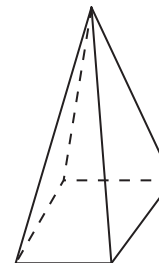


1-1

Think About a Plan

Nets and Drawings for Visualizing Geometry

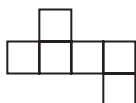
Multiple Representations There are eight different nets for the solid shown at the right. Draw as many of them as you can. (*Hint:* Two nets are the same if you can rotate or flip one to match the other.)



Understanding the Problem

1. What is the net of a solid?

2. What is a result of flipping the net below? Of rotating it?



Planning the Solution

3. Visualize unfolding the solid so that the base shares an edge with all four triangles. Then visualize unfolding the solid so that the base shares an edge with three triangles. Are the nets that result the same? Explain.

4. In Step 3, you saw that a net can have three or four triangles that share an edge with the square base. Are there other possibilities? If so, what are they? Are these the only possibilities?

Finding the Answer

5. Are there other nets that have three or four triangles that share an edge with the square base? Explain.

6. There are four nets that have two triangles that share an edge with the base. For each of these, the triangles may either be on opposite or adjacent sides of the base. Draw each net.

7. How many nets have only one triangle touching the base? Draw as many of them as you can.

1-1

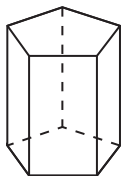
Practice

Form G

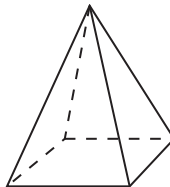
Nets and Drawings for Visualizing Geometry

Match each three-dimensional figure with its net.

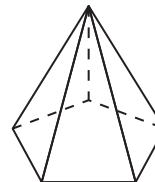
1.



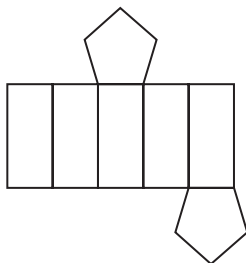
2.



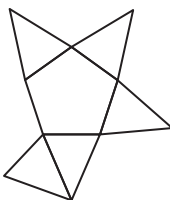
3.



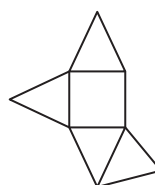
A.



B.

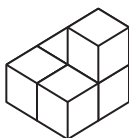


C.

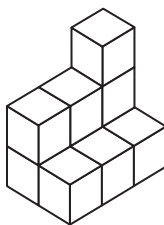


Make an isometric drawing of each cube structure on isometric dot paper.

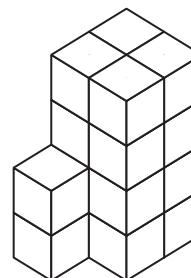
4.



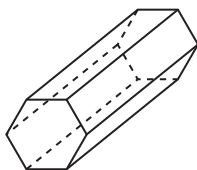
5.



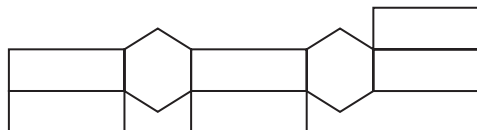
6.



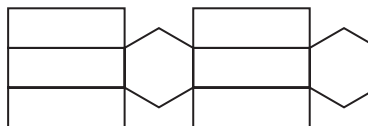
7. **Error Analysis** Two students draw nets for the solid shown below. Who is correct, Student A or Student B? Explain.



Student A:



Student B:



8. You want to make a one-piece cardboard cutout for a child to fold and tape together to make a dollhouse. It includes a floor, a complete roof, and four walls. Draw a net for the dollhouse.

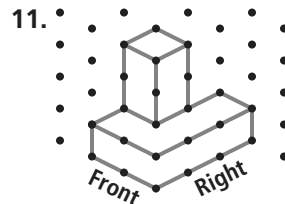
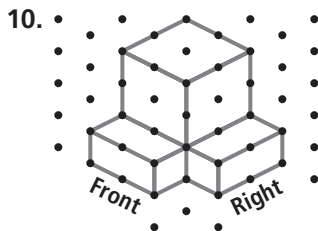
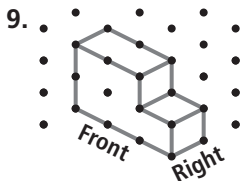
1-1

Practice (continued)

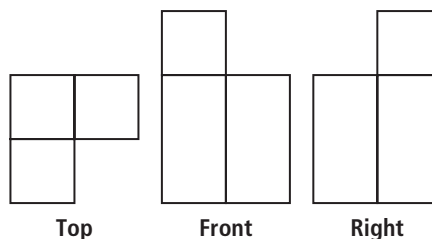
Form G

Nets and Drawings for Visualizing Geometry

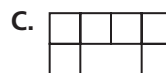
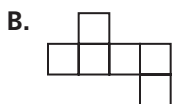
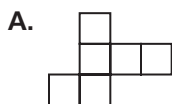
For each isometric drawing, make an orthographic drawing. Assume there are no hidden cubes.



12. **Visualization** Look at the orthographic drawing at the right. Make an isometric drawing of the structure.

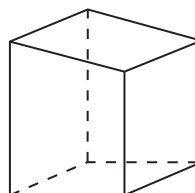


13. Choose the nets that will fold to make a cube.



14. **Writing** To make a net from a container, you start by cutting one of the seams along an edge where two sides meet. If you wanted to make a different net for the container, what would you do differently?

15. **Multiple Representations** Draw two different nets for the solid shown at the right.



1-1

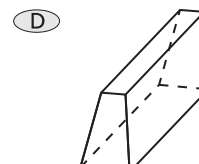
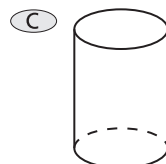
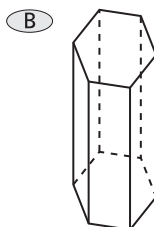
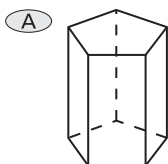
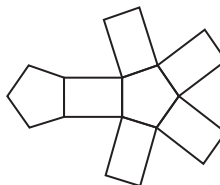
Standardized Test Prep

Nets and Drawings for Visualizing Geometry

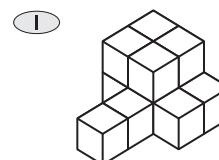
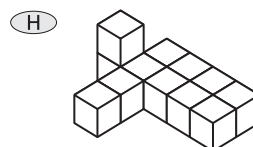
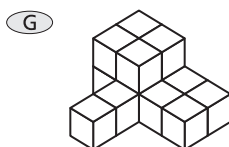
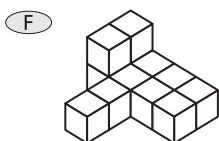
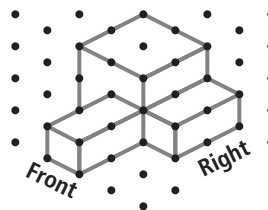
Multiple Choice

For Exercises 1-3, choose the correct letter.

