Bell Ringer

Monday 12/17

1. What is vertex form? (write the equation)

$y = a(x-h)^2 + k$

2. What is the advantage to vertex form? What information is easily found in vertex form?

find vertex Vertex

3. Convert $y = x^2 + 10x + 16$ to vertex form.

$\frac{-10}{2(1)} = \frac{-10}{2} = (-5, -9)$

$y = (x+5)^2 - 9$

3. What is standard form? (write the equation)

$y = ax^2 + bx + c$

4. What is the advantage to standard form? What information is easily found in standard form?

$c = y$ int

5. Convert $y = (x + 3)(x - 5)$ to standard form.

$y = x^2 - 2x - 15$

×	x	$+3$
x	x^2	$+3x$
-5	$-5x$	-15

Correct 6.1A Algebraic Proofs!

1 pt for each complete proof

Name: Key

Algebraic Proofs
Sec. 6.1A

Give the reason for each statement in the following two-column proof.

1. Given: $3x+6=7x-2$
   Prove: $x=2$

Statements	Reasons
1. $3x+6=7x-2$ $-3x \quad -3x$	1. Given
2. $6=4x-2$ $+2 \quad +2$	2. Subtraction property of equality
3. $8=4x$	3. Addition property of equality
4. $2=x$	4. Division property of equality
5. $x=2$	5. Symmetric property of equality

2. Given: $2-6x+4=3x-14+x$
   Prove: $x=2$

Statements	Reasons
1. $2-6x+4=3x-14+x$	1. Given
2. $6-6x=3x-14+x$	2. Substitution
3. $6-6x=4x-14$	3. Substitution
4. $6=10x-14$	4. Addition property of equality
5. $20=10x$	5. Addition property of equality
6. $2=x$	6. Division property of equality
7. $x=2$	7. Symmetric property of equality

3. Given: $\frac{1}{4}x+7y=10-y$

Prove: $x=40-32y$

Statements	Reasons
1. $\frac{1}{4}x+7y=10-y$	1. Given
2. $\frac{1}{4}x+7y-7y=10-y-7y$	2. Subtraction property of equality
3. $\frac{1}{4}x=10-8y$	3. Substitution
4. $4\left(\frac{1}{4}x\right)=4(10-8y)$	4. Multiplication property of equality
5. $x=4(10-8y)$	5. Substitution
6. $x=40-32y$	6. Distributive property of equality

4. Given: $\begin{cases} a=2 \\ -(-2a+3b)=6 \end{cases}$

Prove: $b=-\frac{2}{3}$

Statements	Reasons
1. $-(-2a+3b)=6$	1. Given
2. $-2a+3b=-6$	2. mult/div property of equality
3. $3b=2a-6$	3. Addition property of equality
4. $b=\frac{2}{3}a-2$	4. Division property of equality
5. $a=2$	5. Given
6. $b=\frac{4}{3}-2$	6. Substitution
7. $b=-\frac{2}{3}$	7. Substitution

5. Given: $5(n-3)=4(2n-7)-14$
Prove: $n=9$

Statements	Reasons
1. $5(n-3)=4(2n-7)-14$	1. Given
2. $5n-15=8n-28-14$	2. Distributive Property
3. $5n-15=8n-42$	3. Substitution
4. $5n-15+15=8n-42+15$	4. Addition property of equality
5. $5n=8n-27$	5. Substitution
6. $5n-8n=8n-27-8n$	6. Subtraction property of equality
7. $-3n=-27$	7. Substitution
8. $\frac{-3n}{3}=\frac{-27}{3}$	8. Division property of equality
9. n=9	9. Substitution

6. Given: $4-7x=2x-23$
Prove: $x=3$

Statements	Reasons
(1) $4-7x=2x-23$	(1) Given
(2) $4=9x-23$	(2) Addition property of equality
(3) $27=9x$	(3) Addition property of equality
(4) $3=x$	(4) Division property of equality
(5) $x=3$	(5) Symmetric property of equality

