## Lesson 2.8.1: Writing Proofs **Proof:** a form of logical reasoning in which each statement is organized and backed up by the reasons $\label{postulate:postulate:postulate} \textbf{Postulate:} \ \ \textbf{a} \ \ \textbf{statement} \ \ \textbf{that} \ \ \textbf{is} \ \ \textbf{accepted} \ \ \textbf{without} \ \ \textbf{proof}$ Theorem: a statement that is accepted after it is proved deductively Ways of Writing Proofs 1. Flow-Chart Proof

2. Two-Column Proof
3. Paragraph Form Proof
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Practice Exercises 2.8.1
A. Provide the reason for each statement.
1. If $\angle 1$ is a right angle, then $m \angle 1 = 90^{\circ}$ .
2. If $\angle M$ and $\angle N$ are supplementary, then $m\angle M + m\angle N = 180^{\circ}$ . 3. If $Y$ is the midpoint of $\overline{CE}$ then $CY = EY$ .
4. If $\overline{LO} \cong \overline{VE}$ , then $LO = VE$ .
5. If $2x = 10$ then $\frac{2x}{2} = \frac{10}{2}$ .
6. If $\angle X$ and $\angle Y$ are vertical angles, then $\angle X \cong \angle Y$ .
7. If $\angle M$ and $\angle N$ form a linear pair, then $\angle M$ and $\angle N$ are
supplementary.
8. If $m \angle J + m \angle K = go^{\circ}$ and $m \angle K + m \angle L = go^{\circ}$ , then $\angle J \cong \angle L$ .
g. If Y lies on $\overline{XZ}$ , then $XZ = XY + YZ$ .
10. If $m\angle D + m\angle E = 180^{\circ}$ and $m\angle E + m\angle F = 180^{\circ}$ , then $\angle D \cong \angle F$ .
B. Provide a conclusion for each given hypothesis and give the
reason.
1. If $\angle 1$ is a right angle, then
Reason:
2. If $\angle A$ and $\angle B$ are supplementary, then Reason:
3. If X is the midpoint of $\overline{AC}$ then
Reason:
4. If $LO = \overline{VE}$ , then
Reason:
5. If $2x = 10$ then
Reason: 6. If $\angle M$ and $\angle N$ form a linear pair, then
Reason:
7. If $\overrightarrow{LM}$ bisects $\overrightarrow{PG}$ at $L$ , then
Reason:
8. If $x + y = 12$ and $y = 9$ , then
Reason:
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organized and backed up by the reasons  Postulate: a statement that is accepted without proof  Theorem: a statement that is accepted after it is proved deductively  Ways of Writing Proofs  1. Flow-Chart Proof  2. Two-Column Proof  3. Paragraph Form Proof  Practice Exercises 2.8.1  A. Provide the reason for each statement.  1. If ∠1 is a right angle, then m∠1 = 90°.  2. If ∠M and ∠N are supplementary, then m∠M + m∠N = 180°.  3. If Y is the midpoint of CE then CY = EY.  4. If CO ≅ VE, then LO = VE.  5. If ∠X and ∠Y are vertical angles, then ∠X ≅ ∠Y.  7. If ∠M and ∠N form a linear pair, then ∠M and ∠N are supplementary.  8. If m∠J + m∠K = 90° and m∠K + m∠L = 90°, then ∠J ≅ ∠L.  9. If Y lies on XZ, then XZ = XY + YZ.  10. If m∠D + m∠E = 180° and m∠E + m∠F = 180°, then ∠D ≅ ∠F.  B. Provide a conclusion for each given hypothesis and give the reason.  1. If ∠1 is a right angle, then  Reason:  2. If ∠A and ∠B are supplementary, then  Reason:  3. If X is the midpoint of AC then  Reason:  4. If LO = VE, then  Reason:  5. If 2x = 10 then  Reason:  5. If 2x = 10 then  Reason:  6. If ∠M and ∠N form a linear pair, then
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organized and backed up by the reasons  Postulate: a statement that is accepted without proof Theorem: a statement that is accepted after it is proved deductively  Ways of Writing Proofs  1. Flow-Chart Proof  2. Two-Column Proof  Practice Exercises 2.8.1  A. Provide the reason for each statement.  1. If ∠1 is a right angle, then m∠1 = 90°.  2. If ∠M and ∠N are supplementary, then m∠M + m∠N = 180°.  3. If Y is the midpoint of CE then CY = EY.  4. If LO ≅ VE, then LO = VE.  5. If 2x = 10 then 2x = 10/2.  6. If ∠X and ∠Y are vertical angles, then ∠X ≅ ∠Y.  7. If ∠M and ∠N form a linear pair, then ∠M and ∠N are supplementary.  8. If m∠J + m∠K = 90° and m∠K + m∠L = 90°, then ∠J ≅ ∠L.  9. If Y lies on XZ, then XZ = XY + YZ.  10. If m∠D + m∠E = 180° and m∠E + m∠F = 180°, then ∠D ≅ ∠F.  B. Provide a conclusion for each given hypothesis and give the reason.  1. If ∠1 is a right angle, then  Reason:  2. If ∠A and ∠B are supplementary, then  Reason:  4. If LO = VE, then  Reason:  5. If ∠x = 10 then  Reason:  6. If ∠M and ∠N form a linear pair, then  Reason:  7. If LM bisects PG at L, then

