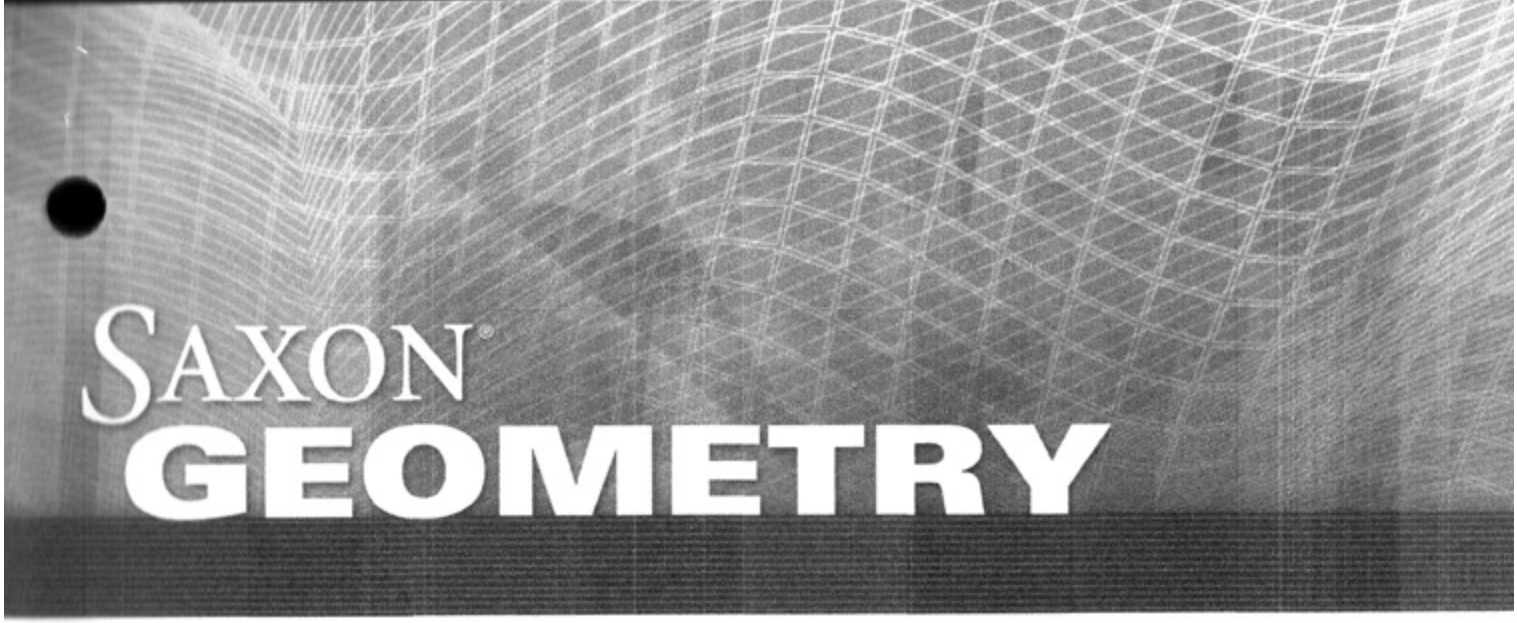
SAXON® GEOMETRY

Solutions Manual



Solution Manual

SAXON®

HOUGHTON MIFFLIN HARCOURT
Supplemental Publishers

www.SaxonPublishers.com
800-531-5015

ISBN 13: 978-1-6027-7561-9
ISBN 10: 1-6027-7561-3

Printed in the United States of America

23 2266 21
4500819588

LESSON 1

Warm Up 1

1. coordinate
2. The length of pipe she needs is 140% of the length of pipe she already has. So, $140\% \times 7 = 1.4 \times 7 = 9.8$ inches.
3. $\sqrt[4]{81}$
   $= \sqrt[4]{3 \times 3 \times 3 \times 3}$
   $= 3$
4. $\frac{4(2 + 6)}{2(2)}$
   $= \frac{4(8)}{4}$
   $= \frac{32}{4}$
   $= 8$

Lesson Practice 1

a. w, x, and y are the lines.

b. Any two points are collinear. Sample: points A and B, points C and D

c. R and S are the two planes.

d. Sample: Points A, B, and D are coplanar.

e. Sample: w and x are coplanar lines.

f. Sample: w and y are noncoplanar lines.

g. point P

h. point K, point M

Practice 1

1. A, B, and C are collinear. Point D is not collinear to any two of the other three points.
2. No, a ruler can be used to line up any two points making them collinear.
3. No, even if two lines appear noncoplanar, once they intersect, they are coplanar.
4. point, line, and plane
5. intersecting
6. No, a plane can always be oriented so that the three points lie in one plane.
7. A, C, and E
8. See student work; lines; Sample: The edges of the classroom are formed where the walls and floor of the room meet. These edges represent lines.
9. $\overleftrightarrow{AD}$
10. $\overleftrightarrow{CD}$ is coplanar with each of the other lines, but not both at once, since $\overleftrightarrow{AD}$ and $\overleftrightarrow{CH}$ are not coplanar.
11. There is no intersection between $\overleftrightarrow{BC}$ and line x because they are noncoplanar and do not intersect at the intersection of the planes.
12. Choice A is false because there can be two lines on different planes. Choice B is false because there can be three lines on three different planes. Choice **C** is true because once two lines intersect, they are by nature coplanar. Choice D is false because two intersecting lines are by nature coplanar.
13. A line can contain an infinite number of points.
14. A plane can contain an infinite number of lines.
15. Choice A is false because the intersection of two lines is a point that is zero-dimensional. Choice B is false because the intersection of two planes forms a line that is one-dimensional. Choice **C** is true because the intersection of two planes forms a line that is one-dimensional. Choice D is false because the intersection of two lines is a point that is zero-dimensional.
16. Two points can be used to name a line, but at least three noncollinear points are needed to define a plane.
17. $5 - (7 + 8) \div 5 + (-2)^3$
    $= 5 - 15 \div 5 + (-8)$
    $= 5 - 3 - 8$
    $= -6$
18. The Commutative Property of Addition, which says that the order of the numbers does not matter for addition.

19. Jacob is correct. -3 can be represented as a fraction using integers, which makes it a rational number.

20. It is rational because, even though it does not terminate, it does repeat and is equal to the fraction of integers $\frac{1}{3}$.

21. $\frac{\text{Non-Hits}}{\text{At Bats}} = \frac{\text{At Bats} - \text{Hits}}{\text{At Bats}}$

$= \frac{55 - 33}{55} = \frac{22}{55}$ or $22 \div 55 = 0.4$

22. $(-3)^3 - \left(\frac{1}{3}\right)^{-3}$

$= -27 - (3)^3$

$= -27 - 27$

$= -54$

23. $2\sqrt{12} + 6\sqrt{27}$

$= 2\sqrt{4} \cdot \sqrt{3} + 6\sqrt{9} \cdot \sqrt{3}$

$= 2 \cdot 2\sqrt{3} + 6 \cdot 3\sqrt{3}$

$= 4\sqrt{3} + 18\sqrt{3}$

$= 22\sqrt{3}$

24. 4 inches $= \frac{4}{12} = \frac{1}{3}$ ft

Cubic yards is a measure of volume.

$V = lwh = 9 \times 9 \times \frac{1}{3} = 27 \text{ ft}^3$

Change cubic feet to cubic yards.

$27 \text{ ft}^3 \times \left(\frac{1 \text{ yd}}{3 \text{ ft}}\right) \times \left(\frac{1 \text{ yd}}{3 \text{ ft}}\right) \times \left(\frac{1 \text{ yd}}{3 \text{ ft}}\right)$

$= \frac{27}{27} \text{ yd}^3 = 1 \text{ yd}^3$

25. mean: $(0.5 + 2 + 0 + 4 + 2.5 + 5 + 7) \div 7$

$= 21 \div 7 = 3$ mm

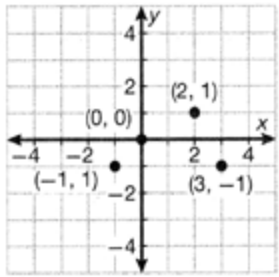
median: 0, 0.5, 2, **2.5,** 4, 5, 7 → median $= 2.5$

26. $\frac{9.760}{9.807} = 0.9952 = 99.52\%$ correct

To find the percent error, we can subtract this percent from 100:

$100 - 99.52 = 0.48\%$.

27.



28. $xy^{-2} + \frac{x}{y}$

$= (-2)\left(\frac{1}{2}\right)^{-2} + \frac{-2}{\frac{1}{2}}$

$= (-2)(2)^2 + (-2)(2)$

$= (-2)(4) + (-4)$

$= -8 - 4$

$= -12$

29. $Prt = I$

$r = I \div Pt$

$r = \frac{I}{Pt}$

30. $3x + 4y - 15 = 0$

$4y = -3x + 15$

$y = -\frac{3}{4}x + \frac{15}{4}$

The slope is $-\frac{3}{4}$.

LESSON 2

Warm Up 2

1. collinear

2. $5x + 6 = 2x - 5$

$5x - 2x = -5 - 6$

$3x = -11$

$x = -\frac{11}{3}$

3. $5(2x - 6) + 3x - 7$

$= 10x - 30 + 3x - 7$

$= 13x - 37$

Lesson Practice 2

a. Symmetric Property of Congruence

b. $|(-4) - 3| = |-7| = 7$

c. $AC = AB + BC$
$AC = x^2 - x + 3 + 2x + 7$
$AC = x^2 + x + 10$

d. If M is the midpoint between Seattle, W, to San Francisco, C:
$WC = WM + MC$
$WM = MC$
$WC = WM + WM$
$811 = 2(WM)$
$405.5 = WM$
The midpoint is 405.5 miles from either city.

Practice 2

1. $\overline{AB} \cong \overline{EF}$ because their measures are equal.

2. $\sqrt{32}$ is between 5 and 6, but closer to 6 because $5^2 = 25$ and $6^2 = 36$.
$5.6^2 = 31.36$
$5.7^2 = 32.49$
5.7^2 is the number to the nearest tenth that is closest to 32. So, $\sqrt{32} \approx 5.7$.

3. Commutative Property of Addition

4. The correct choice is **C** because it takes at least three noncollinear points to define a plane.

5. $AD = |(-7) - 3| = |-10| = 10$

6. $BC = |9 - (-5)| = |14| = 14$

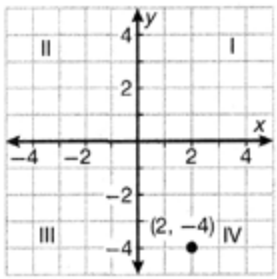
7. $DA = |3 - (-7)| = |10| = 10$

8. $AC = |(-7) - (-5)| = |-2| = 2$

9. The mode is the number that occurs the most in the data set. The mode is 83.

10. $3m^2 - 5m + 17$
$= 3(-3)^2 - 5(-3) + 17$
$= 3(9) - (-15) + 17$
$= 27 + 15 + 17$
$= 59$

11. Quadrant IV



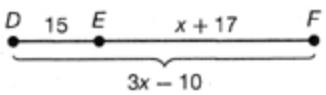
12. Since the data are written in order, the median is the middle number, 6.