7. Given: $\frac{1}{2}x+6y=8-3y$

Prove: $x=16-18y$

Statements	Reasons
① $\frac{1}{2}x+6y=8-3y$	① Given
② $\frac{1}{2}x=8-9y$	② Subtraction property of equality
③ $2(\frac{1}{2}x)=2(8-9y)$	③ Multiplication property of equality
④ $x=2(8-9y)$	④ Substitution
⑤ $x=16-18y$	⑤ Distributive property

8. Given: $3-2x+12=4x-7-2x$

Prove: $\frac{11}{2}=x$

Statements	Reasons
① $3-2x+12=4x-7-2x$	① Given
② $15-2x=4x-7-2x$	② Substitution
③ $15-2x=2x-7$	③ Substitution
④ $15=4x-7$	④ Addition Property of Equality
⑤ $22=4x$	⑤ Addition Property of Equality
⑥ $\frac{11}{2}=x$	⑥ Division Property of Equality

9. Given: $\begin{cases} a=-3 \\ 2b+a+1=5 \end{cases}$

Prove: $b=\frac{7}{2}$

Statements	Reasons
(1) $2b+a+1=5$	(1) Given
(2) $2b+a=4$	(2) Subtraction property of equality
(3) $2b=-a+4$	(3) Subtraction property of equality
(4) $b=-\frac{1}{2}a+2$	(4) Division property of equality
(5) $a=-3$	(5) Given
(6) $b=-\frac{1}{2}(-3)+2$	(6) Substitution
(7) $b=\frac{3}{2}+2$	(7) Substitution
(8) $b=\frac{7}{2}$	(8) Substitution

10. Given: $-(n-5)=2(3n-8)-7$

Prove: $n=4$

Statements	Reasons
(1) $-(N-5)=2(3N-8)-7$	(1) Given
(2) $-N+5=6N-16-7$	(2) Distributive Property
(3) $-N+5=6N-23$	(3) Substitution
(4) $5=7N-23$	(4) Addition property of equality
(5) $28=7N$	(5) Addition property of equality
(6) $4=N$	(6) Division property of equality
(7) $N=4$	(7) Symmetric property of equality

6.1 B due tomorrow :)

Questions...??

Name: _____ **Hour:** _____ **6.1 B Algebraic Proofs**

Solve each equation. Write a reason for every step.

1. $4x = 12x + 32$

2. $28 + 12x = 8x - 4$

3. $60x + 153 = 9x + 51$

4. $-4x + 10 = -5x + 18$

5. $-3(x + 2) = 16 - x$

6. $-x - 2(9 - 8x) = 12$

7. $6(x - 6) = x(16 - 7)$

8. $\frac{1}{4}x + 10 = 2$

9. $2(4-x)+1=16-3x$

10. $\frac{1}{3}x+4=6x+12$

11. **Given:** $8x - 5 = 2x + 1$
Prove: $x = 1$
Proof:

Statements	Reasons
a. $8x - 5 = 2x + 1$	**a.** _____
b. $8x - 5 - 2x = 2x + 1 - 2x$	**b.** _____
c. _____	**c.** Substitution Property
d. _____	**d.** Addition Property
e. $6x = 6$	**e.** _____
f. $\frac{6x}{6} = \frac{6}{6}$	**f.** _____
g. _____	**g.** _____

12. **Given:** $\frac{4x + 6}{2} = 9$
Prove: $x = 3$
Proof:

Statements	Reasons
a. $\frac{4x + 6}{2} = 9$	**a.** _____
b. $\left(\frac{4x + 6}{2}\right) = 2(9)$	**b.** Mult. Prop.
c. $4x + 6 = 18$	**c.** _____
d. $4x + 6 - 6 = 18 - 6$	**d.** _____
e. $4x =$ _____	**e.** Substitution
f. $\frac{4x}{4} =$ _____	**f.** Div. Prop.
g. _____	**g.** Substitution

13. **Given:** $4x + 8 = x + 2$
Prove: $x = -2$
Proof:

Statements	Reasons
a. $4x + 8 = x + 2$	**a.** _____
b. $4x + 8 - x = x + 2 - x$	**b.** _____
c. $3x + 8 = 2$	**c.** Substitution
d. _____	**d.** Subtr. Prop.
e. _____	**e.** Substitution
f. $\frac{3x}{3} = \frac{-6}{3}$	**f.** _____
g. _____	**g.** Substitution

