5th Grade Math
Week of May 4th-8th

Monday, May 4th- Lesson 21 Volume of Rectangular Prisms

Tuesday, May 5th- Lesson 22 Measures of Central Tendency and Range

Wednesday, May 6th- Lesson 23 Line Graphs and Double Bar Graphs

Thursday, May 7th- American Math and Drops in the Bucket

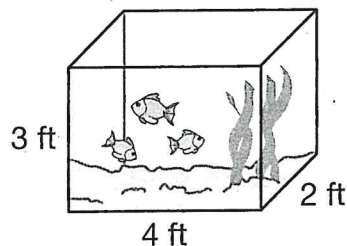Friday, May 8th- American Math and Drops in the Bucket

Volume of Rectangular Prisms

Getting the Idea

To find the **volume** of a rectangular prism you can use the formula $V = lwh$, where l is the length, w is the width, and h is the height. Volume is measured in **cubic units**.

Example 1

What is the volume of the fish tank?

Strategy   Use the formula $V = lwh$ for the volume of a rectangular prism.

Step 1   Substitute the values into the formula $V = lwh$.

$$V = 4 \times 2 \times 3$$

Step 2   Multiply using the associative property.

$$V = 4 \text{ ft} \times 2 \text{ ft} \times 3 \text{ ft}$$
$$= 8 \text{ ft}^2 \times 3 \text{ ft}$$
$$= 24 \text{ ft}^3$$

Solution   **The volume of the fish tank is 24 cubic feet.**

Another formula that you can use to find the volume of a rectangular prism is $V = Bh$, where B is the area of the base and h is the height of the prism. No matter which of the two formulas you use, the result will be the same.

Example 2

A storage unit in the shape of a rectangular prism has a length of 12 feet, a width of 8 feet, and a height of 8 feet. What is the volume of the storage unit?

Strategy Use the formula $V = Bh$ for the volume of a rectangular prism.

Step 1 Find the area of the base.

$$B = 12 \times 8$$
$$= 96 \text{ square feet}$$

Step 2 Multiply the area of the base times the height.

$$V = 96 \text{ ft}^2 \times 8 \text{ ft}$$
$$= 768 \text{ ft}^3$$

Solution The volume of the storage unit is 768 cubic feet.

A cube is a rectangular prism with square faces. To find the volume of a cube, you can use the formula $V = e^3$, where e is the length of each edge of the cube.

Example 3

What is the volume of this cube?

5 cm
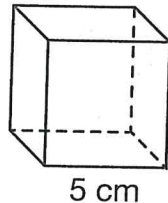
Strategy Use the formula for the volume of a cube.

Step 1 Substitute the value into the formula

$$V = e^3$$
$$V = 5 \text{ cm} \times 5 \text{ cm} \times 5 \text{ cm}$$

Step 2 Multiply using the associative property.

$$V = 25 \text{ cm}^2 \times 5 \text{ cm}$$
$$V = 125 \text{ cm}^3$$

Solution The volume of the cube is 125 cubic centimeters.
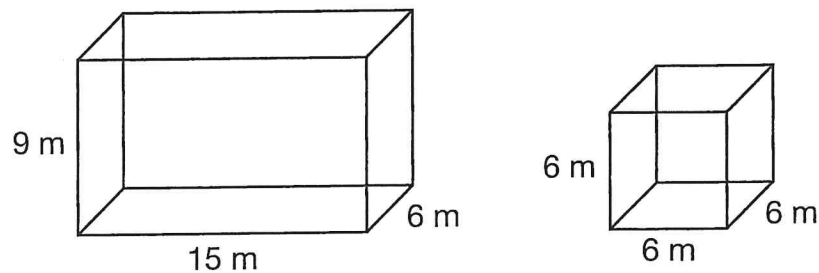
Example 4

What is the volume of this solid figure?
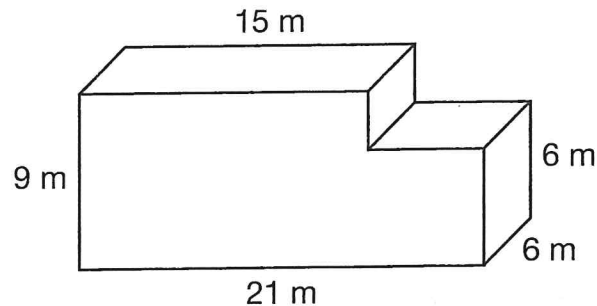
Strategy   Separate the figure into rectangular prisms and find the volume of each part.