13. $AC = AB + BC$
$AC = 5x - 19 + 3x + 4$
$AC = 8x - 15$

14. There are lights at the beginning and the end of the walkway. The three remaining lights must be spaced evenly along the 60-yard walkway. The first light divides the walkway in half and the remaining two lights divide each half in half. So, they divide the walkway into four equal sections. $60 \div 4 = 15$. The lights should be spaced every 15 yards.

15. To define a unique plane, the points must be noncollinear. Sample: Sunil could say, "Three noncollinear points determine a unique plane."

16. $AB = BC$
$3x = 2y + 16$
$AC = AB + BC$
$60 = 3x + 2y + 16$
$60 = 3x + (3x)$
$60 = 6x$
$10 = x$
$3(10) = 2y + 16$
$30 = 2y + 16$
$14 = 2y$
$7 = y$

17. 

$DF = DE + EF$
$3x - 10 = 15 + x + 17$
$3x - x = 15 + 17 + 10$

$2x = 42$

$x = 21$

$DF = 3x - 10 = 3(21) - 10 = 53$

$EF = x + 17 = 21 + 17 = 38$

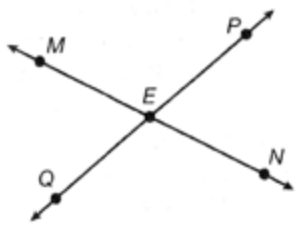
18. The lengths of the line segments are equal (i.e., the value of the length) and the segments themselves are congruent.

19. They are not collinear because points B and C are not on the same line. They are coplanar because they all lie on the same plane.

20. Two points are required to determine a line.

21. Choice **C** is false because space is determined by four noncoplanar points.

22.



Points M, N, and E are collinear. Points P, Q, and E are collinear.

23. $2x^2 - 16x - 66$

$= 2(x^2 - 8x - 33)$

$= 2(x - 11)(x + 3)$

24. $(x - 4)(x + 7)$

$= x^2 + 7x - 4x - 28$

$= x^2 + 3x - 28$

25. 7 feet 4 inches $= 7\frac{1}{3}$ feet

$8 - 7\frac{1}{3} = \frac{24}{3} - \frac{22}{3} = \frac{2}{3}$ foot

26. $\frac{-36x^{-4}y^5}{12x^2y^{-3}} = \frac{-3y^5y^3}{x^2y^4} = \frac{-3y^8}{x^6}$

27. \$48.99 is close to \$50. 10% of \$50 is \$5. It is a little more than \$2.50, which is half of \$5. A good estimate would be approximately \$3.00.

28. $1.8 + 2.345 + 0.65 + 13.56$

$\approx 2 + 2 + 1 + 14$

≈ 19

29. $V = (8)(4)(1.5) = 48\ m^3$

liters $= 48 \times 1000 = 48{,}000$ liters

$48{,}000 \text{ liters} \times \left(\frac{1 \text{ gal}}{3.85 \text{ liters}}\right) \approx 12{,}468$ gallons

30. $9.8\ m/s^2 \times \left(\frac{100 \text{ cm}}{1 \text{ m}}\right) \times \left(\frac{1 \text{ in.}}{2.54 \text{ cm}}\right) \times \left(\frac{1 \text{ ft}}{12 \text{ in.}}\right) \approx 32.15\ ft/s^2$

LESSON 3

Warm Up 3

1. congruent

2. $\frac{1}{2}\left(\frac{2^2}{2} - 2\right) = \frac{1}{2}\left(\frac{4}{2} - 2\right)$

$= \frac{1}{2}(2 - 2) = \frac{1}{2}(0) = 0$

3. $22 \div 7 \approx 3.\overline{142857}$; It is a repeating decimal.

Lesson Practice 3

a. Rays: $\overrightarrow{SR}$, $\overrightarrow{ST}$, $\overrightarrow{SP}$

Angles: $\angle RST$, $\angle TSP$, $\angle RSP$

b. The angle is greater than 90° making it an obtuse angle. The angle measures 125°.

c. $m\angle AED = m\angle AEB + m\angle BEC + m\angle CED$

$120° = m\angle AEB + 22° + 33°$

$m\angle AEB = 65°$

d. Since XY bisects $\angle WXZ$, it divides $\angle WXZ$ into two congruent angles. So,

$m\angle WXY = m\angle YXZ = 32°$.

Using the congruence marks in the diagram,

$m\angle ZXU = m\angle UXV = 35°$.

$m\angle YXU = m\angle YXZ + m\angle ZXU$

$m\angle YXU = 32° + 35° = 67°$

The measure of $\angle YXU = 67°$.

e. $10\% \times 360° = 36°$

Practice 3

1. $\angle AFC$ is a right angle and thus measures 90°.

2. $\angle CFD$ is an acute angle because it is smaller than 90°.

$m\angle CFD = 90° - 36° = 54°$

3. $\angle BFD$ is a right angle and thus measures 90°.

4. $\angle AFD$ is an obtuse angle because it is greater than 90°.
$m\angle AFD = 90° + 54° = 144°$

5. $m\angle GLH = 36°$
$m\angle HLI = 90°$
$m\angle ILK = 180° - m\angle GLI$
$m\angle ILK = 180° - (36° + 90°) = 54°$
$m\angle ILJ = \frac{1}{2}(m\angle ILK) = \frac{1}{2}(54°) = 27°$
$m\angle GLJ = m\angle GLH + m\angle HLI + m\angle ILJ$
$m\angle GLJ = 36° + 90° + 27° = 153°$
The correct choice is **D.**

6. 180°

7. $AB = |(-7) - 4| = |-11| = 11$

8. A: $\frac{1}{2} = 50\% = 5{:}10 \rightarrow$ true

B: $\frac{20}{20} = 100\% = 7{:}7 \rightarrow$ true

C: $\frac{30}{36} = \frac{5}{6} = 0.8333 = 83.\overline{3} = 5{:}6 \rightarrow$ true

So, choice **D**, all of the above, is correct.

9. 2

10. There are 5 significant digits since the first digit is 1 and all of the other digits are to the left of the decimal.

11. Sample: He needs to remember that congruence refers to a figure whereas equality refers to numbers. Two segments having the same length are congruent segments, but their lengths are equal.

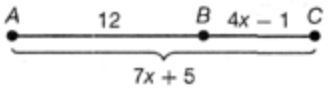
12. Since $\overrightarrow{BD}$ bisects $\angle ABC$, we know that $m\angle ABD = m\angle DBC$.

$$x^2 + x + 12 = x^2 + 3x + 4$$
$$x^2 - x^2 + x - 3x = 4 - 12$$
$$-2x = -8$$
$$x = 4$$

$$m\angle ABC = (x^2 + x + 12) + (x^2 + 3x + 4)$$
$$= 2x^2 + 4x + 16$$
$$= 2(4)^2 + 4(4) + 16$$
$$= 2(16) + 16 + 16$$
$$= 64°$$

13. 16 m/8 posts = 2 m/post
The posts should be spaced apart every 2 meters.

14. Transitive Property of Congruence

15. 

$$7x + 5 = 12 + 4x - 1$$
$$7x - 4x = 12 - 1 - 5$$
$$3x = 6$$
$$x = 2$$

16. $\frac{-142 + 53}{2} = -44.5$

17. Yes, since any line can be contained in a plane.

18. $\frac{\text{Boys}}{\text{Total}} = \frac{14}{31} = \frac{B}{186}$

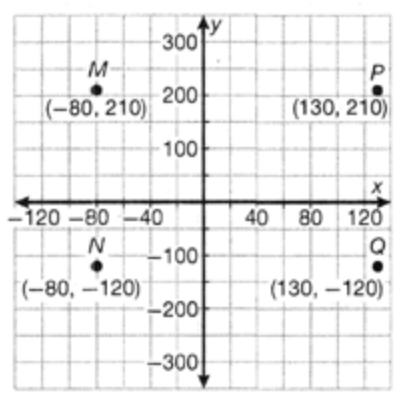
$$14(186) = 31B$$
$$2604 = 31B$$
$$84 = B$$

Of the 186 children, there are 84 boys.

19. $10x^2 + x - 21$
$= 10x^2 + 15x - 14x - 21$
$= 5x(2x + 3) - 7(2x + 3)$
$= (5x - 7)(2x + 3)$

20. The mean of these numbers is the sum of all the numbers divided by 6. So,

$$\frac{25.14 + 17.22 + x + 23.04 + 20.21 + 21.27}{6}$$
$$= 20.38$$
$$106.88 + x = 6(20.38)$$
$$x = 122.28 - 106.88$$
$$x = 15.4$$

21. 

$A = lw$

$A = (210)(330) = 69{,}300$

The area of the lot is 69,300 ft^2.

22. $0.015x = \$12{,}000$

$x = 800{,}000\ yd^2$

23. The graph of $y = f(x) + 3$ is the graph of $y = f(x)$ translated up 3 units.

24. $\sqrt{6g} = (j + y)$

$6g = (j + y)^2$

$6g = (j + y)(j + y)$

$6g = j^2 + 2jy + y^2$

$g = \dfrac{j^2 + 2jy + y^2}{6}$

25. $h(1.7) = 82 - 4.9(1.7)^2$

$= 82 - 4.9(2.89)$

≈ 67.8

The height of the stone is approximately 67.8 meters at 1.7 seconds.

26. $8.6(9.46 \times 10^{15})$

$= 81.4 \times 10^{15}$

$= 8.14 \times 10^{16}$ kilometers

27. $\dfrac{1 \text{ concentrate}}{6 \text{ total}} = \dfrac{500 \text{ mL concentrate}}{x \text{ total}}$

$x = 6 \times 500 = 3000$ mL

This can make 3000 milliliters of juice.

28. integer, rational number, and real number

29. Yes, it will be a rational or irrational number. The exception is negative numbers, for which the square roots are undefined.

30. $|(-346) - (-320)| = |-26| = 26°$ F

CONSTRUCTION LAB 1

Lab Practice 1

See student work.

LESSON 4

Warm Up 4

1. Reflexive Property of Equality

2. The angle is larger than 90°, making it obtuse.

3. $\overleftrightarrow{CD}$ goes through and is not on plane ABC. Choice **B** is correct.

Lesson Practice 4

a. No; Postulate 6: Through any three noncollinear points there is only one plane.

b. $\overleftrightarrow{AB}$ is a line on plane M. The intersection of $\overleftrightarrow{CD}$ and $\overleftrightarrow{AB}$ is point O. The intersection of planes M and N is $\overleftrightarrow{AB}$. Points E and F are coplanar.

c. Three legs are steadier on uneven surfaces by Postulate 6. Four legs are less steady on uneven surfaces because the legs must be in the same plane in order to be steady.

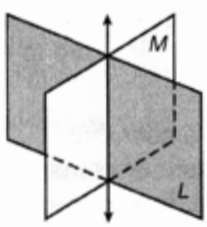
Practice 4

1. Points H, I, and K are noncollinear points. Choice **C** is correct.

2. Collinear points are points that lie on the same line. Coplanar lines are lines that lie in the same plane.

3. Theorem 4-1: If two lines intersect, then they intersect in exactly one point.

4.