Unit 6: Reasons for Proofs

Algebraic Properties (Equality Only)

Addition Property of equality
Subtraction Property of equality
Multiplication Property of equality
Division Property of equality
Distributive Property: For Example: $3(x+2)=3x+6$

Properties used for both Equality and Congruence

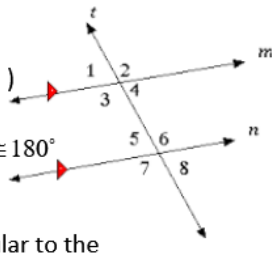
Reflexive Property: (One Equation) Same on both sides of the equation.
Symmetric Property: (Two Equations) If a=b then b=a
Transitive Property: (Three Equations) If a=b and b=c then a=c
Substitution Property: If a=b then b can replace a in any expression.
(Often used with simplifying and changing from $\cong$ to =)

Lines and Angles (Congruence Only)

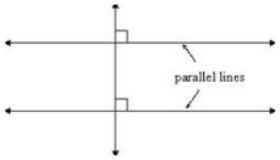
Angle Addition Postulate: The larger angle is congruent to the sum of the measure of the two adjacent angles.
Segment Addition Postulate: The larger segment is congruent to the sum of the segments that comprise it.
Definition of an angle bisector: An angle bisector divides the angle into two congruent angles.
Definition of supplementary Angles: All supplementary angles are congruent to 180°
Definition of a midpoint: A midpoint divides a segment into two equal segments.
Definition of a linear pair: Two angles that are adjacent and supplementary
Definition of vertical angles: A pair of opposite angles that are always congruent.
Definition of Complementary Angles: A pair of angles that sum to 90°
Definition of a Right Angle: An angle that measures 90°

Parallel Lines and Transversals

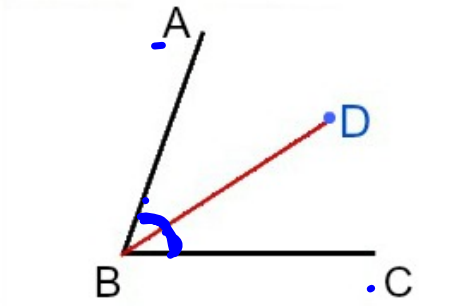
Alternate Interior Angles: Congruent ($\angle 3 \cong \angle 6$ and $\angle 4 \cong \angle 5$)
Corresponding Angles: Congruent ($\angle 1 \cong \angle 5, \angle 3 \cong \angle 7, \angle 2 \cong \angle 6, \angle 4 \cong \angle 8$)
Alternate Exterior Angles: Congruent ($\angle 1 \cong \angle 8$ and $\angle 2 \cong \angle 7$)
Same Side Interior Angles: Supplementary ($\angle 3+\angle 5 \cong 180^\circ$ and $\angle 4+\angle 6 \cong 180^\circ$)
Converse of any of the above proves the lines are parallel



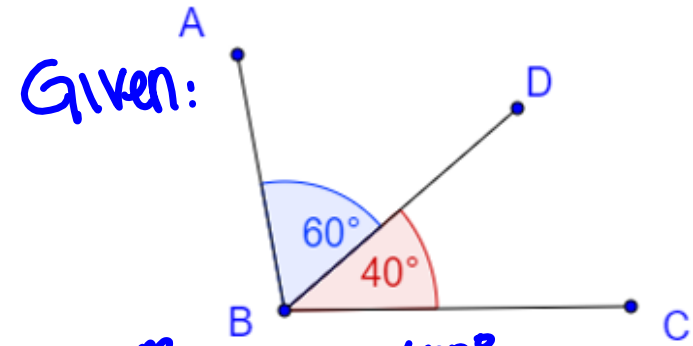
Perpendicular Transversal Theorem: If two lines in a plane are perpendicular to the same line, then they are parallel to each other.



