# *Warm up part 1*
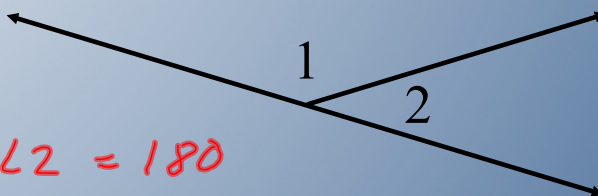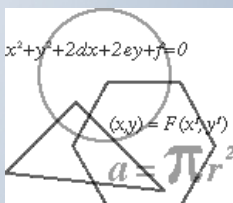
*What statements can you make about ∠1 & ∠2?*
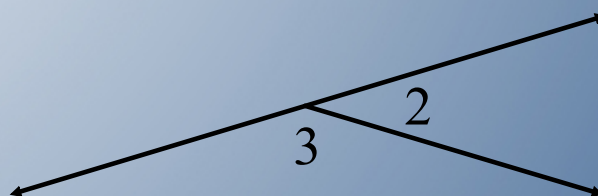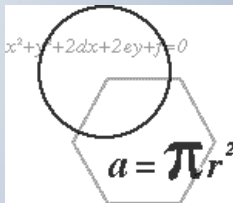
$$m\angle 1 + m\angle 2 = 180$$
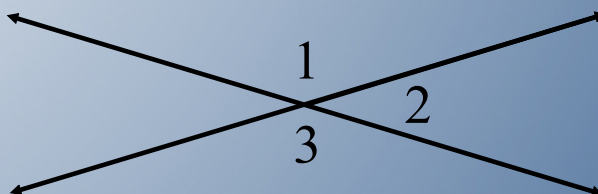


# *Warm up part 2*

*What statements can you make about ∠2 & ∠3?*

$$m\angle 3 + m\angle 2 = 180$$

## Warm up part 3

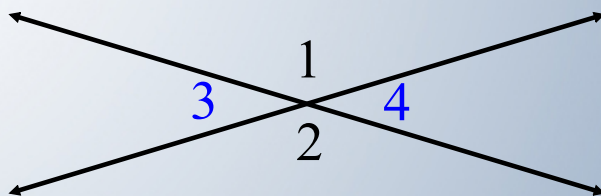*What statements can you make about ∠1 & ∠3?*

Conj: $\angle 1 \cong \angle 3$

$$x^2+y^2+2dx+2ey+f=0$$

$$a = \pi r^2$$

1
2
3

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Let $x = y$

| | |
|---|---|
| $x = y$ | Given |
| $x \cdot x = x \cdot y$ | Mult POE |
| $x^2 = xy$ | Simpl |
| $x^2 - y^2 = xy - y^2$ | Subtr POE |
| $\dfrac{(x-y)(x+y)}{(x-y)} = \dfrac{y(x-y)}{(x-y)}$ | Dist Prop |
| $x + y = y$ | Div POE |
| $y + y = y$ | Subst POE |
| $2y = y$ | Simpl |
| $\dfrac{2y}{y} = \dfrac{y}{y}$ | |
| $2 = 1$ | Div POE |

What is WRONG?
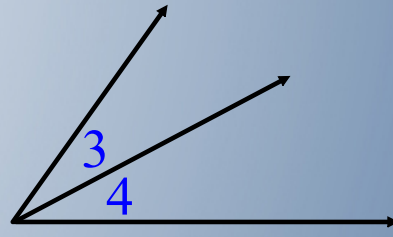
Angle Pairs
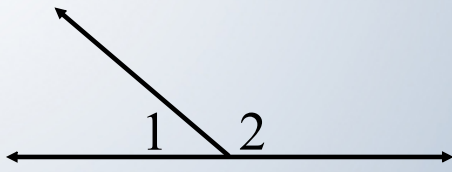Vert ∠'s
Adj ∠'s
Compl ∠'s
Suppl - ∠'s

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*Vertical angles*



Defn:

Two ∠'s whose sides form two pairs of opposite rays.
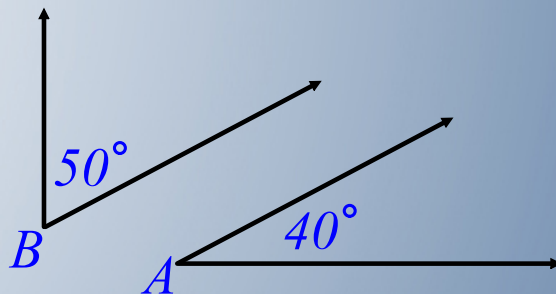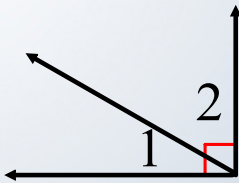
*Adjacent angles*



Defn:

Two coplanar angles with:

1. a common side

2. a common vertex

3. no common interior points

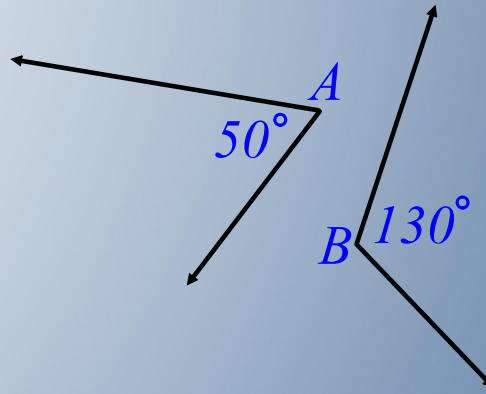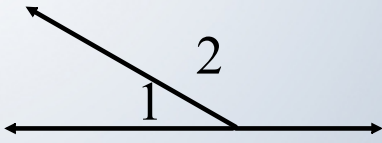---

*Complementary angles*



Defn:

Two angles whose measures have sum $90°$.

Do *NOT* have to share a common side or vertex.

## Supplementary angles



Defn:

Two angles whose measures have sum $180^\circ$.

Do **NOT** have to share a common side or vertex.

## Drawing conclusions from diagrams



Conclusions you can draw from diagrams:
1.   adjacent ∠'s
2.   adjacent supplementary ∠'s
3.   vertical ∠'s

Can not **UNLESS** have special markings or info:
1.   congruent or segments (must be marked)
2.   right ∠'s (must be marked ⌐ or measured)
3.   non-adjacent supplementary ∠'s (marked or measured)
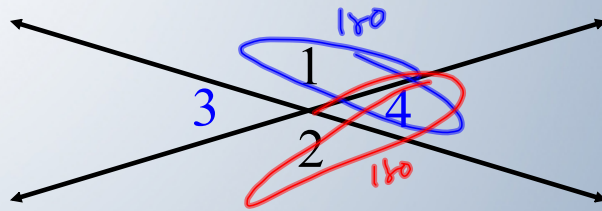4.   ‖ lines (matching arrow head marks mid-line)
5.   ⊥ lines (symbol)

*Example – Pg 97 Example 2*



*Example - Pg 97 Check Understanding 2*

a) $\overline{TW} \cong \overline{WV}$  Y

b) $\overline{PW} \cong \overline{WQ}$  N (no markings)

c) $\overline{TV} \perp \overline{PQ}$  N (no markings)

d) $\overline{TV}$ bisects $\overline{PQ}$  N (tricky!)

e) $W$ is the midpoint of $\overline{TV}$  Y
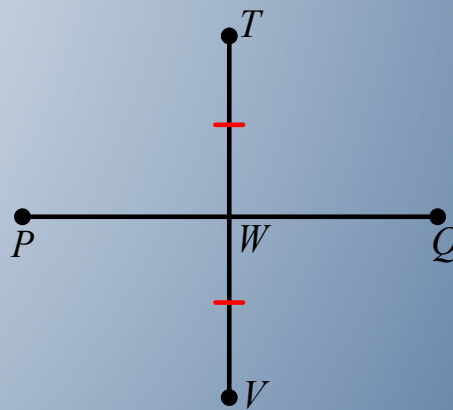
*Putting this all to work*



$m\angle 1 + m\angle 4 = 180$
$m\angle 2 + m\angle 4 = 180$

What conjecture could you make about the two vertical angles ∠1 and ∠2?

Conjecture: ∠1 ≅ ∠2

Given: ∠1 and ∠2 are vertical angles.