_	+BC = AC and $AC = 2AB$ , then
Reason	n: nd Y are vertical angles, then
	n:
Activity 2.	8.1
A. Provide	the reason for each statement.
1. If ∠1 i	s an acute angle, then $m \angle 1 < 90^{\circ}$ .
	and $\angle R$ are complementary, then $m \angle T + m \angle R = go^{\circ}$ .
	the midpoint of $\overline{EF}$ then $EH = HF$ .
4. If <i>RU</i>	$\cong \overline{BY}$ , then $RU = BY$ .
5. If $3x =$	$= 9 \text{ then } \frac{3x}{3} = \frac{9}{3}.$
6. If $x + 1$	2 = 5, then $x + 2 - 2 = 5 - 2$ .
	bisects $\overline{PG}$ at $L$ , then $\overline{LP} \cong \overline{GL}$ .
	y = 12 and $y = 9$ , then $x + 9 = 12$ .
	+BC = 2AB and $2AB = AC$ , then $AB + BC = AC$ .
<b>10</b> . If ∠ <i>X</i>	$\cong \angle Y$ , then $m\angle X = m\angle Y$ .
B. Provide	a conclusion for each given hypothesis and give the
reason.	
	and $\angle$ 2 form two opposite rays, then
Reason	
_	and $\angle D$ are complementary, then
Reason	$\perp {WX}$ , then
Reason	
	$\cong \overline{\overline{OP}}$ , then
Reasor	
_	= 12, then
Reasor	
	$\cong \overline{\angle N}$ , then
Reason	n:
7. If $x - \frac{1}{2}$	3 = 5, then
	1:
	1 .1
	y = 5 and $y = 2$ , then
8. If $x+1$ Reason	n:
8. If $x + 1$ Reason 9. If $Y$ lie	n: es between $\overline{XZ}$ , then
8. If $x + 1$ Reason 9. If $Y$ like Reason	n: es between $\overline{XZ}$ , then n:
8. If <i>x</i> + 1 Reason 9. If <i>Y</i> lice Reason 10. If <i>X</i> and	n: es between $\overline{XZ}$ , then n: n: nd $Y$ are supplementary angles, then
8. If $x + 1$ Reason 9. If $Y$ lin Reason	n: es between $\overline{XZ}$ , then n: nd $Y$ are supplementary angles, then
8. If <i>x</i> + 1 Reason 9. If <i>Y</i> lice Reason 10. If <i>X</i> and	n: es between $\overline{XZ}$ , then n: n: nd $Y$ are supplementary angles, then
8. If <i>x</i> + 1 Reason 9. If <i>Y</i> lice Reason 10. If <i>X</i> and	n: es between $\overline{XZ}$ , then n: n: nd $Y$ are supplementary angles, then
8. If <i>x</i> + 1 Reason 9. If <i>Y</i> lice Reason 10. If <i>X</i> and	n: es between $\overline{XZ}$ , then n: n: nd $Y$ are supplementary angles, then
8. If $x + \frac{1}{2}$ Reason g. If $Y$ line Reason 10. If $X$ and Reason	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n:
8. If $x + \frac{1}{2}$ Reason  9. If $Y$ line Reason  10. If $X$ and Reason  9. If $AB$	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then
8. If $x + \frac{1}{2}$ Reason  9. If $Y$ line Reason  10. If $X$ and Reason  9. If $AB - \frac{1}{2}$ Reason	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then
8. If $x + \frac{1}{2}$ Reason 9. If $Y$ line Reason 10. If $X$ and Reason 9. If $AB - \frac{1}{2}$ Reason 10. If $X$ and	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then
8. If $x + \frac{1}{2}$ Reason  9. If $Y$ line Reason  10. If $X$ and Reason  10. If $AB - \frac{1}{2}$ Reason  10. If $X$ and Reason	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then  n: nd $Y$ are vertical angles, then  n:
8. If $x + \frac{1}{1}$ Reason 9. If $Y$ line Reason 10. If $X$ and Reason 10. If $AB - \frac{1}{1}$ Reason 10. If $X$ and Reason Activity 2.	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then  n: nd $Y$ are vertical angles, then  n:
8. If $x + \frac{1}{1}$ Reason 9. If $Y$ line Reason 10. If $X$ and Reason 10. Activity 2.	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then  n: nd $Y$ are vertical angles, then  n:  8.1  the reason for each statement.
<ul> <li>8. If x + Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li>10. If ∠1 in I</li></ul>	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then  n: nd $Y$ are vertical angles, then  1.: end $Y$ are vertical angles, then  1.: end $Y$ are vertical angles, then