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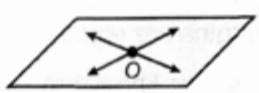


6. This is always true because Theorem 4-3 says if two lines intersect, then there exists exactly one plane that contains them.

7. Answers may vary. Sample: $\overrightarrow{BA}$ and $\overrightarrow{BC}$.

8. This is a straight line, which measures 180°.

9. This is called a straight angle.

10. $30° + 13° = 43°$

11. $m\angle ABD = \frac{1}{2}m\angle ABC$

$m\angle ABD = \frac{1}{2}(62°)$

$m\angle ABD = 31°$

12. Locate the midpoint of AB and label it C. Then locate the midpoint of AC, label it D, and locate the midpoint of CB and label it E. These are the quarter points.

13. A $2x + 5$ B $5x - 16$ C

$AC = (2x + 5) + (5x - 16)$

$= 7x - 11$

14. The probability is still $\frac{1}{2}$ because each flip is an independent event.

15. 1 75 yd 2 x 3

120 yd

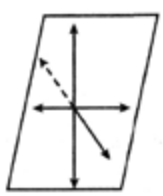
$120 - 75 = 45$

The second light is 45 yards from the third one.

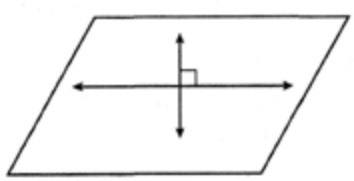
16. Theorem 4-3 tells us that choice **B** is true. Answers may vary for the drawings. Samples:

Choice A:

Choice C:



Choice D:

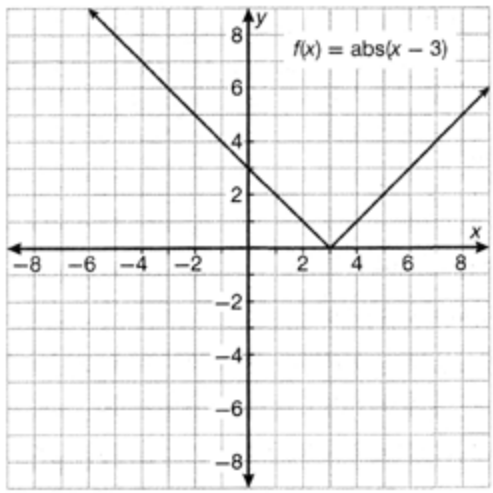


17. An infinite number of points can lie between any two points on a line.

18. parallel

19. $\frac{15 - 6x^2}{2}$ is the parent function $y = x^2$ after some transformations.

20.



Yes, it is a function because it passes the vertical line test.

21. $\frac{4j - 12x^2}{3} = j$

$4j - 12x^2 = 3j$

$4j - 3j = 12x^2$

$j = 12x^2$

22. $-4m + 2 < 26$

$-4m < 24$

$m > -6$

23. $AC = |(-4) - 5| = |-9| = 9$

24. $1.15 \div 1.25 = 0.92$ or 92%. To find the percent error, we can subtract: $100\% - 92\% = 8\%$. Jaime's percent error is 8%.

25. $18 \text{ cm} \times \left(\frac{1 \text{ in.}}{2.54 \text{ cm}}\right) \approx 7.1 \text{ in.}$

26. $0.5 \text{ mi} \times \left(\frac{5280 \text{ ft}}{1 \text{ mi}}\right) \times \left(\frac{12 \text{ in.}}{1 \text{ ft}}\right) = 31{,}680 \text{ in.}$

27. $23{,}000{,}000 = 2.3 \times 10^7$

28. $3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

29. 34,020

30. Multiplication Property of Zero

LESSON 5

Warm Up 5

1. coplanar

2. a line
3. Lines, points, and planes are all undefined terms. The correct choice is **D**.
4. two
5. three

Lesson Practice 5

a. $\overleftrightarrow{AB} \| \overleftrightarrow{CD}$, $\overleftrightarrow{CD} \| \overleftrightarrow{EF}$

b. According to Theorem 5-3, they are perpendicular.

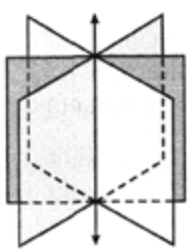
c. According to Theorem 5-2, they are parallel.

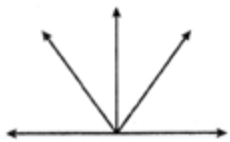
d. They are congruent right angles.

e. The Parallel Postulate states that there is only one line through a point not on a line that is parallel to that line. Since $\overleftrightarrow{XY} \| \overleftrightarrow{CD}$ and passes through M, and $\overleftrightarrow{JK}$ also passes through point M, it cannot also be parallel to $\overleftrightarrow{CD}$.

f. If all adjacent boards are parallel to each other, then all the boards will be parallel to one another by the Transitive Property of Parallel Lines.

Practice 5

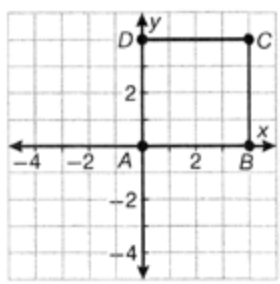
1. 

2. Damon is incorrect as it takes only three noncollinear points to determine a plane.
3. The three points are collinear, and an infinite number of planes contain them all. Three noncollinear points are needed to define a plane.
4. 6, 8, 10, or any multiple of 3, 4, 5, as well as values such as 5, 12, 13 and 7, 24, 25 and 8, 15, 17 and 9, 40, 41 and so on, as well as multiples of these triples. Yes, there are an infinite number.
5. Two opposite rays form a straight line. So, the measure of the angle is 180°.
6. 

   Only one line can be drawn that is perpendicular to the given line from the point, but two lines can be drawn that meet the given line at 45°, one on each side of the perpendicular.
7. 10,000; Square the number of centimeters in 1 m = $(100)^2$.
8. $\frac{2(2+4)}{6} - |-2|$

   $= \frac{2(6)}{6} - 2$

   $= 2 - 2$

   $= 0$
9. Answers will vary. Sample: parallel $\overline{DC}$, perpendicular $\overline{AD}$, skew $\overline{EH}$
10. Symmetric Property of Equality
11. 

    The resulting shape is a square.
12. Since there is only one line through any two points, there is only one option to get from point A to point B in a straight line.
13. $f(x) = 3x^2 - 2x + 5$

    $f(1) = 3(1)^2 - 2(1) + 5$

    $= 3 - 2 + 5 = 6$

    $f(-2) = 3(-2)^2 - 2(-2) + 5$

    $= 12 - (-4) + 5 = 21$

    $f(a) = 3a^2 - 2a + 5$
14. The coordinates are located at $W(-3, 2)$, $Y(3, -3)$, $X(3, 0)$, $Z(0, -3)$; The correct choice is **B**.

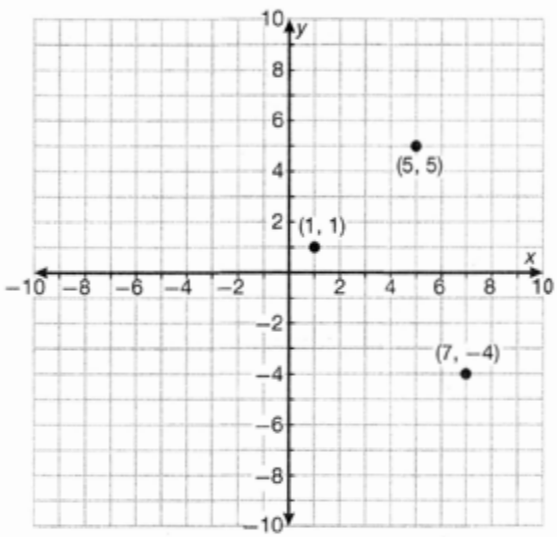
15. Any three points define a plane (Postulate 9), so a tripod will always be steady. A stand with four or more legs could easily wobble on many surfaces.

16. According to Theorem 5-3, $\overrightarrow{UT}$ must be perpendicular to $\overrightarrow{XY}$.

17. $\frac{1 \text{ concentrate}}{8 \text{ total}} = \frac{250 \text{ mL concentrate}}{x \text{ total}}$

$x = 8 \times 250 = 2000$ mL

This can make 2000 mL, or 2 L, of juice.

18. 

They are coplanar, since they are not on the same line.

19. $a^3 + b^3 + c^3 = d^3$

$b^3 = d^3 - a^3 - c^3$

$b = \sqrt[3]{d^3 - a^3 - c^3}$ or $(d^3 - a^3 - c^3)^{\frac{1}{3}}$

20. Even numbers: 2, 4, or 6

Probability: $\frac{3}{6} = \frac{1}{2}$

21. Measure each segment to verify that AM is the same length as MB.

22. Yes, it makes a difference. If paid after the tax, the amount left as a tip would be higher than before the tax is added.

23. Only one line exists through any two points. The curved path does not represent a line.

24. They all have a negative value for x and a positive value for y.

25. They are congruent because they both have a measure of 70°.

26. $A = \frac{1}{2}bh$

$2A = bh$

$\frac{2A}{b} = h$

27. The floor and the ceiling are parallel because if two lines in a plane are perpendicular to the same line, then they are parallel to each other.

28. $m\angle A = 35°$, $m\angle B = 25°$

So, $m\angle A + m\angle B = 35° + 25° = 60°$, which is acute.

$m\angle C = 45°$, $m\angle D = 85°$

So, $m\angle C + m\angle D = 45° + 85° = 130°$, which is obtuse.

29. Going from C_4 to C_5 is one octave, which means the frequency doubles.

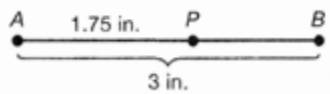
261.63 hertz × 2 = 523.26 hertz

30. No, because $\overleftrightarrow{DE}$ is not shown to be parallel to $\overleftrightarrow{KL}$.

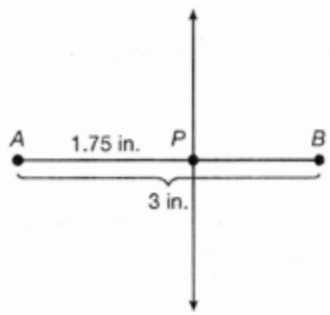
CONSTRUCTION LAB 2

Lab Practice 2

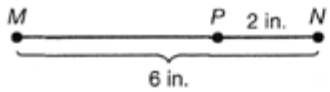
a. Step 1: Use a ruler to draw a line segment that is 3 inches long and label the endpoints A and B. Measure 1.75 inches from point A and mark point P.



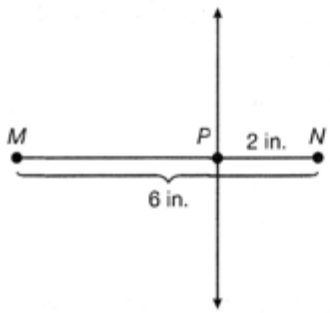
Step 2: Follow steps 1–4 of the lab to construct a bisector through point P.



b. Step 1: Use a ruler to draw a line segment that is 6 inches long and label the endpoints *M* and *N*. Measure 2 inches from point *N* and mark point *P*.