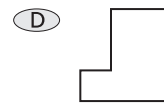
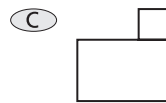
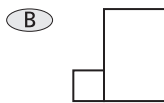
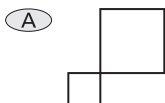
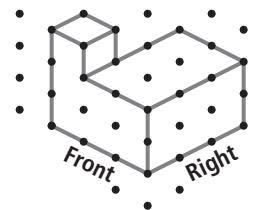
1. Which three-dimensional figure matches the net shown at the right?



2. Which cube structure matches the isometric drawing shown at the right?



3. Which top view of an orthographic drawing matches the isometric drawing shown at the right?



Short Response

4. You are building a small shed. You want to describe the area of the ground the shed will cover. Which type of drawing, isometric or orthographic, would best represent the area? Why?

1-2 Think About a Plan

Points, Lines, and Planes

Estimation You can represent the hands on a clock at 6:00 as opposite rays. Estimate the other 11 times on a clock that you can represent as opposite rays.

Know

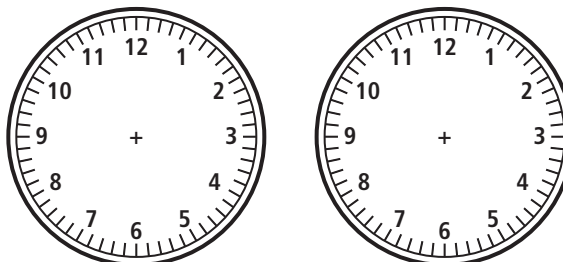
1. Opposite rays are _____.
2. The hands on the clock represent rays. At 6:00, these rays form opposite rays. This means they form a _____.

Need

3. To solve the problem I need to find the 11 other times that _____.

Plan

4. When the hour hand is between 1 and 2 o'clock, what will the minute hand be between?



5. On the two clock faces at the right, draw the hands of a clock at 1:35 and at 1:38.

6. At which time, 1:35 or 1:38, do you think opposite rays form? Explain.

7. Complete the table to show all of the times when the hands on a clock represent opposite rays.

Hour	6	7	8	9	10	11					
Time when opposite rays form	6:00										

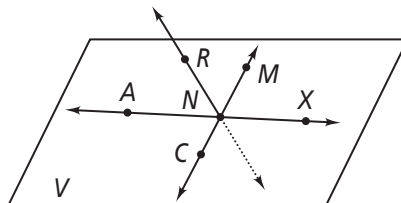
1-2

Practice

Form G

Points, Lines, and Planes

Use the figure below for Exercises 1–8. Note that \overleftrightarrow{RN} pierces the plane at N . It is not coplanar with V .



1. Name two segments shown in the figure.
2. What is the intersection of \overleftrightarrow{CM} and \overleftrightarrow{RN} ?
3. Name three collinear points.
4. What are two other ways to name plane V ?
5. Are points R , N , M , and X coplanar?
6. Name two rays shown in the figure.
7. Name the pair of opposite rays with endpoint N .
8. How many lines are shown in the drawing?

For Exercises 9–14, determine whether each statement is *always*, *sometimes*, or *never* true.

9. \overrightarrow{GH} and \overrightarrow{HG} are the same ray.
10. \overrightarrow{JI} and \overrightarrow{JL} are opposite rays.
11. A plane contains only three points.
12. Three noncollinear points are contained in only one plane.
13. If \overleftrightarrow{EG} lies in plane X , point G lies in plane X .
14. If three points are coplanar, they are collinear.
15. **Reasoning** Is it possible for one ray to be shorter in length than another? Explain.
16. **Open-Ended** Draw a figure of two planes that intersect in \overleftrightarrow{ST} .

1-2

Practice (continued)

Form G

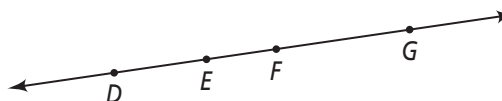
Points, Lines, and Planes

17. Draw a figure to fit each description.
- Through any two points there is exactly one line.
 - Two distinct lines can intersect in only one point.

18. **Reasoning** Point F lies on \overrightarrow{EG} and point M lies on \overrightarrow{EN} . If F , E , and M are collinear, what must be true of these rays?

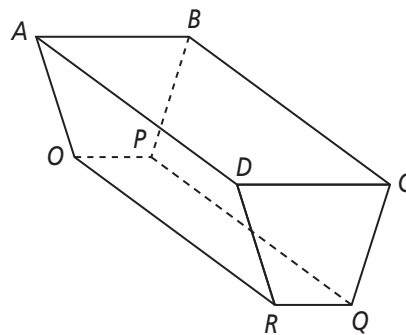
19. **Writing** What other terms or phrases mean the same as *postulate*?

20. How many segments can be named from the figure at the right?



Use the figure at the right for Exercises 21–29. Name the intersection of each pair of planes or lines.

- planes ABP and BCD
- \overleftrightarrow{RQ} and \overleftrightarrow{RO}
- planes ADR and DCQ
- planes BCD and BCQ
- \overleftrightarrow{OP} and \overleftrightarrow{QP}



Name two planes that intersect in the given line.

- \overleftrightarrow{RO}
- \overleftrightarrow{CQ}
- \overleftrightarrow{DA}
- \overleftrightarrow{BP}

Coordinate Geometry Graph the points and state whether they are collinear.

- $(0, 0), (4, 2), (6, 3)$
- $(-1, 1), (2, -2), (4, -3)$
- $(-2, 0), (0, 4), (2, 0)$
- $(0, 0), (6, 0), (9, 0)$
- $(1, 2), (2, 3), (4, 5)$
- $(-4, -1), (-1, -2), (2, -3)$

1-2 Standardized Test Prep

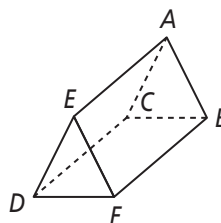
Points, Lines, and Planes

Multiple Choice

For Exercises 1–7, choose the correct letter.

1. Look at the figure at the right. Where do planes ACE and BCD intersect?

- (A) \overleftrightarrow{AD} (C) \overleftrightarrow{CB}
 (B) \overleftrightarrow{CD} (D) \overleftrightarrow{BF}



2. Which of the following are opposite rays?

- (F) \overrightarrow{TS} and \overrightarrow{XS} (H) \overrightarrow{TS} and \overrightarrow{TZ}
 (G) \overrightarrow{TX} and \overrightarrow{TZ} (I) \overrightarrow{TS} and \overrightarrow{TX}



3. What is the smallest number of distinct points that can define a plane?

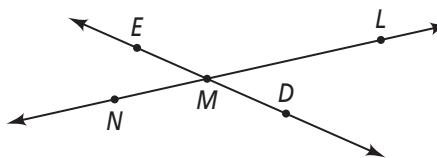
- (A) 2 (B) 3 (C) 4 (D) infinite

4. At how many points can two distinct lines intersect?

- (F) 1 (G) 2 (H) 3 (I) 4

5. In the figure at the right, which line is the same as \overleftrightarrow{ED} ?

- (A) \overleftrightarrow{ML} (C) \overleftrightarrow{NL}
 (B) \overleftrightarrow{DM} (D) \overleftrightarrow{MN}



6. If two lines are coplanar, which of the following must be true?

- (F) The lines intersect.
 (G) The lines never intersect.
 (H) All points on the lines are coplanar.
 (I) The lines share at least one point.