<ul> <li>8. If x + Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li></li></ul>	n: es between $\overline{XZ}$ , then  n: nd $Y$ are supplementary angles, then  n: $+BC = AC$ and $AC = 2AB$ , then  n: nd $Y$ are vertical angles, then  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .
<ul> <li>8. If x + Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li>11. And Reason</li> <li>12. If ∠T</li> <li>13. If H is</li> </ul>	es between $\overline{XZ}$ , then  n:  and $Y$ are supplementary angles, then  h: $+BC = AC$ and $AC = 2AB$ , then  n:  and $Y$ are vertical angles, then  1  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^{\circ}$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^{\circ}$ .  the midpoint of $\overline{EF}$ then $EH = HF$ .
<ul> <li>8. If x + Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li>11. If X and Reason</li> <li>12. If ∠T and If X and If X and If X and If X and X</li></ul>	es between $\overline{XZ}$ , then  n:  nnd $Y$ are supplementary angles, then  h: $+BC = AC$ and $AC = 2AB$ , then  n:  nd $Y$ are vertical angles, then  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\cong \overline{BY}$ , then $RU = BY$ .
<ul> <li>8. If x + _ Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li>11. If X and Reason</li> <li>12. If ∠T and The Interval of the</li></ul>	es between $\overline{XZ}$ , then  n:  nd $Y$ are supplementary angles, then  h: $+BC = AC$ and $AC = 2AB$ , then  n:  nd $Y$ are vertical angles, then  n:  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\cong \overline{BY}$ , then $RU = BY$ . $= 9$ then $\frac{3^{\times}}{3} = \frac{9}{3}$ .
<ul> <li>8. If x + _ Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li>10. If Z and Reason</li> <li>11. If ∠1 ind X and X and</li></ul>	es between $\overline{XZ}$ , then  n:  nd $Y$ are supplementary angles, then  h: $+BC = AC$ and $AC = 2AB$ , then  n:  nd $Y$ are vertical angles, then  1  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\cong \overline{BY}$ , then $RU = BY$ . $= 9$ then $\frac{3^X}{3} = \frac{9}{3}$ . $= 2 = 5$ , then $x + 2 - 2 = 5 - 2$ .
<ul> <li>8. If x + _ Reason</li> <li>9. If Y link</li> <li>Reason</li> <li>10. If X and Reason</li> <li>10. If Z and Reason</li> <li>11. If ∠1 ind X and X and</li></ul>	es between $\overline{XZ}$ , then  n:  nd $Y$ are supplementary angles, then  h: $+BC = AC$ and $AC = 2AB$ , then  n:  nd $Y$ are vertical angles, then  n:  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\cong \overline{BY}$ , then $RU = BY$ . $= 9$ then $\frac{3^{\times}}{3} = \frac{9}{3}$ .
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in 12. If ∠7 13. If <i>H</i> is 14. If RU 15. If 3 <i>x</i> = 16. If <i>x</i> + 16. If <i>x</i> + 17. If LM 18. If <i>x</i> +	es between $\overline{XZ}$ , then  h.:  and $Y$ are supplementary angles, then  h.:  h.:  h.:  h.:  h.:  h.:  h.:  M.:  M.:  B.1  the reason for each statement.  It is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  The midpoint of $\overline{EF}$ then $EH = HF$ . $E B \overline{Y}$ , then $RU = B Y$ . $E = g$ then $E = g$ $E =$
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in 12. If ∠7 13. If <i>H</i> is 14. If RU 15. If 3 <i>x</i> = 16. If <i>x</i> + 16. If <i>x</i> + 17. If LM 18. If <i>x</i> + 19. If <i>AB</i> -	es between $\overline{XZ}$ , then  h.: and $Y$ are supplementary angles, then  h.: and $Y$ are supplementary angles, then  h.:  h.: and $Y$ are vertical angles, then  h.:  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\cong \overline{BY}$ , then $RU = BY$ . $= 9 \text{ then } \frac{3x}{3} = \frac{9}{3}$ . $= 2 = 5$ , then $x + 2 - 2 = 5 - 2$ .  bisects $\overline{PG}$ at $L$ , then $\overline{LP} \cong \overline{GL}$ . $= 12 = 12 = 12$ . $= 13 = 12$ . $= 14 = 12$ .