Step 2: Follow steps 1–4 of the lab to construct a bisector through point *P*.



LESSON 6

Warm Up 6

1. congruent angles
2. $x + 135 = 180$
   $x = 180 - 135$
   $x = 45$
3. Collinear means on the same line (B). Space is the set of all points (C). Coplanar means in the same plane (D). Intersection is the point or set of points common to different figures (A).
4. Answers will vary. Sample answer: $\angle HGB$ is acute and $\angle CGE$ is obtuse.

Lesson Practice 6

a. $m\angle MKN + m\angle PKM = 90°$
Therefore, $\angle MKN$ is complementary to $\angle PKM$.

b. $m\angle LKN + m\angle JKL = 180°$
Therefore, $\angle LKN$ is complementary to $\angle JKL$.

c. The angles are supplementary, which means they add up to 180°.
$3x + 10 + 2x + 5 = 180$
$5x + 15 = 180$
$5x = 165$
$x = 33$

d. Sample: adjacent angles: $\angle JKN$ and $\angle NKH$, $\angle JKN$ and $\angle NKL$, $\angle NKH$ and $\angle HKL$; Linear pairs: $\angle JKN$ and $\angle NKL$, $\angle NKH$ and $\angle HKM$

e. The marked angles are vertical angles, which are congruent.
$6x - 13 = 3x + 11$
$3x = 24$
$x = 8$

f. The 40° angle and the $(2x + 30)°$ angle are supplementary angles.
$2x + 30 + 40 = 180$
$2x + 70 = 180$
$2x = 110$
$x = 55$
Angle 2 and the 40° angle are vertical angles. So, angle 2 is 40°.
Angle 1 and the 40° angle are supplementary angles.
$\angle 1 = 180 - 40 = 140°$

Practice 6

1. The sum of complementary angles is 90°.
   $2x - 16 + 32 = 90$
   $2x + 16 = 90$
   $2x = 74$
   $x = 37$
2. The sum of complementary angles is 180°.
   $180° - 51° = 129°$
3. $|3 \times 2 - 8| \times 2$
   $= |6 - 8| \times 2$
   $= |-2| \times 2$
   $= 2 \times 2$
   $= 4$
4. Yes they can, as two of the points create a line, and this line plus one of the other noncollinear points define one plane while this line and the other noncoplanar point form another unique plane.
5. The marked angles are vertical angles.
   $5x - 30 = 3x + 22$

$2x = 52$

$x = 26$

6. Since an infinite number of planes can be drawn through a line, and the point is also on the line, the statement should be, "If a point is on a line, there are an infinite number of planes that contain this line and the point."

7. midpoint of the x-coordinates:

$\frac{1}{2}(-11 + 7)$

$\frac{1}{2}(-4)$

-2

midpoint of the y-coordinates:

$\frac{1}{2}(3 + 3) = \frac{1}{2}(6)$

$= 3$

The halfway point is at $(-2, 3)$.

8. $3xy + 5x + 2y$ for $x = 2$ and $y = -1$

$3(2)(-1) + 5(2) + 2(-1)$

$-6 + 10 - 2$

2

9. Two equal angles that are complementary must each be 45°.

10. $P(\text{red}) = \frac{20 \text{ red}}{100 \text{ total}} = \frac{1}{5}$ or 20%

11. No. A plane is defined by noncollinear points, and a space is defined by noncoplanar points.

12. x-axis: $\frac{1}{2}(4 + 8) = \frac{1}{2}(12) = 6$

y-axis: $\frac{1}{2}(1 + 7) = \frac{1}{2}(8) = 4$

13. $m\angle ABC = m\angle ABD + m\angle DBC$

$74° = 32° + m\angle DBC$

$m\angle DBC = 42°$

14. There are a total of three possibilities on each turn. So, the probability is one out of three or $\frac{1}{3}$ that two competitors will have the same combination.

15. She will not succeed, since the two lines can only be perpendicular to the same line if they are parallel to each other.

16. Both parallel planes will be intersected by the third plane at a line and the two lines of intersection will be parallel.

17. $-x^y + 3xy - \frac{x}{y}$ for $x = 4$ and $y = 2$

$= -(4)^2 + 3(4)(2) - \frac{4}{2}$

$= -16 + 24 - 2$

$= 6$

18. The correct choice is **D** because in order for an angle to be described by only one point, that point must be at the vertex.

19. Answers will vary. Sample: Find the sum by rounding: 23.52 + 19.37.

20. Students should use a protractor and find the measure of the angle to be 10°.

21. $|(-7) - 11| = |-18| = 18$

22. Since these lines are parallel to a common line, they are parallel to each other (Theorem 5-7).

23. $654 \times 20\% = 654 \times 0.20 = 130.8$

24. Yes, subtraction exhibits the closure property as the difference of any two real numbers is always a real number.

Subtraction is not commutative. The order in which you subtract the numbers does matter (i.e., $5 - 4 \neq 4 - 5$).

25. The sum of complementary angles is 90°.

$90° - 40° = 50°$

26. One; If two lines intersect, then there exists exactly one plane that contains them (Theorem 4-3).

27. $\overleftrightarrow{EF}, \overleftrightarrow{GH}$

28. Apples are cheaper by weight. Since 1 lb = 0.454 kg, \$1.59 per kg is the equivalent of \$0.72/lb, which is cheaper than the oranges.

29. If they are both complementary to $\angle PQR$, then they are congruent angles.

$m\angle PQR + m\angle DEF = 90°$

$= m\angle PQR + m\angle KLM$

$m\angle PQR + m\angle DEF = m\angle PQR + m\angle KLM$

$3x + 5 = x + 31$

$2x = 26$

$x = 13$

$m\angle KLM = x + 31 = 13 + 31 = 44$

Both angles have a measure of 44°.

30. $f(x) = \frac{5}{x+2}$ for $x = \frac{2}{3}$

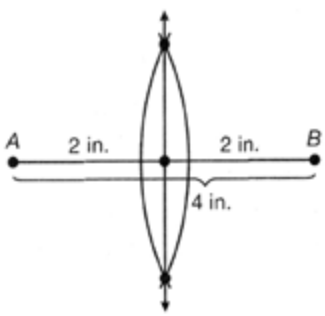
$$f\left(\frac{2}{3}\right) = \frac{5}{\frac{2}{3}+2} = \frac{5}{\frac{2+6}{3}} = \frac{5}{\frac{8}{3}} = 5 \times \frac{3}{8}$$

$$= \frac{15}{8}$$

CONSTRUCTION LAB 3

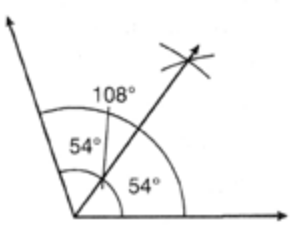
Lab Practice 3

a. Students should use a ruler to draw a segment measuring 4 inches long. Students should follow steps 1–6 for constructing a perpendicular bisector which divides the segment into two 2 inch segments.



b. See student work. The two halves of the segment should have the same measure.

c. Students should use a protractor to draw an angle that measures 108°. Students should follow steps 1–5 for constructing an angle bisector, which divides the angle into two congruent angles measuring 54° each.



d. See student work. Both smaller angles should have congruent measures.

LESSON 7

Warm Up 7

1. theorem

2. Choice **A** is false because a postulate is not a proven statement, but rather a statement that is assumed to be true.

3. Choice A is true by the definition of perpendicular. Choice B is false because parallel lines never intersect. Therefore, choice **A** is the correct answer.

Lesson Practice 7

a. The value that comes next in the sequence is found by adding the previous two values in the sequence.

b. Every even integer between 4 and 14 can be written as the sum of two prime numbers is a true statement. Proof:
$4 = 2 + 2$; $6 = 3 + 3$; $8 = 3 + 5$;
$10 = 3 + 7$ or $5 + 5$; $12 = 5 + 7$;
$14 = 7 + 7$ or $3 + 11$.

c. Find an example of a fruit that does not grow on trees (e.g., grapes or strawberries).

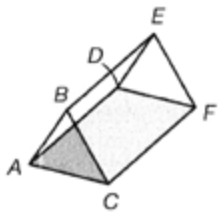
Practice 7

1. Yes, since all terminating or repeating decimal numbers can be expressed as a ratio of two integer numbers, which is the definition of a rational number.

2. Yes. The median of the coordinates of two points is the midpoint of the segment connecting them.

3. The angles are supplementary.
$m\angle ABD + m\angle DBC = 180°$
$4x + 2x = 180$
$6x = 180$
$x = 30$

4. Answers will vary. Sample: In this diagram, $\overleftrightarrow{AC}$ and $\overleftrightarrow{DE}$ are an example of skew lines.



5. Sample: It is a sequence of the squares of even whole numbers.

4, 16, 36, 64, 100, 144, ...

$= 2^2, 4^2, 6^2, 8^2, 10^2, 12^2, \ldots$

6. The two airplanes must be at different altitudes.

7. No, as there is no way to determine if the zero values in the hundreds, tens, and ones places were measured to be zero or if they are simply place holders.

8. The angle marked as 30° and the angle marked as $3x$ are complementary angles.

$3x + 30 = 90$

$3x = 60$

$x = 20$

Also, the angles marked x, 40°, and 30° have a sum of 90°.

$x + 40 + 30 = 90$

$x + 70 = 90$

$x = 20$

9. Three noncollinear points is the fewest number of points that can define a plane (Postulate 9).

10. Sample: If the object were a helium-filled balloon, it would not fall to the ground once released from a position of rest.

11. Yes. Proof:

1 through 5:

$1 + 2 + 3 + 4 + 5 = \frac{1}{2}(5)(5 + 1)$

$15 = \frac{1}{2}(30)$

$15 = 15$

1 through 10: (use 15 for the sum of 1 to 5)

$(15) + 6 + 7 + 8 + 9 + 10 = \frac{1}{2}(10)(10 + 1)$

$55 = \frac{1}{2}(110)$

$55 = 55$

1 through 15: (use 55 for the sum of 1 to 10)

$55 + 11 + 12 + 13 + 14 + 15 = \frac{1}{2}(15)(15 + 1)$

$120 = \frac{1}{2}(240)$

$120 = 120$

12. $3450 ÷ $4000 ≈ 0.86 or 86%

She made 86% of what she thought she would make. This means that her percent error was 100% − 86% = 14%.

13. Any mathematical term that is undefined is a term that cannot be defined without using the term itself.

14. $\frac{2x - 5}{3} = \frac{x + 10}{4}$ (cross-multiply)

$4(2x - 5) = 3(x + 10)$

$8x - 20 = 3x + 30$

$8x - 3x = 30 + 20$

$5x = 50$

$x = 10$

15. $l = 2w + 3$

$A = lw$

$119 = (2w + 3)(w)$

$119 = 2w^2 + 3w$

$0 = 2w^2 + 3w - 119$

$2w^2 + 3w - 119 = 0$

$2w^2 - 14w + 17w - 119 = 0$

$2w(w - 7) + 17(w - 7) = 0$

$(2w + 17)(w - 7) = 0$

$2w + 17 = 0$ and $w - 7 = 0$

$w = -\frac{17}{2}$ and $w = 7$

Since the width cannot be negative, the width must be 7 yards. To find the length,

$119 = 7(l)$

$l = 17$ yd

The dimensions of the field are 17 yd by 7 yd.

