2.3 Start Thinking

You obtain a blueprint of your home. Only the walls are marked, making an outline of the general shape of the living space.

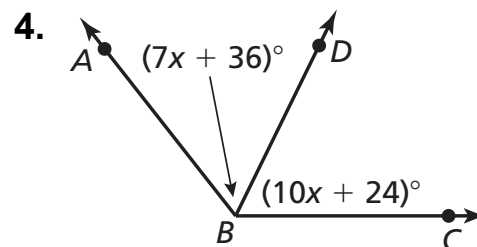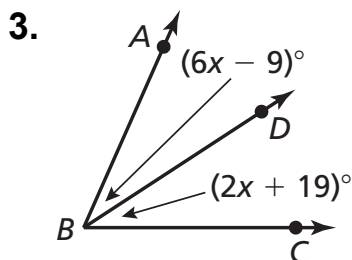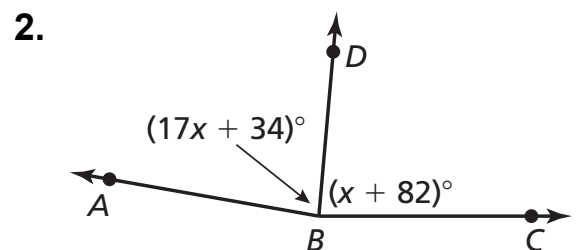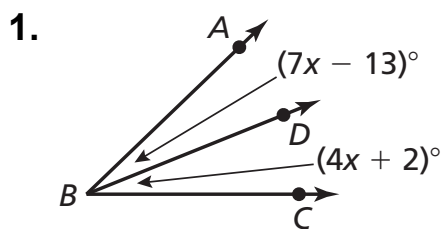Make a list of at least five additional labels you would want on the drawing.

2.3 Warm Up

Find the angle measure.

1. $\angle 1$ is a supplement of $\angle 2$ and $m\angle 1 = 32°$. Find $m\angle 2$.

2. $\angle 3$ is a supplement of $\angle 4$ and $m\angle 3 = 155°$. Find $m\angle 4$.

3. $\angle 5$ is a complement of $\angle 6$ and $m\angle 5 = 59°$. Find $m\angle 6$.

4. $\angle 7$ is a complement of $\angle 8$ and $m\angle 7 = 18°$. Find $m\angle 8$.

2.3 Cumulative Review Warm Up

$\overrightarrow{BD}$ **bisects** $\angle ABC$**. Find** $m\angle ABD$ **and** $m\angle CBD$**.**
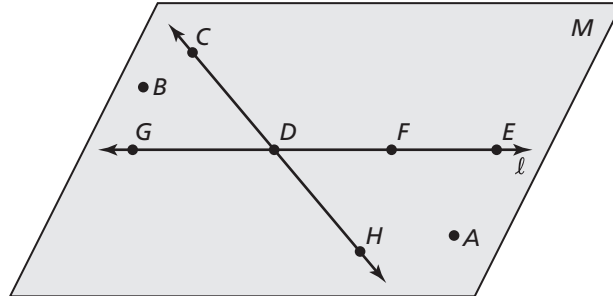
1.

2.

3.

4.

2.3 Practice A

In Exercises 1–6, use the diagram to write an example of the postulate.

1. Two Point Postulate (Postulate 2.1)

2. Line-Point Postulate (Postulate 2.2)

3. Line Intersection Postulate (Postulate 2.3)

4. Three Point Postulate (Postulate 2.4)

5. Plane-Point Postulate (Postulate 2.5)
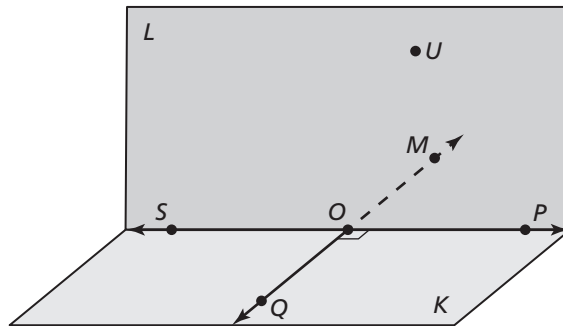
6. Plane-Line Postulate (Postulate 2.6)

In Exercises 7–9, sketch a diagram of the description.

7. $\overleftrightarrow{GH}$ intersecting $\overleftrightarrow{XY}$ at point A in plane Q

8. $\overline{ST}$ bisected by $\overleftrightarrow{UV}$ at point V in plane R

9. plane C and plane D that intersect at $\overleftrightarrow{AB}$ and point E on plane C

In Exercises 10–14, use the diagram to determine whether you can assume the statement.

10. Planes L and K intersect at $\overleftrightarrow{PS}$.

11. Points U, M, and O are coplanar.

12. $\angle QOP$ is a right angle.

13. $\overleftrightarrow{MQ}$ is in plane L.

14. $\overleftrightarrow{PS}$ and $\overleftrightarrow{MQ}$ intersect at point O.

15. Rewrite the Three Point Postulate (Postulate 2.4) in if-then form. Then write the converse, inverse, and contrapositive. Indicate whether these statements are true or false.

16. Your friend claims that if three lines intersect each other, then there are two points of intersection because of the Line Intersection Postulate (Postulate 2.3). Is your friend correct? Explain your reasoning.

2.3 Practice B

In Exercises 1–6, use the diagram to write an example of the postulate.

