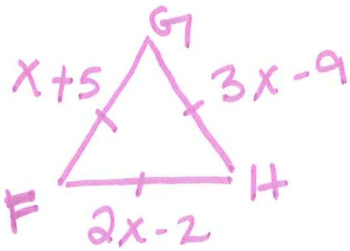
Name: Key Date: ____________ Hour: ________

4.1 & 4.2 (Triangle Basics) 5.2 & 5.4 (Triangle Inequality)

4.1 Warm-Up:

Directions: Find x and the measure of each side of the triangle.

1. $\triangle FGH$ is equilateral with $FG = x + 5$, $GH = 3x - 9$, and $FH = 2x - 2$.



$FG \cong GH$ def of Equilateral triangles

$x+5 = 3x-9$

$\boxed{7 = x}$

X= 7

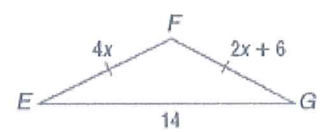
FG= 12

GH= 12

FH= 12

4.1 Warm-Up:

2. *Find x and the measure of each side of isosceles triangle EFG.*



$EF \cong FG$ def of isosceles

$4x = 2x + 6$

$\boxed{x = 3}$

$\boxed{EG = 14}$

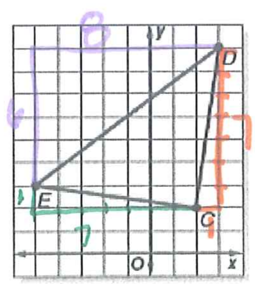
$\boxed{EF = 12}$

$\boxed{FG = 12}$

4.1 Warm-Up:

3. **COORDINATE GEOMETRY** Find the measures of the sides of $\triangle DEC$. Classify the triangle by sides.

Use the Distance Formula to find the lengths of each side.



$1^2 + 7^2 = DG^2$

$50 = DG^2$

$\boxed{5\sqrt{2} = DG}$

$1^2 + 7^2 = EG^2$

$\boxed{5\sqrt{2} = EG}$

$6^2 + 8^2 = DE^2$

$\boxed{10 = DE}$

$\triangle DEC$ is isosceles because it has 2 $\cong$ sides ($DG \cong EG$)

5.4 Warm-Up:

4. If two of the sides of a triangle are 15 and 42, what is the range of possible values for the third side?

27 < X < 57

$X + 15 = 42$
smallest

$15 + 42 = X$
X is the largest

5.4 Warm-Up:

5. Determine whether a triangle can be formed by the given set of side lengths is 8ft, 12ft, 3ft. Explain why or why not.

$8 + 3 = 11$

$11 < 12$ so No, a triangle must have the sum of the 2 smaller sides Greater than the 3rd side.

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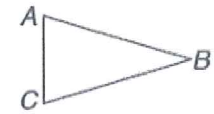
Properties of Isosceles Triangles

An **isosceles triangle** has two congruent sides. The angle formed by these sides is called the **vertex angle**. The other two angles are called **base angles**. You can prove a theorem and its converse about isosceles triangles.

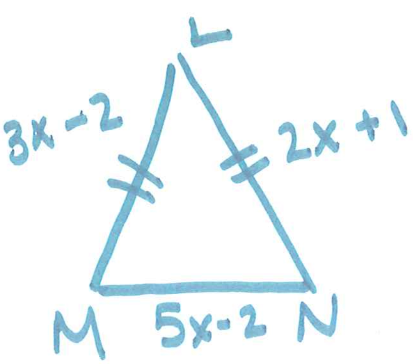
- If two sides of a triangle are congruent, then the angles opposite those sides are congruent. **(Isosceles Triangle Theorem)**
- If two angles of a triangle are congruent, then the sides opposite those angles are congruent.



If $\overline{AB} \cong \overline{CB}$, then $\angle A \cong \angle C$.

If $\angle A \cong \angle C$, then $\overline{AB} \cong \overline{CB}$.

EX1. ΔLMN is isosceles, <L is the vertex angle, LM = 3x – 2, LN = 2x + 1, and MN = 5x – 2.



