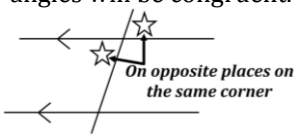
Name: _____

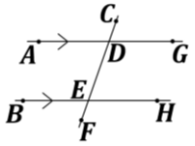
Vertical and Alternate Angles Theorems

Vertical Angles Theorem:
If two angles are vertical (on the same vertex of two crossing lines, but *not* next to each other), then the angles will be congruent.



Example:

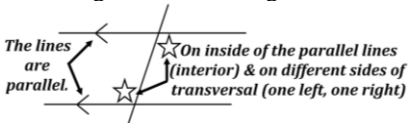
Given:



Prove: $\angle CDG \cong \angle ADE$

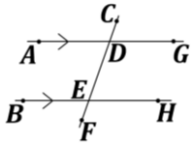
$\angle CDG$ & $\angle ADE$ are vertical angles	**Given**
$\angle CDG \cong \angle ADE$	**Vert. ∠s Thm**

Alternate Interior Angles Theorem:
If two angles are alternate interior angles (*are* between two lines but *not* on the same side of the transversal) **and** the lines are parallel, then the angles will be congruent.



Example:

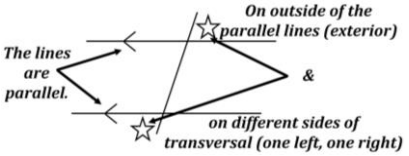
Given:



Prove: $\angle EDG \cong \angle DEB$

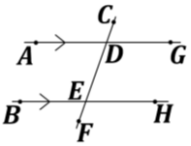
$\angle EDG$ & $\angle DEB$ are alternate interior ∠s	**Given**
$\overline{AG} \parallel \overline{BH}$	**Given**
$\angle EDG \cong \angle DEB$	**Alt. Int. ∠s Thm**

Alternate Exterior Angles Theorem:
If two angles are alternate exterior angles (*not* between two lines & *not* on the same side of the transversal) **and** the lines are parallel, then the angles will be congruent.



Example:

Given:

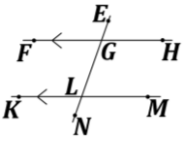


Prove: $\angle CDG \cong \angle FEB$

$\angle CDG$ & $\angle FEB$ are alternate exterior ∠s	**Given**
$\overline{AG} \parallel \overline{BH}$	**Given**
$\angle CDG \cong \angle FEB$	**Alt. Ext. ∠s Thm**

Complete each proof.

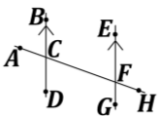
1. Given:



Prove: $\angle EGF \cong \angle HGL$

∠_____ & ∠_____ are _____ angles	Given

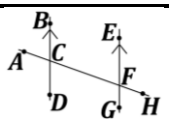
2. Given:



Prove: $\angle ACB \cong \angle GFH$

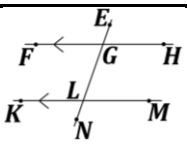
∠_____ & ∠_____ are _____ angles	Given
____ ∥ ____	Given

3. Given:



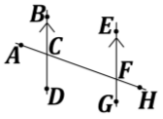
Prove: $\angle CFG \cong \angle EFH$

4. Given:



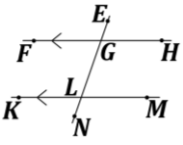
Prove: $\angle FGL \cong \angle MLG$

5. Given:



Prove: $\angle ACD \cong \angle EFH$

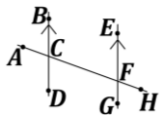
6. Given:



Prove: $\angle GLK \cong \angle LGH$

Name: _____

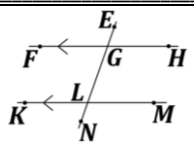
7. Given: $m\angle ACD = 157°$



Prove: $m\angle EFH = 157°$

∠____ & ∠____ are	Given
____ ∥ ____ & $m\angle ACD =$	Given
	Def. ≅
	Subst.

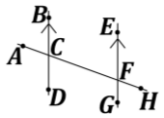
8. Given: $m\angle EGH = 73°$



Prove: $m\angle FGL = 73°$

∠____ & ∠____ are	Given
$m\angle EGH =$	Given
	Def. ≅
	Subst.