Step 1   Separate the figure into two rectangular prisms.

Step 2   Find the volume or the larger prism.

$V = 15\text{ m} \times 6\text{ m} \times 9\text{ m}$

$= 90\text{ m}^2 \times 9\text{ m}$

$= 810\text{ m}^3$

Step 3   Find the volume of the smaller prism.

$V = 6\text{ m} \times 6\text{ m} \times 6\text{ m}$

$= 36\text{ m}^2 \times 6\text{ m}$

$= 216\text{ m}^3$

Step 4   Add the volumes.

$810\text{ m}^3 + 216\text{ m}^3 = 1{,}026\text{ m}^3$

Solution   The volume of the figure is 1,026 cubic meters.

Guided Practice

This figure is made up of 1-foot cubes.

What is the volume of the figure?

Separate the figure into 2 rectangular prisms, one on the left and one on the right.

Use the formula for finding the volume of a rectangular prism.

$V =$ _____ × _____ × _____

Start with the prism on the left.

The length is _____ feet. The width is _____ feet.
The height is _____ feet.

Substitute the values into the formula.

$V =$ _____ × _____ × _____ = _____ cubic feet

The volume of the prism on the left is _____.

Next find the volume of the prism on the right.

The length is _____ feet. The width is _____ feet.
The height is _____ feet.

Substitute the values into the formula.

$V =$ _____ × _____ × _____ = _____ cubic feet

The volume of the prism on the right is _____ cubic feet.

Add to find the total volume.

_____ cubic feet + _____ cubic feet = _____ cubic feet

The volume of the figure is _____.

Lesson Practice • Part 1

Choose the correct answer.

1. What is the volume of this rectangular prism?

4 cm

3 cm

6 cm
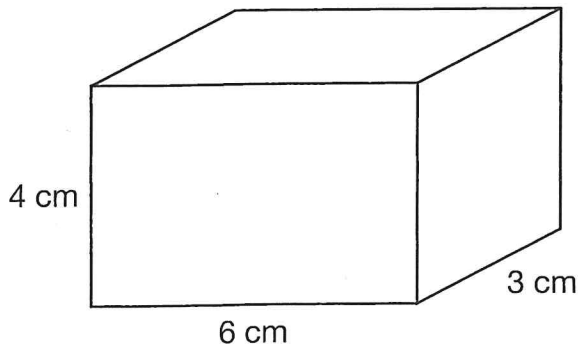
   A. 36 cubic centimeters

   B. 42 cubic centimeters

   C. 54 cubic centimeters

   D. 72 cubic centimeters

2. The trunk in Gary's garage is shaped like a rectangular prism. It has a length of 3 feet, a width of 2 feet, and a height of 3 feet. What is the volume of the trunk?

   A. 18 cubic feet

   B. 15 cubic feet

   C. 12 cubic feet

   D. 8 cubic feet

3. This figure is made up of 1-inch cubes.
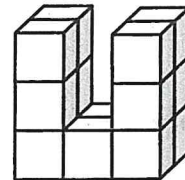
   What is the volume of the figure?

   A. 10 cubic units

   B. 14 cubic units

   C. 18 cubic units

   D. 20 cubic units

4. A box has a volume 240 cubic inches. The width is 6 inches and the height of the box is 5 inches. What is the length of the box?

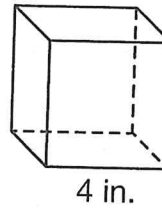   A. 8 inches

   B. 40 inches

   C. 48 inches

   D. 210 inches

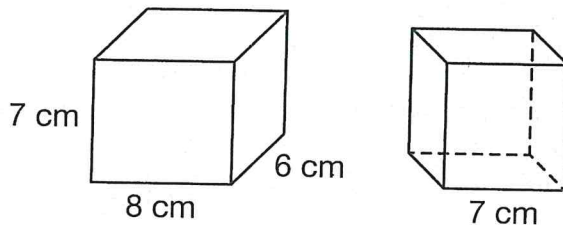**5.** This figure is made up of 1-inch cubes.
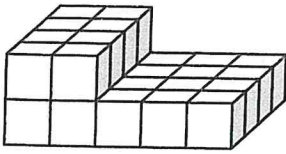
What is the volume of the figure?

