

Unit 1 Key Concepts

point	A
line segment	\overline{AB}
ray	\overrightarrow{AB}
line	\overleftrightarrow{AB}
plane	ABC

- 2 points are needed to define a line
- 3 non-collinear points define a plane
- The intersection of 2 lines is a point
- The intersection of 2 planes is a line
- The intersection of a plane and line is a point
- Skew lines are non-coplanar lines which never intersect

Theorems and Postulates (also in unit 2)

Segment Addition Postulate:	$AB + BC = AC$
Angle Addition Postulate:	$m\angle ABM + m\angle MBC = m\angle ABC$
Theorems of Parts:	<ul style="list-style-type: none"> • Halves of congruent angles are congruent • Halves of congruent segments are congruent • Consecutive adjacent angles on a line sum to 180° • Angles at a point sum to 360°
Linear Pair Theorem:	Linear Pair \rightarrow Supplementary Angles

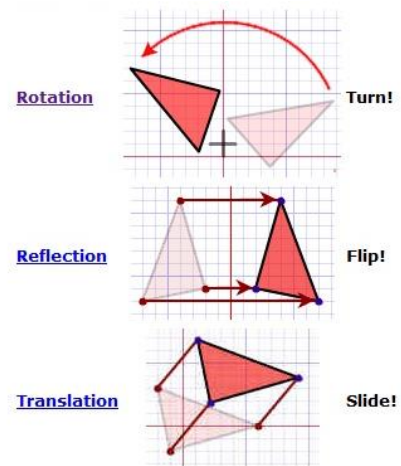
Angle Pairs

Adjacent angles
Linear pair
Complementary angles
Supplementary angles
Vertical angles

Area Formulas				Circles	
rectangle	square	triangle	trapezoid	Circumference Area Radius Diameter	$C = \pi d$ $A = \pi r^2$
$A = bh$	$A = s^2$	$A = \frac{1}{2}bh$	$A = \frac{1}{2}h(b_1 + b_2)$		
	$A = bh$				

Transformations

<p>Rotation: Direct Isometry</p> <p>$R_{90^\circ}(x, y) = (-y, x)$</p> <p>$R_{180^\circ}(x, y) = (-x, -y)$</p>	<p>Translation: Direct Isometry</p> <p>$T_{a,b}(x, y) = (x + a, y + b)$</p>
<p>Reflections:</p> <p>$r_{x-axis}(x, y) = (x, -y)$</p> <p>$r_{y-axis}(x, y) = (-x, y)$</p> <p>$r_{y=x}(x, y) = (y, x)$</p> <p>$r_{origin}(x, y) = (-x, -y)$</p> <p>Line Reflection - Indirect Isometry; Point Reflection - Direct Isometry</p>	<p>Compositions:</p> <ul style="list-style-type: none"> • 2nd (1st (Pre-image)) maps to image • Compare pre-image to final image for direct/indirect isometry • Isometry = angle measure and distance are preserved \rightarrow congruent image • To map- <ol style="list-style-type: none"> 1) Translate to common vertex 2) Rotate to get a shared side 3) Reflect over shared side



Unit 2 Key Concepts

Properties

Addition property of equality	If $x = y$	Then $x + a = y + a$
Subtraction property of equality	If $x = y$	Then $x - a = y - a$
Multiplication property of equality	If $x = y$	Then $xa = ya$
Division property of equality	If $x = y$	Then $\frac{x}{a} = \frac{y}{a}$
Reflexive Property	of equality $m\angle A = m\angle A; AB = AB$	of congruence $\angle A \cong \angle A; \overline{AB} \cong \overline{AB}$
Symmetric Property ($= / \cong$)	If $x = y$	Then $y = x$
Transitive Property ($= / \cong$)	If $\angle A \cong \angle B$ and $\angle B \cong \angle C$	Then $\angle A \cong \angle C$
Sustitution Property ($= / \cong$)	If $\angle A \cong \angle B$ and $\angle C \cong \angle B$	Then $\angle A \cong \angle C$

