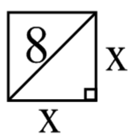
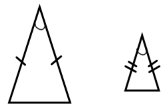
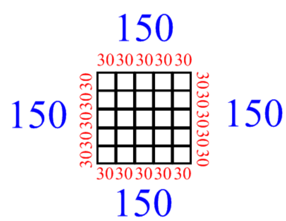
Name: ______________________________ Per: ____

Geometry: 1st Semester Benchmark Exam
Example Sheet 4

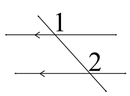
Study Guide Problem & Solution		**New Example**
The lengths of two sides of a triangle are 5 inches and 11 inches. Find the range of possible lengths for the third side, *s*. **The third side MUST BE long enough to connect the other two (<u>bigger than the space between them—subtract</u>) AND short enough that the other two can both connect to it (<u>smaller than the total distance of the others—add</u>).** **So...** Subtraction < 3rd side < Addition $11-5 < s < 11+5$ **$6 < s < 16$**	41	The lengths of two sides of a triangle are 3 inches and 12 inches. Find the range of possible lengths for the third side, *s*.
The diagonal of a square is 8 inches. How long is one side? **Use the Pythagorean theorem.**  $x^2 + x^2 = 8^2$ $2x^2 = 64$ $x^2 = 32$ $x = \sqrt{32} = \sqrt{16}\sqrt{2} = \mathbf{4\sqrt{2}}$	42	The diagonal of a square is 12 inches. How long is one side?
The sum of the exterior angles of a polygon is two times the sum of the interior angles. What type of polygon is it? a) Triangle **– 3 sides** b) Quadrilateral **– 4 sides** c) Pentagon **– 5 sides** d) Hexagon **– 6 sides** e) Decagon **– 10 sides** **The formula for the sum of the interior angles is $(n-2)(180)$. n = number of sides.** **For this problem, the sum of the exterior angles (360°) = 2 times the sum of the interior angles (n–2)(180).** **Set up the equation and solve for the number of sides.** ext. ∠ sum = 2(int. ∠ sum) $360 = 2[(n-2)(180)]$ ← **Plugged in the ext. & int. ∠s** $180 = (n-2)(180)$ ← **Divided both sides by 2** $1 = n-2$ ← **Divided both sides by 180** $3 = n$ ← **Added 2 to both sides** **The number of sides is 3! It's a <u>TRIANGLE!</u>**	43	The sum of the exterior angles of a polygon is half of the sum of the interior angles. What type of polygon is it?
What makes a triangle *similar*? **Triangles are similar when the corresponding angles are congruent and the corresponding sides are proportional (fractions are equal). To <u>prove</u> they're similar, you need to have SSS (all 3 sides), SAS (2 sides and the angle between), or AA (2 angles).** Are all obtuse triangles *similar*? **No. All angles between 90° & 180° are "obtuse." You need <u>two</u> CONGRUENT angles to prove similarity. "Obtuse" refers to one angle, and doesn't tell its size.** Are all acute triangles *similar*? **No. All angles between 0° & 90° are "acute." You need <u>two</u> CONGRUENT angles to prove similarity. "Acute" refers to only one angle, and doesn't tell its measure.** Are all isosceles triangles *similar*? **No. Isosceles means that ONE triangle has two congruent**	44	a. ΔLMN and ΔDEF are both acute. m∠D=m∠L. Are they similar? b. ΔLMN and ΔDEF are both obtuse. m∠D=m∠L. Are they similar? c. ΔLMN and ΔDEF are both isosceles. m∠D = m∠F, m∠L = m∠M & m∠D=m∠L. Are they similar?