Angle Addition Postulate:



$\angle ABD + \angle DBC = \angle ABC$



Given:

Prove: $m\angle ABC = 100°$

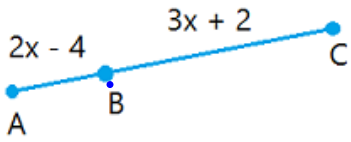
$\angle ABD + \angle DBC = \angle ABC$

$60 + 40 = \angle ABC$

Segment Addition Postulate

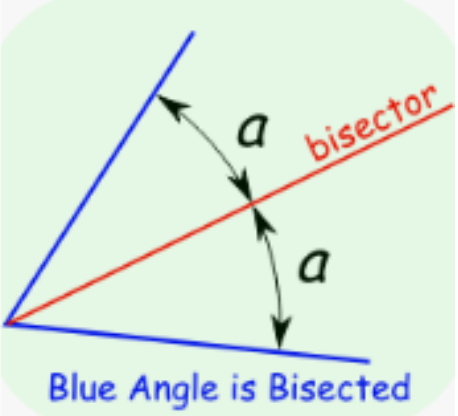
- If three points A, B, and C are collinear and B is between A and C, then AB + BC = AC.

$$AB + BC = AC$$

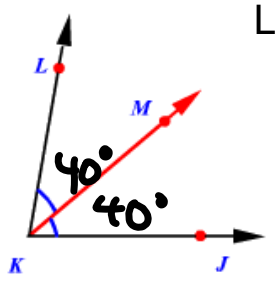


$AC = 5x - 2$

Definition of an Angle Bisector

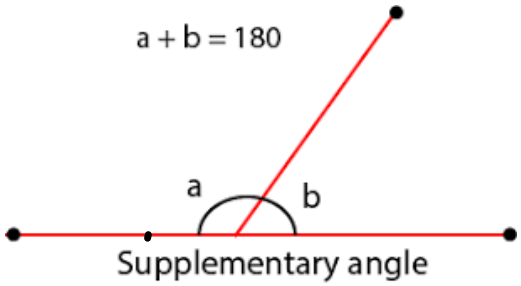


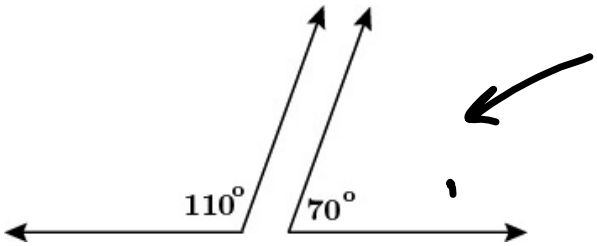
Divides an angle into two congruent angles

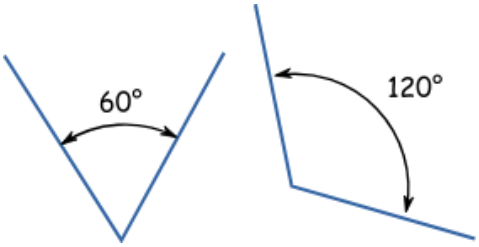


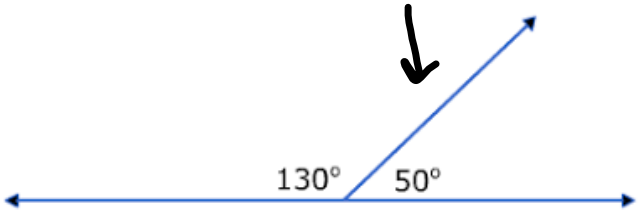
LKJ is 80 degrees. Find the measure of angle LKM