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in 12. If ∠7 13. If <i>H</i> is 14. If RU in 15. If 3 <i>x</i> = 16. If <i>x</i> + in 17. If LM 18. If <i>x</i> + in 19. If ∠8 10. If ∠8	es between $\overline{XZ}$ , then  h.: and $Y$ are supplementary angles, then  h.: and $Y$ are supplementary angles, then  h.:  h.: and $Y$ are vertical angles, then  h.:  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^{\circ}$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^{\circ}$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\overline{EF}$ then $EH = HF$ . $\overline{EF}$ then $EH = FF$ .
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in 12. If ∠7 13. If <i>H</i> is 14. If RU in 15. If 3 <i>x</i> = 16. If <i>x</i> + in 17. If LM 18. If <i>x</i> + in 19. If ∠8 10. If ∠8	es between $\overline{XZ}$ , then  h.: and $Y$ are supplementary angles, then  h.: and $Y$ are supplementary angles, then  h.:  h.: and $Y$ are vertical angles, then  h.:  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\cong \overline{BY}$ , then $RU = BY$ . $= 9 \text{ then } \frac{3x}{3} = \frac{9}{3}$ . $= 2 = 5$ , then $x + 2 - 2 = 5 - 2$ .  bisects $\overline{PG}$ at $L$ , then $\overline{LP} \cong \overline{GL}$ . $= 12 = 12 = 12$ . $= 13 = 12$ . $= 14 = 12$ .
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in 12. If ∠7 13. If <i>H</i> is 14. If RU 15. If 3 <i>X</i> = 16. If <i>X</i> + 17. If LM 18. If <i>X</i> + 19. If AB 10. If ∠ <i>X</i> 10. If ∠ <i>X</i> 11. If ∠ <i>X</i> 12. If ∠ <i>X</i> 13. If <i>X</i> + 14. If <i>X</i> + 15. If <i>X</i> + 16. If ∠ <i>X</i> 17. If LM 18. If <i>X</i> + 19. If AB 10. If ∠ <i>X</i> 10. If ∠ <i>X</i> 11. If ∠ <i>X</i> 12. If ∠ <i>X</i> 13. If ∠ <i>X</i> 14. If ∠ <i>X</i> 15. If ∠ <i>X</i> 16. If ∠ <i>X</i> 17. If ∠ <i>X</i> 18. Provide reason.	es between $\overline{XZ}$ , then  here is between $\overline{XZ}$ , then  here is between $\overline{XZ}$ , then  here is  here is upplementary angles, then  here is  here is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in ∠1	es between $\overline{XZ}$ , then  h:  and $Y$ are supplementary angles, then  h:  8.1  the reason for each statement.  is an acute angle, then $m \angle 1 < 90^\circ$ .  and $\angle R$ are complementary, then $m \angle T + m \angle R = 90^\circ$ .  the midpoint of $\overline{EF}$ then $EH = HF$ . $\overline{EF}$ is the $RU = BY$ . $\overline{EF}$ $\overline{EF}$ then $RU = BY$ . $\overline{EF}$ $\overline{EF}$ $\overline{EF}$ then $EH = FF$ . $\overline{EF}$ $\overline{EF}$ $\overline{EF}$ then $EH = FF$ .
8. If <i>x</i> + Reason 9. If <i>Y</i> line Reason 10. If <i>X</i> and Reason 11. If ∠1 in 12. If ∠1 in 13. If <i>H</i> is 14. If <i>RU</i> 15. If 3 <i>x</i> = 16. If <i>x</i> + 17. If <i>LM</i> 18. If <i>x</i> + 19. If <i>AB</i> 10. If ∠ <i>X</i> 11. If ∠1 in 12. If ∠1 in 13. If <i>X</i> + 14. If <i>X</i> + 15. If <i>X</i> + 16. If <i>X</i> + 17. If <i>LM</i> 18. If <i>x</i> + 19. If <i>AB</i> 10. If ∠ <i>X</i> 11. If ∠1 in 12. Reason 11. If ∠1 in 13. Reason	es between $\overline{XZ}$ , then  here is between $\overline{XZ}$ , then  here is between $\overline{XZ}$ , then  here is  here is supplementary angles, then  here is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is an acute $\overline{MZ}$ is an acute angle, then $\overline{MZ}$ is accuse angle, then $\overline{MZ}$ is ac
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Reason: \_\_\_

Reason: \_\_

Reason:

Reason: \_\_\_\_

7. If x - 3 = 5, then \_\_\_\_\_.

8. If x + y = 5 and y = 2, then \_\_\_\_

g. If Y lies between  $\overline{XZ}$ , then \_\_\_\_.

10. If X and  $\overline{Y}$  are supplementary angles, then \_\_\_\_