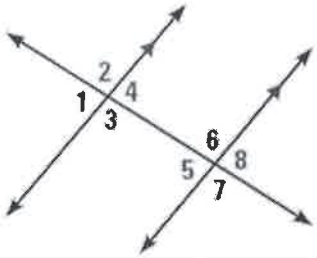
Geometry H
Unit 2 Test Review

Name: Key
Date: _____ Period: _____

For the Unit 2 Performance Task and/or Unit 2 Assessment you should be able to...

- Identify parallel, perpendicular, and skew lines (section 3.1)
- Identify parallel, perpendicular, or intersecting planes (section 3.1)
- Identify corresponding angles, alternate interior angles, consecutive interior angles, and alternate exterior angles (section 3.1)
- Find measures of angles given parallel lines (section 3.2)
- Prove lines are parallel using the converse (section 3.3)
- Write algebraic proofs and proofs involving parallel lines (sections 2.5, 3.2, and 3.3)
- Find slopes of lines (section 3.4)
- Determine if lines are parallel, perpendicular, or neither using slope (section 3.4)
- Write equations of parallel and perpendicular lines (section 3.5)

Complete the statement using the figure at the right.



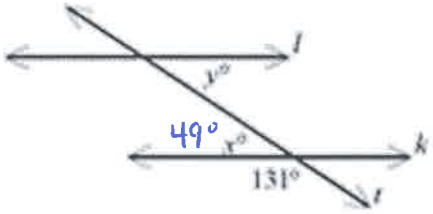
1. ∠1 and 5 are corresponding angles.
2. ∠3 and 6 are alternate interior angles.
3. ∠4 and 6 are consecutive interior angles.
4. ∠7 and 2 are alternate exterior angles.

5. In the figure below, $k \parallel l$. What is the value of x and y? Justify your answers.

$x + 131 = 180$ ← linear pair postulate

$x = 49°$

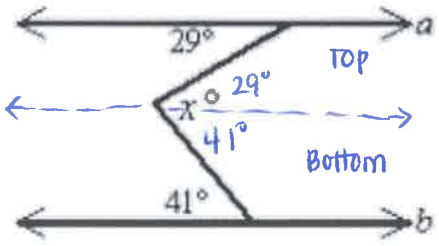
$y = 49°$ ← Alt. Int. Ang. Thm



6. Given that $a \parallel b$, what is the value of x? (the figure may not be drawn to scale)

$x = 29 + 41$

$x = 70°$



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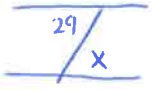
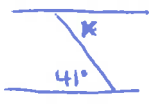


$x = 29$

(alt. interior)

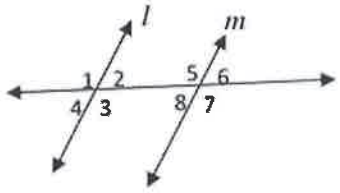
Bottom:



$x = 41$

(alt. interior)

7. Given $l \parallel m$, find the values of x. Be sure to check for extraneous solutions. Diagram is not drawn to scale.



a) $m\angle 3 = (x^2 + 112)°$, $m\angle 8 = (16x + 131)°$ consecutive interior

$x^2 + 112 + 16x + 131 = 180$

$x^2 + 16x + 243 = 180$

$x^2 + 16x + 63 = 0$

$(x+7)(x+9) = 0$

$\boxed{x = -7}$ $x = -9$ not a solution

Check:

$x=-7$: $(-7)^2 + 112 = 161°$ ✓

$16(-7) + 131 = 19°$

$x=-9$: $(-9)^2 + 112 = 193°$ ✗ can't have a neg. angle measure

$16(-9) + 131 = -13°$

b) $m\angle 1 = (x^2 - 7x)°$, $m\angle 7 = (-x + 7)°$ alt. exterior

$x^2 - 7x = -x + 7$

$x^2 + x - 7x - 7 = 0$

$x^2 - 6x - 7 = 0$

$(x-7)(x+1) = 0$

$x = 7$, $\boxed{x = -1}$ not a solution

Check:

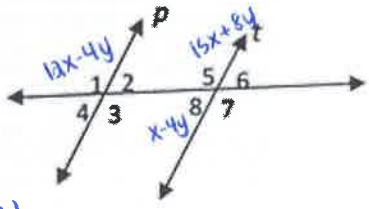
$x=7$: $(7)^2 - 7(7) = 49 - 49 = 0$ ✗ can't have a 0 angle measure

$-7 + 7 = 0$

$x=-1$: $(-1)^2 - 7(-1) = 1 + 7 = 8$ ✓

$-1 + 7 = 1 + 7 = 8$

8. Given $p \parallel t$, $m\angle 1 = (12x - 4y)°$, $m\angle 8 = (x - 4y)°$, and $m\angle 5 = (15x + 8y)°$, find the values of x and y, and the measure of each angle.



$15x + 8y + x - 4y = 180$ ← Linear Pair

$16x + 4y = 180$

$12x - 4y = 15x + 8y$ ← corr. Ang.

$-3x - 12y = 0$

System: $\begin{cases} [16x + 4y = 180]3 \\ -3x - 12y = 0 \end{cases} \Rightarrow$

$48x + 12y = 540$

$-3x - 12y = 0$

$45x = 540$

$\boxed{x = 12}$

$16(12) + 4y = 180$

$192 + 4y = 180$

$4y = -12 \Rightarrow \boxed{y = -3}$

$m\angle 1 = 12(12) - 4(-3)$

$m\angle 1 = 156°$

$m\angle 5 = 15(12) + 8(-3)$

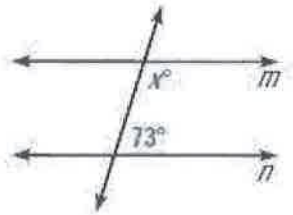
$m\angle 1 = 156°$

$m\angle 8 = 12 - 4(-3)$

$m\angle 8 = 24°$

Find the value of x that makes $m \parallel n$. Justify your reasoning with the appropriate theorem or postulate.

9.

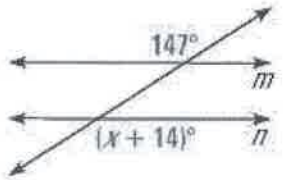


$x + 73 = 180$

$\boxed{x = 107°}$

m//n by consecutive interior angles converse

10.

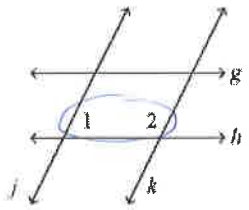


$147 = x + 14$

$\boxed{x = 133}$

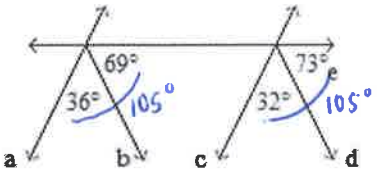
m//n by alt. exterior angles converse

11. Which lines, if any, can you conclude are parallel, given that $m\angle 1 + m\angle 2 = 180°$? Justify your conclusion.



If $m\angle 1 + m\angle 2 = 180°$, lines j // k by the consecutive interior angles converse.

12. Which lines, if any, can be proven parallel given the following diagram?



since corresponding angles both have measures of 105°, a // c by the corresponding angles converse.

13. Describe how we can use slopes to determine:
    a. if lines are parallel.

Slopes are the same

    b. if lines are perpendicular.

