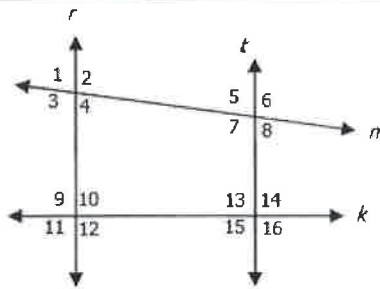


UNIT 3A: STUDY GUIDE TRIANGLES AND PARALLEL LINES

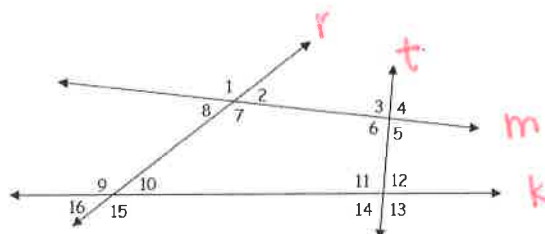
Using the figure below, state the transversal that forms each pair of angles. Then, identify the special name for the angle pair: Vertical, Linear Pair, Corresponding, Alternate Interior or Exterior, or Consecutive Interior or Exterior.

Angle Pair	Transversal	Special Name
$\angle 1$ and $\angle 12$	1. <i>r</i>	2. <i>alternate exterior</i>
$\angle 2$ and $\angle 10$	3. <i>r</i>	4. <i>corresponding</i>
$\angle 4$ and $\angle 9$	5. <i>r</i>	6. <i>alternate interior</i>
$\angle 6$ and $\angle 3$	7. <i>m</i>	8. <i>alternate exterior</i>
$\angle 14$ and $\angle 10$	9. <i>k</i>	10. <i>corresponding</i>
$\angle 7$ and $\angle 13$	11. <i>t</i>	12. <i>consecutive interior</i>



Using the figure below, state the transversal that forms each pair of angles. Then, identify the special name for the angle pair: Vertical, Linear Pair, Corresponding, Alternate Interior or Exterior, or Consecutive Interior or Exterior.

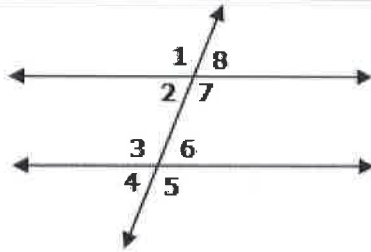
Angle Pair	Transversal	Special Name
$\angle 2$ and $\angle 6$	13. <i>m</i>	14. <i>alternate interior</i>
$\angle 1$ and $\angle 9$	15. <i>r</i>	16. <i>corresponding</i>
$\angle 6$ and $\angle 4$	17. <i>t</i> or <i>m</i>	18. <i>vertical</i>
$\angle 9$ and $\angle 13$	19. <i>k</i>	20. <i>alternate exterior</i>
$\angle 14$ and $\angle 16$	21. <i>k</i>	22. <i>corresponding</i>
$\angle 10$ and $\angle 16$	23. <i>r</i> or <i>k</i>	24. <i>vertical</i>
$\angle 1$ and $\angle 2$	25. <i>r</i>	26. <i>linear pair</i>
$\angle 10$ and $\angle 14$	27. <i>k</i>	28. <i>alternate interior</i>
$\angle 11$ and $\angle 6$	29. <i>t</i>	30. <i>consecutive interior</i>
$\angle 15$ and $\angle 9$	31. <i>k</i> or <i>r</i>	32. <i>vertical</i>



UNIT 3A: STUDY GUIDE TRIANGLES AND PARALLEL LINES

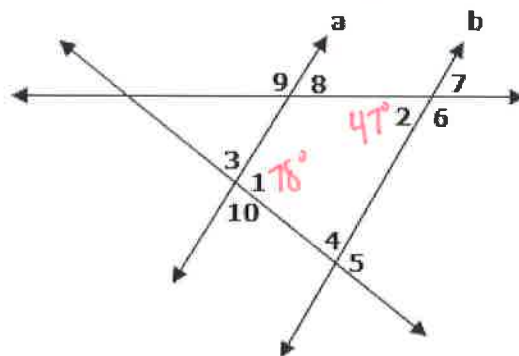
In the figure $l \parallel m$. Find the measure of each angle. Each problem is different.