16. The distance she drives along the x-axis is the distance between 4 and -3.

$|4 - (-3)| = |7| = 7$ miles

The distance she drives along the y-axis is the distance between 22 and -4.

$|22 - (-4)| = |26| = 26$ miles

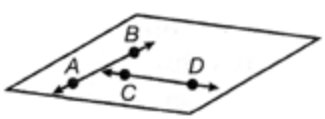
The total distance is 26 miles + 7 miles = 33 miles.

17. A conjecture can only be proved by the study of examples relating to the conjecture if all possible cases are tested, but if one result that is not predicted by the conjecture is found, the conjecture can be disproved.

18. Since $\overrightarrow{BD}$ bisects $\angle ABC$, $m\angle ABD = m\angle DBC$.

$$3x + 2 = 4x - 20$$
$$3x - 4x = -20 - 2$$
$$-1x = -22$$
$$x = 22$$

19. Answers will vary. Sample:



20. There are 3 significant digits: In 0.0100, the one and two trailing zeros are significant.

21. From this diagram, it can be seen that the two perpendicular lines through K and L are parallel to each other and the two parallel lines through K and L are parallel to each other.

22. It is a valid use of inductive reasoning because it is based on several true observations. However, it may be proven false by further observations, such as a car that runs on diesel or electricity.

23. $m = 1.609k$

$$\frac{m}{1.609} = k$$

For 539 miles, $k = \frac{539}{1.609} \approx 335$ km

For 7380 miles, $k = \frac{7380}{1.609} \approx 4587$ km

24. No, because acute angles have to measure less than 90°, so two of them cannot add to 180°, which is the definition of a linear pair.

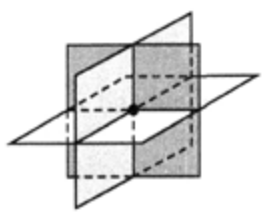
25. $F = \frac{9}{5}C + 32$

$$F - 32 = \frac{9}{5}C$$
$$5(F - 32) = 9C$$
$$\frac{5(F - 32)}{9} = C$$
$$C = \frac{5(F - 32)}{9}$$

26. Choice A is false because the two coplanar lines intersect at only one point. Choice B is true. Choice C is false because two distinct lines will not coincide, and, therefore, will intersect at only one point or never intersect if they are parallel. Choice D is false because parallel lines will never intersect. Choice **B** is the correct option.

27. The measures of the three congruent angles whose sum is 180° is $\frac{180°}{3} = 60°$. Therefore, the complementary angle to one of these angles would be 30° because 60° + 30° = 90°.

28. It is possible. Sample:



29. Since B is the midpoint of the segment, $\overline{AB} \cong \overline{BC}$.

$$2x - 2 = x + 11$$
$$2x - x = 11 + 2$$
$$x = 13$$

30. An angle bisector divides an angle into two equal parts.

$$\frac{110°}{2} = 55°$$

LESSON 8

Warm Up 8

1. Parallel; Perpendicular lines intersect at 90°, and skew lines are noncoplanar lines that do not intersect.

2. $AB = BC = \frac{1}{2}AC$

$\frac{1}{2}(12) = 6$

$AB = BC = 6$

3. Choice **D** is a property, not a theorem.

Lesson Practice 8

a. 6.5 m + 6.5 m + 6.5 m = 19.5 m

b. $P = 2l + 2w$

$P = 2(145) + 2(123)$

$= 290 + 246$

$= 536$

The perimeter of the rectangle is 536 cm.

c. $P = 6 \times 16 = 96$

The perimeter of the rectangle is 96 in.

d. $A = lw$

$A = 21.2 \times 14.5 = 307.4$

The area of the rectangle is 307.4 ft^2.

e. $A = lw$

$12 = 6w$

$2 = w$

The base of the rectangle is 2 cm.

f. $a^2 + b^2 = c^2$

$8^2 + b^2 = 10^2$

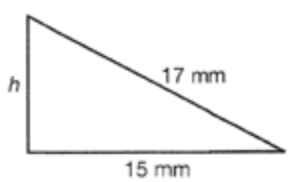
$64 + b^2 = 100$

$b^2 = 36$

$\sqrt{b^2} = \sqrt{36}$

$b = 6$ m

g.



First, find the length of h.

$h^2 + 15^2 = 17^2$

$h^2 + 225 = 289$

$h^2 = 64$

$\sqrt{h^2} = \sqrt{64}$

$h = 8$

Now use $A = \frac{1}{2}bh$ to find the area of the triangle.

$A = \frac{1}{2}(15)(8) = \frac{1}{2}(120) = 60$

The area of the triangle is 60 mm^2.

h. $C = \frac{5}{9}(F - 32)$ for $F = 0°$

$C = \frac{5}{9}(0 - 32) = \frac{5(-32)}{9}$

$= \frac{-160}{9}$

≈ -17.8

The temperature is −17.8°C.

i. $C = \frac{5}{9}(F - 32)$ for $C = 100°$

$100 = \frac{5}{9}(F - 32)$

$900 = 5(F - 32)$

$180 = F - 32$

$212 = F$

The temperature is 212°F.

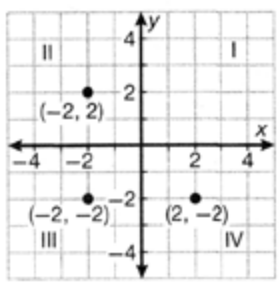
Practice 8

1. Even; When a number is multiplied by an even number, the product is always even.

2. Each week's growth is found by multiplying the previous week's growth by $\frac{2}{3}$. 1.333 is the same as $\frac{4}{3}$. So, $\frac{4}{3} \times \frac{2}{3} = \frac{8}{9}$ in. or 0.888 in.

3. point, line, and plane

4.



a. Quadrant III

b. Quadrant II

c. Quadrant IV

5. Since the median weight is the middle weight of all of the turtles, half the turtles' weights will be more than the median weight.

$P(>\text{median weight}) = \frac{6}{12} = \frac{1}{2}$ or 0.5

6. $(2x + 1)(x + 2) = 54$
$2x^2 + 5x + 2 = 54$
$2x^2 + 5x - 52 = 0$
$2x^2 - 8x + 13x - 52 = 0$
$2x(x - 4) + 13(x - 4) = 0$
$(2x + 13)(x - 4) = 0$
$2x + 13 = 0$ and $x - 4 = 0$
$x = -\frac{13}{2}$ and $x = 4$

Since the sides of the rectangle cannot be negative, $x = 4$. Now substitute this value for x to find the length of the sides.

$x + 2 = 4 + 2 = 6$

$2x + 1 = 2(4) + 1 = 9$

The sides measure 6 cm and 9 cm.

7. A line cannot be intersected at the same point with two different perpendicular lines. Using any point on a line as the vertex, a line has a 180° angle and to intersect it at 90° means there is only one trajectory from which the line can come.

8. $\frac{0 + 0.25}{2} = 0.125$ mi

9. Each term in the sequence is two times the previous term. So, the next term is $32 \times 2 = 64$.

10. Choice A is two unrelated angles. Choice B is two vertical angles. Choice C is two supplementary angles. Choice D is two supplementary angles. Choice **B** is the correct option because vertical angles are congruent.

11. A linear pair is two supplementary, adjacent angles. Choice A is two supplementary, adjacent angles. Choice B is two vertical angles. Choice C is two vertical angles. Choice D is two unrelated angles. Choice **A** is the correct option.

12. $\angle 5$ and $\angle 6$, $\angle 6$ and $\angle 8$, $\angle 5$ and $\angle 7$, and $\angle 7$ and $\angle 8$

13. No; Three noncollinear points define a plane.

14. Doubled side lengths: 60 m and 72 m; New perimeter: 264 m, which is double the original perimeter measuring 132 m.

15. The student incorrectly factored in the second step.
$5^2 + 12^2 = c^2$
$25 + 144 = c^2$
$169 = c^2$
$\sqrt{169} = \sqrt{c^2}$
$13 = c$

16. $\overleftrightarrow{LN}$ or m

17. $\overrightarrow{NL}$ and $\overrightarrow{NA}$

18. a point

19. Choice **B** is the correct choice because line segments can be congruent but lines cannot.

20. $\frac{x + (3x)^2 + x}{2}$ for $x = \sqrt{2}$
$= \frac{\sqrt{2} + (3\sqrt{2})^2 + \sqrt{2}}{2} = \frac{2\sqrt{2} + (9 \cdot 2)}{2}$
$= \frac{2\sqrt{2} + 18}{2} \qquad = \sqrt{2} + 9$

21. Since an increase in one octave results in the doubling of the frequency, moving down one octave would cut the frequency in half.
$261.63 \div 2 \approx 130.82$

22. $136 \times 3 = 408$
The perimeter of the triangle is 408 mm.

23. $f(x) = 3x + x^2$
$f(2) = 3(2) + (2)^2 = 6 + 4 = 10$

24. The mode is the members that appear most frequently in the set. M and H both show up twice and are the modes of the set.

25. Two opposite rays form a straight angle, which measures 180°.

26. 2:00 – 25 2:45 – 200
2:15 – 50 3:00 – 400
2:30 – 100 3:15 – 800
The number of bacteria doubles every 15 minutes.

27. Reflexive Property

28. $\frac{1.5 \text{ cups}}{6 \text{ people}} = \frac{x \text{ cups}}{8 \text{ people}}$

$1.5 \times 8 = 6 \times x$

$12 = 6x$

$2 = x$

2 cups of flour should be used to serve 8 people.

29. Since one side will be the house and the sides of the fence are equal in length, you multiply the length of a side by 3, $3s$.

30. Showing Associative Property:

$[f(x) + g(x)] + h(x) = f(x) + [g(x) + h(x)]$

$[3x + 2 + (-2x) + 3] + 0$

$= 3x + 2 + [-2x + 3 + 0]$

$[x + 5] + 0 = 3x + 2 + [-2x + 3]$

$x + 5 = x + 5$

Showing Commutative Property:

$f(x) + g(x) = g(x) + f(x)$

$(3x + 2) + (-2x + 3) = (-2x + 3) + (3x + 2)$

$[x + 5] + 0 = 3x + 2 + [-2x + 3]$

$x + 5 = x + 5$

LESSON 9

Warm Up 9

1. absolute value
2. Quadrant IV
3. $\frac{|5x - 8|}{2}$ when $x = 3$

$= \frac{|5(3) - 8|}{2} = \frac{|15 - 8|}{2}$

$= \frac{|7|}{2} = \frac{7}{2} = 3.5$

Lesson Practice 9

a. $d = |a_1 - a_2| = |-7 - 5| = |-12| = 12$

b. Use the distance formula to find the distance between $S(-5, -3)$ and $T(-2, -6)$.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(-2 - -5)^2 + (-6 - -3)^2}$

$= \sqrt{(3)^2 + (-3)^2}$

$= \sqrt{9 + 9}$

$= \sqrt{18}$

≈ 4.24

c. $d = \sqrt{(2 - 2)^2 + (-4 - 3)^2}$

$= \sqrt{0^2 + (-7)^2}$

$= \sqrt{49}$

$= 7$

d. $d = \sqrt{(0 - 120)^2 + (125 - 0)^2}$

$= \sqrt{(-120)^2 + 125^2}$

$= \sqrt{14{,}400 + 15{,}625}$

$= \sqrt{30{,}025}$

≈ 173.277 units

Since each unit is 10 meters, we need to multiply our result by 10.