ANGLES. THAT SET OF CONGRUENT ANGLES MAY NOT BE THE SAME AS THE CONGRUENT ANGLES ON THE OTHER TRIANGLE. HOWEVER, IF THE VERTEX ANGLE (ON BOTH TRIANGLES) MATCHES, THEN THE ISOSCELES TRIANGLES MUST BE SIMILAR. 		
Find the length of the line segment with endpoints (-2, 5) and (1, 11). Write your answer in the simplest radical form. $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $d=\sqrt{(1-(-2))^2+(11-5)^2}=\sqrt{(3)^2+(6)^2}=\sqrt{9+36}=\sqrt{45}=\sqrt{9}\sqrt{5}$ $d=3\sqrt{5}$	45	Find the length of the line segment with endpoints (-2, 8) and (4, 12). Write your answer in the simplest radical form.
A sewing club is making a quilt consisting of 25 squares with each side of the square measuring 30 centimeters. If the quilt has 5 rows and 5 columns, what is the perimeter of the quilt? THE QUILT WOULD HAVE 5 ROWS & 5 COLUMNS LIKE THE PICTURE TO THE RIGHT. THE SIDE OF EACH SQUARE IS 30, SO EACH SIDE OF THE QUILT IS: (30)(5)=150 cm PERIMETER IS THE SUM OF THE SIDES, SO: P = 150 + 150 + 150 + 150 = 600 CM 	46	A sewing club is making a quilt consisting of 16 squares with each side of the square measuring 20 centimeters. If the quilt has 4 rows and 4 columns, what is the perimeter of the quilt?

The Properties You Need to Know for the Final

Angle Addition Postulate
$m\angle ABC + m\angle CBD = m\angle ABD$

Corresponding Angles Postulate



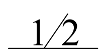
$\angle 1 \cong \angle 2$

Definition of Complementary Angles
$m\angle G + m\angle H = 90°$

Definition of Congruence
$PQ = RS$ / $\overline{PQ} \cong \overline{RS}$ OR $\overline{PQ} \cong \overline{RS}$ / $PQ = RS$

Definition of Supplementary Angles
$m\angle A + m\angle B = 180°$

Linear Pair Theorem



$m\angle 1 + m\angle 2 = 180°$

Perpendicular Transversal Theorem
IF A TRANSVERSAL IS PERPENDICULAR TO ONE PARALLEL LINE, THEN IT IS PERPENDICULAR TO THE OTHER LINE.

Segment Addition Postulate
$XY + YZ = XZ$

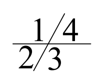
Substitution Property of Equality
IF $x = 4$, THEN
$5x - 2 = 5(4) - 2$

Reflexive Property of Equality
$4 = 4$ OR $2x = 2x$ OR $AB = AB$

Subtraction Property of Equality
IF $2x + 4 = 6$, THEN
$2x = 2$
(SUBTRACTED 4 FROM BOTH SIDES)

Transitive Property of Equality
IF $AB = BC$ AND $BC = CD$, THEN $AB = CD$

Vertical Angles Theorem



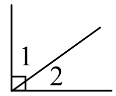
$\angle 1 \cong \angle 3$ OR $\angle 2 \cong \angle 4$

Study Guide Problem & Solution

Fill in the blank to complete the two-column proof.

Given: $\angle 1$ and $\angle 2$ are complementary. $m\angle 1 = 42^\circ$

Prove: $m\angle 2 = 48^\circ$



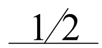
Proof:

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary.	1. Given
2. $m\angle 2 = 42^\circ$	2. Given
3. $m\angle 1 + m\angle 2 = 90^\circ$	3. [?] *They're complementary, so we know the angles add to 90°. So, Definition of Complementary angles.*
4. $42^\circ + m\angle 2 = 90^\circ$	4. Substitution Property
5. $m\angle 2 = 48^\circ$	5. Subtraction Property of Equality.

New Example

47 Fill in the blank to complete the two-column proof.

Given: $\angle 1$ and $\angle 2$ are a linear pair. $m\angle 2 = 57^\circ$



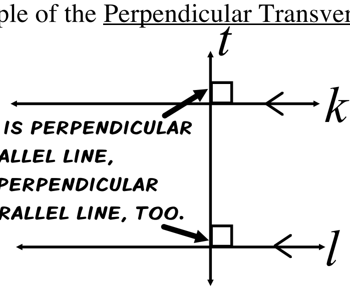
Prove: $m\angle 1 = 127^\circ$

Proof:

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are a linear pair.	1. Given
2. $m\angle 2 = 57^\circ$	2. Given
3. $m\angle 1 + m\angle 2 = 180^\circ$	3. Linear Pair Theorem
4. $m\angle 1 + 57^\circ = 90^\circ$	4. [?]
5. $m\angle 1 = 127^\circ$	5. Subtraction Property of Equality.