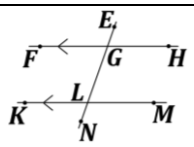
9. Given: $m\angle BCF = 157°$



Prove: $m\angle GFC = 157°$

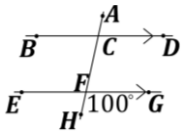
∠____ & ∠____ are	Given
____ ∥ ____ & $m\angle BCF =$	Given

10. Given: $m\angle EGH = 73°$



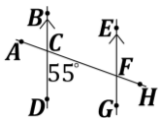
Prove: $m\angle FGL = 73°$

11. Given:



Prove: $m\angle ACB = 100°$

12. Given:



Prove: $m\angle CFE = 55°$

Name: _____

Vertical and Alternate Angles Theorems Answers

1.

$\angle EGF$ & $\angle HGL$ are **vertical angles**	Given
$\angle EGF \cong \angle HGL$	**Vert. $\angle s$ Thm**

2.

$\angle ACB$ & $\angle GFH$ are **alternate exterior angles**	Given
$\overline{BD} \parallel \overline{EG}$	Given
$\angle ACB \cong \angle GFH$	**Alt. Ext. $\angle s$ Thm.**

3.

$\angle CFG$ & $\angle EFH$ are **vertical angles**	Given
$\angle CFG \cong \angle EFH$	**Vert. $\angle s$ Thm**

4.

$\angle FGL$ & $\angle MLG$ are **alternate interior angles**	Given
$\overline{FH} \parallel \overline{KM}$	Given
$\angle FGL \cong \angle MLG$	**Alt. Int $\angle s$ Thm**

5.

$\angle ACD$ & $\angle EFH$ are **alternate exterior angles**	Given
$\overline{BD} \parallel \overline{EG}$	Given
$\angle ACD \cong \angle EFH$	**Alt. Ext $\angle s$ Thm**

6.

$\angle GLK$ & $\angle LGH$ are **alternate interior angles**	Given
$\overline{FH} \parallel \overline{KM}$	Given
$\angle GLK \cong \angle LGH$	**Alt. Int. $\angle s$ Post.**

7.

$\angle EFH$ & $\angle ACD$ are alt. ext. $\angle s$	Given
$\overline{BD} \parallel \overline{EG}$ & $m\angle ACD = 157°$	Given
$\angle EFH \cong \angle ACD$	Alt. Ext. $\angle s$ Thm
$m\angle EFH = m\angle ACD$	Def. $\cong$
$m\angle EFH = 157°$	Subst.

8.

$\angle FGL$ & $\angle EGH$ are vert. $\angle s$	Given
$m\angle EGH = 73°$	Given
$\angle FGL \cong \angle EGH$	Vert. $\angle s$ Thm
$m\angle FGL = m\angle EGH$	Def. $\cong$
$m\angle FGL = 73°$	Subst.

9.

$\angle GFC$ & $\angle BCF$ are alt. int. $\angle s$	Given
$\overline{BD} \parallel \overline{EG}$ & $m\angle BCF = 157°$	Given
$\angle GFC \cong \angle BCF$	Alt. Int. $\angle s$ Thm
$m\angle GFC = m\angle BCF$	Def. $\cong$
$m\angle GFC = 157°$	Subst.

10.

$\angle FGL$ & $\angle EGH$ are vert. $\angle s$	Given
$m\angle EGH = 73°$	Given
$\angle FGL \cong \angle EGH$	Vert. $\angle s$ Thm
$m\angle FGL = m\angle EGH$	Def. $\cong$
$m\angle FGL = 73°$	Subst.

11.

$\angle ACB$ & $\angle GFH$ are alt. ext. $\angle s$	Given
$\overline{BD} \parallel \overline{EG}$ & $m\angle GFH = 100°$	Given
$\angle ACB \cong \angle GFH$	Alt. Ext. $\angle s$ Thm
$m\angle ACB = m\angle GFH$	Def. $\cong$
$m\angle ACB = 100°$	Subst.

12.

$\angle CFE$ & $\angle DCF$ are alt. int. $\angle s$	Given
$\overline{BD} \parallel \overline{EG}$ & $m\angle DCF = 55°$	Given
$\angle CFE \cong \angle DCF$	Alt. Int. $\angle s$ Thm
$m\angle CFE = m\angle DCF$	Def. $\cong$
$m\angle CFE = 55°$	Subst.