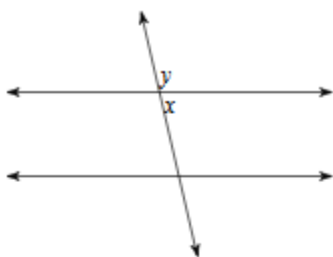## 6.4-6.5B Parallel Lines and Transversals Proofs   Key
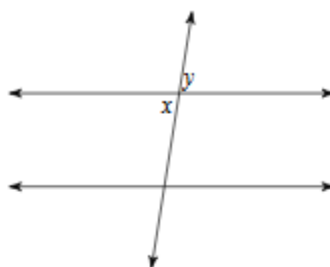
Identify each pair of angles as corresponding, alternate interior, alternate exterior, consecutive interior, vertical, or linear pair.
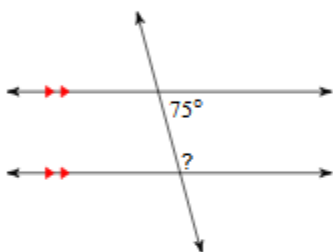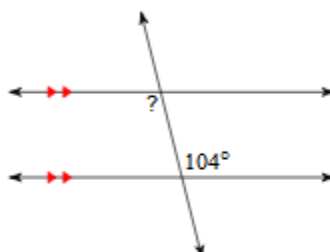
1)

adjacent

2)

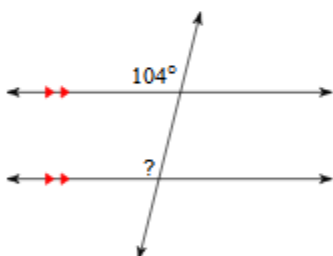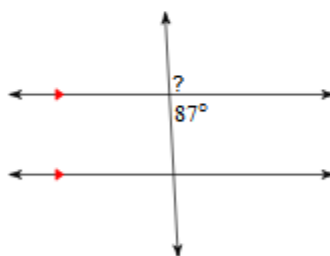vertical

Find the measure of each angle indicated.
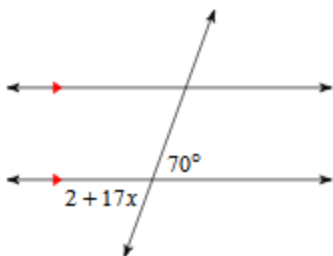
3)

75°

?

105°

4)

?

104°

104°

5)

104°

?

104°

6)

?

87°

93°

Solve for x.

7)

70°

2 + 17x

4

8)

105°

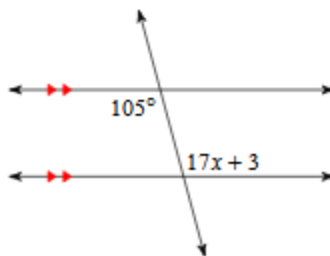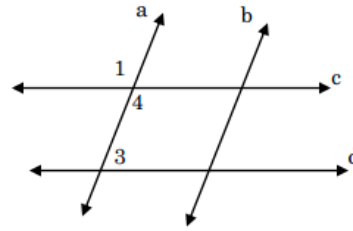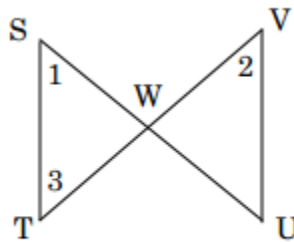17x + 3

6

9) Given: $\angle 1$ and $\angle 3$ are supplementary
   Prove: $c \parallel d$

Statement	Reason
1. $\angle 1$ and $\angle 3$ are supplementary	1. Given
2. $\angle 1 \cong \angle 4$	2. Vertical Angles are Congruent
3. $\angle 4$ and $\angle 3$ are supplementary	3. Transitive Property
4. $c \parallel d$	4. Converse of Same Side Interior Angle Theorem

10) Given: $\angle 2 \cong \angle 1$
    $\angle 1 \cong \angle 3$
   Prove: $\overline{ST} \parallel \overline{UV}$