Definition of Supplementary Angles

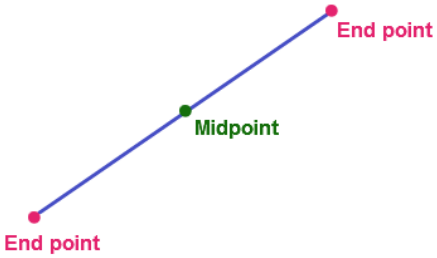


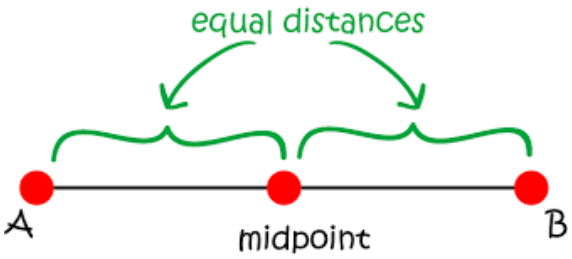


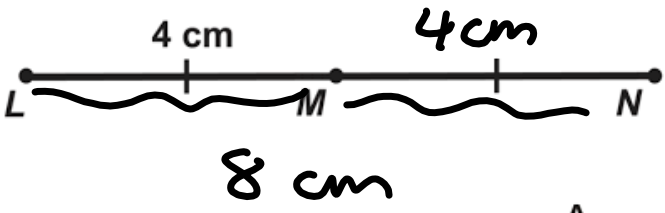


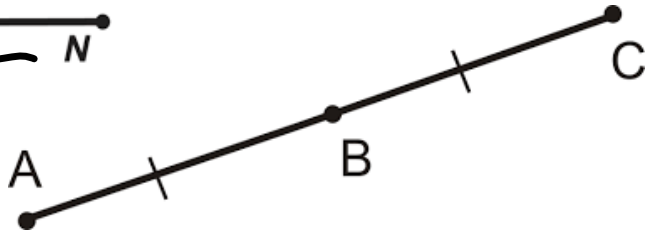


Definition of a midpoint

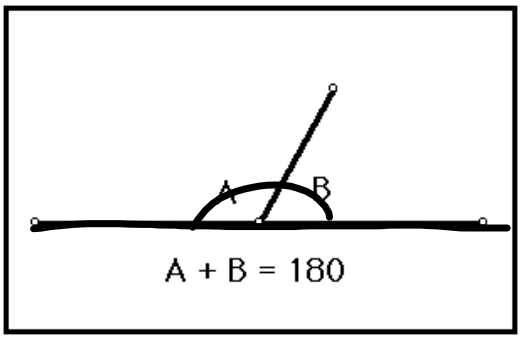


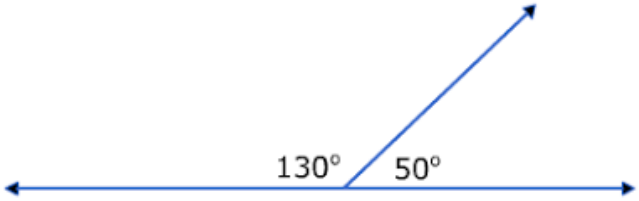




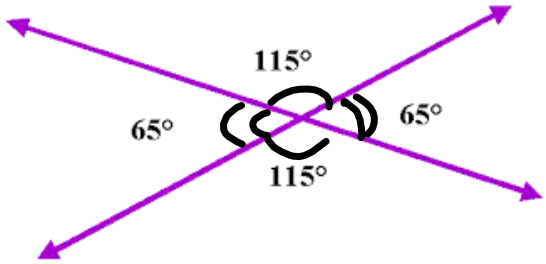


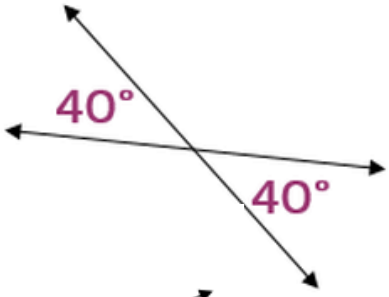
