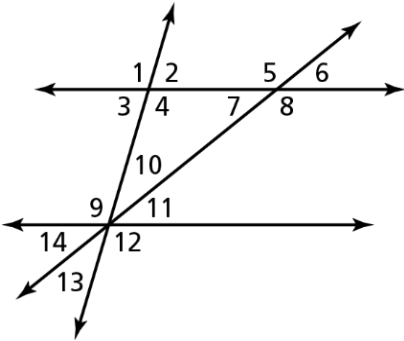# Lines and Angles

Lines and Angles

1) Classify the angle pair as vertical, corresponding, alternate interior, alternate exterior, or consecutive interior angles.

∠4 and ∠9   _____

∠1 and ∠9   _____
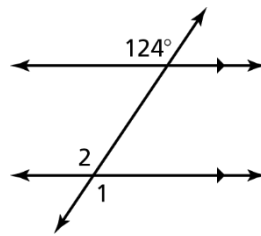
∠1 and ∠12   _____

∠5 and ∠8   _____

∠6 and ∠11   _____

∠3 and ∠9   _____

2) Find the measure of the indicated angles.
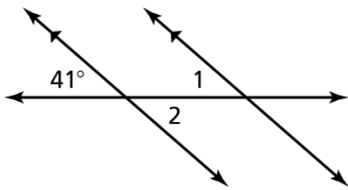
$m\angle1 =$ _____

$m\angle2 =$ _____

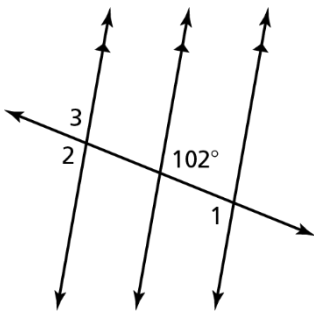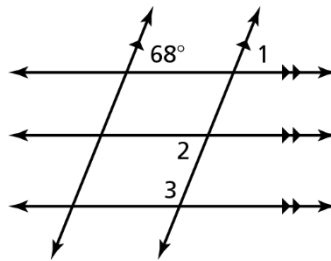$m\angle1 =$ _____

$m\angle2 =$ _____

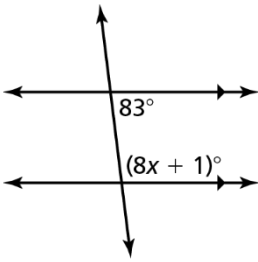$m\angle1 =$ _____

$m\angle2 =$ _____

$m\angle3 =$ _____

$m\angle1 =$ _____

$m\angle2 =$ _____

$m\angle3 =$ _____

Lines and Angles

3) Find the value of the indicate variables.

$83°$

$(8x + 1)°$

r

$(7x - 20)°$

s

$(4x + 16)°$

t

s

$2(x + 15)°$

$(3x + 20)°$

r

t

$x =$ _____

$x =$ _____

$x =$ _____

$37°$

$(6x - 11)°$

p

q

r

$(4x - 30)°$ $(6y)°$

$3(x - 1)°$

$6(z + 8)°$ s
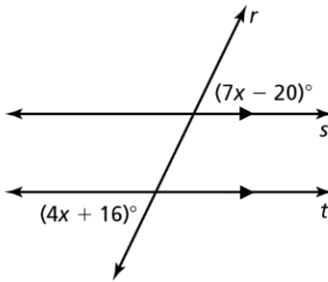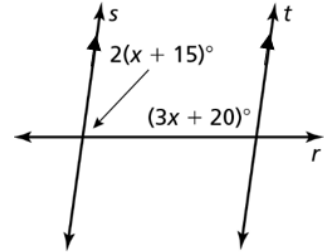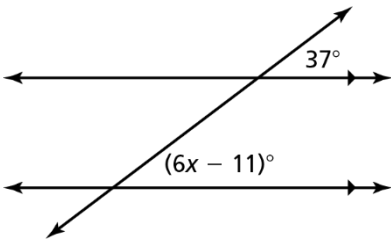
$x =$ _____
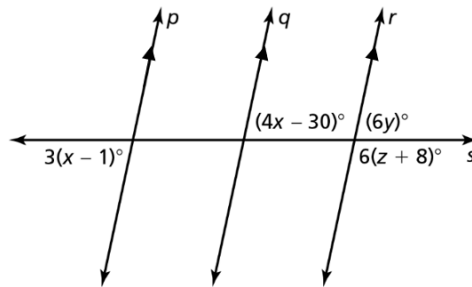
$x =$ _____

$y =$ _____

$z =$ _____

4) What is the value of x such that $l \parallel m$?

k

$(9x + 5)°$

ℓ

$(11x + 25)°$

m
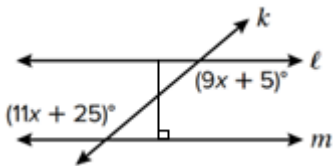
Enter your answer in the box.

