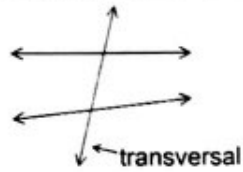
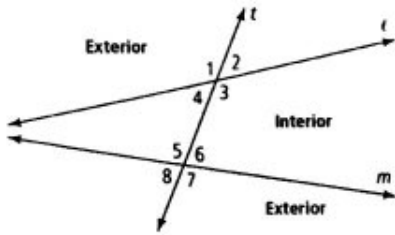


SM2H 7.2 Parallell Lines and Angle Relationships Notes

Transversal: A line that intersects two or more coplanar lines at different points.

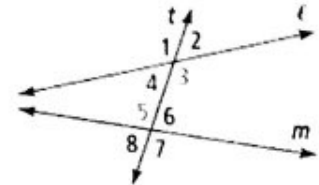


Angle Pairs Formed by Transversals:



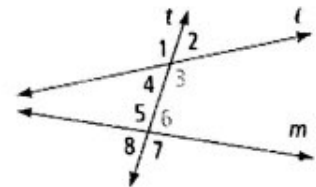
Definition
Alternate interior angles are nonadjacent interior angles that lie on opposite sides of the transversal.

Example
 $\angle 4$ and $\angle 6$
 $\angle 3$ and $\angle 5$



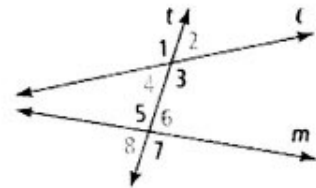
Same-side interior angles are interior angles that lie on the same side of the transversal.

$\angle 4$ and $\angle 5$
 $\angle 3$ and $\angle 6$



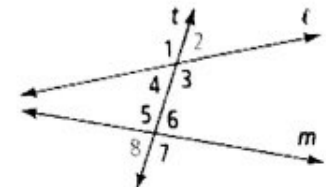
Corresponding angles lie on the same side of the transversal t and in corresponding positions.

$\angle 1$ and $\angle 5$
 $\angle 4$ and $\angle 8$
 $\angle 2$ and $\angle 6$
 $\angle 3$ and $\angle 7$

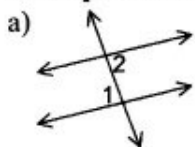


Alternate exterior angles are nonadjacent exterior angles that lie on opposite sides of the transversal.

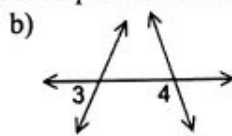
$\angle 1$ and $\angle 7$
 $\angle 2$ and $\angle 8$



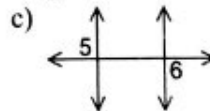
Examples: Describe the relationship between the numbered angles.



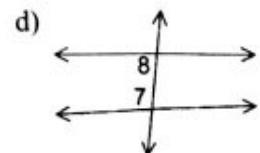
Alter nate
Interior
angles



Corresponding
angles

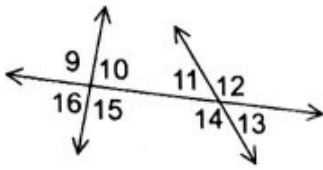


alter nate
exterior
angles



Same side
interior
angles

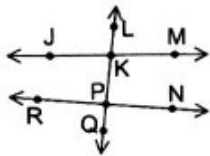
Examples: List all pairs of angles that fit the description.



- a) alternate exterior
 $\angle 9 + \angle 13$ $\angle 16 + \angle 12$
- c) same-side interior
 $\angle 10 + \angle 11$
 $\angle 15 + \angle 14$

- b) corresponding
 $\angle 9 + \angle 11$ $\angle 16 + \angle 14$
 $\angle 10 + \angle 12$ $\angle 15 + \angle 13$
- d) alternate interior
 $\angle 10 + \angle 14$
 $\angle 11 + \angle 15$

Examples: Describe the relationship between each pair of angles.

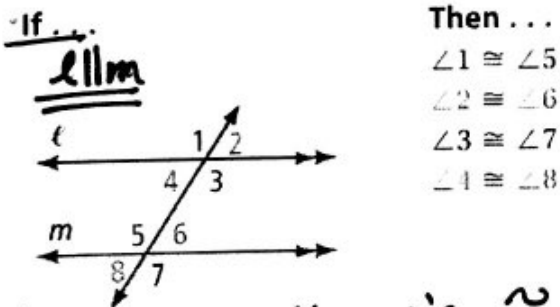


- a) $\angle JKP$ and $\angle KPN$
 alternate interior
- c) $\angle JKL$ and $\angle RPK$
 Corresponding

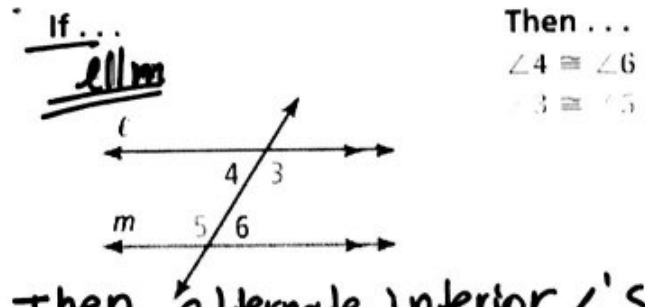
- b) $\angle LKM$ and $\angle QPR$
 alternate exterior
- d) $\angle JKP$ and $\angle KPR$
 Same side interior

Corresponding Angles Postulate: If a transversal intersects two parallel lines, then corresponding angles are congruent.