7. What is the intersection of two distinct, non-parallel planes?

- (A) a point (B) a line (C) a line segment (D) a ray

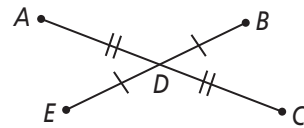
Short Response

8. Point C does not lie on \overleftrightarrow{XY} . Can point C lie in the same plane as \overleftrightarrow{XY} ? Explain.

1-3 Think About a Plan

Measuring Segments

If $AD = 12$ and $AC = 4y - 36$, find the value of y .
Then find AC and DC .



Understanding the Problem

1. What are the two congruence relationships that the diagram shows?
2. What is the value of DC ?
3. Write an equation that describes the relationship between AC , DC , and AD .

Planning the Solution

4. How can you use the equation in Exercise 3 above to find the value of y ?

Getting an Answer

5. Write an equation for y using the method described in Exercise 4 above.
6. Solve for y .
7. $AC = 4y - 36$. Substitute the value of y to find AC .
8. Check your answer. Does it make the equation that you wrote in Step 5 true? _____

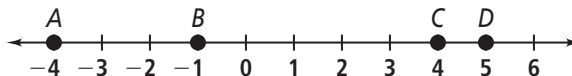
1-3

Practice

Form G

Measuring Segments

In Exercises 1–6, use the figure below. Find the length of each segment.



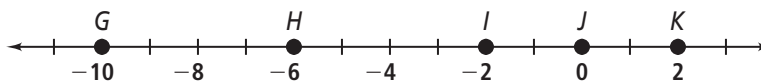
- | | | |
|--------------------|--------------------|--------------------|
| 1. \overline{AB} | 2. \overline{BC} | 3. \overline{AC} |
| 4. \overline{AD} | 5. \overline{BD} | 6. \overline{CD} |

For Exercises 7–11, use the figure at the right.



7. If $PQ = 7$ and $QR = 10$, then $PR = \square$.
8. If $PQ = 20$ and $QR = 22$, then $PR = \square$.
9. If $PR = 25$ and $PQ = 12$, then $QR = \square$.
10. If $PR = 19$ and $QR = 12$, then $PQ = \square$.
11. If $PR = 10$ and $PQ = 4$, then $QR = \square$.

Use the number line below for Exercises 12–16. Tell whether the segments are congruent.



- | | | |
|---|---|---|
| 12. \overline{GH} and \overline{HI} | 13. \overline{GH} and \overline{IK} | 14. \overline{HJ} and \overline{IK} |
| 15. \overline{IJ} and \overline{JK} | 16. \overline{HJ} and \overline{GI} | 17. \overline{HK} and \overline{GI} |

18. **Reasoning** Points A, Q, and O are collinear. $AO = 10$, $AQ = 15$, and $OQ = 5$. What must be true about their positions on the line?

Algebra Use the figure at the right for Exercises 19 and 20.



19. Given: $ST = 3x + 3$ and $TU = 2x + 9$.
 - a. What is the value of ST ?
 - b. What is the value of TU ?
20. Given: $ST = x + 3$ and $TU = 4x - 6$.
 - a. What is the value of ST ?
 - b. What is the value of SU ?
21. **Algebra** On a number line, suppose point E has a coordinate of 3, $EG = 6$, and $EX = 12$. Is point G the midpoint of \overline{EX} ? What are possible coordinates for G and X?

1-3

Practice (continued)

Form G

Measuring Segments

On a number line, the coordinates of P , Q , R , and S are -12 , -5 , 0 , and 7 , respectively.

22. Draw a sketch of this number line. Use this sketch to answer Exercises 23–26.

23. Which line segment is the shortest?

24. Which line segment is the longest?

25. Which line segments are congruent?

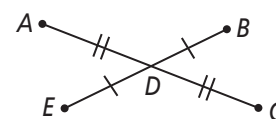
26. What is the coordinate of the midpoint of \overline{PR} ?

27. You plan to drive north from city A to town B and then continue north to city C . The distance between city A and town B is 39 mi, and the distance between town B and city C is 99 mi.

- Assuming you follow a straight driving path, after how many miles of driving will you reach the midpoint between city A and city C ?
- If you drive an average of 46 mi/h, how long will it take you to drive from city A to city C ?

28. **Algebra** Point O lies between points M and P on a line. $OM = 34z$ and $OP = 36z - 7$. If point N is the midpoint of \overline{MP} , what algebraic equation can you use to find MN ?

Algebra Use the diagram at the right for Exercises 29–32.



29. If $AD = 20$ and $AC = 3x + 4$, find the value of x . Then find AC and DC .

30. If $ED = 5y + 6$ and $DB = y + 30$, find the value of y . Then find ED , DB , and EB .

31. If $DC = 6x$ and $DA = 4x + 18$, find the value of x . Then find AD , DC , and AC .

32. If $EB = 4y - 12$ and $ED = y + 17$, find the value of y . Then find ED , DB , and EB .

33. **Writing** Is it possible that $PQ + QR < PR$? Explain.

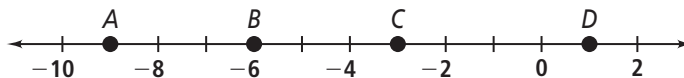
1-3 Standardized Test Prep

Measuring Segments

Gridded Response

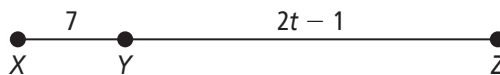
Solve each exercise and enter your answer on the grid provided.

1. What is the length of \overline{BD} ?



2. Points G , H , and I are collinear and H is between G and I . If $GH = 12$ and $GI = 23$, what is HI ?

3. Look at the diagram below. If $XY = 7$ and $XZ = 30$, what is the value of t ?



For Exercises 4 and 5, use the figure at the right.



4. M is the midpoint of \overline{LN} . What is LM ?

5. What is LN ?

Answers

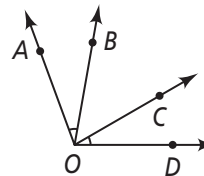
1.	2.	3.	4.	5.

1-4 Think About a Plan

Measuring Angles

Use the diagram at the right. Solve for x . Find the angle measures to check your work.

$$m\angle AOB = 4x - 2, m\angle BOC = 5x + 10, m\angle COD = 2x + 14$$



Understanding the Problem

1. The diagram shows that $\angle AOB$ and _____ are congruent.
2. So, $m\angle AOB =$ _____.

Planning the Solution

3. How can you use the information in Step 2 to write an equation for x ?

4. Write an equation for x .

Getting an Answer

5. Solve for x .
6. Find the measures of the angles by substituting for x .

$$m\angle AOB = \square$$

$$m\angle BOC = \square$$

$$m\angle COD = \square$$

7. Measure the angles using a protractor to check your answers. Are they reasonable?

1-4

Practice Measuring Angles

Form G

Use the diagram below for Exercises 1-11. Find the measure of each angle.