$x =$ [   ]

5) Given the figure below. Find the values of x and y.

$(13x - 24)°$

$y°$

$(10x + 12)°$
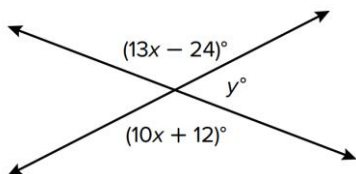
$x =$ [   ]

$y =$ [   ]

Lines and Angles

6) Given the figure below. Find the values of x, y, and z.

$(y-4)°$

$(y+25)°$

$(9x+7)°$ $z°$
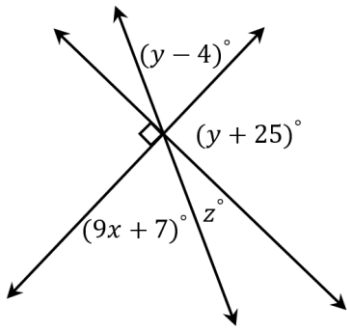
$x = $ ☐

$y = $ ☐

$z = $ ☐

7) The figure shows a two-dimensional representation of a bird made from origami paper. Select All the true statements.

$(3x+5)°$

1

2

$(4x-30)°$
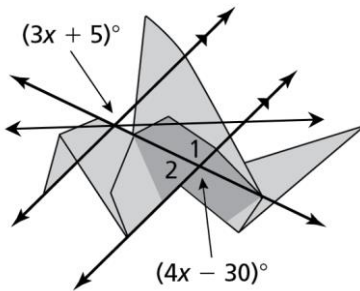
A. $x = 5$

B. $x = 35$

C. $m\angle 1 = 20°$

D. $m\angle 2 = 70°$

E. $m\angle 1 = 110°$

F. $m\angle 2 = 160°$

8) The figure shows two parallel lines and two transversals. Select All the statements that are true.

$(3y-18)°$

$84°$ $\frac{2}{3}(x+27)°$

1

$(3x-25)°$

2
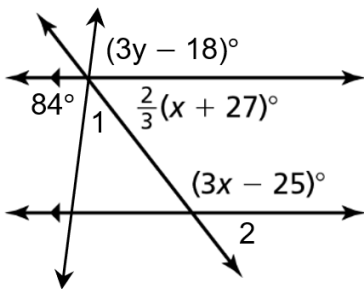
A. $x = 3$

B. $x = 51$

C. $y = 22$

D. $y = 34$

E. $m\angle 1 = 44°$

F. $m\angle 2 = 128°$

9) In the figure below, $m \parallel n$ and $p \parallel q$. Determine the values of x, y, and z.

m   n

$66°$ $(2x+31)°$ $y°$ p

$z°$

$(6x-25)°$ q

r
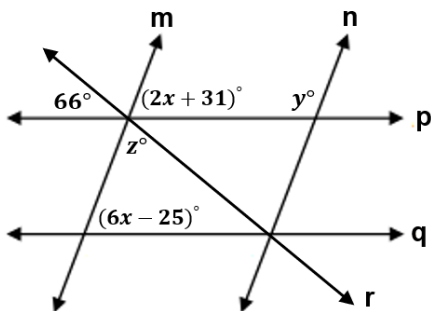
A. $x = 14, y = 59$, and $z = 66$

B. $x = 14, y = 121$, and $z = 55$

C. $x = 17.5, y = 100$, and $z = 14$

D. $x = 17.5, y = 80$, and $z = 66$

Lines and Angles

10) In the figure below $\overline{BD}$ is the perpendicular bisector of $\overline{AC}$. Find the value of x.

$-x + 25 \qquad 3(2x - 8)$
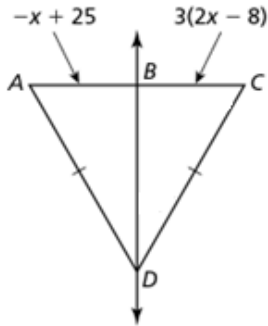
Enter your answer in the box.