Statement	Reason
1. $\angle 2 \cong \angle 1$	1. Given
2. $\angle 1 \cong \angle 3$	2. Given
3. $\angle 2 \cong \angle 3$	3. Transitive Property of Congruence
4. $\overline{ST} \parallel \overline{UV}$	4. Converse of Alternate Interior Angle Theorem

11) Given: $\overline{JM} \parallel \overline{KN}$
    $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$
   Prove: $\overline{KM} \parallel \overline{LN}$
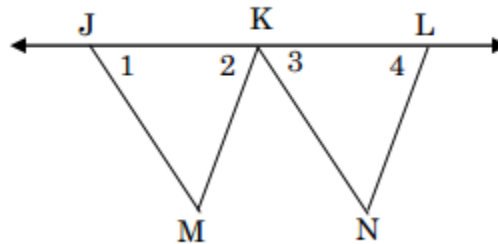
Statement	Reason
1. $\overline{JM} \parallel \overline{KN}$	1. Given
2. $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$	2. Given
3. $\angle 1 \cong \angle 3$	3. Corresponding Angles are Congruent
4. $\angle 1 \cong \angle 4$	4. Transitive Property of Congruence
5. $\angle 2 \cong \angle 4$	5. Transitive Property of Congruence
6. $\overline{KM} \parallel \overline{LN}$	6. Converse of Corresponding Angles Theorem

12) Given: Line ABCD

$m\angle ECD = 130°$

$m\angle ABF = 50°$

Prove: $BF \parallel CE$
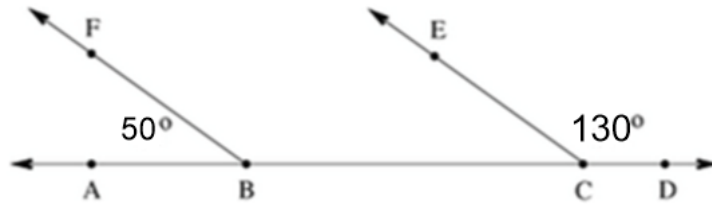
Statement	Reason
Line ABCD, $m\angle ECD = 130°, m\angle ABF = 50°$	1. Given
$\angle ECD$ and $\angle ECB$ are supplementary	2. Definition of Linear Pair
3. $m\angle ECD + m\angle ECB = 180°$	Definition of supplementary
4. $130° + m\angle ECB = 180°$	Substitution property of equality
$m\angle ECB = 50°$	5. Subtraction property of equality
$m\angle ECB = m\angle ABF$	6. Substitution property of equality
$BF \parallel CE$	7. Converse of same side int. angles theorem

Statements: Reasons:

a. $m\angle ECD + m\angle ABF = 180°$ a. Definition of supplementary   b. Definition of Linear Pair

b. $m\angle ECD + m\angle ECB = 180°$ c. Converse of corresponding angles theorem   d. Addition property of equality

c. $50° + m\angle ECB = 180°$ e. Given   f. if ll lines, Same side interior angles are congruent

d. $130° + m\angle ECB = 180°$ g. Subtraction property of equality   h. Converse of same side int. angles theorem

e. $\angle ECD$ & $\angle ECB$ are supplementary   i. Substitution property of equality

13) Given: $m\angle 3 = 60°$, $m\angle 5 = 2x - 8$, $a \parallel b$

Prove: $x = 64$
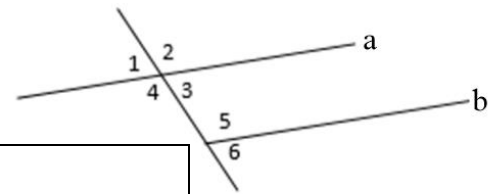
Statement	Reason
$m\angle 3 = 60°$, $m\angle 5 = 2x - 8$, $a \parallel b$	1. Given
$180 = m\angle 3 + \angle 5$	2. If ll lines, Same Side Interior Angles are Supplementary
3. $180° = 60 + 2x - 8$	Substitution property of equality
$180 = 52 + 2x$	4. Substitution property of equality
5. $128 = 2x$	Subtraction property of equality
6. $64 = x$	Division property of equality
7. $64 = x$	Symmetric property of equality

