

LESSON 1-5 Angle Relationships

Target: I will be able to identify and use special pairs of angles, and identify perpendicular lines.

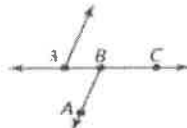
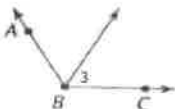
KeyConcept Special Angle Pairs

Adjacent angles are two angles that lie in the same plane and have a common vertex and a common side, but no common interior points.

Examples $\angle 1$ and $\angle 2$ are adjacent angles.



Nonexamples $\angle 3$ and $\angle ABC$ are nonadjacent angles



A **linear pair** is a pair of adjacent angles with noncommon sides that are opposite rays.

Example $\angle 1$ and $\angle 2$



Nonexample $\angle ADB$ and $\angle ADC$

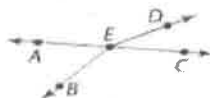


Vertical angles are two nonadjacent angles formed by two intersecting lines.

Examples $\angle 1$ and $\angle 2$; $\angle 3$ and $\angle 4$



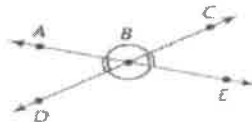
Nonexample $\angle AEB$ and $\angle DEC$



KeyConcept Angle Pair Relationships

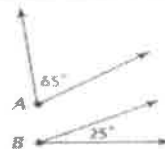
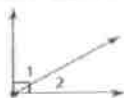
Vertical angles are congruent.

Examples $\angle ABC \cong \angle DBE$ and $\angle ABD \cong \angle CBE$



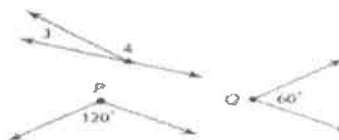
Complementary angles are two angles with measures that have a sum of 90.

Examples $\angle 1$ and $\angle 2$ are complementary.
 $\angle A$ is complementary to $\angle B$.



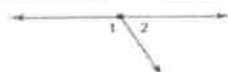
Supplementary angles are two angles with measures that have a sum of 180.

Examples $\angle 3$ and $\angle 4$ are supplementary.
 $\angle P$ and $\angle Q$ are supplementary.



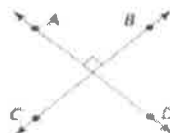
The angles in a linear pair are supplementary.

Example $m\angle 1 + m\angle 2 = 180$



KeyConcept Perpendicular Lines

- Perpendicular lines intersect to form four right angles.
- Perpendicular lines intersect to form congruent adjacent angles.
- Segments and rays can be perpendicular to lines or other line segments and rays.
- The right angle symbol in the figure indicates that the lines are perpendicular.

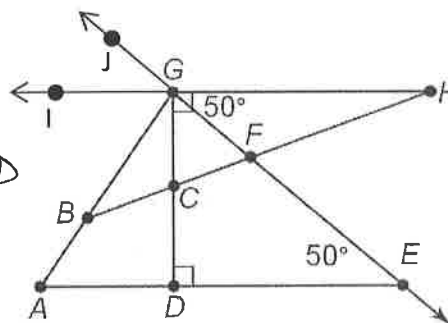


Symbol \perp is read is perpendicular to.

Example $\overrightarrow{AD} \perp \overrightarrow{CB}$

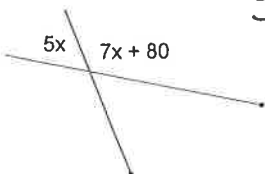
p.51:8-17

- 1A. Name two acute vertical angles. $\angle JGI, \angle FGH$
- 1B. Name two complimentary nonadjacent angles. $\angle CGF, \angle FED$
- 1C. A linear pair whose vertex is F. $\angle GFC, \angle GFH$
- 1D. An angle supplementary to $\angle GBC$. $\angle CBA$



Find the value of the variable.

2A. p.51:20



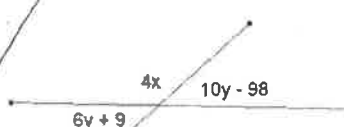
$$5x + 7x + 80 = 180 \text{ linear pair}$$

$$12x + 80 = 180$$

$$12x = 100$$

$$x = 8.3$$

2B. p.51:22



$$6y + 9 = 10y - 98 \text{ vertical angles}$$

$$9 = 4y - 98$$

$$107 = 4y$$

$$26.75 = y$$

$$6y + 9 + 4x = 180$$

$$6(26.75) + 9 + 4x = 180$$

$$169.5 + 4x = 180$$

$$4x = 10.5$$

$$x = 2.625$$

p.52:28

2C. $\angle 3$ and $\angle 4$ form a linear pair. The measure of $\angle 3$ is five more than twice the measure of $\angle 4$. Find the measure of each angle.

$$m\angle 3 + m\angle 4 = 180 \text{ linear pairs are supplementary}$$

$$m\angle 3 = 2x + 5$$

$$m\angle 4 = x$$

$$2x + 5 + x = 180$$

$$3x + 5 = 180$$

$$3x = 175$$

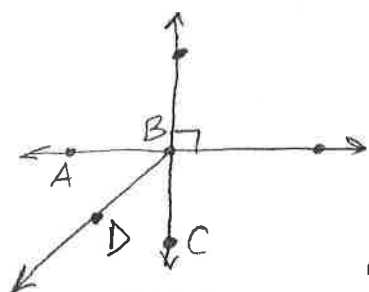
$$x = 58.3$$

$$m\angle 3 + 58.3 = 180$$

$$m\angle 3 = 121.7$$

p.52:34

2D. Rays AB and BC are perpendicular. Point D lies in the interior of $\angle ABC$. If $m\angle ABD = 4r + 8$ and $m\angle DBC = 6r - 18$, find $m\angle ABD$ and $m\angle DBC$.



p.52:36-41

$$\begin{aligned}
 m\angle ABD + m\angle DBC &= 90 \\
 4r + 8 + 6r - 18 &= 90 \\
 10r - 10 &= 90 \\
 10r &= 100 \\
 r &= 10 \\
 m\angle ABD &= 4r + 8 \\
 &= 4(10) + 8 = 48 \\
 m\angle DBC &= 6r - 18 \\
 &= 6(10) - 18 = 42
 \end{aligned}$$

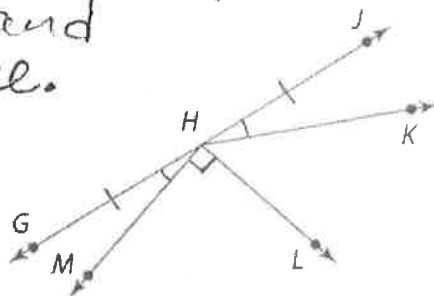
Determine whether each statement can be assumed from the figure. Explain.

3A. $\angle GHM$ and $\angle JHK$ are vertical angles.

No, though they are ~~adjacent~~ ^{Congruent} and \overleftrightarrow{GJ} is a straight line, rays \overrightarrow{HK} and \overrightarrow{HM} do not form a straight line.

3B. $\angle GHL$ and $\angle LHJ$ are supplementary.

Yes, they form a linear pair.



3C. $\angle GHM$ and $\angle MHL$ are adjacent.

Yes, they share a common side and vertex, but no common interior points.