

Converse of Parallelogram Theorems	
If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.	
If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.	
If one pair of opposite sides of a quadrilateral are congruent and parallel, then the quadrilateral is a parallelogram.	
If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.	

Examples: Determine if the quadrilateral must be a parallelogram. Describe how you determined your answer.

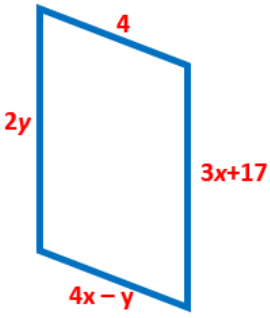
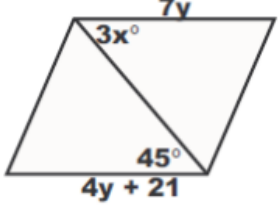
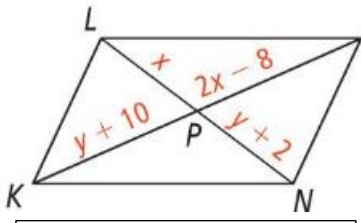
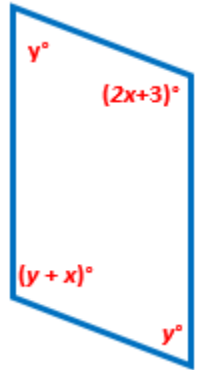
<p>1. </p>	<p>2. </p>	<p>3. Plot a point <math>S</math> and draw segments so that parallelogram <math>PQRS</math> is formed.</p>
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Algebra Review:

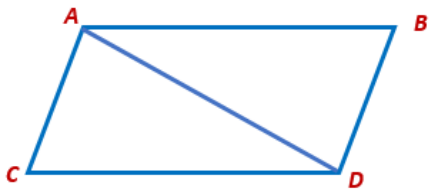
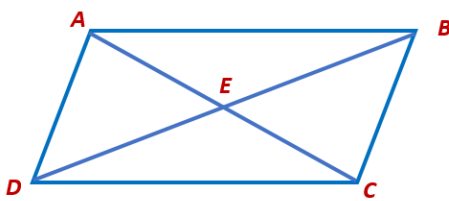
<p>Rules:</p> $x^a x^b = x^{a+b}$ $(x^a)^b = x^{ab}$	<p>4. What does <math>x^5</math> mean?</p> <div style="border: 1px solid blue; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> <p>_____ factors of _____</p> </div> <p>_____ • _____ • _____ • _____ • _____</p>	<p>5. Write out all the factors of <math>x^3 x^7</math></p> <p>_____ = _____</p>
		<p>6. Write out all the factors of <math>(x^2)^4</math></p> <p>_____ = _____ = _____</p>
<p>7. <math>(3x^4)(4x^5)</math></p>	<p>8. <math>(2x^2 y^4)^3</math></p>	<p>9. <math>(4x^3 y^4)(7x^6 y)</math></p>
<p>10. <math>2x^4 \cdot 6x^6</math></p>	<p>11. <math>(4x^3 y)^2</math></p>	<p>12. <math>(3x^5 y^2)(7xy^5)</math></p>

HW #3 - Use separate paper for most problems.

Find the value of each variable that will make the quadrilateral a parallelogram. You may need to solve a system of equations.

<p>1.</p> 	<p>2.</p> 	<p>3.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>*try solving this one by substitution instead of elimination.</p> </div>	<p>4.</p> 
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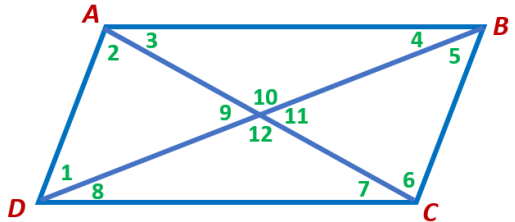
5. Proofs: Parallelograms and Congruent Triangles:

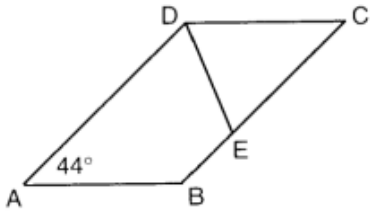
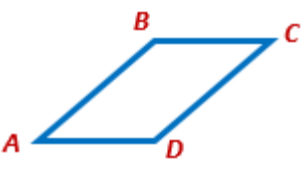
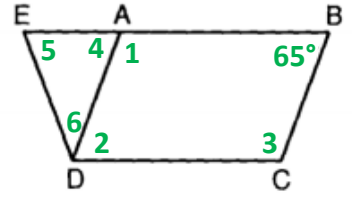
<p>a) Given: <math>ABDC</math> is a parallelogram, Prove: <math>\triangle ABD \cong \triangle DCA</math>.</p> 	<p>b) Given: <math>ABCD</math> is a parallelogram Prove: <math>\triangle AEB \cong \triangle CED</math></p> 
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More parallelogram problems...

6) In  $\square ABCD$ ,  $m\angle 1 = 48^\circ$ ,  $m\angle ADC = 70^\circ$ ,  $m\angle 9 = 52^\circ$ .  
Find the measure of all the numbered angles.

$m\angle 1 = \underline{\hspace{2cm}}$	$m\angle 5 = \underline{\hspace{2cm}}$	$m\angle 9 = \underline{\hspace{2cm}}$
$m\angle 2 = \underline{\hspace{2cm}}$	$m\angle 6 = \underline{\hspace{2cm}}$	$m\angle 10 = \underline{\hspace{2cm}}$
$m\angle 3 = \underline{\hspace{2cm}}$	$m\angle 7 = \underline{\hspace{2cm}}$	$m\angle 11 = \underline{\hspace{2cm}}$
$m\angle 4 = \underline{\hspace{2cm}}$	$m\angle 8 = \underline{\hspace{2cm}}$	$m\angle 12 = \underline{\hspace{2cm}}$



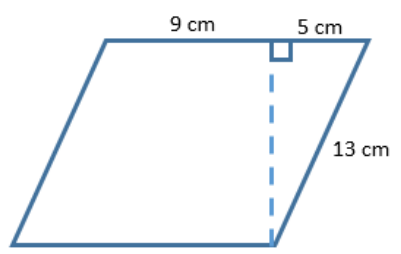
<p>7) In <math>\square ABCD</math>, <math>\overline{DE}</math> bisects <math>\angle ADC</math> and <math>m\angle A = 44^\circ</math>. Find <math>m\angle CDE</math>.</p> 	<p>8) The measure of <math>\angle A</math> and <math>\angle B</math> of <math>\square ABCD</math> are in the ratio 2:7. Find the <math>m\angle A</math> and <math>m\angle B</math>.</p> 	<p>9) In <math>\square ABCD</math>, <math>\overline{DA} \cong \overline{DE}</math> and <math>m\angle B = 65^\circ</math>. Find the measure of the numbered angles.</p> 
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10) Find the area of the parallelogram. Use the Pythagorean Theorem to find the height. Figure not to scale.

Algebra Review: Simplify each expression.

10. $x^5x^7$	11. $3x^4 \cdot 4x^3$	12. $(5x^2y^6)(2y^4)$	13. $3x^8y \cdot 4xy^5$
14. $3xy \cdot 5xy$	15. $(x^3)^4$	16. $(2x^3)^4$	17. $(5x^5)^2$
18. $(3x^3y^5)^2$	19. $(5x^2y)^3$		

Don't use a ruler to measure lengths.



Jumbled Answers to even-numbered problems:

$9x^6y^{10}$   $15x^2y^2$   $10x^2y^{10}$   $x^{12}$   $16x^{12}$