Angle Pair Theorems

- | | |
|-----------------------------------|---|
| 1) Congruent Supplements Theorem: | Supplements of $\cong \angle s$ are \cong ; Supplements of the same angle are \cong |
| 2) Congruent Complements Theorem: | Complements of $\cong \angle s$ are \cong ; Complements of the same angle are \cong |

Coordinate Geometry Tools

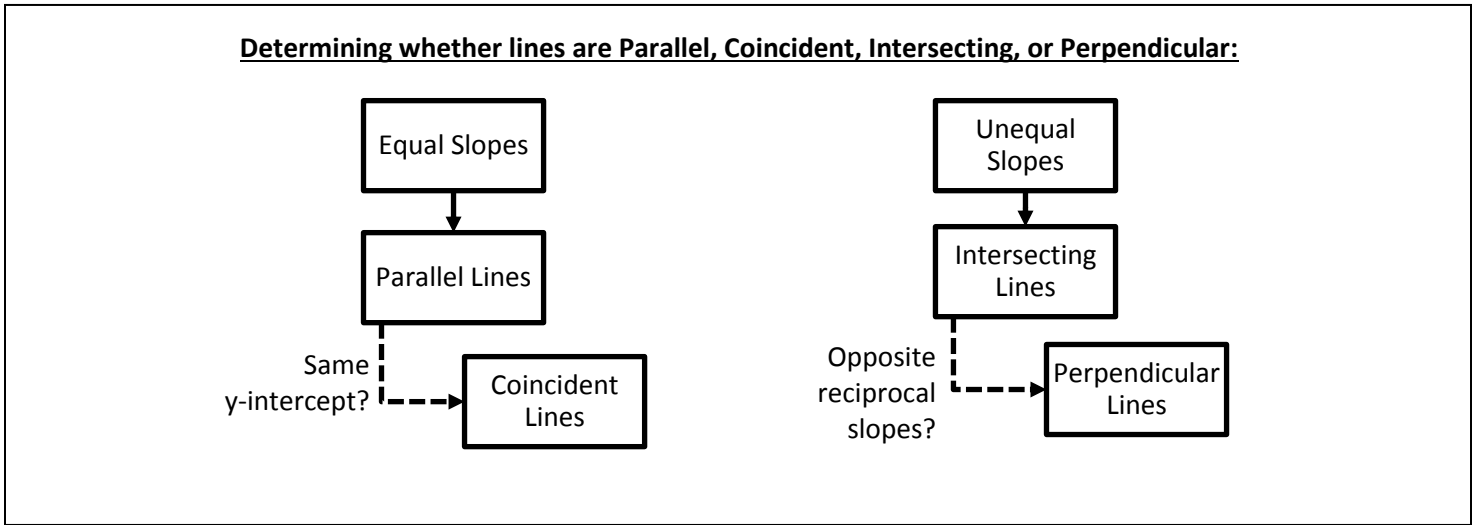
Slope	$m = \frac{\Delta y}{\Delta x}$
Distance	$x = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Midpoint	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Unit 3 Key Concepts

lines	\leftrightarrow	\cong corresponding angles
lines	\leftrightarrow	\cong alternate interior angles
lines	\leftrightarrow	\cong alternate exterior angles
lines	\leftrightarrow	supplementary same side interior angles
\cong linear pair	\rightarrow	Right angles
A line \perp to 1 of 2 lines	\rightarrow	Line is \perp to 2 nd line
2 lines \perp to same line	\rightarrow	2 lines

} *Parallel lines are perpendicular to the same line.*

Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$ OR $m = \frac{\Delta y}{\Delta x}$	Distance $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Midpoint $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	
Equations of Lines			
Slope-Intercept Form $y = mx + b$	Point-Slope Form $y - y_1 = m(x - x_1)$	Horizontal Line $y = c$	Vertical Line $x = c$



Line Transformations

Plot two pre-image points, do the transformation on the two points, plot the image points & connect to make the image line. Compare slopes and y-intercepts if you need to determine the relationship between the pre-image & image lines.