1. Two Point Postulate (Postulate 2.1)

2. Line-Point Postulate (Postulate 2.2)

3. Line Intersection Postulate (Postulate 2.3)

4. Three Point Postulate (Postulate 2.4)

5. Plane-Line Postulate (Postulate 2.6)

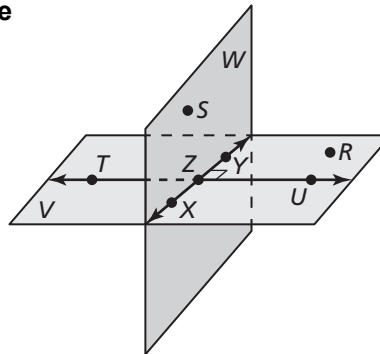6. Plane Intersection Postulate (Postulate 2.7)
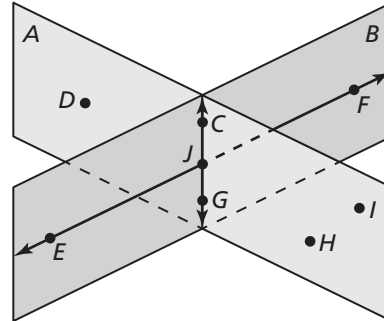
In Exercises 7 and 8, sketch a diagram of the description.

7. $\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$, and $\overleftrightarrow{BD}$ that intersect at exactly two points

8. planes S and T intersecting at a right angle, $\overline{AB}$ on plane S and plane T, and point C is the midpoint of $\overline{AB}$

In Exercises 9–12, use the diagram to determine whether you can assume the statement.

9. Planes W and V intersect at $\overleftrightarrow{TU}$.

10. Points $T, U,$ and R are coplanar.

11. $\angle TZX$ and $\angle UZY$ are vertical angles.

12. $\overleftrightarrow{TU}$ lies in plane W.

13. The Plane Intersection Postulate (Postulate 2.7) is written in if-then form. Write the converse, inverse, and contrapositive and state which ones are true.

14. Is it possible for three planes to intersect along the same line? Explain your reasoning.

15. Your friend claims that if the Plane-Line Postulate (Postulate 2.6) is true, then all lines that pass through a point in a plane must also be in that same plane. Is your friend correct? Explain your reasoning.

16. $\overline{AB}$ and $\overline{CD}$ lie in plane Z. If $\overleftrightarrow{EF}$ bisects either $\overline{AB}$ or $\overline{CD}$, does $\overleftrightarrow{EF}$ lie in plane Z? If $\overleftrightarrow{EF}$ bisects both $\overline{AB}$ and $\overline{CD}$, does $\overleftrightarrow{EF}$ lie in plane Z? Explain your reasoning.

2.3 Enrichment and Extension

Postulates & Diagrams

In Exercises 1–5, let _m_ and _n_ be two lines that intersect at point _X_.

1. Make a conjecture about the number of planes that contain both lines _m_ and _n_.

2. Which postulate allows you to state that there is a point _Y_, distinct from _X_, on line _m_, and a point _Z_, distinct from _X_, on line _n_? Explain your reasoning.

3. Which postulate guarantees that point _Y_ is not on line _n_? Explain your reasoning.

4. Which postulates allows you to conclude that there is exactly one plane _P_ that contains points _X, Y,_ and _Z?_ Explain your reasoning.

5. Which postulate guarantees that lines _m_ and _n_ are contained in plane _P_? Explain your reasoning.

In Exercises 6–8, construct a diagram using the information.

6. Line _a_, line _b_, and line _c_ are coplanar, but do not intersect.

7. Point _C_ lies in plane _M_. Line _r_ intersects line _s_ at point _D_. Point _C_, line _r_, and line _s_ are not coplanar.

8. Plane _A_ and plane _B_ intersect at line _s_. Plane _C_ intersects plane _A_ and plane _B_, but does not contain _s_.

In Exercises 9–12, use the following information.

Plane _P_ contains points _A, C, D, E,_ and _X_. Plane _Q_ contains points _B, C, F,_ and _X_. $\overleftrightarrow{CX}$ and $\overleftrightarrow{AE}$ intersect at point _X_. $\overleftrightarrow{BF}$ and $\overleftrightarrow{AE}$ intersect at point _X_. Point _D_ is between points _E_ and _C_.

9. Draw a diagram using the given information.

10. Where do planes _Q_ and _P_ intersect? Explain your reasoning.

11. Are points _D, E,_ and _X_ collinear? Explain your reasoning.

12. Can you assume that the line between points _D_ and _B_ lies in plane _Q?_ Explain your reasoning.

Name_____ Date _____

2.3 Puzzle Time

Why Do Geese Fly South Every Year?

A	B	C	D	E	F
G	H	I			

Complete each exercise. Find the answer in the answer column. Write the word under
the answer in the box containing the exercise letter.

4
GEESE
P
VACATION
3
IT
0
MEET
Q
WALK
6
THE

Match the item that makes the statement correct.

A. If two lines intersect,

B. Through any three noncollinear points

C. If two points lie in a plane,

D. If two planes intersect,

E. Through any two points,

F. A plane contains at least

G. A line contains at least

1. then their intersection is a line.

2. two points.

3. there exists exactly one plane.

4. three noncollinear points.

5. then their intersection is exactly one point.

6. there exists exactly one line.

7. then the line containing them lies in the plane.

7
WOULD
$\overline{AB}$
COLD
5
BECAUSE
1
TAKE
2
FOREVER
$\overrightarrow{AB}$
TO

Identify the correct answer using the diagram.

H. The intersection of planes *Q* and *P*.

I. What plane is defined by points *A*, *B*, and *C*?