A. 12 cubic inches

B. 16 cubic inches

C. 28 cubic inches

D. 35 cubic inches

6. What is the volume of this cube?

4 in.

A. 12 cubic inches

B. 32 cubic inches

C. 64 cubic inches

D. 96 cubic inches

7. A rectangular prism and a cube are shown below.

7 cm   6 cm   8 cm   7 cm

A. What is the volume of the rectangular prism? Show your work.

B. What is the volume of the cube? Show your work.

**Choose the correct answer.**

1. Paul has two boxes. One is a cylinder and has a volume of 280 cubic inches. The other is a rectangular prism and has a length of 9 inches, a width of 5 inches, and a height of 6 inches. Which sentence is true?
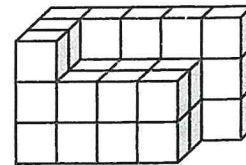
   A. The cylinder has a greater volume by 10 cubic inches.

   B. The cylinder has a greater volume by 20 cubic inches.

   C. The rectangular prism has a greater volume by 10 cubic inches.

   D. The rectangular prism has a greater volume by 20 cubic inches.

2. How many 1-inch cubes can fit inside this rectangular prism?

   5 in.   7 in.   9 in.
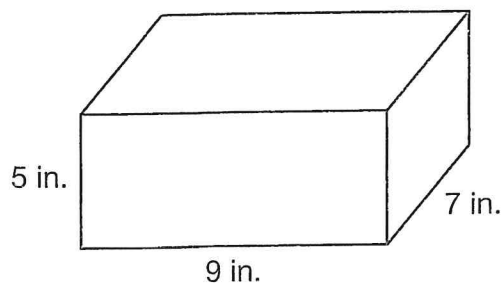
   A. 80

   B. 105

   C. 108

   D. 315

3. What is the volume of the solid figure?

   A. 45 cubic units

   B. 36 cubic units

   C. 33 cubic units

   D. 24 cubic units

4. A desk drawer is a rectangular prism. It has a volume of 3,528 cubic inches. The base has an area of 252 square inches. Which equation shows how to find the height, in inches, h, of the desk drawer?

   A. $h \div 252 \div 3{,}528$

   B. $3{,}528 \div 252 = h$

   C. $3{,}528 \times 252 = h$

   D. $h \times 3{,}528 = 252$

5. How many 2-inch cubes can fit inside this rectangular prism?
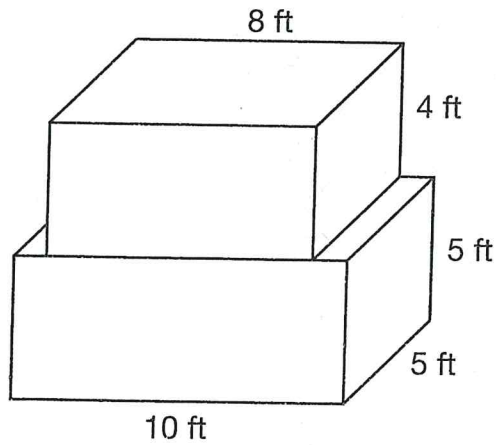
8 in.

6 in.

10 in.
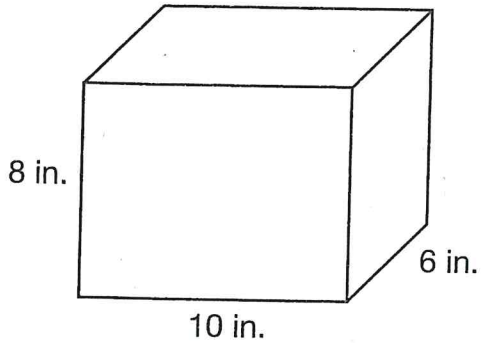
A. 60

C. 120

B. 80

D. 240

6. A rectangular prism has the same length and width. Its volume is 144 cubic inches and its height is 4 inches. What is the length of the rectangular prism?

A. 36 inches

B. 12 inches

C. 9 inches

D. 6 inches

7. A composite solid figure is shown.

8 ft

4 ft

5 ft

5 ft

10 ft

A. Explain how you can find the volume of the entire figure.

_____

_____

_____

B. What is the volume of the figure? Show your work.

Lesson 21 Answers

Lesson 21

Guided Practice

$V = l \times w \times h$

The length is **2** feet.