slopes are opposite reciprocals

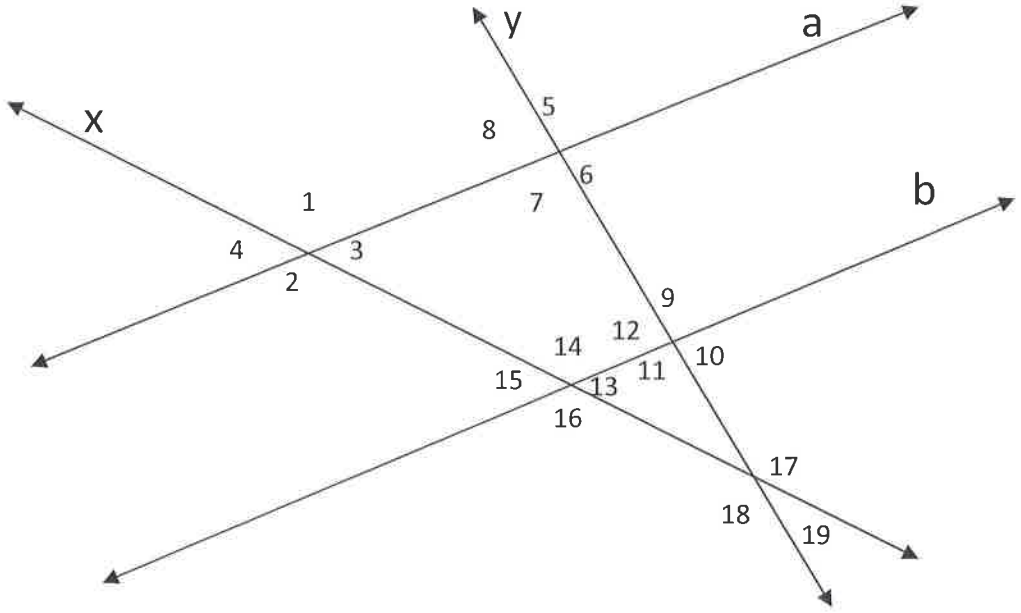
14. Describe how we can use angle measures to determine:
    a. if lines are parallel.

use an angle pair converse (i.e. see if alt. int. angles have equal measures)

    b. if lines are perpendicular.

Angles should have a measure of 90°

Use the diagram below to complete the chart. Assume $a \parallel b$.



ANGLES	TRANSVERSAL	TYPE	≅, SUPPL., OR NONE (relationship between angles)
15. ∠1 and ∠14	x	Corresponding	congruent
16. ∠2 and ∠15	x	consecutive interior	supplementary
17. ∠7 and ∠9	y	alternate interior	congruent
18. ∠9 and ∠16	b	alternate exterior	congruent
19. ∠10 and ∠17	y	none	none
20. ∠16 and ∠14	x or b	vertical angles	congruent
21. ∠9 and ∠14	b	corresponding	congruent
22. ∠18 and ∠19	x	Linear Pair	supplementary
23. ∠1 and ∠16	x	alternate exterior	congruent
24. ∠3 and ∠8	a	alternate interior	congruent
25. ∠6 and ∠9	y	consecutive interior	supplementary
26. ∠12 and ∠13	b	alternate interior	congruent
27. ∠7 and ∠11	y	corresponding	congruent
28. ∠6 and ∠8	a or y	vertical angles	congruent
29. ∠4 and ∠13	x	alternate exterior	congruent

Tell whether the lines with given characteristics are *parallel, perpendicular,* or *neither.*

30. Line 1 : $y = -x - 4$
Line 2 : $-5x + 5y = 20$

Line 1: $m = -1$
Line 2: $5y = 5x + 20$, $y = x + 4$, $m = 1$ → Perpendicular

31. Line *a* passes through (-5, 6) and (7, -2)
Line *b* passes through (-12, -2) and (-9, -4)

Line a: $m = \frac{-2-6}{7+5} = \frac{-8}{12} = -\frac{2}{3}$
Line b: $\frac{-4+2}{-9+12} = \frac{-2}{3}$ → parallel

Write the equation of the line with the given characteristics.

32. Write the equation of the line parallel to $y = 6x - 4$ and passes through point *P*(3, -1).

$m = 6$ thru $(3, -1)$

$y = mx + b$
$-1 = 6(3) + b$
$-1 = 18 + b$
$b = -19$

$y = 6x - 19$

33. Write the equation of the line perpendicular to $y = 2x - 1$ and passes through the point *P*(2, -3).

$m = -\frac{1}{2}$ thru $(2, -3)$

$y = mx + b$
$-3 = -\frac{1}{2}(2) + b$
$-3 = -1 + b$
$b = -2$

$y = -\frac{1}{2}x - 2$

34. Determine if line that passes through (7, 1) and (10, 5) and the line that passes through (-8, 5) and (-5, 9) are parallel, perpendicular or neither. Explain.