LM≅LN def of isosceles Δ

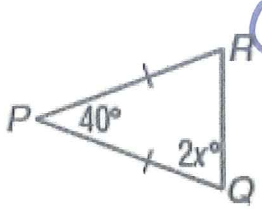
3x-2 = 2x+1

x = 3

X= 3 LM= 7

LN= 7 MN= 13

EX2. Find x. ① <R ≅ <Q base <s of isosc. Δ's are ≅



② <P+<Q+<R = 180 Δ Sum

40+2x+2x=180

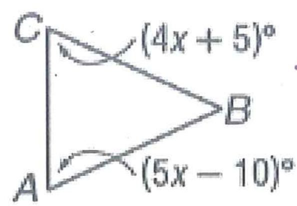
40+4x=180

4x=140

$\boxed{x=35}$

EX3. Find x. If BC≅BA.

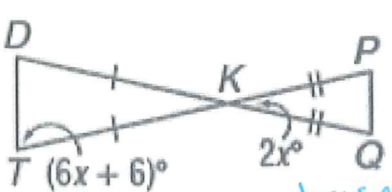
<C ≅ <A Base<s of iso. Δs are ≅



4x+5=5x-10

$\boxed{15=x}$

EX4. Find x.



<T ≅ <D base <s of isos Δ are ≅

<PKQ ≅ <TKD vertical <s are ≅

<D+<T+<TKD=180 Δ sum

6x+6+6x+6+2x =180

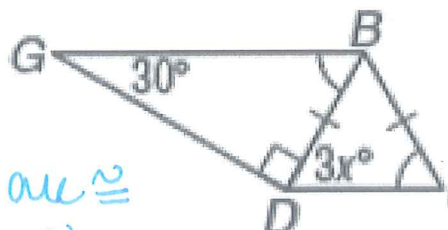
14x+12 =180 $\boxed{x=12}$

EX5. Find x. Given <GBD ≅ <L

<G+<GBD+<BDG=180

Δ sum

$\boxed{<GBD=60°}$



<L ≅ <BDL base <s of isos Δ's are ≅

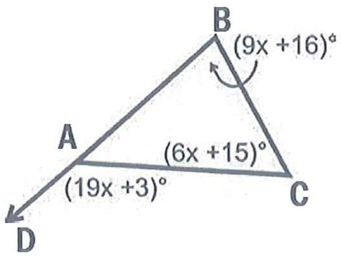
60=3x

$\boxed{20=x}$

Name: ______________________ Date: __________ Hour: ________

4.2 Angle Example:

Exterior Angle Theorem: The measure of the exterior angle is the sum of the measures of the remote interior angles.



$\angle B + \angle C = \angle CAD$ Ext. $\angle$ Thm.

$9x+16+6x+15=19x+3$

$15x+31=19x+3$

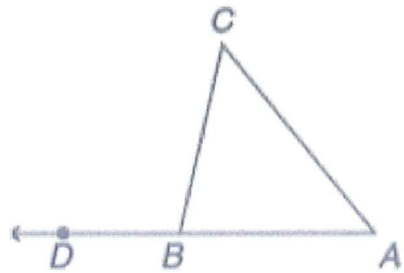
$28=4x$

$7=x$

<u>4.2 Proof that the Exterior Angle Theorem WORKS!</u>

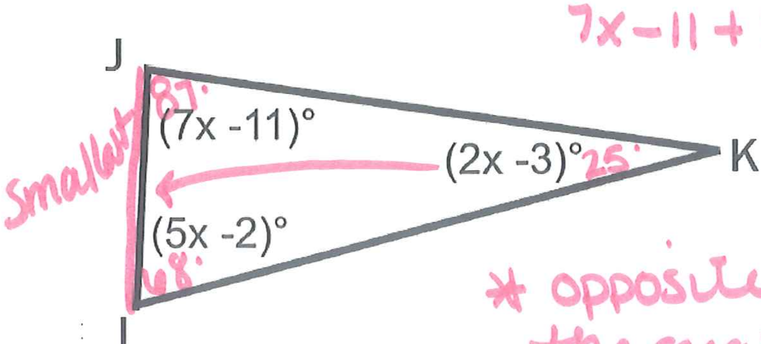
Given: ΔABC

Prove: $\angle A + \angle C = \angle DBC$



1. ΔABC	1. given
2. $\angle A + \angle ABC + \angle C = 180$	2. Δ sum
3. $\angle DBC + \angle ABC = 180°$	3. linear pairs are suppl.
4. $\angle A + \angle ABC + \angle C = \angle DBC + \angle ABC$	4. subs.
5. $\angle A + \angle C = \angle DBC$	5. subt.