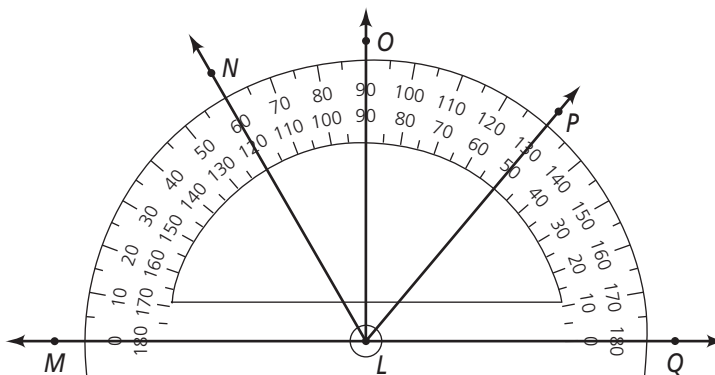
1. $\angle MLN$

2. $\angle NLP$

3. $\angle NLQ$

4. $\angle OLP$

5. $\angle MLQ$



Classify each angle as *acute*, *right*, *obtuse*, or *straight*.

6. $\angle MLN$

7. $\angle NLO$

8. $\angle MLP$

9. $\angle OLP$

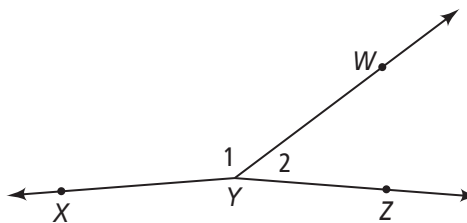
10. $\angle OLQ$

11. $\angle MLQ$

Use the figure at the right for Exercises 12 and 13.

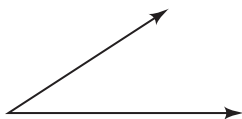
12. What is another name for $\angle XYW$?

13. What is another name for $\angle WYZ$?



Use a protractor. Measure and classify each angle.

14.



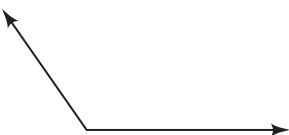
15.



16.



17.



18.



1-4

Practice (continued)

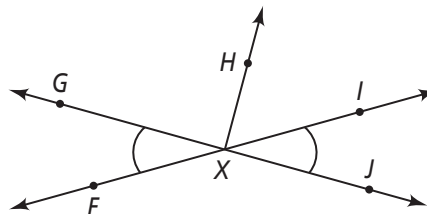
Form G

Measuring Angles

19. $\angle JKL$ and $\angle CDE$ are congruent. If $m\angle JKL = 137$, what is $m\angle CDE$?

Use the figure at the right for Exercises 20–23.

$m\angle FXH = 130$ and $m\angle FXG = 49$.



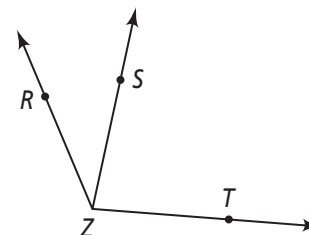
20. $\angle FXG \cong \square$

21. $m\angle GXH = \square$

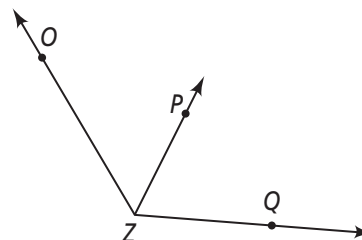
22. Name a straight angle in the figure.

23. $\angle IXJ \cong \square$

24. **Algebra** If $m\angle RZT = 110$, $m\angle RZS = 3s$, and $m\angle TZS = 8s$, what are $m\angle RZS$ and $m\angle TZS$?



25. **Algebra** $m\angle OZP = 4r + 2$, $m\angle PZQ = 5r - 12$, and $m\angle OZQ = 125$. What are $m\angle OZP$ and $m\angle PZQ$?



26. **Reasoning** Elsa draws an angle that measures 56. Tristan draws a congruent angle. Tristan says his angle is obtuse. Is he correct? Why or why not?

27. Lisa makes a cherry pie and an apple pie. She cuts the cherry pie into six equal wedges and she cuts the apple pie into eight equal wedges. How many degrees greater is the measure of a cherry pie wedge than the measure of an apple pie wedge?

28. **Reasoning** $\angle JNR$ and $\angle RNX$ are congruent. If the sum of the measures of the two angles is 180, what type of angle are they?

29. A new pizza place in town cuts their circular pizzas into 12 equal slices. What is the measure of the angle of each slice?

1-4 Standardized Test Prep

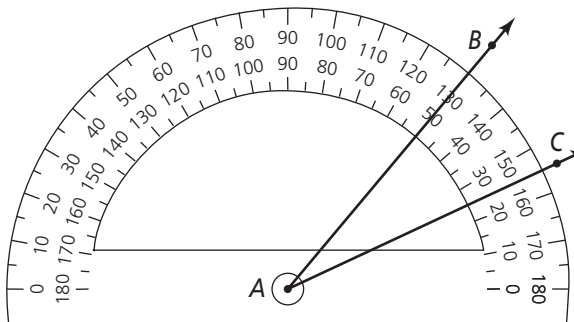
Measuring Angles

Multiple Choice

For Exercises 1-5, choose the correct letter.

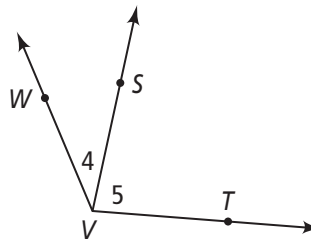
1. What is $m\angle BAC$?

- (A) 25
- (B) 50
- (C) 130
- (D) 155



2. What is another name for $\angle 4$?

- (F) $\angle VWS$
- (H) $\angle SVW$
- (G) $\angle SWV$
- (I) $\angle WVT$

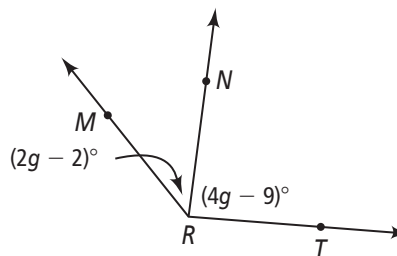


3. $m\angle KLM = 129$ and $m\angle MNO = 129$. What is true about these two angles?

- (A) They are both acute angles.
- (B) They are congruent.
- (C) They are both right angles.
- (D) They are both straight angles.

4. $m\angle MRT = 133$. What is $m\angle MRN$?

- (F) 24
- (G) 48
- (H) 46
- (I) 87



5. $\angle LJB$ and $\angle IJM$ are congruent. If the sum of the measures of the angles is 90, what type of angle are they?

- (A) acute
- (B) obtuse
- (C) right
- (D) straight

Short Response

6. $m\angle RNY + m\angle GNC = 128$ and $\angle RNY \cong \angle GNC$. What is true about these two angles?

