CHAPTER 3:
PARALLEL LINES AND PLANES

SECTION 3.1: DEFINITIONS

Standards:

1.0 - Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning

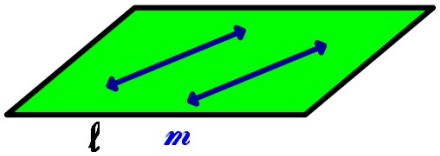
7.0 - Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals,a nd the properties of circles.

NON-INTERSECTING LINES

2 lines that don't intersect are either parallel or skew

PARALLEL LINES

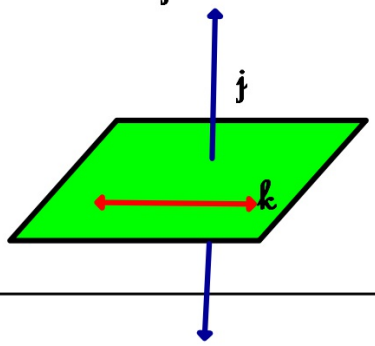
coplanar lines that do not intersect $\ell \,//\, m$

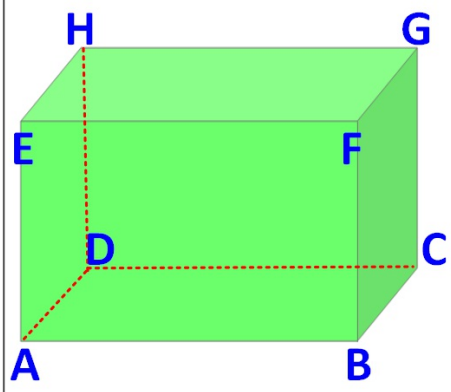


SKEW LINES

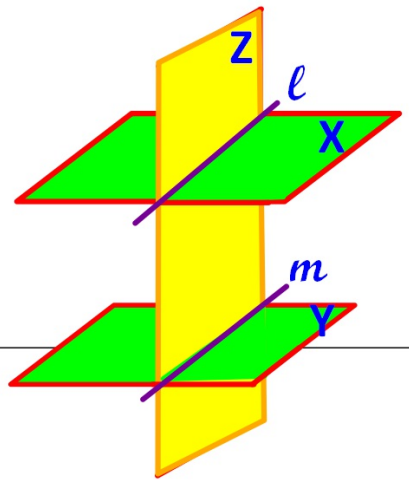
non coplanar lines that do not intersect

j and k are skew lines

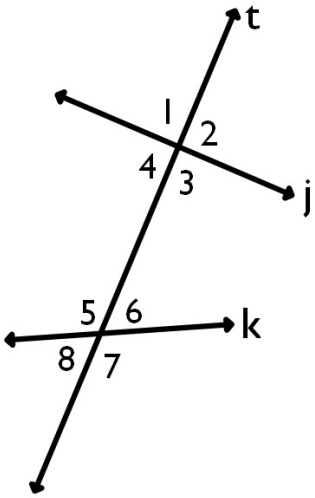


	Parallel planes do not intersect Ex: ABCD and EFGH	A line and a plane are parallel if they don't intersect. Ex: $\overleftrightarrow{GH}$ and plane ABCD

THEOREM If 2 parallel planes are cut by a third plane,then the lines of intersection are parallel.



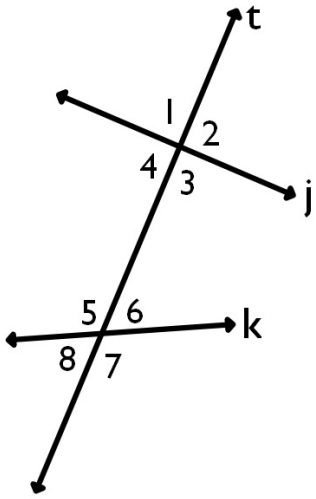
If plane X // plane Y, then $\ell // m$



Transversal:
a line that intersects 2 or more coplanar lines in different points

Interior Angles: ∠3, ∠4, ∠5, ∠6

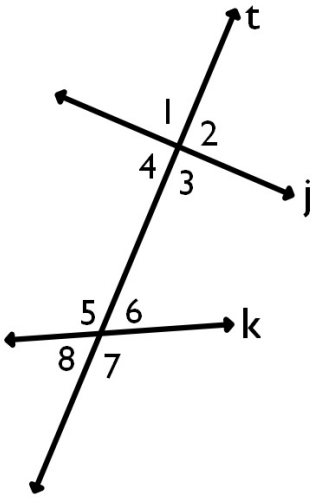
Exterior Angles: ∠1, ∠2, ∠7, ∠8



Alternate Interior Angles:

✅ $\angle 4$ & $\angle 6$

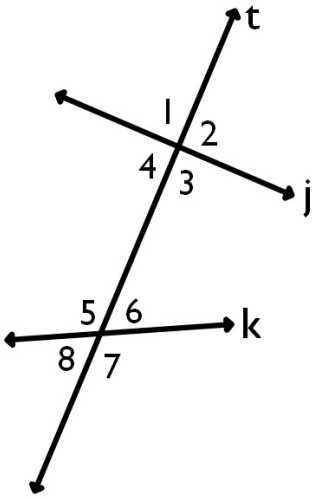
$\angle 3$ & $\angle 5$



Same-Side Interior Angles:

$\angle 3$ & $\angle 6$

$\angle 4$ & $\angle 5$



Corresponding Angles:

∠1 & ∠5

∠2 & ∠6

∠3 & ∠7

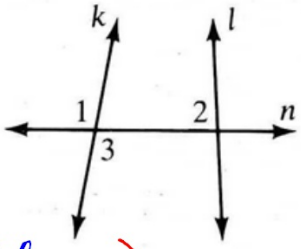
∠4 & ∠8

Complete each statement with the word *always*, *sometimes*, or *never*.

1) Two lines in the same plane are ? parallel. sometimes
2) Two lines in the same plane are ? skew. never
3) Two noncoplanar lines ? intersect. never
4) Two planes ? intersect. sometimes
5) A line and a plane ? have exactly one point of intersection. sometimes
6) If two planes do not intersect, then they are ? parallel. always

Name the two lines and the transversal that form each pair of angles.

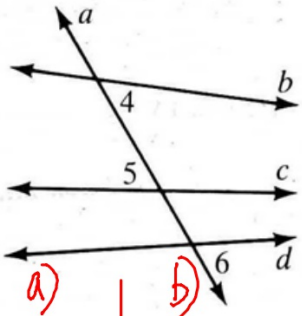
7. ✓ ∠1 and ∠2
✓ **b.** ∠2 and ∠3



lines k & l

transversal n } for both a) & b)

8. ✓ ∠4 and ∠5
✓ ∠4 and ∠6

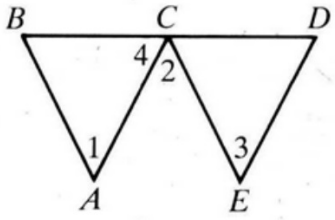


a) b)

lines: b and d | b and c

transversal: a | a

9 ✓ ∠1 and ∠2
✓ ∠2 and ∠3

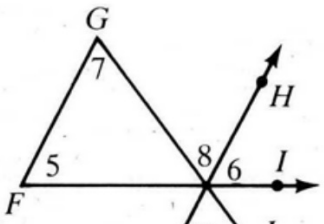


a) b)

lines: $\overleftrightarrow{AB}$ & $\overleftrightarrow{CE}$ | $\overleftrightarrow{AC}$ & $\overleftrightarrow{DE}$

transversal: $\overleftrightarrow{AC}$ | $\overleftrightarrow{CE}$

10 ✓ ∠5 and ∠6
✓ ∠7 and ∠8



a) b)

lines: $\overleftrightarrow{GF}$ & $\overleftrightarrow{HK}$ | $\overleftrightarrow{GF}$ & $\overleftrightarrow{HK}$

transversal: $\overleftrightarrow{FI}$ | $\overleftrightarrow{GJ}$

Classify each pair of angles as alternate interior angles, same-side interior angles, or corresponding angles.

11. ∠2 and ∠4 corresponding

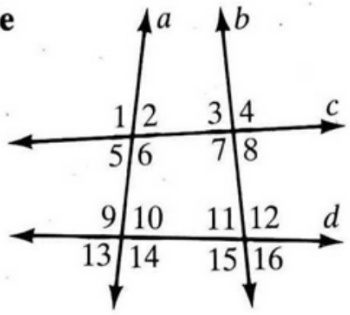
12. ∠10 and ∠11 s-s int

13. ∠14 and ∠15 s-s int

14. ∠7 and ∠12 alt-int

15. ∠5 and ∠10 alt-int

16. ∠3 and ∠11 corresponding



17. $\angle STU$ and $\angle SZX$ corr

18. $\angle WXZ$ and $\angle YZX$ s-s int

19. $\angle UTZ$ and $\angle VZY$ corr

20. $\angle VXT$ and $\angle UTX$ s-s-int

21. $\angle QTZ$ and $\angle VZT$ alt-int

22. $\angle VXT$ and $\angle XTQ$ alt-int

23. $\angle WXZ$ and $\angle YZP$ corr

24. $\angle QTZ$ and $\angle PZT$ s-s int