$x = $ [   ]

11) In the figure below $\overline{AD}$ is the perpendicular bisector of $\overline{CB}$. Based on this information select All the statements that are true.

$7x - 17 \qquad\qquad 2x + 48$

C   35   D   B
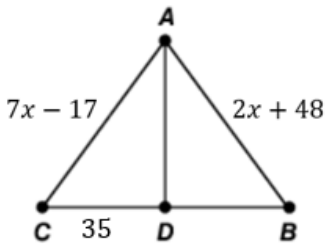
A. $x = 7.43$
B. $AC = 35$
C. $CB = 70$
D. $AB = 74$
E. $m\angle ACD = 45°$
F. $m\angle ADC = 90°$

12) Monica is working on the proof below.
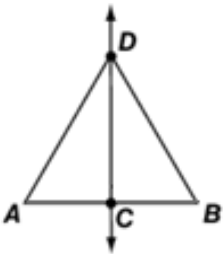
Given: $\overleftrightarrow{CD}$ is the perpendicular bisector of $\overline{AB}$
Prove: $\overline{DA} \cong \overline{DB}$

	Statements	Reasons
1.	$\overleftrightarrow{CD}$ is the perpendicular bisector of $\overline{AB}$	Given
2.	$\overline{AC} \cong \overline{CB}$; $m\angle DCA = m\angle DCB = 90°$	Definition of Perpendicular Bisector
3.	$\overline{DC} \cong \overline{DC}$	?
4.	?	SAS Postulate
5.	$\overline{DA} \cong \overline{DB}$	Corresponding parts of congruent triangles are congruent

Select the statement and the reason that Monica is missing from her proof.

A.   Reason 3: Transitive Property
   Statement 4: $\Delta DCA \cong DAB$

B.   Reason 3: Transitive Property
   Statement 4: $\Delta DCA \cong DCB$

C.   Reason 3: Reflexive Property
   Statement 4: $\Delta DCA \cong DCB$

D.   Reason 3: Reflexive Property
   Statement 4: $\Delta DCA \cong DAB$

Lines and Angles

13) Select the statement and reason that are missing from the proof below showing that vertical angles formed by intersecting lines are congruent.
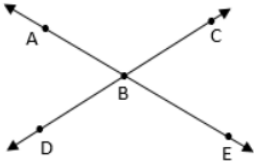
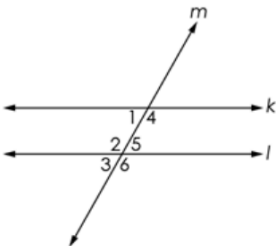|	Statements	Reasons
1.	$\angle ABD$ and $\angle ABC$ form a linear pair. $\angle CBE$ and $\angle ABC$ form a linear pair	Definition of a linear pair
2.	$\angle ABD$ and $\angle ABC$ are supplementary. $\angle CBE$ and $\angle ABC$ are supplementary	Linear Pair Postulate
3.	$m\angle ABD + m\angle ABC = 180°$ $m\angle CBE + m\angle ABC = 180°$	?
4.	?	Substitution Property of Equality
5.	$m\angle ABD = m\angle CBE$	Subtraction Property of Equality
6.	$\angle ABD \cong \angle CBE$	Definition of congruent angles

A. Reason 3: Definition of Complementary Angles
   Statement 4: $m\angle ABD + m\angle ABC = m\angle DBE + m\angle EBC$

B. Reason 3: Definition of Supplementary Angles
   Statement 4: $m\angle ABD + m\angle ABC = m\angle DBE + m\angle EBC$

C. Reason 3: Definition of Complementary Angles
   Statement 4: $m\angle ABD + m\angle ABC = m\angle CBE + m\angle ABC$

D. Reason 3: Definition of Supplementary Angles
   Statement 4: $m\angle ABD + m\angle ABC = m\angle CBE + m\angle ABC$

14) A diagram is shown, where $k \parallel l$ and m is a transversal.

The table below shows Mika's work proving that $\angle 1 \cong \angle 5$.

	Statements	Reasons
1.	$k \parallel l$	Given
2.	?	Corresponding angles are congruent.
3.	?	?
4.	$\angle 1 \cong \angle 5$	?

Part A: Select the two missing statements to complete Mika's proof.