(7,1) and (10,5): $m = \frac{5-1}{10-7} = \frac{4}{3}$

(-8,5) and (-5,9): $m = \frac{9-5}{-5+8} = \frac{4}{3}$

→ Parallel

35. Write an equation in slope-intercept form of the line through points S(–3, –10) and T(0, -1).

$m = \frac{-1+10}{0+3} = \frac{9}{3} = 3$

$m = 3$ thru $(0, -1)$

$y = mx + b$
$-1 = 3(0) + b$
$-1 = 0 + b$
$b = -1$

$y = 3x - 1$

36. Write an equation in slope-intercept form of the line parallel to the line $y = -5x + 2$ through point P(–10, 1).

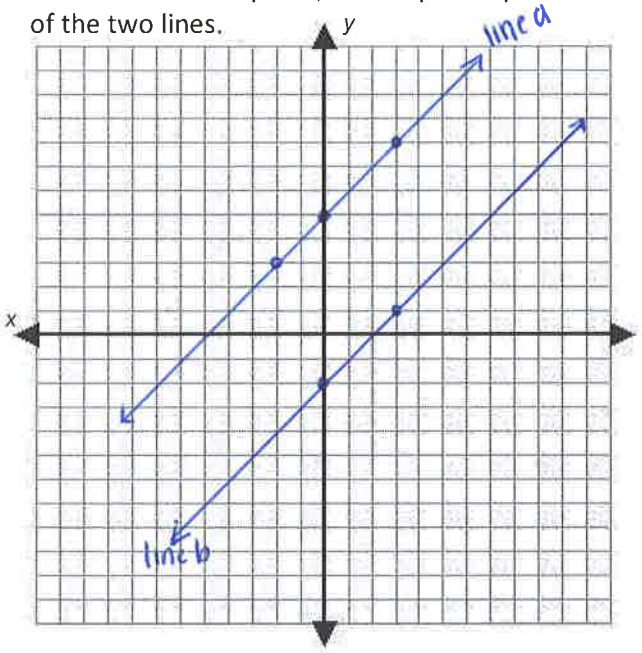
$m = -5$ thru $(-10, 1)$

$y = mx + b$
$1 = -5(-10) + b$
$1 = 50 + b$
$b = -49$

$y = -5x - 49$

Complete the following:

37. On the coordinate plane, draw a pair of parallel lines (*not* horizontal or vertical). Then write the equations of the two lines.



Line a: (3,8) and (-2,3):

$m = \frac{3-8}{-2-3} = \frac{-5}{-5} = 1$, $b = 5$ $\Rightarrow$ $y = 1x+5$

Line b: $m = 1$ thru $(3,1)$

$y = mx+b$

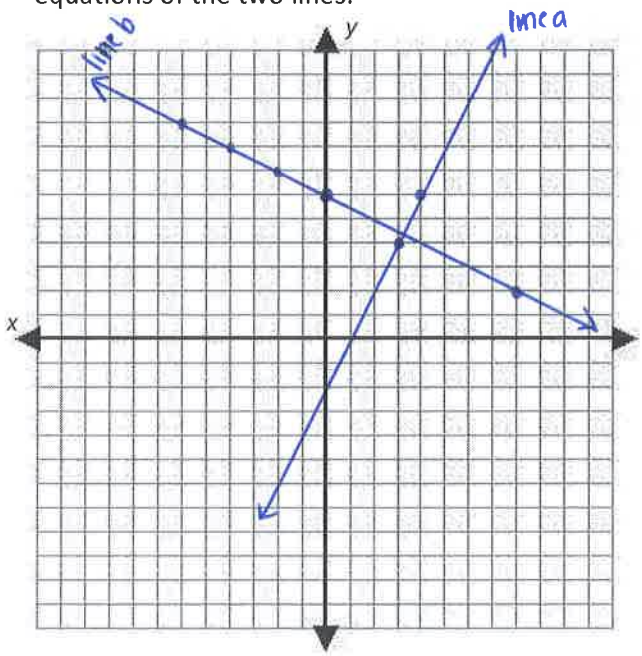
$1 = 1(3)+b$

$1 = 3+b$

$-2 = b$

$y = 1x-2$

38. On the coordinate plane, draw a pair of perpendicular lines (*not* horizontal or vertical). Then write the equations of the two lines.