1-5 Think About a Plan

Exploring Angle Pairs

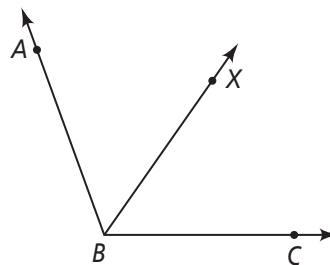
Reasoning When \overrightarrow{BX} bisects $\angle ABC$, $\angle ABX \cong \angle CBX$. One student claims there is always a related equation $m\angle ABX = \frac{1}{2}m\angle ABC$. Another student claims the related equation is $2m\angle ABX = m\angle ABC$. Who is correct? Explain.

Understanding the Problem

1. What does it mean for \overrightarrow{BX} to bisect $\angle ABC$?

2. How is $m\angle ABC$ related to $m\angle ABX$ and $m\angle CBX$?

3. How are $m\angle ABX$ and $m\angle CBX$ related?



Planning the Solution

4. Based on your answers, write an equation relating $m\angle ABC$ and $m\angle ABX$.
5. Based on your answers, write an equation relating $m\angle ABC$ and $m\angle CBX$.
6. Based on your answers, write an equation relating $m\angle ABX$ and $m\angle CBX$.

Getting an Answer

7. Do any of your equations match an equation given in the exercise?

8. Can you show using algebra that one of your equations is equivalent to another equation in the exercise? Explain.

9. Which student is correct? Explain.

1-5

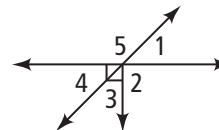
Practice

Form G

Exploring Angle Pairs

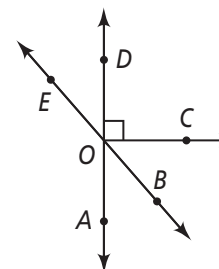
Use the diagram at the right. Is each statement true? Explain.

- $\angle 2$ and $\angle 5$ are adjacent angles.
- $\angle 1$ and $\angle 4$ are vertical angles.
- $\angle 4$ and $\angle 5$ are complementary.

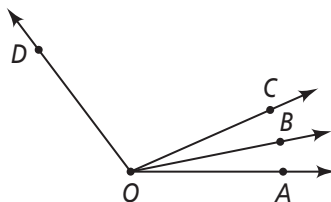


Name an angle or angles in the diagram described by each of the following.

- complementary to $\angle BOC$
- supplementary to $\angle DOB$
- adjacent and supplementary to $\angle AOC$



Use the diagram below for Exercises 7 and 8. Solve for x . Find the angle measures.



- $m\angle AOB = 4x - 1$; $m\angle BOC = 2x + 15$; $m\angle AOC = 8x + 8$
- $m\angle COD = 8x + 13$; $m\angle BOC = 3x - 10$; $m\angle BOD = 12x - 6$
- $\angle ABC$ and $\angle EBF$ are a pair of vertical angles; $m\angle ABC = 3x + 8$ and $m\angle EBF = 2x + 48$. What are $m\angle ABC$ and $m\angle EBF$?
- $\angle JKL$ and $\angle MNP$ are complementary; $m\angle JKL = 2x - 3$ and $m\angle MNP = 5x + 2$. What are $m\angle JKL$ and $m\angle MNP$?

For Exercises 11–14, can you make each conclusion from the information in the diagram? Explain.

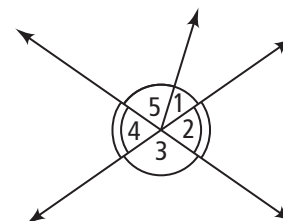
- $\angle 3 \cong \angle 4$
- $m\angle 1 + m\angle 5 = m\angle 3$
- \overrightarrow{KM} bisects $\angle JKL$. If $m\angle JKM = 86$, what is $m\angle JKL$?
- \overrightarrow{SV} bisects $\angle RST$. If $m\angle RST = 62$, what is $m\angle RSV$?

11. $\angle 3 \cong \angle 4$

12. $m\angle 1 + m\angle 5 = m\angle 3$

13. \overrightarrow{KM} bisects $\angle JKL$. If $m\angle JKM = 86$, what is $m\angle JKL$?

14. \overrightarrow{SV} bisects $\angle RST$. If $m\angle RST = 62$, what is $m\angle RSV$?



1-5

Practice (continued)

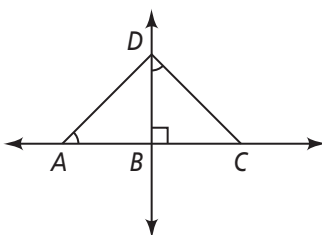
Form G

Exploring Angle Pairs

\overrightarrow{QS} bisects $\angle PQR$. Solve for x and find $m\angle PQR$.

17. $m\angle PQS = 3x$; $m\angle SQR = 5x - 20$
18. $m\angle PQS = 2x + 1$; $m\angle RQS = 4x - 15$
19. $m\angle PQR = 3x - 12$; $m\angle PQS = 30$
20. $m\angle PQS = 2x + 10$; $m\angle SQR = 5x - 17$

For Exercises 21–24, can you make each conclusion from the information in the diagram below? Explain.



21. $\angle DAB$ and $\angle CDB$ are congruent.
22. $\angle ADB$ and $\angle CDB$ are complementary.
23. $\angle ADB$ and $\angle CDB$ are congruent.
24. $\angle ADB$ and $\angle BCD$ are congruent.
25. **Algebra** $\angle MLN$ and $\angle JLK$ are complementary, $m\angle MLN = 7x - 1$, and $m\angle JLK = 4x + 3$.
 - a. Solve for x .
 - b. Find $m\angle MLN$ and $m\angle JKL$.
 - c. Show how you can check your answer.
26. **Reasoning** Describe all the situations in which the following statements are true.
 - a. Two vertical angles are also complementary.
 - b. A linear pair is also supplementary.
 - c. Two supplementary angles are also a linear pair.
 - d. Two vertical angles are also a linear pair.
27. **Open-Ended** Write and solve an equation using an angle bisector to find the measure of an angle.

1-5 Standardized Test Prep

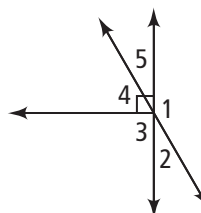
Exploring Angle Pairs

Multiple Choice

For Exercises 1–6, choose the correct letter.

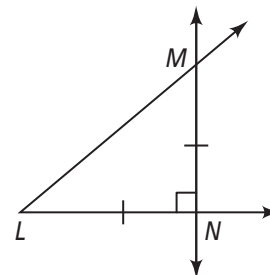
- $\angle CDE$ and $\angle FDE$ are supplementary, $m\angle CDE = 3x + 10$, and $m\angle FDE = 6x + 8$. What is $m\angle FDE$?
 (A) 18 (B) 64 (C) 108 (D) 116
- \overrightarrow{SV} bisects $\angle RST$. If $m\angle RSV = 64$, what is $m\angle RST$?
 (F) 32 (G) 64 (H) 116 (I) 128

Use the diagram at the right for Exercises 3 and 4.



