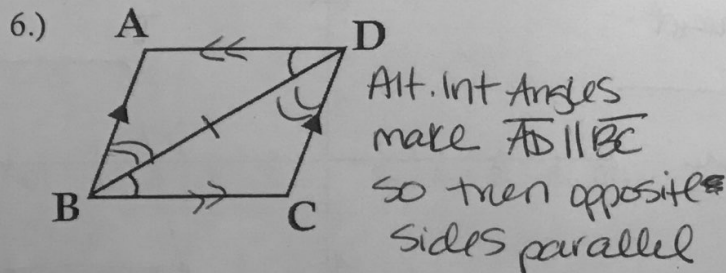
Find the values of x and y.

8.) ABCD is a rhombus.

A

13

B   D

$2y+5 \quad 3x-2$

C
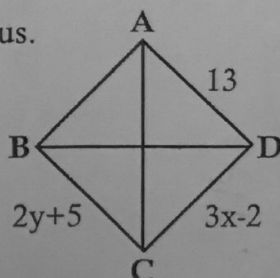
$3x-2 = 13$

$3x = 15$

$\boxed{x = 5}$

$2y + 5 = 13$

$2y = 8 \quad \boxed{y = 4}$

9.) ABCD is a rectangle.

A $11x+14$ D

$6y+10$ $3y+10$

B $9x+18$ C
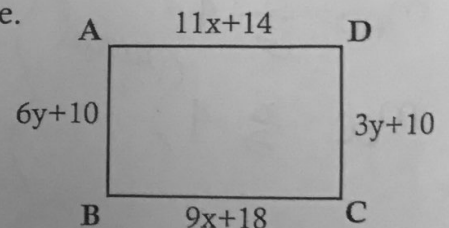
$6y+10 = 3y+10$

$6y = 3y$

$3y = 0$

$\boxed{y = 0}$

$11x + 14 = 9x + 18 \quad \boxed{x = 2}$

$2x = 4$

Scanned by CamScanner

Find the value of x.

10.)

6

x

20
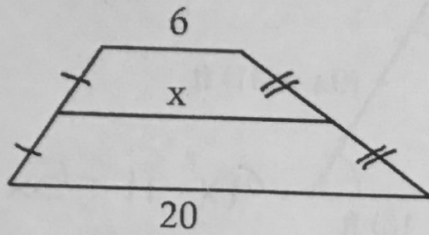
$$\text{midsegment} = \frac{6+20}{2} = \boxed{13}$$

~~Find the area of each polygon.~~

~~11.)~~ (crossed out)

10 cm

12 cm

16 cm

~~12.)~~ (crossed out)

⊢ 10 in ⊣

24 in
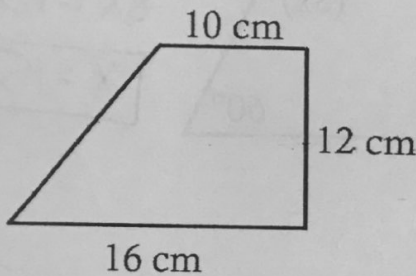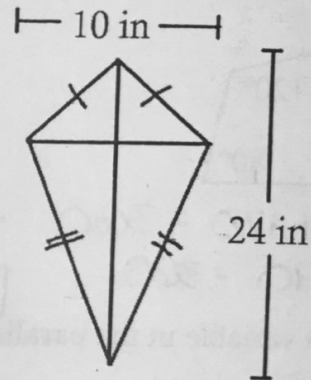
13.) Show by one or the methods that quadrilateral ABCE
Is a parallelogram with given vertices:

A(5, -4), B(11, -4), C(13, 4), D(7, 4)

using parallel
sides

$m_{DC} = 0$ ⎫ parallel
$m_{AB} = 0$ ⎭

$m_{AD} = \frac{8}{2} = 4$ ⎫ parallel
$m_{BC} = \frac{8}{2} = 4$ ⎭

using congruent
sides

$DC = 6$ ⎫ ≅
$AB = 6$ ⎭

AD: $2^2 + 8^2 = c^2$
$4 + 64 = c^2$
$68 = c^2$
$c = 8.25$

BC: $2^2 + 8^2 = c^2$
$4 + 64 = c^2$
$68 = c^2$
$c = 8.25$ ⎫ ≅