Line a: (3,4) and (4,6)

$m = \frac{6-4}{4-3} = \frac{2}{1} = 2$, $b = -2$ $\Rightarrow$ $y = 2x-2$

Line b: $m = -\frac{1}{2}$ thru $(8,2)$

$y = mx+b$

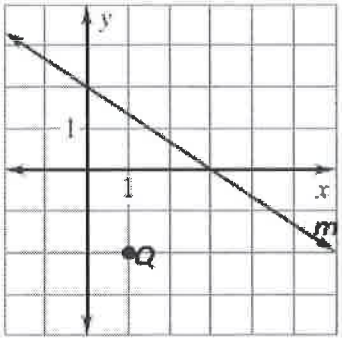
$2 = -\frac{1}{2}(8)+b$

$2 = -4+b$

$b = 6$

$y = -\frac{1}{2}x+6$

39. Write the equation of the line parallel to line *m* and passes through point *Q*.



slope of line $m = -\frac{2}{3}$

new slope $= -\frac{2}{3}$ thru $Q(1,-2)$

$y = mx + b$

$-2 = -\frac{2}{3}(1) + b$

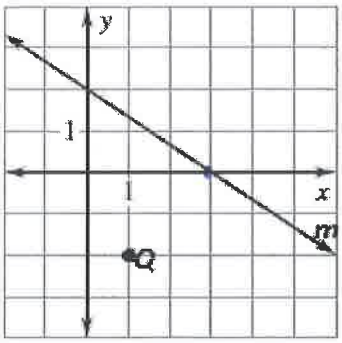
$-\frac{2}{1} = -\frac{2}{3} + b$

$-\frac{6}{3} = -\frac{2}{3} + b$

$b = -\frac{4}{3}$

$y = -\frac{2}{3}x - \frac{4}{3}$

40. Write the equation of the line perpendicular to line *m* and passes through point *Q*.



slope of line $m = -\frac{2}{3}$

new slope $= \frac{3}{2}$ thru $Q(1,-2)$

$y = mx + b$

$-2 = \frac{3}{2}(1) + b$

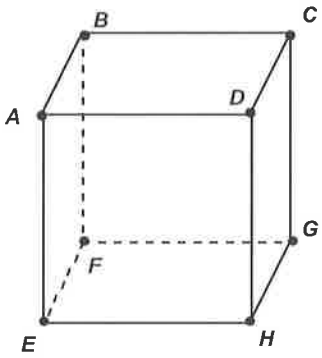
$-\frac{2}{1} = \frac{3}{2} + b$

$-\frac{4}{2} = \frac{3}{2} + b$

$b = -\frac{7}{2}$

$y = \frac{3}{2}x - \frac{7}{2}$

Use the diagram of the cube below to complete the following statements with *parallel, perpendicular, skew,* or *neither*.



41. Plane *ABD* and Plane *EFG* are parallel.

42. $\overleftrightarrow{AB}$ and $\overleftrightarrow{GH}$ are parallel.

43. $\overleftrightarrow{AE}$ and $\overleftrightarrow{EF}$ perpendicular.

44. $\overleftrightarrow{AB}$ and $\overleftrightarrow{GF}$ are skew.

45. Plane *ABC* and Plane *BFG* are perpendicular.

Complete the following proofs. ***Note…you should review all of the proofs that we have done. These are just a few samples to help you practice!!!***

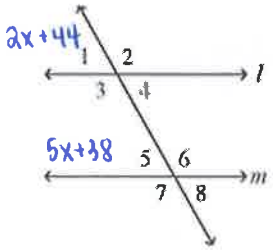
46. What property is shown by the following statement?