Problem	Answer	Problem	Answer
If $m\angle 7 = 100^\circ$	33. Then $m\angle 3 = 100^\circ$	If $m\angle 3 = 140^\circ$	34. Then $m\angle 8 = 40^\circ$
If $m\angle 7 = 175^\circ$	35. Then $m\angle 6 = 5^\circ$	If $m\angle 4 = 30^\circ$	36. Then $m\angle 1 = 150^\circ$
If $m\angle 7 = 120^\circ$	37. Then $m\angle 5 = 120^\circ$	If $m\angle 4 = 40^\circ$	38. Then $m\angle 2 = 40^\circ$
If $m\angle 4 = 20^\circ$	39. Then $m\angle 7 = 160^\circ$	If $m\angle 7 = 125^\circ$	40. Then $m\angle 4 = 55^\circ$



In the figure $a \parallel b$, $m\angle 1 = 78^\circ$, and $m\angle 2 = 47^\circ$. Find the measure of each angle.

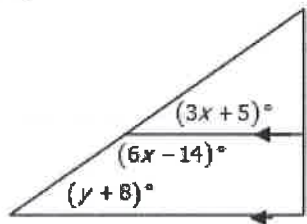
Problem	Problem
41. $m\angle 3 = 102^\circ$	42. $m\angle 4 = 102^\circ$
43. $m\angle 5 = 78^\circ$	44. $m\angle 6 = 133^\circ$
45. $m\angle 7 = 47^\circ$	46. $m\angle 8 = 47^\circ$
47. $m\angle 9 = 133^\circ$	48. $m\angle 10 = 102^\circ$



UNIT 3A: STUDY GUIDE TRIANGLES AND PARALLEL LINES

Find the missing values of the variables.

49.



$$3x+5+6x-14=180$$

$$9x-9=180$$

$$9x=189$$

$$\boxed{x=21}$$

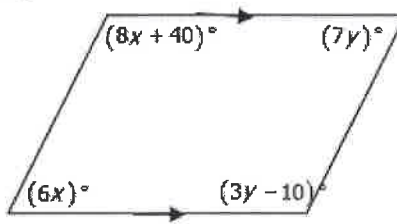
$$3(21)+5=y+8$$

$$63+5=y+8$$

$$68=y+8$$

$$\boxed{60=y}$$

50.



$$8x+40+6x=180$$

$$14x+40=180$$

$$14x=140$$

$$\boxed{x=10}$$

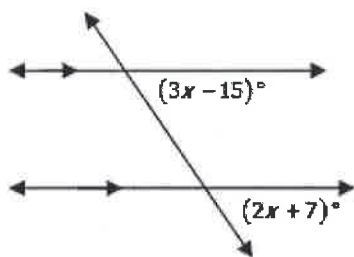
$$7y+3y-10=180$$

$$10y-10=180$$

$$10y=190$$

$$\boxed{y=19}$$

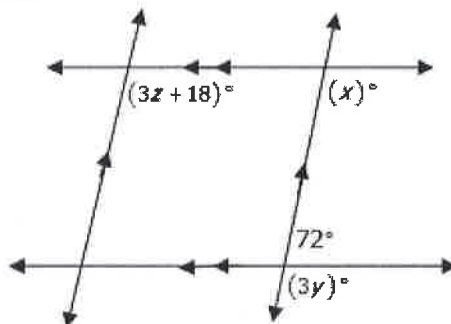
51.



$$3x-15=2x+7$$

$$\boxed{x=22}$$

52.



$$3z+18=108$$

$$3z=90$$

$$\boxed{z=30}$$

$$x+72=180$$

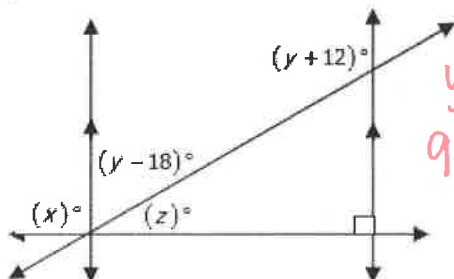
$$\boxed{x=108}$$

$$72+3y=180$$

$$3y=108$$

$$\boxed{y=36}$$

53.