A. Statement 2: $\angle 2 \cong \angle 4$
   Statement 3: $\angle 3 \cong \angle 5$

B. Statement 2: $\angle 1 \cong \angle 5$
   Statement 3: $\angle 2 \cong \angle 6$

C. Statement 2: $\angle 1 \cong \angle 3$
   Statement 3: $\angle 4 \cong \angle 6$

D. Statement 2: $\angle 1 \cong \angle 3$
   Statement 3: $\angle 3 \cong \angle 5$

Lines and Angles

Part B: Select the two missing reasons to complete Mika's proof.

   A. Reason 3: Alternate interior angles are congruent
      Reason 4: Symmetric property.

   B. Reason 3: Vertical angles are congruent
      Reason 4: Transitive property.

   C. Reason 3: Vertical angles are congruent
      Reason 4: Symmetric property.

   D. Reason 3: Alternate interior angles are congruent
      Reason 4: Transitive property.

15) Complete the proof below by filling the blanks. For each blank, bubble the letter that matches the correct statement or reason from the list.
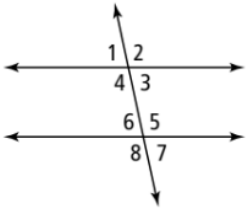
Given $\angle 1 \cong \angle 7$

Prove: $m\angle 6 + m\angle 2 = 180°$

	Statements	Reasons
1.	(A) (B) (C) (D) (E) (F)	Given
2.	(A) (B) (C) (D) (E) (F)	Vertical Angles are Congruent.
3.	$\angle 1 \cong \angle 6$	(A) (B) (C) (D) (E) (F)
4.	$m\angle 1 = m\angle 6 = m\angle 7$	Definition of Congruent Angles
5.	$m\angle 1 + m\angle 2 = 180°$	Linear Pairs Theorem
6.	$m\angle 6 + m\angle 2 = 180°$	(A) (B) (C) (D) (E) (F)

(A) Symmetric Property

(B) Substitution Property

(C) Transitive Property

(D) $\angle 1 \cong \angle 3$

(E) $\angle 1 \cong \angle 7$

(F) $\angle 6 \cong \angle 7$

Lines and Angles

Constructions

1) Listed below, not in order, are the steps for copying ∠A using a compass and a straightedge. Select the option that lists the steps in the correct order.
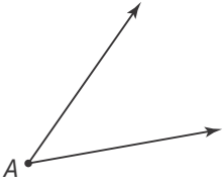
     I.   Draw a reference ray.

     II.   Draw a ray from the vertex through the intersection of the arcs.

     III.   Place the compass on the vertex of the original angle and draw an arc that intersects both legs.

     IV.   Set the compass to the distance between the intersections of the first arc with the legs of the angle. Use this setting to draw a third arc centered where the second arc intersects the reference ray.

     V.   Without changing the setting, place the compass on the starting point of the ray and draw an arc intersecting the ray.

A. I, II, IV, V, III
B. I, III, V, IV, II
C. I, IV, V, II, III
D. I, V, II, II, IV

2) Listed below, not in order, are the steps for constructing the perpendicular bisector of $\overline{AB}$. Select the option that lists the steps in the correct order.

     I.   Adjust the compass width to be more than half of the length of the line segment. Then, draw an arc above and below line segment AB.

     II.   Using a straightedge, draw a line connecting the points where the arcs intersect.

     III.   Given $\overline{AB}$, center the compass on point A.

     IV.   Without changing the size of the compass opening, center the compass on point B and draw an arc above and below line segment AB so that these arcs intersect the other two arcs drawn.

A. I, II, III, IV
B. II, I, IV, III
C. III, I, IV, II
D. IV, II, III, I

3) What is the first step in constructing the angle bisector of angle A?
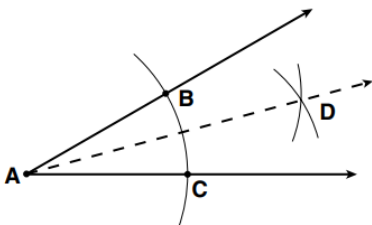
A. Draw ray $\overrightarrow{AD}$.
B. Draw a line segment connecting points B and C.
C. From points B and C, draw equal arcs that intersect at D.
D. From point A, draw an arc that intersects the sides of the angle at points B and C.