Study Guide Problem & Solution

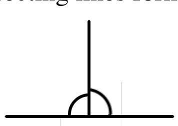
a) Explain and draw an example of the Perpendicular Transversal Theorem



If the transversal is perpendicular to ONE parallel line, then it must be perpendicular to the OTHER parallel line, too.

If $t \perp k$ and $k \parallel l$, then $t \perp l$.

b) If 2 intersecting lines form a linear pair of congruent angles, then how many degrees must those two angles be?



A linear pair adds to equal 180°.

$m\angle 1 + m\angle 2 = 180^\circ$

$m\angle 1 = m\angle 2$ (*Substitute*)

$m\angle 2 + m\angle 2 = 180^\circ$

$2(m\angle 2) = 180^\circ$

$m\angle 2 = 90^\circ$

So, that means the two angles are 90°. The lines are perpendicular.

The property name is: *2 intersecting lines form lin. pair of $\cong$ $\angle$s $\rightarrow$ lines $\perp$*

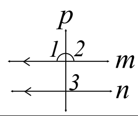
New Example

48 Fill in the blank to complete the two-column proof with the provided answer choices.

Given: $\angle 1$ and $\angle 2$ are a linear pair. $\angle 1 \cong \angle 2$.

Prove: $m\angle 3 = 90^\circ$

Proof:



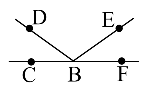
Answer choices:
–*Perpendicular Transversal theorem* or
– *2 intersecting lines form lin. pair of ≅ ∠s → lines ⊥*

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are a linear pair	1. Given
2. $\angle 1 \cong \angle 2$	2. Given
3. line $p \perp$ line m	3. [?]
4. line m || line n	4. [?]
5. $m\angle 3 = 90^\circ$	5. Definition of Perpendicular

Study Guide Problem & Solution

Complete the proof by supplying the missing reason.

Given that $m\angle CBE = m\angle FBD$, prove $m\angle CBD = m\angle FBE$.



$m\angle CBE = m\angle FBD$	Given information
$m\angle CBE = m\angle CBD + m\angle EBD$	Angle Addition Postulate
$m\angle FBD = m\angle FBE + m\angle EBD$	[?] *Two angles added up to equal a third angle. So, Angle Addition Postulate.*
$m\angle CBD + m\angle EBD = m\angle FBE + m\angle EBD$	Substitution Property of Equality
$m\angle CBD = m\angle FBE$	Subtraction Property of Equality.

New Example

49 Complete the proof by supplying the missing reason.

Given that AB = 4, and BC = 7, prove AC = 11.

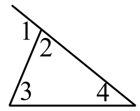
AB = 4, and BC = 7	Given information
AB + BC = AC	[?]
4 + 7 = AC	Substitution Property of Equality
11 = AC	Simplify
AC = 11	Symmetric Property of Equality

Study Guide Problem & Solution

Complete the following proof.

Given: $m\angle 2 + m\angle 3 + m\angle 4 = 180°$

Prove: $m\angle 1 = m\angle 3 + m\angle 4$



Proof:

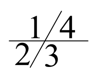
Statements	Reasons
1. $m\angle 2 + m\angle 3 + m\angle 4 = 180°$	1. Given
2. $m\angle 3 + m\angle 4 = 180° - m\angle 2$	2. Subtraction Property of Equality
3. $m\angle 1 + m\angle 2 = 180°$	3. [?] $\angle 1$ & $\angle 2$ ARE A LINEAR PAIR, SO, LINEAR PAIR THEOREM.
4. $m\angle 1 = 180° - m\angle 2$	4. Subtraction Property of Equality
5. $m\angle 1 = m\angle 3 + m\angle 4$	5. Substitution

New Example

50 Complete the following proof.

Given: $\angle 2$ and $\angle 4$ are vertical angles.

Prove: $m\angle 2 = m\angle 4$



Proof:

Statements	Reasons
1. $\angle 2$ and $\angle 4$ are vertical angles.	1. Given
2. $\angle 2 \cong \angle 4$	2. Definition of Vertical Angles
3. $m\angle 2 = m\angle 4$	3. [?]