Alternate Interior Angles Theorem: If a transversal intersects two parallel lines, then alternate interior angles are congruent.



- Then ...
- $\angle 1 \cong \angle 5$
 - $\angle 2 \cong \angle 6$
 - $\angle 3 \cong \angle 7$
 - $\angle 4 \cong \angle 8$



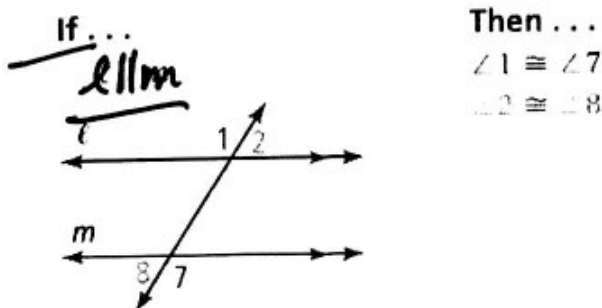
- Then ...
- $\angle 4 \cong \angle 3$
 - $\angle 5 \cong \angle 6$

Then corresponding \angle 's \cong

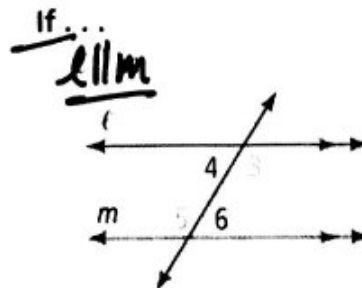
Then alternate interior \angle 's \cong

Alternate Exterior Angles Theorem: If a transversal intersects two parallel lines, then alternate exterior angles are congruent.

Same-Side Interior Angles Theorem: If a transversal intersects two parallel lines, then same-side interior angles are supplementary.



- Then ...
- $\angle 1 \cong \angle 8$
 - $\angle 2 \cong \angle 7$




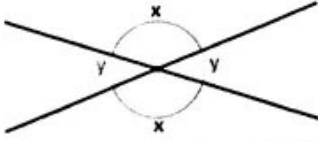


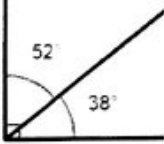
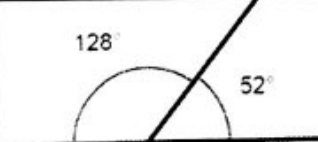
- Then ...
- $m\angle 4 + m\angle 5 = 180$
 - $m\angle 3 + m\angle 6 = 180$

Then alternate exterior \angle 's \cong

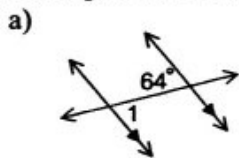
Then same side interior angles are supplementary

Other Useful Theorems:

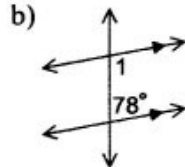
<p style="text-align: center;">Triangle Sum Theorem</p> <div style="display: flex; align-items: center;">  <p>The sum of the three interior angles in a triangle is always 180°.</p> </div> <p style="text-align: center;">$\angle a + \angle b + \angle c = 180^\circ$</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div>	<p style="text-align: center;">Vertical Angles</p> <p>Vertical Angles are pairs of opposite angles made by intersecting lines.</p> <p style="text-align: center;">Vertical Angle Theorem</p> <p>If 2 angles are vertical then they are congruent.</p> <div style="text-align: center; margin-top: 10px;">  </div>
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Type of Angles	Description	Example
Complementary Angles	Angles that add up to 90°	
Supplementary Angles	Angles that add up to 180°	

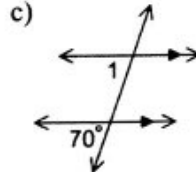
Examples: Find $m\angle 1$ in each diagram. Give a reason for each answer.



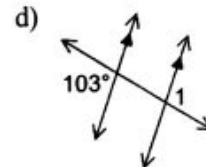
$m\angle 1 = 64$
alternate interior \angle 's \cong



$m\angle 1 = 102$
same side interior \angle 's supplementary

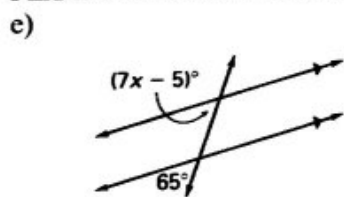


$m\angle 1 = 70$
corresponding \angle 's \cong

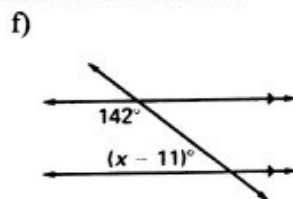


$m\angle 1 = 103$
alternate exterior \angle 's \cong

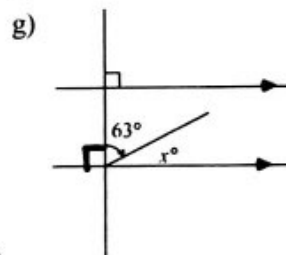
Find the value of x . Give a reason for each answer.