Lines and Angles

4) Alex needs to bisect $\angle ABC$ using a compass and straightedge. He starts by performing the following steps.

Step 1: Place the compass on vertex B of the angle.

Step 2: Draw an arc that intersects both sides of the angle.

Step 3: Label these intersections as point D and point E.

Step 4: _____.

Step 5: _____.

What are the next two steps Alex should take in his construction?

A. **Step 4**: Adjust the compass width to be half the distance between point B and point E, and then place the compass on point E and draw an arc in the interior of the angle that crosses the other arc.
   Step 5: Place the compass at point D and draw an arc in the interior of the angle.

B. **Step 4**: Place the compass at point D and draw an arc in the interior of the angle.
   Step 5: Without adjusting the compass width, place the compass at point E and draw an arc in the interior of the angle that crosses the other arc.

C. **Step 4**: Adjust the compass width to be half the distance between point B and point E, and then place the compass on point E and draw an arc on the exterior of the angle.
   Step 5: Without adjusting the compass width, place the compass at point E and draw an arc on the exterior of the angle that is opposite the other arc.

D. **Step 4**: Without adjusting the compass width, place the compass at point E and draw an arc on the exterior of the angle that is opposite the other arc.
   Step 5: Adjust the compass width to be half the distance between point B and point E, and then place the compass on point E and draw an arc in the interior of the angle that crosses the other arc.

5) What is the next step in constructing an angle RTS congruent to the given angle BCD) with a straightedge and a compass?
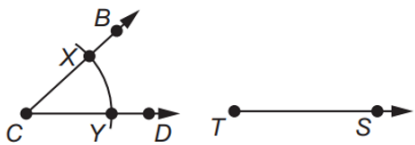
Step 1: Draw a ray. Label it $\overrightarrow{TS}$.

Step 2: Using C as the center and any radius, draw an arc which intersects $\overrightarrow{CB}$ and $\overrightarrow{CD}$. Label the intersection points X and Y.

Step 3: _____

A. Draw $\overrightarrow{XY}$
B. Set the compasses on Y and adjust its width to point X.
C. Using T as the center and any radius, draw an arc which intersects $\overrightarrow{TS}$. Label the point where the arc intersects $\overrightarrow{TS}$.
D. Without changing the compasses' width, place the point of the compass on point T and draw an arc there. Label the point where the arc intersects $\overrightarrow{TS}$.

Lines and Angles

6) What construction does the diagram below represent?
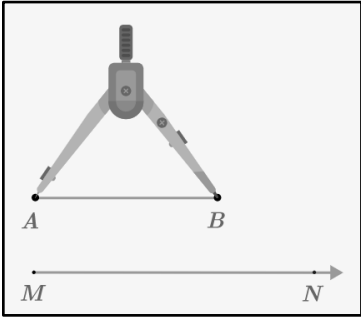
A. Bisecting an angle

B. Bisecting a segment

C. Copying an angle

D. Copying a segment

7) Listed below, not in order, are the steps for copying $\overline{AB}$ using a compass and a straightedge. Select the option that lists the steps in the correct order.


Given: $\overline{AB}$

Construct: $\overline{PQ}$ congruent to $\overline{AB}$.

I. Place the point of a compass on point A.
II. Use a straightedge to draw a line, l.
III. Adjust the compass width to the length of $\overline{AB}$.
IV. Without changing the compass, place the compass point on point P and draw an arc intersecting line l. Label the point of intersection as point Q.
V. Choose a point on line l and label it point P.
VI. $\overline{PQ} \cong \overline{AB}$

A. I, IV, II, III, V, VI
B. II, V, I, III, IV, VI
C. III, II, V, IV, I, VI
D. IV, II, III, I, V, VI

8) Carla drew two arcs of the same radius by placing her compass at each endpoint of $\overline{AB}$ to produce the picture below.
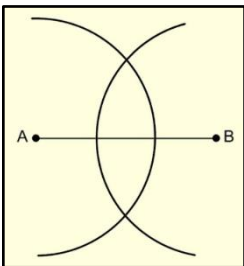
If she connects the two points where the arcs intersect with a straightedge, what must be true about the segment she creates?

A. It is congruent to and perpendicular to $\overline{AB}$.

B. It is congruent to and bisects $\overline{AB}$.

C. It is perpendicular to and bisects $\overline{AB}$.

D. It is congruent to, perpendicular to, and bisects $\overline{AB}$.