$173.277 \times 10 \approx 1732.8$ m

Practice 9

1. $A(-3, 3)$, $B(1, 1)$

$d = \sqrt{(1 - -3)^2 + (1 - 3)^2}$

$= \sqrt{4^2 + (-2)^2}$

$= \sqrt{16 + 4}$

$= \sqrt{20}$

≈ 4.47

2. Distance from $E(-4, -4)$ to $F(1, -1)$.

$d = \sqrt{(1 - -4)^2 + (-1 - -4)^2}$

$= \sqrt{5^2 + 3^2}$

$= \sqrt{25 + 9}$

$= \sqrt{34}$

≈ 5.83

Distance from $F(1, -1)$ to $E(-4, -4)$.

$d = \sqrt{(-4 - 1)^2 + (-4 - -1)^2}$

$= \sqrt{(-5)^2 + (-3)^2}$

$= \sqrt{25 + 9}$

$= \sqrt{34}$

≈ 5.83

Yes, they are the same distance.

3. $9x^2 - 18x - 7$

$= 9x^2 - 21x + 3x - 7$

$= 3x(3x - 7) + 1(3x - 7)$

$= (3x + 1)(3x - 7)$

4. (9, 14), (−5, 13)

$d = \sqrt{(-5 - 9)^2 + (13 - 14)^2}$

$= \sqrt{(-14)^2 + (-1)^2}$

$= \sqrt{196 + 1}$

$= \sqrt{197}$

≈ 14.04

5. For 4:00, the hour hand is rotated around 20 out of 60 minutes. Since there are 360° in a circle, the angle can be found as follows:

$\frac{20}{60} \times 360° = \frac{1}{3} \times 360° = 120°$

6. The angle must be acute because a right angle or an obtuse angle will make the sum greater than 180°.

7. The student has confused a decagon with a dodecagon, which has 12 sides instead of 10. The correct formula is $P = 12n$.

8. $\frac{2(2 + 4)}{6} - |-2|$

$= \frac{2(6)}{6} - 2$

$= 2 - 2$

$= 0$

9. Never; Two planes intersect at a line.

10. Each number is found by adding the two numbers directly above it. The next line will be:

1, 4, 6, 4, 1

11. No; By the parallel postulate, two lines that are each parallel to a third line are parallel to each other.

12. A postulate is a statement that is accepted as true without proof. A theorem is a statement that is accepted as true only when proven.

13. The angles are vertical angles, which are congruent. So,

$4x^2 + 3x + 3 = 6x^2 - 4x + 6$

$2x^2 - 7x + 3 = 0$

$2x^2 - 6x - 1x + 3 = 0$

$2x(x - 3) + -1(x - 3) = 0$

$(2x - 1)(x - 3) = 0$

$2x - 1 = 0$ and $x - 3 = 0$

$x = \frac{1}{2}, 3$

14. Two distinct nonparallel planes intersect in a line.

15. $a^2 + b^2 = c^2$

$\sqrt{a^2 + b^2} = \sqrt{c^2}$

$\sqrt{a^2 + b^2} = c$

It is similar to the distance formula because when you calculate the difference in the x-variable, you are calculating one of the legs of a right triangle. When you calculate the difference in the y-variable, you are calculating the other leg.

16. $5^2 + 7^2 = c^2$

$74 = c^2$

$8.60 \text{ m} \approx c$

17. $\frac{7 \text{ apples}}{15 \text{ total}} \times \frac{2 \text{ oranges}}{14 \text{ total}} = \frac{14}{210}$ or $\frac{1}{15}$

18. $m\angle BXC = 180° - m\angle AXB - m\angle CXD$

$= 180° - 13° - 129°$

$= 38°$

19. There is not a protractor formula. Choice **D** is correct. There is a Protractor Postulate.

20. $(2x - 2)(x + 1)$

$= 2x^2 + 2x - 2x - 2$

$= 2x^2 - 2$

21. Transitive Property of Congruence

22. No, Sample: if two lines intersect, then there is a plane containing both lines.

23. Sample: $\frac{10}{2} = 5$. You can buy 5 cartons if they cost \$2. But they cost slightly more than \$2, so you can only buy 4 cartons.

24. Choice **C** is correct because a right angle is a single angle.

25. Since B is the midpoint. $BC = AB = \frac{1}{2}AC$.

$$BC = \frac{5}{2}x + 12 = \frac{1}{2}(12x - 4)$$

$$2\left[\frac{5}{2}x + 12\right] = (12x - 4)$$

$$5x + 24 = 12x - 4$$

$$-7x = -28$$

$$x = 4$$

$$BC = \frac{5}{2}(4) + 12$$

$$= 10 + 12$$

$$= 22$$

26. The domain is all nonnegative real numbers. The square root of negative numbers is undefined.

27. The formula $d = |y_2 - y_1|$ can be used rather than the distance formula.

28. $-3w + 2 < 4w + 16$

$$-7w < 14$$

$$w > -2$$

29. They are right angles. Yes, all right angles are congruent.

30. A conjecture becomes a theorem only after being proved true.

LESSON 10

Warm Up 10

1. inductive

2. conjecture

3. $2x + 7 = 4$

$$2x = -3$$

$$x = -\frac{3}{2}$$

Lesson Practice 10

a. Hypothesis: $x = 4$ and $y = 2$

Conclusion: $2x + 3y = 14$

b. Hypothesis: An apple is a golden delicious apple.

Conclusion: The apple is yellow in color.

c. True; Two collinear points are coplanar.

d. If $x = 3$ or -3, then $x^2 = 9$; True.

e. If it is Thursday, then it is Thanksgiving Day; False.

f. If a cardinal is bright red, then it is a male; True.

Practice 10

1.

$32 = x + 19$

$13 = x$

Using the Segment Addition Postulate, we find the distance to be 13 miles.

2. A regular triangle has three sides with equal lengths.

$15 + 15 + 15 = 45$

The perimeter is 45 inches.

3. Yes, by definition, parallel lines are coplanar.

4. If a number is an integer, then it is a rational number.

5. $x^2 - 4x - 21 = (x - 7)(x + 3)$

6. The statement is always nonnegative for all real numbers x, because the numerator is always nonnegative, and the denominator is positive.

7. Use the distance formula to check each point.

Choice A:

$A(4, 7), B(1, 4)$

$$d = \sqrt{(1 - 4)^2 + (4 - 7)^2}$$

$$= \sqrt{(-3)^2 + (-3)^2}$$

$$= \sqrt{9 + 9}$$

$= \sqrt{18}$

≈ 4.24

Choice B:

$A(4, 7), B(1, 11)$

$d = \sqrt{(1 - 4)^2 + (11 - 7)^2}$

$= \sqrt{(-3)^2 + (4)^2}$

$= \sqrt{9 + 16}$

$= \sqrt{25}$

$= 5$

The distance between (4, 7) and (1, 11) is 5.

8. The Ruler Postulate refers to measures of distance whereas the Protractor Postulate refers to angle measures.

9. No; A statement's converse can be false even if the statement itself is true. For example:

Statement: If it is Easter, then it is Sunday. (true)

Converse: If it is Sunday, then it is Easter. (false)

10. Yes; If an animal's expected life span is approximately 70 years, then it is a loggerhead sea turtle.

11. $\frac{768}{770} = 0.9974$ or 99.74%

768 is 99.74% of 770. So, the percent error is $100\% - 99.74\% = 0.26\%$.

12. $E = mc^2$

$\frac{E}{c^2} = m$

13.

It is impossible to draw a second line because of the Parallel Postulate.

14. (2, 3), (−4, 1)

$d = \sqrt{(-4 - 2)^2 + (1 - 3)^2}$

$= \sqrt{(-6)^2 + (-2)^2}$

$= \sqrt{36 + 4}$

$= \sqrt{40}$

≈ 6.32

15. $d = 7$

$7 = \sqrt{(k - 1)^2 + (3 - 3)^2}$

$7 = \sqrt{(k - 1)^2 + (0)^2}$

$7^2 = \left(\sqrt{(k - 1)^2}\right)^2$

$49 = (k - 1)^2$

$\sqrt{49} = \sqrt{(k - 1)^2}$

$\pm 7 = k - 1$

$\pm 7 + 1 = k$

$+7 + 1 = 8$ and $-7 + 1 = -6$

$k = 8$ or $k = -6$; There are two solutions because the segment can extend in either of two directions.

16. It is not possible because the lines are straight. They intersect at the same angle on both sides of the line. Therefore, the vertical angles will be equal.

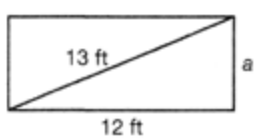
17. These would be the corners that are opposite each other, called vertical angles.

18. Yes, as long as they are measuring the same types of units (i.e. both are units of length), but you must convert one into the unit of the other.

19. Answers will vary. Sample: expressing the distances between planets.

20. Reflexive Property of Equality

21.



$a^2 + 12^2 = 13^2$

$a^2 = 169 - 144$

$\sqrt{a^2} = \sqrt{25}$

$a = 5$

$A = \frac{1}{2}bh$

$= \frac{1}{2}(5)(12)$

$= 30$

The area of one of the triangles is 30 ft^2.

22. The pattern is to multiply the previous term by three to get the next term. The next term is $81 \times 3 = 243$.

23. $(1)(3 \times 10^8)^2$
$= 3^2 \times (10^8)^2$
$= 9 \times 10^{16}$

24. $2x + 7 = 13$
$2x = 6$
$x = 3$
If $2x + 7 = 13$, then $x = 3$.

25. There could be one obtuse angle and two acute angles whose measures would add to 180°. The student could say, "If the measures of three angles add to 90°, then the angles are all acute."

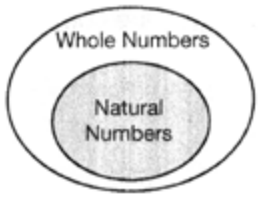
26. $(x + 2)(x - 3)$
$= x^2 - 3x + 2x - 6$
$= x^2 - x - 6$
The student incorrectly added the center term. The answer should be $x^2 - x - 6$.

27. rational numbers and real numbers.

28. $|3 + (-4) + 6|$
$= |5|$
$= 5$
$|3| + |-4| + |6|$
$= 3 + 4 + 6$
$= 13$
The answers are different because in the first, the magnitude of the numbers' sum is found, but in the second, the magnitude of each number is found before adding.