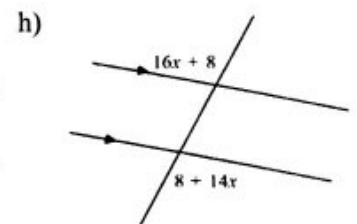
$7x - 5 = 65$
 $7x = 70$
 $x = 10$
corresponding \angle 's \cong



$x - 11 + 142 = 180$
 $x - 11 = 38$
 $x = 49$
same side interior \angle 's supplementary



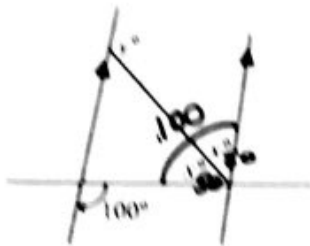
$x + 63 = 90$
 $x = 27$
complementary angles



$16x + 8 = 8 + 14x$
 $2x = 0$
 $x = 0$
Alternate exterior \angle 's \cong

Find the values of x and y

a)



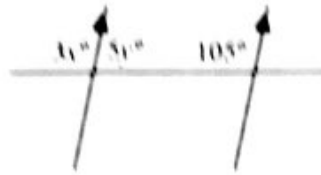
$$2x = 100$$

$$\boxed{x = 50}$$

$$y + 50 = 180$$

$$\boxed{y = 130}$$

b)



$$3x = 105$$

$$\boxed{x = 35}$$
 Corresponding \angle 's

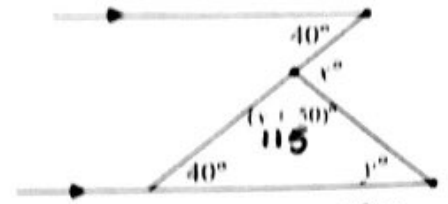
$$5y + 105 = 180$$

$$5y = 75$$

$$\boxed{y = 15}$$

same side interior supplementary

c)



$$x + x + 50 = 180$$

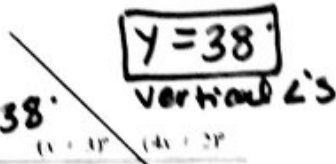
$$2x = 130$$

$$\boxed{x = 65}$$

$$40 + 115 + y = 180$$

$$\boxed{y = 25}$$

d)



$$35 + 3 = 38$$

Vertical \angle 's

$$x + 3 + 4x + 2 = 180$$

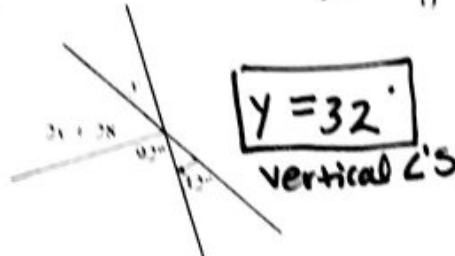
$$5x = 175$$

$$\boxed{x = 35}$$

Supplementary \angle 's

e) Find the measure of each numbered angle.

e)



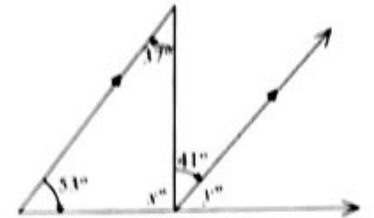
$$\boxed{y = 32}$$

Vertical \angle 's

$$2x + 28 + 92 + 32 = 180$$

$$2x = 28$$

$$\boxed{x = 14}$$

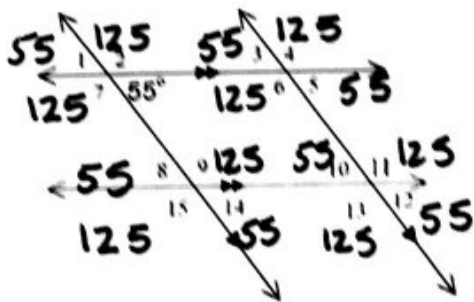


$$x + 53 + 37 = 180$$

$$\boxed{x = 90}$$

$$90 + 41 + y = 180$$

$$\boxed{y = 49}$$



$$m\angle 1 = 55$$

$$m\angle 2 = 125$$

$$m\angle 3 = 55$$

$$m\angle 4 = 125$$

$$m\angle 5 = 55$$

$$m\angle 6 = 125$$

$$m\angle 7 = 125$$

$$m\angle 8 = 55$$

$$m\angle 9 = 125$$

$$m\angle 10 = 55$$

$$m\angle 11 = 125$$

$$m\angle 12 = 55$$

$$m\angle 13 = 125$$

$$m\angle 14 = 55$$

$$m\angle 15 = 125$$