$$y-18+z=90$$

$$93-18+z=90$$

$$75+z=90$$

$$\boxed{z=15}$$

$$\boxed{x=90}$$

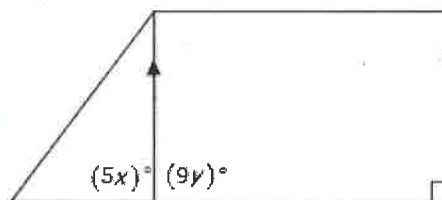
$$y-18+y+12=180$$

$$2y-6=180$$

$$2y=186$$

$$\boxed{y=93}$$

54.



$$5x=90$$

$$\boxed{x=18}$$

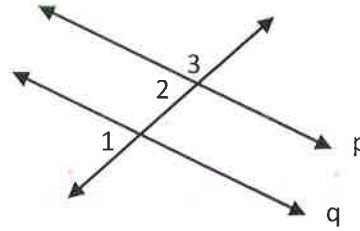
$$90+9y=180$$

$$9y=90$$

$$\boxed{y=10}$$

UNIT 3A: STUDY GUIDE TRIANGLES AND PARALLEL LINES

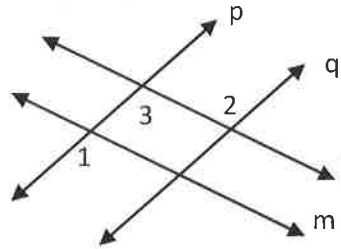
Complete each two-column proof.



Given: $p \parallel q$

Prove: $m\angle 1 + m\angle 3 = 180^\circ$

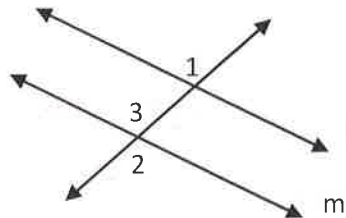
Statements	Reasons
55. $p \parallel q$	55. <i>Given</i>
56. $m\angle 2 + m\angle 3 = 180^\circ$	56. <i>def. of linear pair</i>
57. $\angle 1 \cong \angle 2$	57. <i>corresponding \angle's post.</i>
58. $m\angle 1 = m\angle 2$	58. <i>def. of congruence</i>
59. $m\angle 1 + m\angle 3 = 180^\circ$	59. <i>substitution</i>



Given: $l \parallel m$ and $p \parallel q$

Prove: $\angle 1 \cong \angle 2$

Statements	Reasons
60. $l \parallel m$ and $p \parallel q$	60. <i>Given</i>
61. $\angle 1 \cong \angle 3$	61. <i>corresponding \angle's post.</i>
62. $\angle 3 \cong \angle 2$	62. <i>alternate interior \angle's thm.</i>
63. $\angle 1 \cong \angle 2$	63. <i>transitive</i>



Given: $\angle 1 \cong \angle 2$

Prove: $l \parallel m$

Statements	Reasons
64. $\angle 1 \cong \angle 2$	64. <i>Given</i>
65. $\angle 2 \cong \angle 3$	65. <i>vertical \angle's theorem</i>
66. $\angle 1 \cong \angle 3$	66. <i>transitive</i>
67. $l \parallel m$	67. <i>corresponding \angle's converse</i>

UNIT 3A: STUDY GUIDE TRIANGLES AND PARALLEL LINES

Find the length of each side of the triangle and classify as equilateral, isosceles, or scalene.

68. $X(-5, 9), Y(2, 1), Z(-8, 3)$

Scalene

$$XY = \sqrt{(1-9)^2 + (2-5)^2}$$

$$= \sqrt{-8^2 + 7^2}$$

$$= \sqrt{113}$$

$$YZ = \sqrt{(3-1)^2 + (-8-2)^2}$$

$$= \sqrt{4 + 100} = \sqrt{104}$$

$$XZ = \sqrt{(3-9)^2 + (-8+5)^2}$$

$$= \sqrt{36 + 9} = \sqrt{45}$$

69. $X(-4, -2), Y(-3, 7), Z(-5, -7)$

Scalene

$$XY = \sqrt{(7+2)^2 + (-3+4)^2}$$

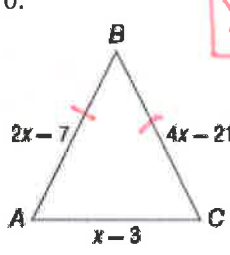
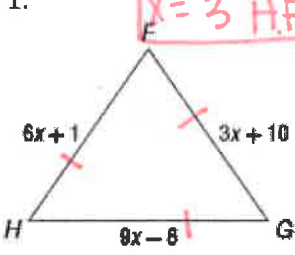
$$= \sqrt{81 + 1} = \sqrt{82}$$