29. Choice A: Supplementary angles add up to 180° and vertical angles are equal.
Choice B: Complementary angles add up to 90° and vertical angles are equal.
Choice C: A linear pair is two adjacent, supplementary angles.
Choice D: Adjacent angles are not necessarily supplementary.
Choice **C** is the correct choice.

30.



INVESTIGATION 1

1. Line n is the transversal because it intersects two coplanar lines.

2. There are 8 angles formed by the transversal crossing two lines.

3. Answers could be any one of the following: $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$, $\angle 4$ and $\angle 8$.

4. Answers could be any one of the following: $\angle 3$ and $\angle 6$, $\angle 4$ and $\angle 5$.

5. Answers could be any one of the following: $\angle 2$ and $\angle 7$, $\angle 1$ and $\angle 8$.

6. Answers could be any one of the following: $\angle 4$ and $\angle 6$, $\angle 3$ and $\angle 5$.

7. One will increase and the other will decrease.

8. Main St. is a transversal intersecting Third and Second Avenues.

9. Mille's Restaurant and Jake's Restaurant represent corners that are alternate exterior angles.

10. These represent same-side interior angles.

11. corresponding angles

12. Students should find that both angles measure 70°.

13. Their measures are the same.

14. 50°; They are corresponding angles.

15. Yes, it is equal to the measure of $\angle 4$; They are a pair of alternate interior angles.

16. Same-side interior angles formed by a transversal intersecting parallel lines are supplementary. $180° - 75° = 105°$

17. **a.** The angle pair are alternate interior angles.

b. Alternate interior angles are congruent.

$5b - 45° = 36°$

$5b = 81°$

$b = 16.2°$

c. $\angle 1$ is supplementary to 36°.

$180° - 36° = 144°$

Investigation Practice 1

a. alternate exterior

b. same-side interior

c. corresponding

d. alternate exterior

e. alternate interior

f. $\angle 2$ and $\angle 5$ or $\angle 3$ and $\angle 4$

g. Answers could be any one of the following: $\angle 3$ and $\angle 9$, $\angle 2$ and $\angle 8$, or $\angle 1$ and $\angle 10$.

h. $\angle 6$ and $\angle 9$ or $\angle 5$ and $\angle 8$

i. transversal c

j. The hill represents the transversal. The posts represent the two lines it intersects.

k. $\angle 1$ and $\angle 2$ are supplementary angles.

$m\angle 1 = 180° - 135° = 45°$

This is true because of the Same-Side Interior Angles Theorem.

l. By the Alternate Exterior Theorem,

$\angle LMP \cong \angle ONQ$

$m\angle LMP = m\angle ONR$

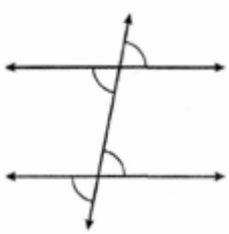
$4x + 25 = 3x + 50$

$x + 25 = 50$

$x = 25$

$m\angle LMP = m\angle ONR = 125°$

m. Yes; See student work. Sample:



Marked acute angles are congruent.

LESSON 11

Warm Up 11

1. coordinates
2. distance $= |C - D| = |-4 - 6| = |-10| = 10$
3. $\frac{-3 + 5}{2} = \frac{2}{2} = 1$

   The correct choice is **C**.

Lesson Practice 11

a. midpoint $= \frac{1 + 4}{2} = \frac{5}{2} = 2.5$

b. $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M\left(\frac{5 + 3}{2}, \frac{1 + 7}{2}\right)$

$= M\left(\frac{8}{2}, \frac{8}{2}\right)$

$= M(4, 4)$

c. $M\left(\frac{-3 + 4}{2}, \frac{2 + 2}{2}\right)$

$= M\left(\frac{1}{2}, \frac{4}{2}\right)$

$= M(0.5, 2)$

d. M of $\overline{JK}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M$ of $\overline{JK}\left(\frac{-3 + 1}{2}, \frac{0 + 3}{2}\right)$

$= M$ of $\overline{JK}\left(\frac{-2}{2}, \frac{3}{2}\right)$

$= M$ of $\overline{JK}\ (-1, 1.5)$

M of $\overline{KL}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M$ of $\overline{KL}\left(\frac{1 + 3}{2}, \frac{3 + -1}{2}\right)$

$= M$ of $\overline{KL}\left(\frac{4}{2}, \frac{2}{2}\right)$

$= M$ of $\overline{KL}\ (2, 1)$

M of $\overline{JL}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M$ of $\overline{JL}\left(\frac{-3 + 3}{2}, \frac{0 + -1}{2}\right)$

$= M \text{ of } \overline{JL}\left(\frac{0}{2}, \frac{-1}{2}\right)$

$= M \text{ of } \overline{JL}(0, -0.5)$

e. $A(-3, 5)$, $B(4, 3)$, $C(0, -2)$

$M \text{ of } \overline{AB}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M \text{ of } \overline{AB}\left(\frac{-3 + 4}{2}, \frac{5 + 3}{2}\right)$

$= M \text{ of } \overline{AB}\left(\frac{1}{2}, \frac{8}{2}\right)$

$= M \text{ of } \overline{AB}(0.5, 4)$

$M \text{ of } \overline{BC}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M \text{ of } \overline{BC}\left(\frac{4 + 0}{2}, \frac{3 + -2}{2}\right)$

$= M \text{ of } \overline{BC}\left(\frac{4}{2}, \frac{1}{2}\right)$

$= M \text{ of } \overline{BC}(2, 0.5)$

$M \text{ of } \overline{AC}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M \text{ of } \overline{AC}\left(\frac{-3 + 0}{2}, \frac{5 + -2}{2}\right)$

$= M \text{ of } \overline{AC}\left(\frac{-3}{2}, \frac{3}{2}\right)$

$= M \text{ of } \overline{AC}(-1.5, 1.5)$

Practice 11

1. $\frac{2 + 9}{2} = \frac{11}{2} = 5.5$

2. $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M\left(\frac{3 + 7}{2}, \frac{2 + 4}{2}\right)$

$= M\left(\frac{10}{2}, \frac{6}{2}\right)$

$= M(5, 3)$

3. $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= M\left(\frac{-3 + 2}{2}, \frac{2 + -2}{2}\right)$

$= M\left(\frac{-1}{2}, \frac{0}{2}\right)$

$= M(-0.5, 0)$

4. $\frac{a + 5}{2} = 2$

$a + 5 = 4$

$a = -1$

5. He only added the coordinates instead of finding their average.

6. $\angle EFD = 90° + 17° = 107°$

$\angle EFD = \angle AEF = 107°$

7. $\angle BEG = \angle AEF = 107°$

$11x + 19 = 107$

$11x = 88$

$x = 8$

8. Alternate Exterior Angles Theorem

9. False; February is another possible winter month.

10. False; $x = 1$ and $y = 2$ is another possible solution.

11. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(-9 - 3)^2 + (7 - 4)^2}$

$= \sqrt{(-12)^2 + 3^2}$

$= \sqrt{144 + 9}$

$= \sqrt{153}$

≈ 12.37

12. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(5 - -1)^2 + (-6 - 4)^2}$

$= \sqrt{(6)^2 + (-10)^2}$

$= \sqrt{36 + 100}$

$= \sqrt{136}$

≈ 11.66

13. $a^2 + b^2 = c^2$

$120^2 + b^2 = 180^2$

$b^2 = 32{,}400 - 14{,}400$

$b^2 = 18{,}000$

$\sqrt{b^2} = \sqrt{18{,}000}$

$b \approx 134 \text{ yd}$

14. To find the hypotenuse,

$a^2 + b^2 = c^2$

$6^2 + 6^2 = c^2$

$36 + 36 = c^2$

$72 = c^2$

$\sqrt{72} = \sqrt{c^2}$

$8.49 \approx c$

The perimeter is $6 + 6 + 8.49 = 20.49$ units.

15. Perimeter of a square $= 4s$

$4s = 458$

$s = \frac{458}{4}$

$s = 114.5$ cm

16. Each number is the sum of the two numbers directly above it.

1, 5, 10, 10, 5, 1

1, 6, 15, 20, 15, 6, 1

1, 7, 21, 35, 35, 21, 7, 1

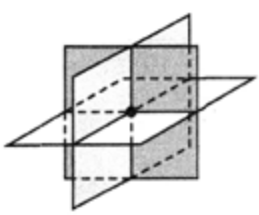
17. The value that comes next in the sequence is found by multiplying the previous value by 3.

18. Her conjecture has no foundation in fact. There would be no evidence to support a team playing better based on an event unrelated to the game.

19. $90° - 14° = 76°$

20. $180° - 85° = 95°$

21. No, the three planes could all be perpendicular to each other. For example,



22. $18k = 90°$

$k = \frac{90}{18}$

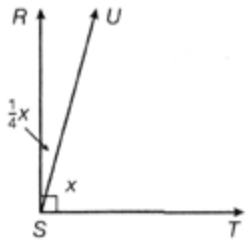
$k = 5$

23. Greatest: There could be an infinite number of planes by moving the three points around.

Least: There is only one plane that goes through three noncoplanar points that are set in place.

24. Sometimes; The lines could be parallel or skew.

25.



$x + \frac{1}{4}x = 90$

$\frac{5}{4}x = 90$

$x = 90 \times \frac{4}{5}$

$x = 72$

$m\angle UST = 72°$

26.

Each number on the clock represents $\frac{360°}{12} = 30°$. There are 3.5 numbers on the clock between the 2:30 and the 6:00. So, the angle measurement is $3.5 \times 30° = 105°$.

27. Figures are congruent and numbers are equal. If $\overline{AB}$ is congruent to $\overline{CD}$, and $\overline{AB}$ has a length of 6, then $AB = 6 = CD$.

28. Segment Addition Postulate

29. Three points can be noncollinear, but if they are on the same line, then they are collinear. The student could say, "Any two distinct points are collinear."

30. Choice A: False. If two planes are coplanar, they are the same plane.

Choice B: False. Two points are collinear.

Choice **C**: True

Choice D: False. Two lines can be noncoplanar.

LESSON 12

Warm Up 12

1. transversal
2. alternate exterior angles
3. Choice **A**: alternate interior angles

Lesson Practice 12

a. $m\angle 1 = m\angle 2$, so $\angle 1 \cong \angle 2$; angles 1 and 2 are corresponding angles; by Postulate 12, *a* and *b* are parallel

b. Since $\angle 2$ and $\angle 3$ form a linear pair and thus are supplementary angles, $m\angle 2 + 111^\circ = 180^\circ$. So $m\angle 2 = 69^\circ$. Since $m\angle 1 = 69^\circ$, $\angle 1 \cong \angle 2$. Since $\angle 1$ and $\angle 2$ are alternate interior angles, by Theorem 12-1, lines *u* and *v* are parallel.

c. $\angle 1$ and $\angle 7$, $\angle 4$ and $\angle 6$

d. $\angle 1$ and $\angle 7$ are $\cong$ alternate exterior angles; lines *m* and *n* are parallel by Theorem 12-2.

e. $\angle 2$ and $\angle 5$, $\angle 3$ and $\angle 8$

f. Angles 5 and 6 are supplementary. Since $\angle 2 \cong \angle 6$, $\angle 2$ and $\angle 5$ are supplementary. Lines *m* and *n* are parallel by Theorem 12-3.

g. transversal

h. Angles marked at Fox St. and Elati St. are congruent and corresponding angles. By Postulate 12, Fox St. and Elati St. are parallel. By the same argument, Elati St. and Delaware St. are parallel. Since two lines that are parallel to the same line are also parallel to each other, all three streets are parallel to each other.