Statements: Reasons:

a. $64 = x$ a. Vertical angles are congruent

b. $180° = 60 + 2x - 8$ b. Substitution property of equality

c. $64 = x$ c. Given

d. $x = 64$ d. Addition property of equality

e. $128 = 2x$ e. If ll lines, Same Side Interior Angles are Supplementary

f. Subtraction property of equality

14) Given: $\angle 1 = 115°$, $\angle 1$ and $\angle 3$ are supplementary

Prove: $m \parallel n$

Statement	Reason
1. $\angle 1 = 115°$, $\angle 1$ and $\angle 3$ are supplementary	Given
2. $m\angle 1 + m\angle 3 = 180°$	Definition of Supplementary
$115 + \angle 3 = 180°$	3. Substitution property of equality
4. $\angle 3 = 65°$	Subtraction Property of Equality
$\angle 2 = \angle 3$	5. Vertical angles are equal in measure
6. $\angle 2 = 65°$	Substitution Property of Equality
$\angle 1$ and $\angle 2$ are supplementary	7. Definition of supplementary
$m \parallel n$	8. Converse of same side interior angles
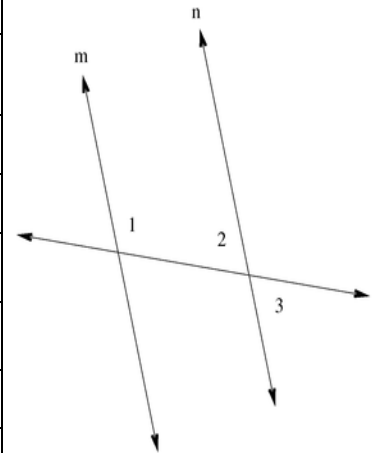
Statements:
a. $\angle 2 = 65°$
b. $\angle 1 = 115°$, $\angle 1$ and $\angle 3$ are supplementary
c. $m\angle 1 + m\angle 3 = 180°$
d. $\angle 1 + \angle 2 = 180°$
e. $\angle 2 + \angle 3 = 180°$
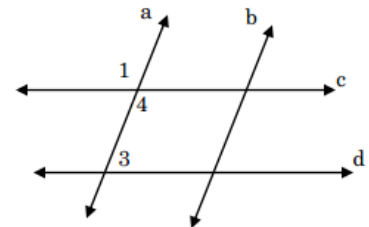f. $\angle 2 = \angle 1$
g. $\angle 3 = 65°$

Reasons:
a. Definition of supplementary
b. Vertical angles are equal in measure
c. Converse of corresponding angles
d. Addition property of equality
e. Converse of same side interior angles
f. Same side interior angles are congruent
g. Substitution property of equality

15)   Given: $\angle 1$ and $\angle 3$ are supplementary, $m\angle 3 = 120°$

Prove: $c \parallel d$

Statement	Reason
$\angle 1$ and $\angle 3$ are supplementary	1. Given
$m\angle 3 + m\angle 1 = 180°$	2. Definition of supplementary
3. $m\angle 3 = 120°$	Given
$120° + m\angle 1 = 180°$	4. Substitution property of equality
5. $m\angle 1 = 60°$	Subtraction property of equality
6. $\angle 1 = \angle 4$	Vertical Angles are equal in measure
$\angle 4 = 60°$	7. Substitution property of equality
7. $\angle 1$ and $\angle 4$ are supplementary	Definition of supplementary
$c \parallel d$	8. Converse of same side interior angles

Statements:
a. $\angle 1 = \angle 4$
b. $\angle 3 + 140° = 180°$
c. $60° + \angle 4 = 180°$
d. $m\angle 3 = 120°$
e. $\angle 1$ and $\angle 4$ are supplementary
f. $\angle 3$ and $\angle 4$ are supplementary
g. $m\angle 1 = 60°$

Reasons:
a. Definition of supplementary
b. Converse of same side interior angles
c. Converse of corresponding angles
d. Addition property of equality
e. Substitution property of equality
i. Given
g. Subtraction property of equality