- Which of the following pairs are vertical angles?
 (A) $\angle 1$ and $\angle 2$ (C) $\angle 2$ and $\angle 5$
 (B) $\angle 2$ and $\angle 3$ (D) $\angle 4$ and $\angle 5$
- Which of the following pairs are supplementary?
 (F) $\angle 1$ and $\angle 2$ (H) $\angle 2$ and $\angle 3$
 (G) $\angle 2$ and $\angle 5$ (I) $\angle 4$ and $\angle 5$

Use the diagram at the right for Exercises 5 and 6.



- Which of the following conclusions can you make from the information in the diagram?
 (A) $\angle MNL \cong \angle LMN$ (C) $\overline{LM} \cong \overline{MN}$
 (B) $m\angle MNL = 2m\angle LMN$ (D) $LM = 2MN$
- Which of the following conclusions cannot be made from the information in the diagram?
 (F) $\overline{MN} \cong \overline{LN}$ (H) $\angle NLM$ is supplementary to $\angle NML$.
 (G) $\angle NLM \cong \angle NML$ (I) $\angle NLM$ is complementary to $\angle NML$.

Short Response

- $\angle ABC$ and $\angle DBE$ are vertical angles, $m\angle ABC = 3x + 20$, and $m\angle DBE = 4x - 10$. Write and solve an equation to find $m\angle ABC$ and $m\angle DBE$.

1-6 Think About a Plan

Basic Constructions

- a. Draw a large triangle with three acute angles. Construct the bisector of the three angles. What appears to be true about the three angle bisectors?
 - b. Repeat the constructions with a triangle that has one obtuse angle.
 - c. **Make a Conjecture** What appears to be true about the three angle bisectors of any triangle?
1. In this problem, you will draw three rays for each triangle. Each ray starts at a vertex and passes through the interior of the triangle.
 - a. What is the maximum number of points of intersection between the rays?
 - b. What is the minimum number?
 2. On a separate piece of paper, draw $\triangle ABC$ such that all three angles are acute angles and the triangle takes up most of the paper.
 3. In your own words, what are the steps for drawing the angle bisector of $\angle A$?

 4. Draw the angle bisector of $\angle A$. Then draw the angle bisectors for $\angle B$ and $\angle C$.
 5. On a separate piece of paper, draw $\triangle DEF$ such that one of the three angles is an obtuse angle and the triangle takes up most of the paper. Construct the angle bisectors for $\angle D$, $\angle E$, and $\angle F$.
 6. How many points of intersection are there for the three angle bisectors of $\triangle ABC$?
 7. How many points of intersection are there for the three angle bisectors of $\triangle DEF$?
 8. Suppose a friend draws $\triangle DHI$. Without looking at the triangle, what do you think will be true of the three angle bisectors of its angles?

1-6

Practice

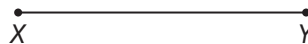
Form G

Basic Constructions

For Exercises 1–13, do the construction using the figures below. Check your work with a ruler or a protractor.

1. Construct \overline{AB} congruent to \overline{XY} .

2. Construct the perpendicular bisector of \overline{XY} .



3. Construct a triangle whose sides are all the same length as \overline{XY} .

4. Construct \overline{AB} so that $AB = MN + OP$.

5. Construct \overline{KL} so that $KL = OP - MN$.

6. Construct the perpendicular bisector of \overline{MN} .



7. Construct the perpendicular bisector of \overline{OP} .



8. Construct $\angle A$ so that $m\angle A = m\angle 1 + m\angle 2$.



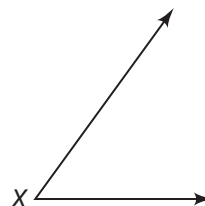
9. Construct $\angle B$ so that $m\angle B = m\angle 1 - m\angle 2$.

10. Construct $\angle C$ so that $m\angle C = 2m\angle 2$.

11. Construct $\angle D$ so that $m\angle D = 2m\angle 1$.

12. Construct $\angle Y$ so that $m\angle Y = \frac{1}{2}m\angle 2$.

13. Construct $\angle Z$ so that $m\angle Z = \frac{1}{2}m\angle X$.



1-6

Practice (continued)

Form G

Basic Constructions

14. Draw a segment \overline{AB} . Construct a segment whose length is $\frac{1}{4}AB$.
- How is the line segment you need to construct related to the perpendicular bisector of \overline{AB} ?
 - How can you use the previous constructions to help you?
15. Answer the questions about an angle in a plane. Explain each answer.
- How many angle bisectors does an angle have in the plane?
 - How many rays in the plane bisect the angle?
 - How many rays in space bisect the angle?
16. **Writing** Explain how to do each construction with a compass and straightedge.
- Draw an $\angle A$. Construct the angle bisector of $\angle A$.
 - Divide $\angle A$ into four congruent angles.
17. Draw a segment \overline{ST} .
- Construct a right triangle with two sides that have the measure $\frac{1}{2}ST$.
 - Reasoning** Describe how to construct a 45° angle. Then describe how to construct an isosceles right triangle.
18. Draw a segment \overline{VW} .
- Construct a square $ABCD$ whose sides have length VW .
 - Describe how to construct the perpendicular bisectors of sides \overline{AB} and \overline{BC} .

1-6 Standardized Test Prep

Basic Constructions

Multiple Choice

For Exercises 1–4, choose the correct letter.

- You are asked to construct a segment congruent to \overline{AB} . As a first step, you draw a ray. Which of the following, if true of the ray, would be most helpful?
 - The ray is drawn on the paper shorter than \overline{AB} .
 - The ray is drawn on the paper longer than \overline{AB} .
 - The ray is drawn parallel to \overline{AB} .
 - The ray is drawn perpendicular to \overline{AB} .
- Which of the following must be true about a perpendicular bisector and the segment it bisects?
 - The perpendicular bisector and the segment bisect each other.
 - The angle of intersection depends on the length of the line segment.
 - The perpendicular bisector intersects the segment at a 45° angle.
 - The perpendicular bisector intersects the segment at a 90° angle.
- Which of the following is true about the bisectors of a segment in a plane?
 - Every segment has exactly one bisector.
 - Every segment has exactly two bisectors.
 - Every segment has infinitely many bisectors.
 - Every segment has infinitely many perpendicular bisectors.
- Which of the following materials is not used when making basic constructions?
 - a ruler
 - a compass
 - a straightedge
 - a pencil

Extended Response

- How do you construct a perpendicular bisector of \overline{AB} ? Use three steps.

1-7

Think About a Plan

Midpoint and Distance in the Coordinate Plane

Do you use the Midpoint Formula or the Distance Formula to find the following?

- Given points K and P , find the distance from K to the midpoint of \overline{KP} .
- Given point K and the midpoint of \overline{KP} , find KP .

Understanding the Problem

1. What does the Midpoint Formula help you find?

2. What does the Distance Formula help you find?

Planning the Solution

3. What does part (a) of the problem ask you to find?

4. What does part (b) of the problem ask you to find?

Getting the Answer

5. What formula would you use for part (a)?

6. What formula would you use for part (b)?

7. In Steps 5 and 6, how could you explain why you need to use one formula instead of the other?

1-7

Practice

Form G

Midpoint and Distance in the Coordinate Plane

Find the coordinate of the midpoint of the segment with the given endpoints.