Practice 12

1. The pair of marked angles in the figure are both congruent and are alternate interior angles. So, by the Converse of the Alternate Interior Angles Postulate, lines *m* and *n* are parallel.
2. Inductive reasoning is being used.
3. **a.** Angles 1 and 5 are corresponding angles and $\angle 1 \cong \angle 5$. Lines *x* and *y* are parallel by the Converse of the Corresponding Angles Postulate.

   b. $\angle 1$ and $\angle 8$, $\angle 2$ and $\angle 7$
4. If the two lines are parallel, then the same-side interior angles are supplementary. So, we add the two expressions together and set them equal to 180° and solve for *x*. If $x = 34$, then the lines are parallel.
5. $\frac{4 + 8}{2} = \frac{12}{2} = 6$
6. Midpoint between 1 in. and 6 in.:

   $\frac{1 + 6}{2} = \frac{7}{2} = 3.5$ in.

   Midpoint between 6 in. and 11 in.:

   $\frac{6 + 11}{2} = \frac{17}{2} = 8.5$ in.
7. Draw a picture and use the Pythagorean Theorem. The line segment will make a right triangle with the segment's rise and run. The run is known to be 4 units. The rise is unknown, call it *y*. The segment's length is *a*. Using the Pythagorean Theorem, *y* can be found for any given length. The coordinates of the endpoint will be $(4, y)$.
8. Midpoint of $\overline{SR}$:

   $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

   $= M\left(\frac{0 + 4}{2}, \frac{3 + 3}{2}\right)$

   $= M\left(\frac{4}{2}, \frac{6}{2}\right)$

   $= (2, 3)$

   Midpoint of $\overline{RT}$:

   $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

   $= M\left(\frac{4 + 4}{2}, \frac{3 + 0}{2}\right)$

   $= M\left(\frac{8}{2}, \frac{3}{2}\right)$

   $= (4, 1.5)$

9. Midpoint of $\overline{ST}$:

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$
$$= M\left(\frac{0 + 4}{2}, \frac{3 + 0}{2}\right)$$
$$= M\left(\frac{4}{2}, \frac{3}{2}\right)$$
$$= (2, 1.5)$$

10. true

11. true

12. $(4x + 2) + (6x + 8) = 180$
$10x + 10 = 180$
$10x = 170$
$x = 17$

13. $3^2 + 5^2 = c^2$
$9 + 25 = c^2$
$34 = c^2$
$\sqrt{34} = \sqrt{c^2}$
$5.83 \approx c$
The diagonal is approximately 5.83 ft.

14. $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
$= M\left(\frac{-3 + 4}{2}, \frac{-4 + 3}{2}\right)$
$= M\left(\frac{1}{2}, \frac{-1}{2}\right)$
$= (0.5, -0.5)$

15. always

16. $A = s^2$
$182.25 = s^2$
$\sqrt{182.25} = \sqrt{s^2}$
$13.5 = s$

17. $A_{room} = 12 \times 18$
$= 216 \text{ ft}^2$
18 in. = 1.5 ft
$A_{tile} = 1.5 \times 1.5$
$= 2.25$
Number of tiles = $216 \div 2.25 = 96$

18. $\overleftrightarrow{PQ} \parallel \overleftrightarrow{RS}$

19. Angles 1 and 2 have equal measures, so they are congruent alternate exterior angles. The Converse of the Alternate Exterior Angles Theorem implies lines *a* and *b* are parallel.

20. $x + 32° = 90°$
$x = 58°$

21. Choice A: $y = 2(1)^2 - 5$
$= 2 - 5$
$= -3$
Choice B: $y = 2(2)^2 - 5$
$= 8 - 5$
$= 3$
Choice C: $y = 2(3)^2 - 5$
$= 18 - 5$
$= 13$
Choice D: $y = 2(100)^2 - 5$
$= 20{,}000 - 5$
$= 19{,}995$
Choice **A** is correct.

22. Yes, since $\overleftrightarrow{XY}$ and $\overleftrightarrow{TU}$ are parallel, and $\overleftrightarrow{AB}$ is perpendicular to $\overleftrightarrow{TU}$, and $\overleftrightarrow{DF}$ is perpendicular to $\overleftrightarrow{XY}$, $\overleftrightarrow{AB}$ and $\overleftrightarrow{DF}$ must be parallel.

23. **D**

24. Two lines can intersect at one point (with different slopes); they can be non-intersecting (parallel lines that have a different *y*-intercept); or they can have an infinite number of points of intersection (if they are coincidental lines).

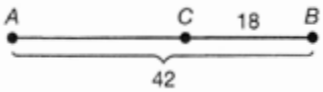
25. $P = 2l + 2w$
$84 = 2(5x - 5) + 2(3x - 7)$
$84 = 10x - 10 + 6x - 14$
$84 = 16x - 24$
$108 = 16x$
$6.75 = x$
$l = 5(6.75) - 5 = 28.75$
$w = 3(6.75) - 7 = 13.25$
$A = lw = (28.75)(13.25) \approx 381 \text{ in.}^2$

26. The lines could be skew.

27. 

Each number on the clock represents $\frac{360°}{12} = 30°$. There are 4 numbers on the clock between the 8 and the 12. So, the angle measurement is $4 \times 30° = 120°$.

28. Choice **A**: This is not a property.

29. 

$AC = AB - CB = 42 - 18 = 24$

30. They can have zero (all three parallel), one (two coincidental), two (two parallel), or three (none parallel or coincidental) points of intersection.

CONSTRUCTION LAB 4

Lab Practice 4

Answers will vary. Check student work with a protractor.

LESSON 13

Warm Up 13

1. obtuse
2. $P = 3.5 + 3 + 6 = 12.5$ units
3. Angles X and Z are both acute angles. Choice **B** is correct.

Lesson Practice 13

a. $\triangle UVW$

b. $\triangle XYZ$

c. $\triangle RST$

d. Yes, $\triangle XYZ$ has no congruent sides, making it scalene.

e. $P = 13.2 + 13.2 + 18.7 = 45.1$ cm

f. $A = \frac{1}{2}bh$

$= \frac{1}{2}(13.2)(13.2)$

$= 87.12 \text{ cm}^2$

g. The boundary fencing is the perimeter of the triangle.

$P = 766 + 987 + 1254 = 3007$ yd

h. $0.95A = 0.95\left(\frac{1}{2}\right)(1254)(603)$

$\approx 359{,}177 \text{ yd}^2$

Practice 13

1. $\angle 2$ and $\angle 5$ or $\angle 3$ and $\angle 8$ are both sets of same-side interior angles.
2. Answers may vary. Sample: If a triangle is equilateral, then the triangle is isosceles.
3. Since $\angle A$ is obtuse, $\triangle ABC$ is obtuse.
4. It is not possible with three points. Four noncoplanar points can be drawn.
5. $n = 3$: $n^2 = 3^2 = 9$; $1 + 3 + 5 = 9$
   $n = 5$: $n^2 = 5^2 = 25$; $1 + 3 + 5 + 7 + 9 = 25$
   $n = 7$: $n^2 = 7^2 = 49$; $1 + 3 + 5 + 7 + 9 + 11 + 13 = 49$
6. $Y(-3, 4)$, $Z(3, 6)$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(3 - -3)^2 + (6 - 4)^2}$

$= \sqrt{6^2 + 2^2}$

$= \sqrt{36 + 4}$

$= \sqrt{40}$

≈ 6.32

7. $W(-1, -2)$, $X(1, 2)$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(1 - -1)^2 + (2 - -2)^2}$

$= \sqrt{2^2 + 4^2}$

$= \sqrt{4 + 16}$

$= \sqrt{20}$

≈ 4.47

8. Northern hedge runs from $(-3, 3)$ to $(6, 5)$.

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$= M\left(\frac{-3 + 6}{2}, \frac{3 + 5}{2}\right)$$

$$= M\left(\frac{3}{2}, \frac{8}{2}\right)$$

$= (1.5, 4)$

Southern hedge runs from $(-3, -2)$ to $(5, -3)$.

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$= M\left(\frac{-3 + 5}{2}, \frac{-2 + -3}{2}\right)$$

$$= M\left(\frac{2}{2}, \frac{-5}{2}\right)$$

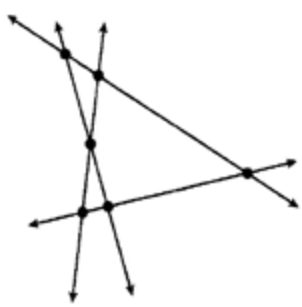
$= (1, -2.5)$

9. There is a chance of the conclusion being true, but not for the reasons given. So, the conjecture is invalid.

10. No, because $\overleftrightarrow{DE}$ is not parallel to $\overleftrightarrow{KL}$.

11. Since $\angle 3$ and $\angle 8$ are same-side interior angles, the Converse of the Same-Side Interior Angles Theorem should be used.

12. Choice **D**: 6; Sample:



13. Isosceles; No, because $\overline{EF}$ is not congruent to the other two sides.

14. There is not enough data to determine who is correct. There is no indication as to whether the numbers increase by adding 2, by multiplying by 2, or by squaring the previous term.

15. $\frac{-4 + 11}{2} = \frac{7}{2} = 3.5$

This is choice **C**.

16. Because an angle greater than 90° cannot be equal to an angle less than 90°

17. If a person is born in the United States, then that person can have an American passport.

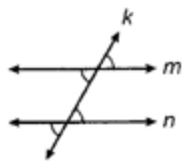
18. $A = lw$

$40 = (8)(w)$

$5 = w$

The length of the other side is 5 feet.

19. Sample:



20. $A = \frac{1}{2}bh$

$= \frac{1}{2}(200)(1280)$

$= 128{,}000 \text{ ft}^2$

$128{,}000 \div 45 \approx 2844.44$

Approximately 2845 panes of glass are needed to cover one of the faces of the tower.

21. If a bird is pink, then it is a flamingo.

22. The two angles are congruent because they are vertical angles.

23. always true

24. **a.** $\triangle PQR$

b. $\triangle MNO$

c. $\triangle JKL$

25. **a.** $\frac{-5 + 0}{2} = \frac{-5}{2} = -2.5$

b.

26. $P = 2 + 2 + 5 + 5 + 3 = 17$

27. $CD = 2DE$

$2x + 7 = 2(4x - 13)$

$2x + 7 = 8x - 26$

$-6x = -33$

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ISBN-10: 1-6027-7561-3
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