If $m\angle 3 \cong m\angle 5$
And $m\angle 5 \cong m\angle 8$
Then $m\angle 3 \cong m\angle 8$

47. Given $-8+2(4x-3)=4+2x$, please prove $x=3$.

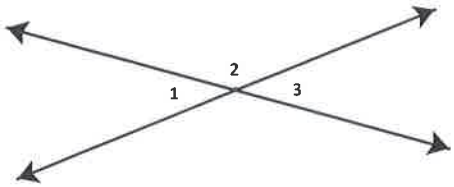
Statements	Reasons
1. $-8+2(4x-3)=4+2x$	1. Given
2. $-8+8x-6=4+2x$	2. Distributive Property
3. $-14+8x=4+2x$	3. Combine Like Terms
4. $-14+6x=4$	4. Subtraction Property
5. $6x=18$	5. Addition Property
6. $x=3$	6. Division Property

48. Using the diagram below, prove that $m\angle 5=48°$, given that $m \parallel l$, $m\angle 1=(2x+44)°$, and $m\angle 5=(5x+38)°$



Statements	Reasons
1. $m \parallel l$, $m\angle 1=(2x+44)°$, $m\angle 5=(5x+38)°$	1. Given
2. $2x+44=5x+38$	2. Corresponding Angles Postulate
3. $44=3x+38$	3. Subtraction Property
4. $6=3x$	4. Subtraction Property
5. $x=2$	5. Division Property
6. $m\angle 5=5(2)+38$	6. Substitution Property
7. $m\angle 5=48°$	7. Simplification

49. Given $m\angle 1=(5x-3)°$, $m\angle 3=(2x+6)°$, prove $m\angle 2=168°$.



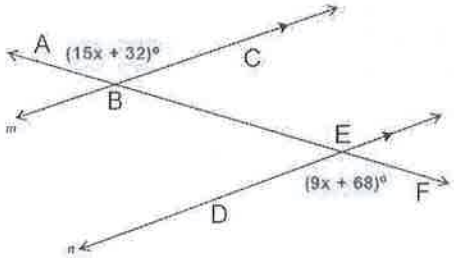
Statements	Reasons
1. $m\angle 1=(5x-3)°$, $m\angle 3=(2x+6)°$	1. Given
2. $5x-3=2x+6$	2. Vertical Angles Theorem
3. $3x-3=6$	3. Subtraction Property
4. $3x=9$	4. Addition Property
5. $x=3$	5. Division Property
6. $m\angle 1+m\angle 2=180$	6. Linear Pair Postulate
7. $5(3)-3+m\angle 2=180$	7. Substitution Property
8. $12+m\angle 2=180$	8. Simplification
9. $m\angle 2=168°$	9. subtraction Property

50. Given the first two statements and reasons, what reason is used for the third statement?

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are supplementary	1. Given
2. $\angle 2\cong\angle 3$	2. Given
3. $\angle 1$ and $\angle 3$ are supplementary	3. Substitution Property

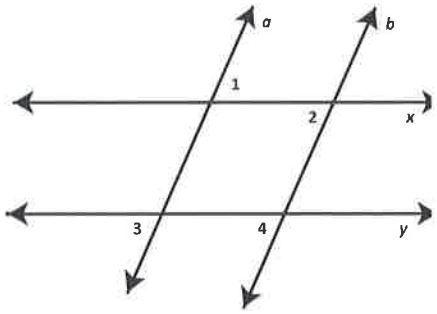
51. Given $m\angle ABC=(15x+32)°$, $m\angle DEF=(9x+68)°$ and $m \parallel n$, please prove $x=6$.