1. Name the property illustrated by the statement.

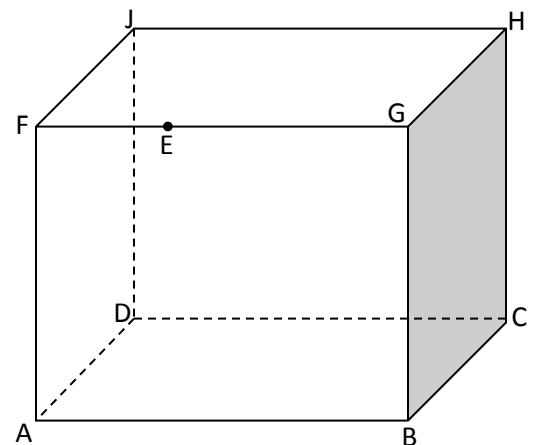
$$\overline{BC} \cong \overline{BC}$$

Since $\overline{AB} \cong \overline{BC}$ and $\overline{BC} \cong \overline{CD}$, then $\overline{AB} \cong \overline{CD}$

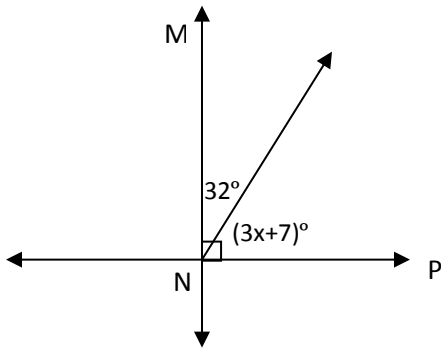
2. Find the coordinates of the midpoint of the segment with the given endpoints R(3,1) and S(3,7).
3. Given that point M(0,6) is the midpoint of the segment with endpoints K(3,4) and P, find the coordinates for point P.
4. The endpoints of a segment are given as F(8,-5) and G(-1,7). Find the length of the segment using the distance formula (you may confirm with Pythagorean Theorem).

Use the diagram of rectangular prism ABCDFGHJ at the right to answer questions 7-12:

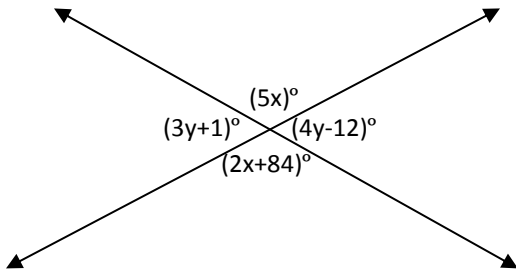
5. Name 3 collinear points _____
6. Name the intersection of planes ABC and GHC _____
7. What is the intersection of \overrightarrow{AF} and \overrightarrow{AD} ? _____
8. Name a segment skew to \overrightarrow{AF} _____
9. Name a line parallel to \overrightarrow{AF} _____
10. Name the plane parallel to plane GHC _____



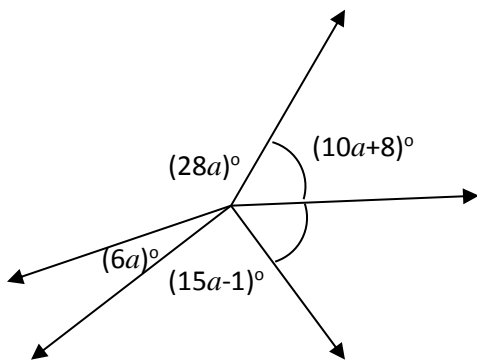
11. In the diagram, $\overline{MN} \perp \overline{NP}$. Find the value of x .



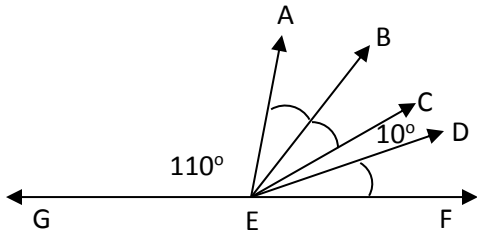
12. Find the measure of each angle in the following diagram:



13. Find the value of a



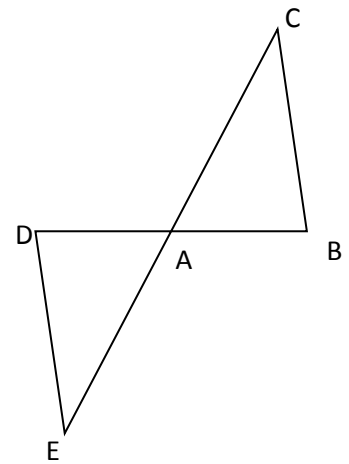
14. Find the $m\angle BEC$



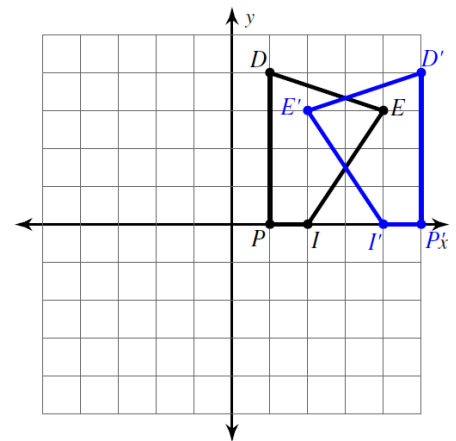
15. Given that $\triangle ABC$ is reflected through point A,

- a. State the corresponding image for point B: _____
- b. Explain whether this is an indirect or direct isometry:

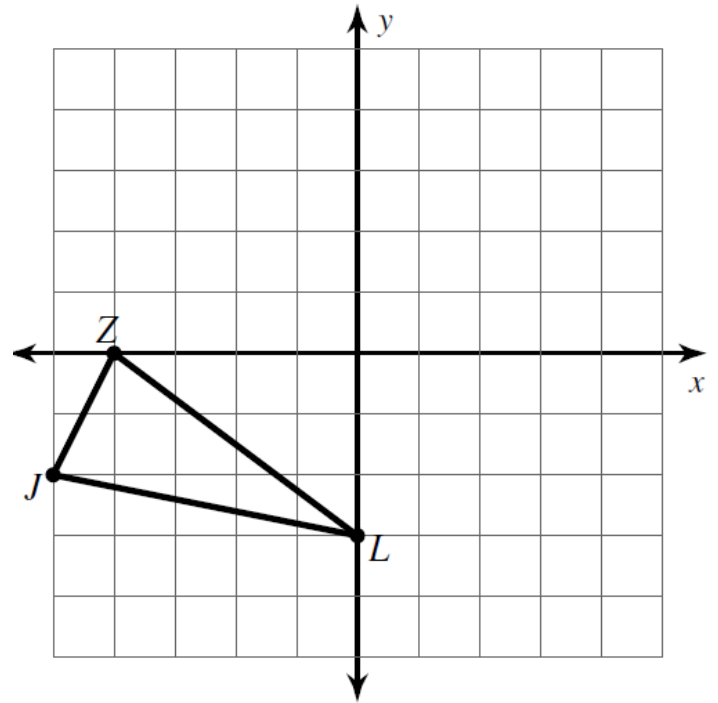
- c. State the triangle congruency: $\triangle ABC \cong \triangle$ _____
- d. Identify another single transformation that would map these triangles onto each other such that they are congruent (be specific): _____



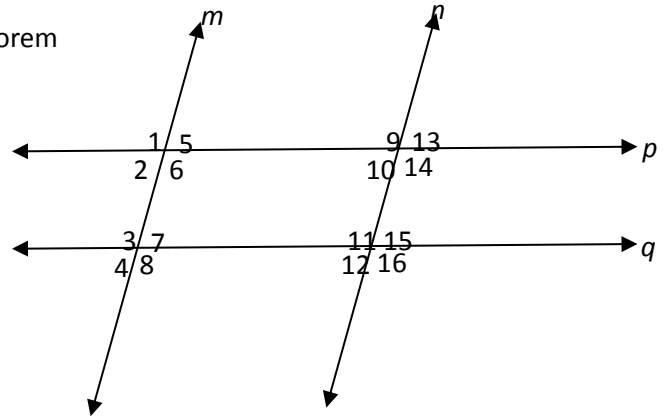
16. Describe the specific rule that was used to transform quadrilateral PIED.



17. Perform the following transformation: $R_{O, 90^\circ}((T_{3, 4})(\triangle JZL))$. Graph and state the coordinates of the image.