Prove: ∠1 ≅ ∠2

Plan: Use subst or trans POE

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*Proving vertical angles are congruent*
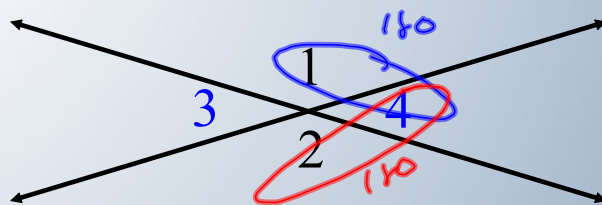


Conjecture: ∠1 ≅ ∠2

Given: ∠1 and ∠2 are vertical angles.

Prove: ∠1 ≅ ∠2

$m\angle 1 + m\angle 4 = 180$   given
$m\angle 2 + m\angle 4 = 180$   given
$180 = 180$   Refl POE
$m\angle 1 + m\angle 4 = m\angle 2 + m\angle 4$   subst POE
$-m\angle 4 \qquad -m\angle 4$
$m\angle 1 = m\angle 2$   Subtr POE
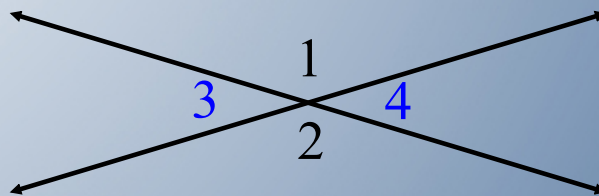∴ ∠1 ≅ ∠2   defn ≅ ∠'s
QED

*Definition*

A ***theorem*** is a proven conjecture.

A theorem can be used to establish following proofs.

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*Theorem 2-1 Vertical Angles Theorem*

Vertical angles are congruent.
$\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$

*Try it again...*

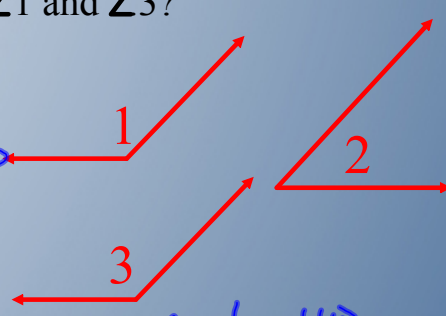Given that ∠1 & ∠2, and that ∠3 & ∠2 are both sets of supplementary angles, what would you conjecture about ∠1 and ∠3?

Conjecture: ∠1 ≅ ∠3

Given: m∠1 + m∠2 = 180, m∠3+m∠2=180

Prove: ∠1 ≅ ∠3

Plan: use substitution since both are equal to 180

$$m∠1 + m∠2 = 180 \quad \text{given}$$
$$m∠3 + m∠2 = 180 \quad \text{given}$$
$$180 = 180 \quad \text{Refl POE}$$
$$m∠1 + m∠2 = m∠3 + m∠2 \quad \text{Subst POE}$$
$$\underline{-m∠2 \qquad\qquad -m∠2}$$
$$m∠1 = m∠3 \quad \text{Subtr POE}$$
$$∴ ∠1 ≅ ∠3 \quad \text{defn ≅ ∠'s} \quad QED!$$

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*Theorem 2-2 Congruent Supplements Theorem*

If two angles are supplements of the same angle (or of congruent angles),

then the two angles are congruent.

*Theorem 2-3 Congruent Complements Theorem*

If two angles are complements of the same angle (or of congruent angles),

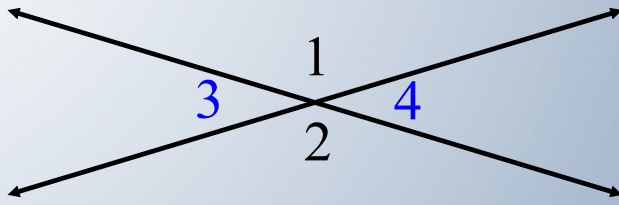then the two angles are congruent.

*Theorem 2-4*

All right angles are congruent.

*Theorem 2-5*

If two angles are congruent and supplementary,

then each is a right angle.

*Assigment*

Pg 100   #1-25 odd
             29-35
             39-42
             43-53 odd
             56-59

$$1$$
$$3 \quad 4$$
$$2$$

∠     ∠

∠     ∠          ∠     ∠

∠     ∠

=

=

||          =

─     ─

∠  ∠'s   ∠'s   ∠'s          ∠'s     ┌   ⊥     ─

$TW \cong WV$