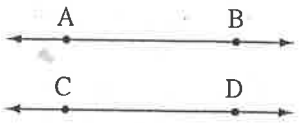
NAME: _____ DIV: _____ DATE: _____

3.6 Parallels and Transversals

In the figure below, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ represent two lines in the same plane which have no point in common.

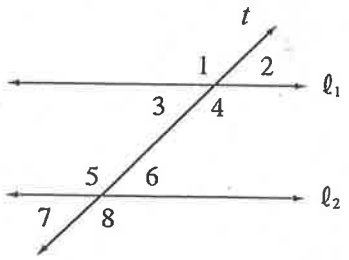


$\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$. This statement can also be written $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$.

Definition of Parallel Lines

Two lines are parallel if and only if they lie in the same plane and they do not intersect

In a plane, a transversal is a line that intersects two other lines in two different points.



The transversal t intersects line ℓ_1 and ℓ_2

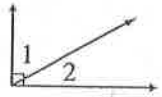
If line ℓ_1 and ℓ_2 are parallel ($\ell_1 \parallel \ell_2$), then many pairs of angles will have certain properties.

Angle Properties of Parallel Lines and a Transversal

Vertically Opposite Angles	Corresponding Angles	Alternate Interior Angles	Co-Interior Angles
$\angle 1 = \angle 4$ $\angle 5 = \angle 8$	$\angle 1 = \angle 5$ $\angle 3 = \angle 7$	$\angle 3 = \angle 6$	$\angle 3 + \angle 5 = 180°$
$\angle 2 = \angle 3$ $\angle 6 = \angle 7$	$\angle 2 = \angle 6$ $\angle 4 = \angle 8$	$\angle 4 = \angle 5$	$\angle 4 + \angle 6 = 180°$

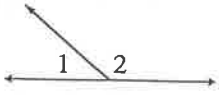
Other important geometric concepts to remember:

Complementary - Two angles that add to 90°



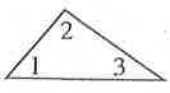
$\angle 1 + \angle 2 = 90°$

Supplementary - Two angles that add to 180°



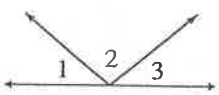
$\angle 1 + \angle 2 = 180°$

Interior angles of a triangle add to 180°



$\angle 1 + \angle 2 + \angle 3 = 180°$

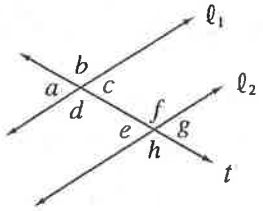
Angles on a line add to 180°



$\angle 1 + \angle 2 + \angle 3 = 180°$

3.6 Exercise Set

1. Given parallel lines ℓ_1 and ℓ_2 intersected with transversal t



Identify:

a) 4 pairs of vertically opposite angles _____ _____ _____ _____

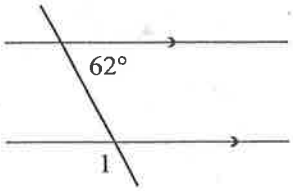
b) 2 pairs of alternate interior angles _____ _____

c) 4 pairs of corresponding angles _____ _____ _____ _____

d) 2 pairs of co-interior angles _____ _____

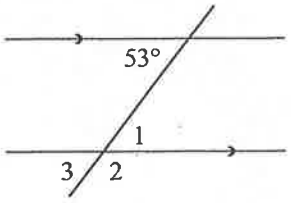
2. Find the missing angles.

a)



$\angle 1 =$ _____

b)

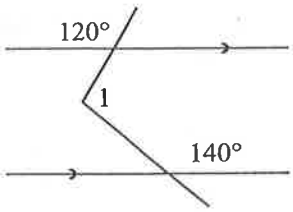


$\angle 1 =$ _____

$\angle 2 =$ _____

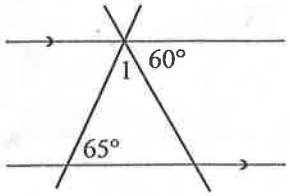
$\angle 3 =$ _____

c)



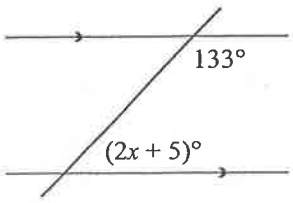
$\angle 1 =$ _____

d)