1. 3 and 5 2. -7 and 4 3. 5 and -9 4. -6 and -10

Find the coordinates of the midpoint of \overline{AB} .

5. $A(6, 7), B(4, 3)$ 6. $A(-1, 5), B(2, -3)$
 7. $A(14, -2), B(7, -8)$ 8. $A(0, 0), B(-5, 12)$
 9. $A(2.8, 1.1), B(-3.4, 5.7)$ 10. $A(2\frac{1}{2}, -\frac{1}{4}), B(3\frac{1}{4}, -1)$

The coordinates of point Y are given. The midpoint of \overline{XY} is $(3, -5)$. Find the coordinates of point X .

11. $Y(0, 2)$ 12. $Y(-10, 5)$ 13. $Y(7, 1)$
 14. $Y(4, -8)$ 15. $Y(-1, -9)$ 16. $Y(2.5, -6.5)$

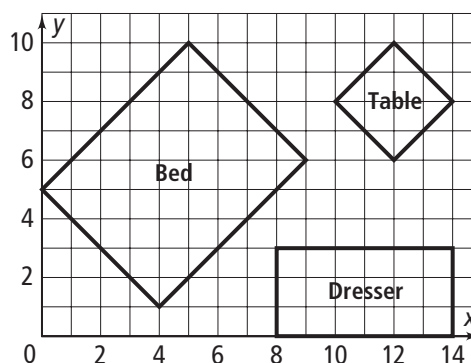
Find the distance between each pair of points. If necessary, round to the nearest tenth.

17. $A(6, 7), B(-1, 7)$ 18. $C(5, -5), D(5, 3)$
 19. $E(-1, 0), F(12, 0)$ 20. $Q(2, -6), T(10, 0)$
 21. $H(20, -4), I(-4, 3)$ 22. $J(-5, 5), K(-3, -2)$

The room shown below right is 14 ft by 10 ft. Find the dimensions of each piece of furniture to the nearest tenth.

23. length and width of the dresser
 24. length and width of the table
 25. length and width of the bed

26. **Reasoning** The midpoint of \overline{AB} is on the y -axis, and \overline{AB} is parallel to the x -axis. Point A is located in Quadrant III. Which quadrant contains point B ? Explain.



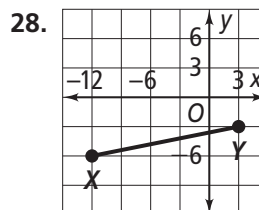
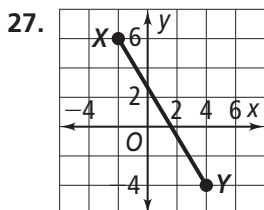
1-7

Practice (continued)

Form G

Midpoint and Distance in the Coordinate Plane

For each graph, find (a) XY to the nearest tenth and (b) the coordinates of the midpoint of \overline{XY} .



29. **Coordinate Geometry** Graph the points $A(0, 0)$, $B(3, 3)$, $C(9, 3)$, and $D(12, 0)$.

Draw trapezoid $ABCD$ and diagonals \overline{AC} and \overline{BD} . Add point $E(6, 2)$ at the intersection of diagonals \overline{AC} and \overline{BD} .

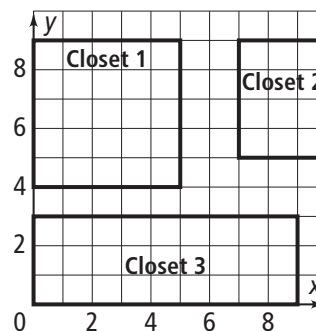
- Find BE and CE . What do you notice?
- Find AE and DE . What do you notice?
- Make a Conjecture** What appears to be true about the diagonals of a trapezoid?

30. **Open-Ended** Point $B(-3, -3)$ is the endpoint of many segments.

- Find the coordinates of the midpoint and the other endpoint of four noncollinear segments that have point B as their endpoint.
- You know that a segment with endpoint B lies entirely in Quadrant III. What does that tell you about the other endpoint?
- How many possible segments parallel to either the y -axis or the x -axis match this description? Explain.

31. The plan at the right shows three storage closets in an apartment building. Find the center of each closet and the length of the closet's diagonal to the nearest tenth of a foot. (*Hint: The diagonals bisect each other, so the center is the midpoint of each diagonal.*)

- closet 1
- closet 2
- closet 3



32. **Writing** In your own words, describe how to find the distance between two points on a coordinate plane.

1-7

Standardized Test Prep

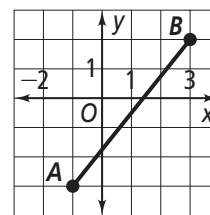
Midpoint and Distance in the Coordinate Plane

Multiple Choice

For Exercises 1-7, choose the correct letter.

- What is the other endpoint of the segment with midpoint -3 and endpoint -7 ?
 (A) -11 (B) -5 (C) 1 (D) 4
- The endpoints of \overline{ST} are $S(2, -2)$ and $T(4, 2)$. What are the coordinates of the midpoint of \overline{ST} ?
 (F) $(3, 0)$ (G) $(0, 3)$ (H) $(3, -2)$ (I) $(3, 2)$
- What is the distance between $A(-8, 4)$ and $B(4, -1)$?
 (A) 7 (B) 10 (C) 13 (D) 17
- The midpoint of \overline{XZ} is Y . Which of the following is true?
 (F) $XZ = XY$ (G) $XZ = \frac{1}{2}XY$ (H) $YZ = \frac{1}{2}XY$ (I) $YZ = \frac{1}{2}XZ$

Use the graph at the right for Exercises 5 and 6.



- According to the graph, what is the midpoint of \overline{AB} ?
 (A) $(1, 0)$ (C) $(1, 0.5)$
 (B) $(1, -0.5)$ (D) $(1.5, -0.5)$
- According to the graph, what is AB to the nearest tenth?
 (F) 2.2 (G) 3 (H) 5 (I) 6.4
- The midpoint of \overline{CD} is $M(-3, -7)$. If the coordinates of C are $(-2, -10)$, what are the coordinates of D ?
 (A) $(-4, -4)$ (B) $(-1, -13)$ (C) $(-2.5, -8.5)$ (D) $(-5, -17)$

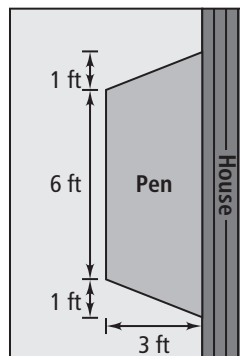
Short Response

- The midpoint of \overline{AB} is in Quadrant IV, and \overline{AB} is parallel to the y -axis.
 - What quadrant or quadrants cannot contain either point A or B ? Explain.
 - What else can you determine about points A and B ?