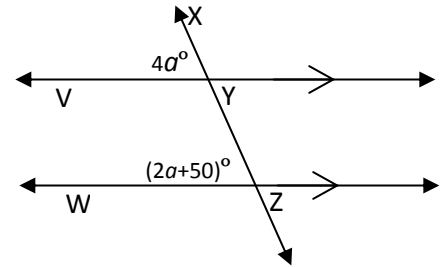
18. In the following diagram, $p \parallel q$. What postulate or theorem justifies each of the following statements?



- A. _____ $\angle 1 \cong \angle 3$
- B. _____ $\angle 10 \cong \angle 13$
- C. _____ $\angle 1 \cong \angle 9$
- D. _____ $m\angle 6 + m\angle 7 = 180$
- E. _____ $\angle 12 \cong \angle 13$

- 1) Parallel lines \rightarrow Alternate interior angles are congruent
- 2) Parallel lines \rightarrow Alternate exterior angles are congruent
- 3) Parallel lines \rightarrow Corresponding angles are congruent
- 4) Parallel lines \rightarrow Same side interior angles are supplementary
- 5) Vertical angles are congruent
- 6) The angles are not necessarily congruent

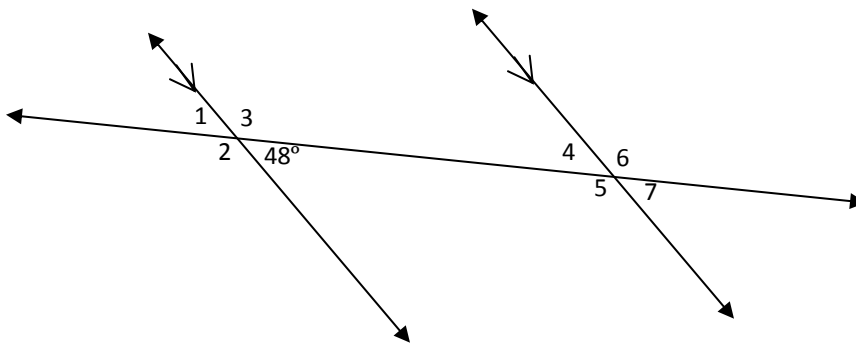
19. Use the diagram at the right for each of the following:



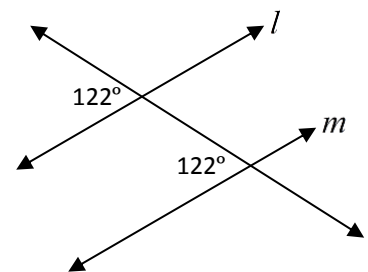
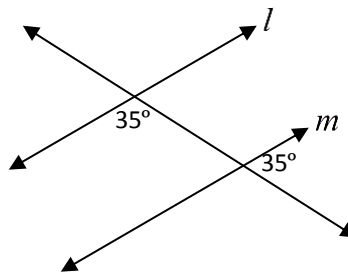
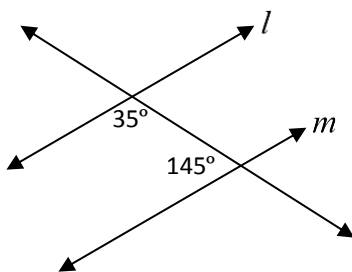
a. Find a

b. Find $m\angle VYZ$

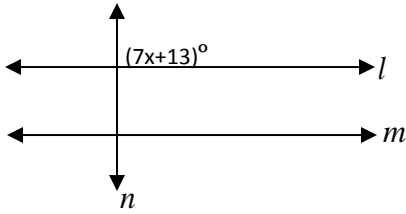
20. Find the measures of angles 1-7.



21. In each diagram, tell whether $l \parallel m$. Justify your answer.



22. In the diagram below, $l \parallel m$ and $m \perp n$. Find x :



23. Write the equation of the line that is parallel to $2y = 5x + 6$ and passes through the point $(10, 8)$ in point-slope form.