Definition of Linear Pair

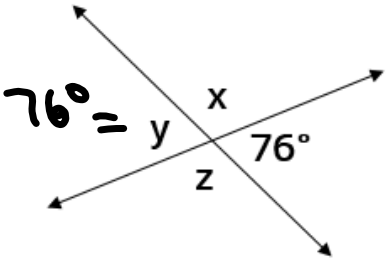




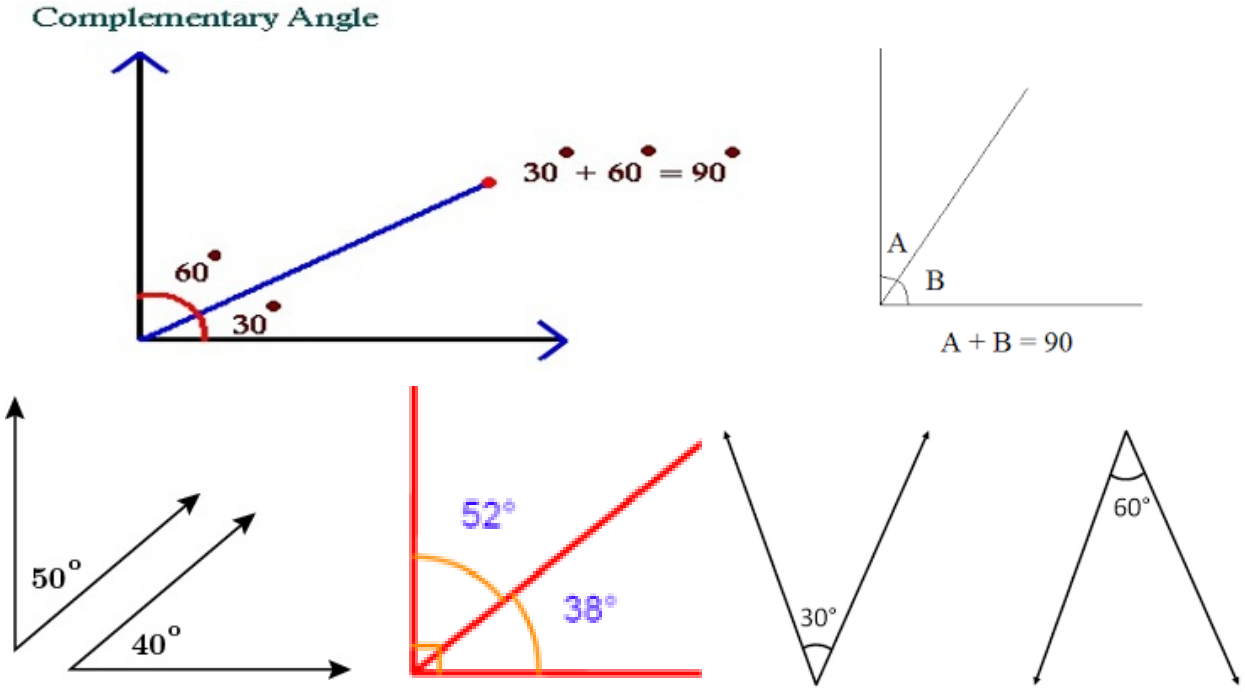
Definition of Vertical Angles



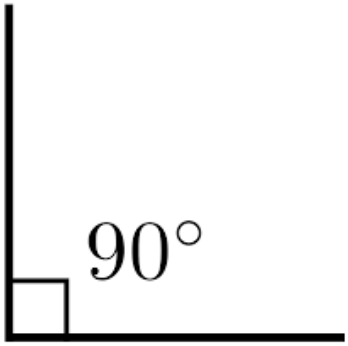


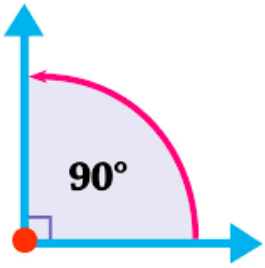


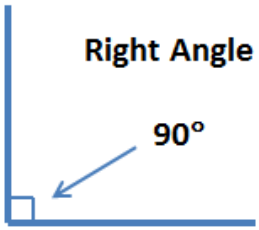
Definition of Complementary Angles

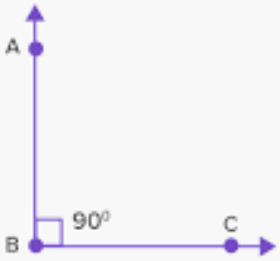


Definition of a Right Angle









∠ABC is a right angle.