1-8 Think About a Plan

Perimeter, Circumference, and Area

Pet Care You want to adopt a puppy from your local animal shelter. First, you plan to build an outdoor playpen along the side of your house, as shown on the right. You want to lay down special dog grass for the pen's floor. If dog grass costs \$1.70 per square foot, how much will you spend?



Understanding the Problem

1. What are you trying to find?

Planning the Solution

2. What additional information do you need to know to answer the question?

3. How will you use that additional information to answer the question?

Getting the Answer

4. How can you find the area of the playpen?

5. How do you find the total cost of the grass?

6. What is the total cost of the grass? Show your work.

1-8

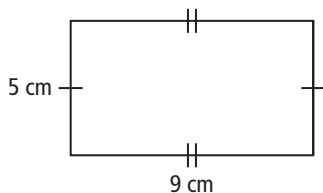
Practice

Form G

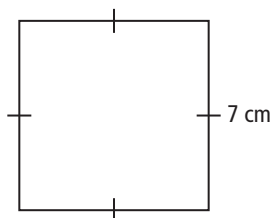
Perimeter, Circumference, and Area

Find the perimeter of each figure.

1.



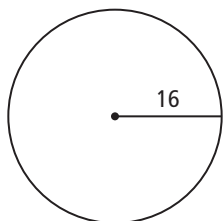
2.



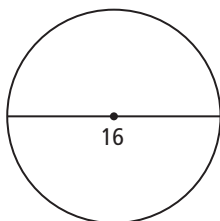
3. An 8-ft-by-10-ft rug leaves 1 ft of the bedroom floor exposed on all four sides. Find the perimeter of the bedroom floor.

Find the circumference of each circle in terms of π .

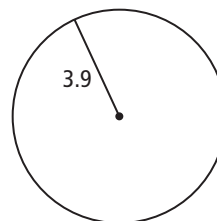
4.



5.



6.



Graph each figure in the coordinate plane. Find the perimeter.

7. $X(-4, 2), Y(2, 10), Z(2, 2)$

8. $R(1, 2), S(1, -2), T(4, -2)$

9. $A(0, 0), B(0, 5), C(6, 5), D(6, 0)$

10. $L(-3, 2), M(2, 14), N(2, 20), P(-3, 20)$

Find the area of the rectangle with the given base and height.

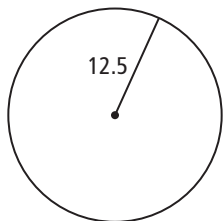
11. 4 ft, 15 in.

12. 90 in., 3 yd

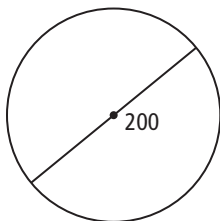
13. 3 m, 130 cm

Find the area of each circle in terms of π .

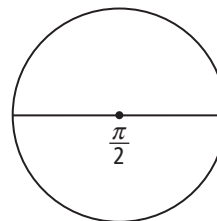
14.



15.



16.



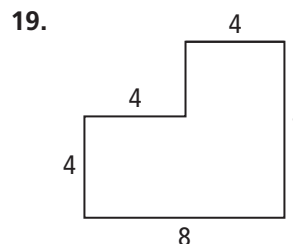
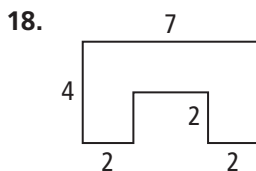
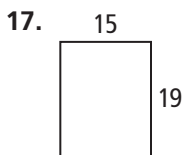
1-8

Practice (continued)

Form G

Perimeter, Circumference, and Area

Find the area of each shaded region. All angles are right angles.



Find the circumference and area of each circle, using $\pi = 3.14$. If necessary, round to the nearest tenth.

20. $r = 5$ m

21. $d = 2.1$ in.

22. $d = 2$ m

23. $r = 4.7$ ft

24. The area of a circle is 25π in.². What is its radius?

25. A rectangle has twice the area of a square. The rectangle is 18 in. by 4 in. What is the perimeter of the square?

26. **Reasoning** If two circles have the same circumference, what do you know about their areas? Explain.

27. **Coordinate Geometry** The center of a circle is $A(-3, 3)$, and $B(1, 6)$ is on the circle. Find the area of the circle in terms of π .

28. **Algebra** Use the formula for the circumference of a circle to write a formula for the area of a circle in terms of its circumference.

29. **Coordinate Geometry** On graph paper, draw polygon $ABCDEF$ with vertices $A(0, 0)$, $B(0, 10)$, $C(5, 10)$, $D(5, 7)$, $E(9, 7)$, and $F(9, 0)$. Find the perimeter and the area of the polygon.

30. The units of the floor plan at the right are in feet. Find the perimeter and area of each room.

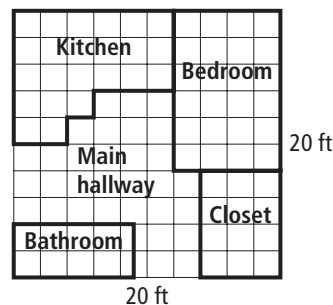
a. the kitchen

b. the bedroom

c. the bathroom

d. the closet

e. What is the area of the main hallway? Explain how you could find this area using the area of each room.



1-8 Standardized Test Prep

Perimeter, Circumference, and Area

Multiple Choice

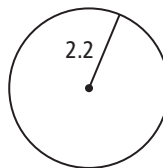
For Exercises 1–6, choose the correct letter.

1. A 12-ft-by-15-ft swimming pool has a 3-ft-wide no-slip surface around it. What is the outer perimeter of the no-slip surface?

(A) 78 ft (B) 78 ft^2 (C) 198 ft (D) 198 ft^2

2. What is the circumference of the circle at the right in terms of π ?

(F) 1.1π (H) 2.2π
 (G) 1.21π (I) 4.4π



3. What is the perimeter of $\triangle PQR$ with vertices $P(-2, 9)$, $Q(7, -3)$, and $R(-2, -3)$ in the coordinate plane?

(A) 21 units (B) 25 units (C) 34 units (D) 36 units

4. You are tiling a kitchen floor that is 10 ft wide by 4 yd long. How many square yards of tile do you need?

(F) $13\frac{1}{3} \text{ yd}^2$ (G) $13\frac{1}{2} \text{ yd}^2$ (H) 20 yd^2 (I) 40 yd^2

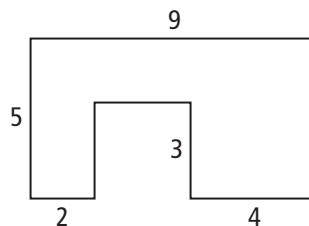
5. The diameter of $\odot Z$ is 5 in. What is its area in terms of π ?

(A) $2.5\pi \text{ in.}^2$ (B) $5\pi \text{ in.}^2$ (C) $6.25\pi \text{ in.}^2$ (D) $25\pi \text{ in.}^2$

6. All angles in the figure at the right are right angles.

What is the area of the figure?

(F) 14 (H) 28
 (G) 18 (I) 36



Short Response

7. a. If two squares have the same area, what do you know about the measures of their sides? Explain.

- b. If two rectangles have the same area, what do you know about the measures of their sides? Explain.