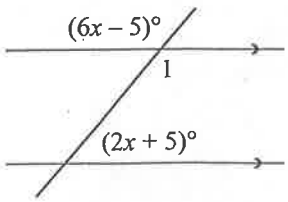
$\angle 1 =$ _____

e)



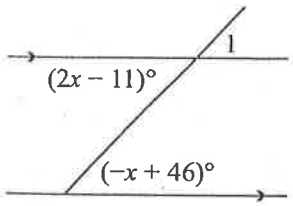
$x =$ _____

f)



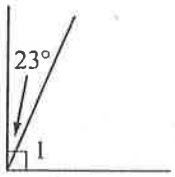
$\angle 1 =$ _____

g)



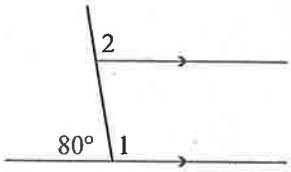
∠1 = _____

h)



∠1 = _____

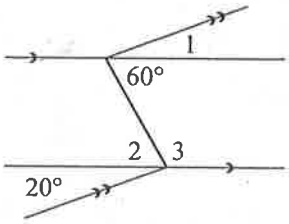
i)



∠1 = _____

∠2 = _____

j)

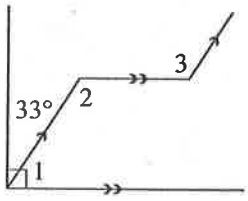


∠1 = _____

∠2 = _____

∠3 = _____

k)

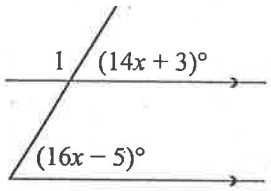


∠1 = _____

∠2 = _____

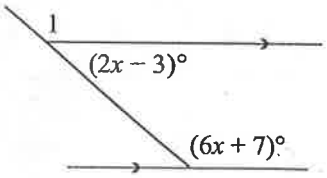
∠3 = _____

l)



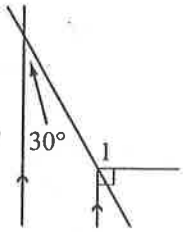
∠1 = _____

m)



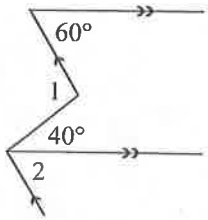
∠1 = _____

n)



∠1 = _____

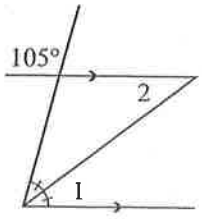
o)



∠1 = _____

∠2 = _____

p)

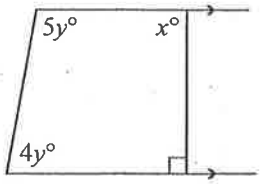


∠1 = _____

∠2 = _____

3. Find the missing angles and state the reason for each answer.

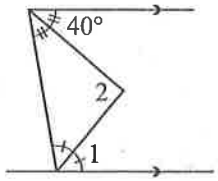
a)



$x =$ _____ _____

$y =$ _____ _____

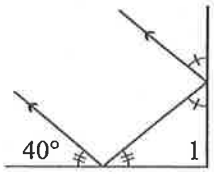
b)



1 = _____ _____

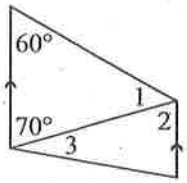
2 = _____ _____

c)



1 = _____ _____

d)

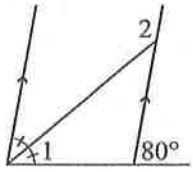


1 = _____ _____

2 = _____ _____

3 = _____ _____

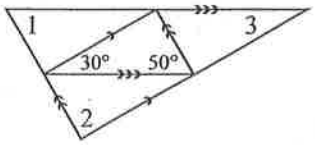
e)



1 = _____ _____

2 = _____ _____

f)

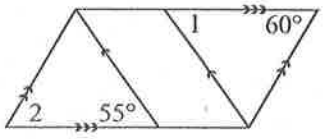


1 = _____ _____

2 = _____ _____

3 = _____ _____

g)



1 = _____ _____

2 = _____ _____