Do #s 3-6 on the hw together

Name:_____Hr:_____ 6.1 C Algebraic and Linear Proofs

Standard: Students will be able to prove algebraic calculations

1. Order the statements correctly. Then choose the reasons for each statement from the choices below.
   Given: $2x + 3 = 5x - 6$
   Prove: $x = 3$

Statements:	Reasons (Justification):
1)	a)
2)	b)
3)	c)
4)	d)
5)	e)

Statements:	Reasons:
• $3 = x$ • $2x + 3 = 5x - 6$ • $9 = 3x$ • $x = 3$ • $3 = 3x - 6$	• Subtraction Property of Equality • Given • Addition Property of Equality • Subtraction Property of Equality • Division Property of Equality • Substitution Property • Symmetric Property • Reflexive Property

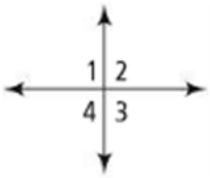
2. Write a complete proof.
   Given: $3x - 5 = 10$
   Prove: $x = 5$

Statements:	Reasons (Justification):

(Hint: Work out the problem first, use the steps as statements)

Standard: Students will be able to prove statements about angles.

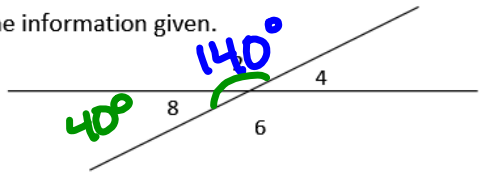
3. Fill in the blanks on the following proof.
Given: ∠1 ≅ ∠2
Prove: ∠4 ≅ ∠3



Statements:	Reasons:
1) ∠1 ≅ ∠2	a) given
2) ∠2 ≅ ∠4	b) Vertical angles are ≅
3) ∠1 ≅ ∠4	c) Transitive Property of Congruence
4) ∠1 ≅ ∠3	d) vertical angles are ≅
5) ∠4 ≅ ∠3	e) Transitive Property

a=b, b=c, a=c

4. Write a complete proof using the information given.
Given: ∠2 ≅ 140°
Prove: ∠8 ≅ 40°

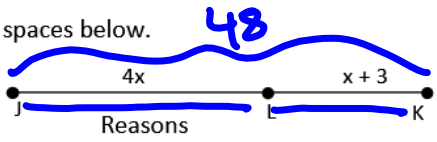


Statements:	Reasons:
∠2 ≅ 140°	Given
∠2 + ∠8 ≅ 180°	Definition of Linear Pair
140° + ∠8 ≅ 180°	Substitution
−140° −140°	
∠8 ≅ 40°	Subtraction P.O.E.

Standard: Students will be able to prove statements about lines (segments)

5. Complete the proof by filling in the spaces below.

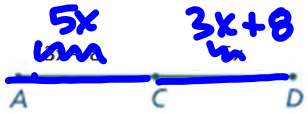
Given: JK = 48
Prove: x = 9



Statements	Reasons
1) JK = 48	a) Given
2) JL + LK = JK	b) segment addition postulate.
3) 4x + x + 3 = 48	c) Substitution Property
4) 5x + 3 = 48 −3 −3	d) ~~multiplication Property~~ Substitution
5) 5x = 45	e) Subtract P.O.E.
6) x = 9	f) Division P.O.E

6. Use the statements and reasons given at the bottom to write a complete proof of the following:

Given: C *is the midpoint of* $\overline{AD}$.
Prove: $x = 4$



Statements: Reasons:

C is the midpt of $\overline{AD}$
$\overline{AC} \cong \overline{CD}$
$m\overline{AC} = m\overline{CD}$
$5x = 3x + 8$
$2x = 8$
$x = 4$

Statements:
- ~~$2x = 8$~~
- ~~$m\overline{AC} = m\overline{CD}$~~
- ~~$5x = 3x + 8$~~
- ~~$\overline{AC} \cong \overline{CD}$~~
- $x = 4$
- ~~*C is the midpoint of* $\overline{AD}$~~

Reasons:
- Given
- Definition of a midpt
- Congruent segments have = length
- Substitution
- Subtract P.O.E.
- Division P.O.E.
- ~~Congruent segments have equal length~~
- Subtraction Property of Equality
- ~~Given~~
- ~~Definition of midpoint~~
- Division Property of Equality
- ~~Substitution Property~~