4.2 and 5.4 Spiral Example: List the sides in order from least to greatest.



$\angle J + \angle K + \angle L = 180$ Δ sum

$7x-11+2x-3+5x-2=180$

$x=14$

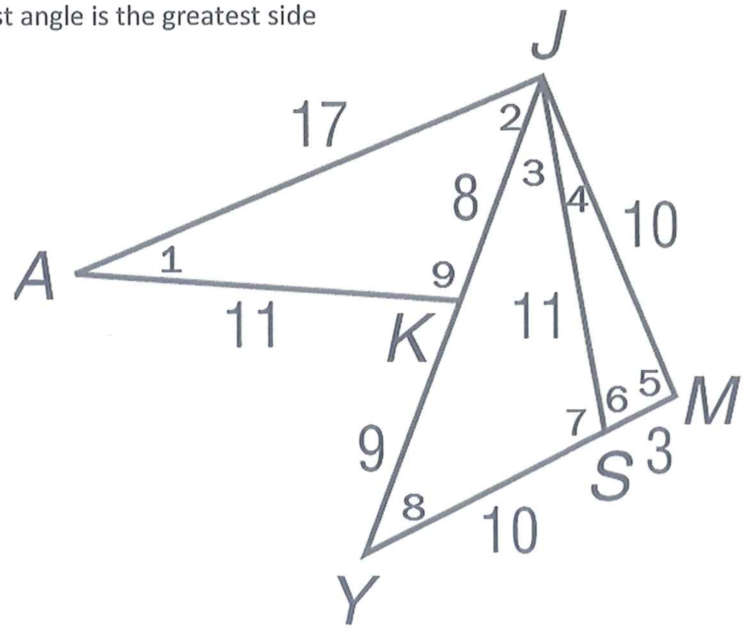
* opposite the greatest $\angle$ is the greatest side.

$\overline{JL}$, $\overline{JK}$, $\overline{LK}$

least ... Greatest

Name: ______________________________ Date: __________ Hour: ________

5.2 Side Angle Theorem Practice: Opposite the greatest angle is the greatest side



1.) For ΔAKJ list the angles from least to greatest.

∡1 < ∡2 < ∡9

2.) For ΔJYM list the angles from greatest to least.

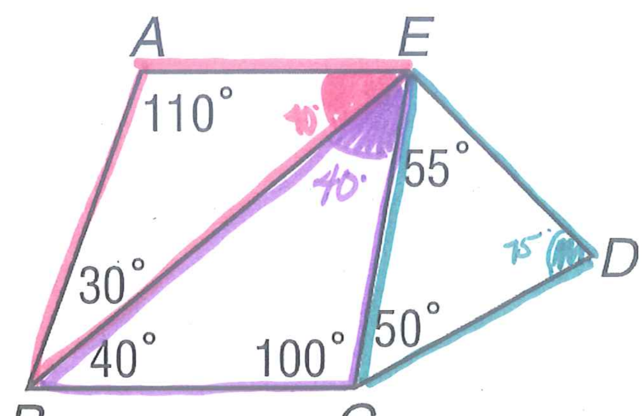
∡5 > ∡ YJM > ∡8

3.) What is the smallest angle in ΔJMS?

<4

4.) What is the greatest angle in ΔJSY?

<7



5.) Find m<AEB. 40°

6.) Find m<CEB. 40°

7.) Find m<CDE. 75°

8.) List the sides of ΔABE in order from greatest to least.

~~BE, AB, AE~~ → BE > AB > AE

9.) What is the greatest side of ΔCDE?

CE

10.) List the sides of ΔBCE in order from least to greatest.

BC = EC < EB