24. Tell whether the following pair of lines is parallel, perpendicular or neither. Justify your reasoning.

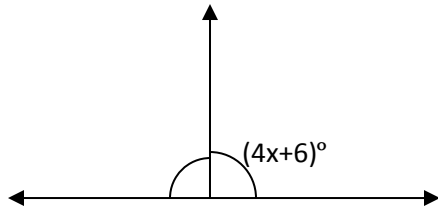
$$y = \frac{2}{3}x - 7$$

$$2y = -3x + 8$$

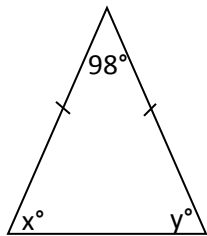
25. Write the equation of a horizontal line through the point $(4, 5)$.

26. Write the equation of the line through $(5, -2)$ with slope $\frac{3}{5}$ in slope-intercept form.

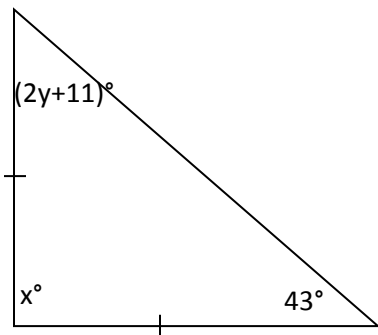
27. Find x



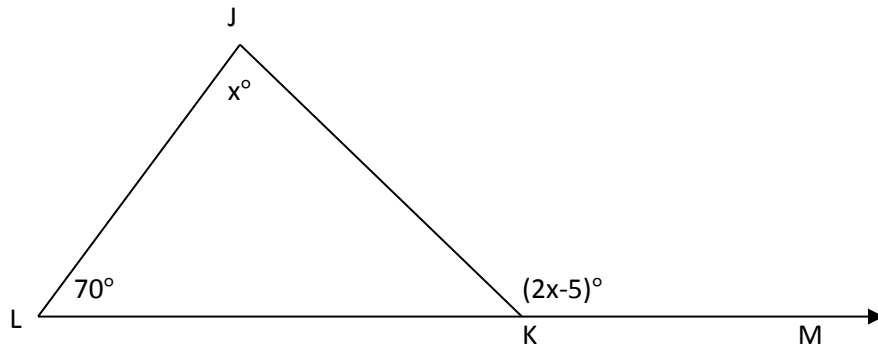
28. Find the values of x and y :



29. Find the values of x and y :

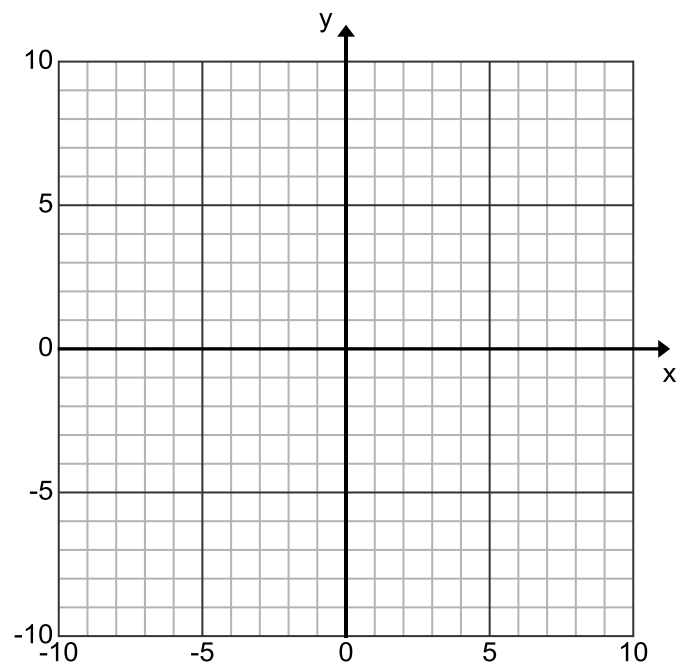


30. Find $m\angle JKM$



31. Graph line h with the equation $y - 3 = \frac{1}{4}(x - 1)$.

- a. Write the equation for the image after a transformation of $r_{y=x}$ (line h).



- b. Determine the relationship between the pre-image and image lines. Justify your response.