$$YZ = \sqrt{(-7-7)^2 + (-5+3)^2}$$

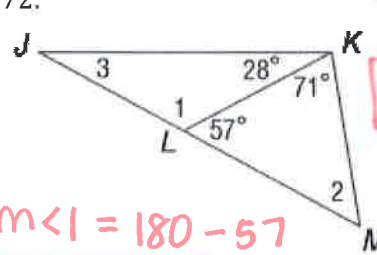
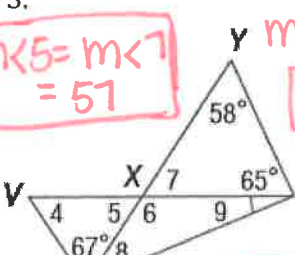
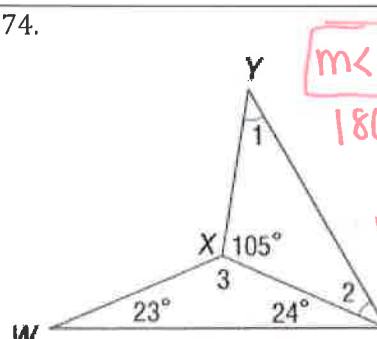
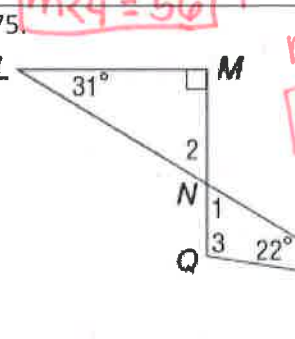
$$= \sqrt{196 + 4} = \sqrt{200}$$

$$XZ = \sqrt{(-7+2)^2 + (-5+4)^2} = \sqrt{25 + 1} = \sqrt{26}$$

Find x and the length of each side of the triangle.

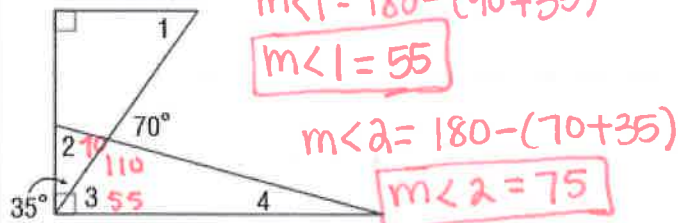
<p>70.</p>  <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$x=7 \quad AB=BC=7 \quad AC=4$</p> $2x-7 = 4x-21$ $14 = 2x$ $7 = x$ $2(7)-7 = 7 \quad 7-3 = 4$ $4(7)-21 = 7$	<p>71.</p>  <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$x=3 \quad EF=EG=FG=19$</p> $6x+1 = 3x+10$ $3x = 9$ $x = 3$ $6(3)+1 = 19 \quad 3(3)+10 = 19 \quad 9(3)-8 = 19$
---	--

Find the measure of each numbered angle.

<p>72.</p>  <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 1 = 180 - (71 + 57) = 52$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 2 = 52$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 3 = 180 - (123 + 28) = 29$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 3 = 180 - 151 = 29$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 1 = 180 - 57 = 123$</p>	<p>73.</p>  <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 5 = m\angle 7 = 57$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 7 = 180 - (58 + 65) = 57$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 6 = 180 - 57 = 123$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 6 = 123$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 8 = m\angle 9 = \frac{180 - 123}{2} = 28.5$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 4 = 180 - (67 + 57) = 56$</p>
<p>74.</p>  <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 1 = m\angle 2 = 37.5$</p> $180 - 105 = \frac{75}{2}$ <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 3 = 180 - (23 + 24) = 133$</p>	<p>75.</p>  <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 2 = 180 - (90 + 31) = 59$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 2 = 59$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 1 = 59$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 3 = 180 - (59 + 22) = 99$</p> <p style="color: red; font-weight: bold; border: 1px solid red; padding: 2px;">$m\angle 3 = 99$</p>