Statements	Reasons
1. $m\angle ABC=(15x+32)°$, $m\angle DEF=(9x+68)°$, $m \parallel n$	1. Given
2. $15x+32=9x+68$	2. Alternate Exterior Angles Theorem
3. $6x+32=68$	3. Subtraction Property
4. $6x=36$	4. Subtraction Property
5. $x=6$	5. Division Property



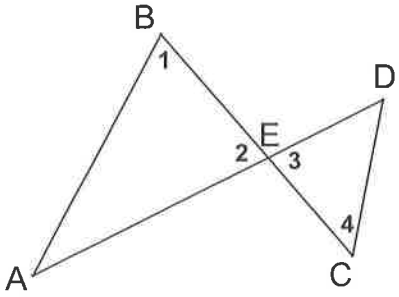
52. Given $\angle 1 \cong \angle 3$, prove $\angle 2 \cong \angle 4$.

Statements	Reasons
1. $\angle 1 \cong \angle 3$	1. Given
2. $x \parallel y$	2. Alternate Exterior Angles Converse
3. $\angle 2 \cong \angle 4$	3. Corresponding Angles Postulate



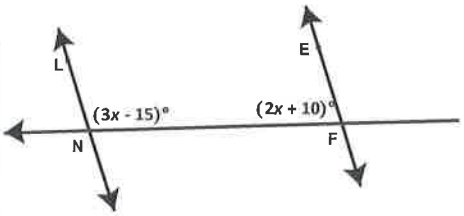
53. Given $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$, Prove $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

Statements	Reasons
1. $\angle 1 \cong \angle a$	1. Given
2. $\angle a \cong \angle 3$	2. Vertical Angles Theorem
3. $\angle 3 \cong \angle 4$	3. Given
4. $\angle 1 \cong \angle 4$	4. Transitive Property
5. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$	5. Alternate Interior Angles Converse



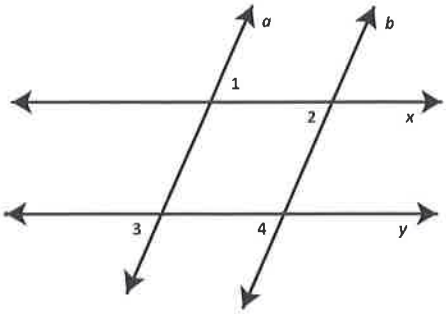
54. Given: $m\angle LNF = (3x-15)°$, $m\angle EFN = (2x+10)°$, $\overleftrightarrow{LN} \parallel \overleftrightarrow{EF}$. Please prove: $x = 37$.

Statements	Reasons
1. $m\angle LNF = (3x-15)°$ $m\angle EFN = (2x+10)°$ $\overleftrightarrow{LN} \parallel \overleftrightarrow{EF}$	1. Given
2. $3x-15+2x+10=180$	2. Consecutive Interior Angles Theorem
3. $5x-5=180$	3. Combine Like Terms
4. $5x=185$	4. Addition Property
5. $x=37$	5. Division Property

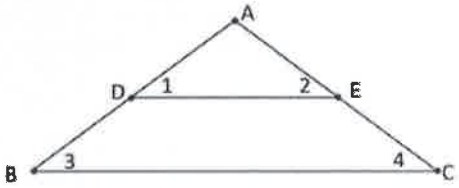


55. Given: $\angle 1 \cong \angle 2$, $\angle 1 \cong \angle 4$. Please prove $x \parallel y$.

Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $a \parallel b$	2. Alternate Interior Angles Converse
3. $\angle 1 \cong \angle 4$	3. Given
4. $\angle 2 \cong \angle 4$	4. Transitive Property
5. $x \parallel y$	5. Corresponding Angles Converse
6.	6.



56. Given: $\angle 1 \cong \angle 3$, $\angle 1 \cong \angle 2$
Prove: $\angle 3 \cong \angle 4$



Statements	Reasons
1. $\angle 1 \cong \angle 3$, $\angle 1 \cong \angle 2$	1. Given
2. $\angle 3 \cong \angle 2$	2. Transitive Property
3. $\overleftrightarrow{DE} \parallel \overleftrightarrow{BC}$	3. Corresponding Angles Converse (b/c $\angle 1 \cong \angle 3$ from given)
4. $\angle 4 \cong \angle 2$	4. Corresponding Angles Postulate
5. $\angle 3 \cong \angle 4$	5. Transitive Property