UNIT 3A: STUDY GUIDE TRIANGLES AND PARALLEL LINES

76.



$$m\angle 1 = 180 - (90 + 35)$$

$$m\angle 1 = 55$$

$$m\angle 2 = 180 - (70 + 35)$$

$$m\angle 2 = 75$$

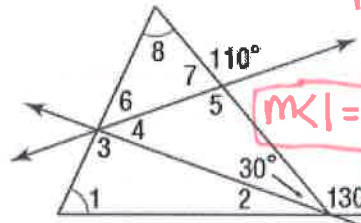
$$m\angle 3 = 90 - 35$$

$$m\angle 3 = 55$$

$$m\angle 4 = 180 - (110 + 55)$$

$$m\angle 4 = 15$$

77.



$$m\angle 1 = m\angle 8$$

$$m\angle 1 + m\angle 8 = 130$$

$$m\angle 1 = m\angle 8 = 65$$

$$m\angle 2 = 180 - 160 = 20$$

$$m\angle 3 = 180 - (65 + 20)$$

$$m\angle 3 = 95$$

$$m\angle 5 = 110$$

$$m\angle 3 = 95$$

$$m\angle 6 = 110 - 65 = 45$$

$$m\angle 4 = 180 - (30 + 110) = 40$$

$$m\angle 7 = 180 - 110 = 70$$

$$m\angle 3 = 51 - 25 = 26$$

$$m\angle 4 = 180 - (90 + 35)$$

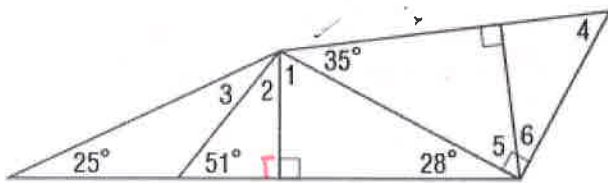
$$m\angle 4 = 55$$

$$m\angle 6 = 180 - 90 - 55 = 35$$

$$m\angle 4 = 55$$

$$m\angle 6 = 35$$

78.



$$m\angle 1 = 180 - (90 + 28)$$

$$m\angle 1 = 62$$

$$m\angle 2 = 180 - (90 + 51)$$

$$m\angle 2 = 39$$

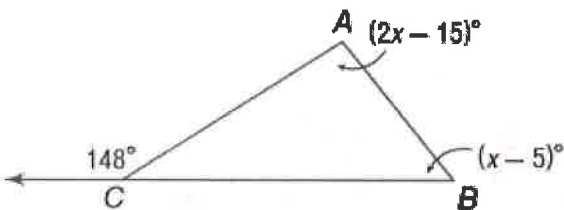
$$m\angle 5 = 180 - (90 + 35)$$

$$m\angle 5 = 55$$

$$m\angle 6 = 35$$

Find the value of x.

79.



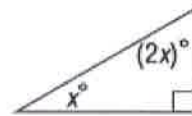
$$2x - 15 + x - 5 = 148$$

$$3x - 20 = 148$$

$$3x = 168$$

$$x = 56$$

80.



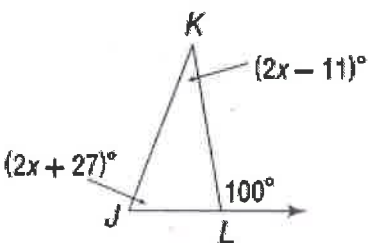
$$x + 2x + 90 = 180$$

$$3x + 90 = 180$$

$$3x = 90$$

$$x = 30$$

81.



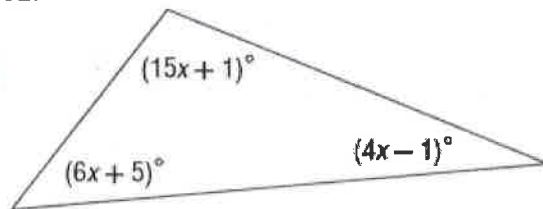
$$2x - 11 + 2x + 27 + 100 = 180$$

$$4x + 16 = 180$$

$$4x = 164$$

$$x = 41$$

82.



$$6x + 5 + 15x + 1 + 4x - 1 = 180$$

$$25x + 5 = 180$$

$$25x = 175$$

$$x = 7$$