The width is **2** feet.

The height is **2** feet.

$V = 2 \times 2 \times 2 = 8$ cubic feet

The volume of the prism on the left is **8** cubic feet.

The length is **2** feet.

The width is **4** feet.

The height is **2** feet.

Substitute the values into the formula.

$V = 2 \times 4 \times 2 = 16$ cubic feet

The volume of the prism on the right is **16** cubic feet.

8 cubic feet + **16** cubic feet = **24** cubic feet

The volume of the figure is **24 cubic feet.**

Lesson Practice Part 1

1. D
2. A
3. B

4. A
5. C
6. C
7. A. 336 cubic centimeters; Possible work:
   8 cm $\times$ 6 cm $\times$ 7 cm =
   48 cm² $\times$ 7 cm = 336 cm³

   B. 343 cubic centimeters; Possible work:
   7 cm $\times$ 7 cm $\times$ 7 cm =
   49 cm² $\times$ 7 cm = 343 cm³

Lesson Practice Part 2

1. A
2. D
3. C
4. B
5. A
6. D
7. A. Possible explanation: I can separate the figure into two rectangular prisms. One is 10 feet by 5 feet by 5 feet and the other is 8 feet by 5 feet by 4 feet. I can find the volume of each rectangular prism and then add the volumes.

   B. 410 ft³; Possible work: 10 $\times$ 5 $\times$ 5 + 8 $\times$ 5 $\times$ 4 = 10 $\times$ 25 + 40 $\times$ 4 = 250 + 160 = 410

Measures of Central Tendency and Range

Getting the Idea

You can describe a set of **data** in different ways. When a set of data is ordered from least to greatest, the **median** is the middle number.

Example 1

Bradley listed the heights, in inches, of seven of his friends.

   61, 60, 64, 60, 63, 62, 61

What is the median height of Bradley's friends?

Strategy   Use the definition of median.

   Step 1   Order the heights from least to greatest.

   60, 60, 61, 61, 62, 63, 64

   Step 2   Underline the middle number in that set of data.

   60, 60, 61, <u>61</u>, 62, 63, 64

   61 is the middle number, so 61 is the median.

Solution   **The median height of Bradley's friends is 61 inches.**

The **mode** of a set of data is the number that appears most often in the data set. It is possible for a set of data to have no mode, one mode, or more than one mode.

Example 2

The school cafeteria records the number of cartons of chocolate milk it sells each day.

The number of cartons of chocolate milk sold each day last week is shown below.

   236, 242, 245, 227, 242

What is the mode number of cartons of chocolate milk sold last week?

Strategy   Use the definition of mode.

Underline the number that appears most often in the data set.

   236, <u>242</u>, 245, 227, <u>242</u>

   The number 242 occurs 2 times.

The other numbers occur only once.

So, 242 is the mode.

**Solution**   The mode number of cartons of chocolate milk sold last week is 242.

The **mean**, or average, describes the center, or balancing point, of a set of data. Think of the mean as the point on a number line where the data distribution is balanced. This means that the sum of the distances from the mean of all the data points above the mean is equal to the sum of the distances of all the data points below the mean.

Example 3

Nancy asked ten classmates how many hours they spend on homework each week. This line plot shows the results.

Number of Hours Spent on Homework Each Week

```
        X   X
        X   X       X
    X   X   X   X   X
    ───────────────────
    1   2   3   4   5
```
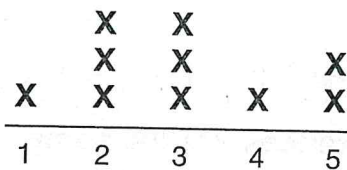
What is the mean number of hours spent on homework?

Strategy   Calculate the mean.

Step 1   Make a list of the data.

1, 2, 2, 2, 3, 3, 3, 4, 5, 5

Step 2   Find the sum of the data.

$1 + 2 + 2 + 2 + 3 + 3 + 3 + 4 + 5 + 5 = 30$

Step 3   Divide the sum of the data by the number of pieces of data.

The sum of the data is 30. There are 10 pieces of data.

$30 \div 10 = 3$

The mean is 3.

Solution   The mean number of hours spent on homework is 3 hours.

Example 4

Show that the mean in Example 3 is the balancing point of the data set.

Strategy   Find the distance each data point is from the mean. Then find the sum of the distances on either side of the mean.

Step 1   The data less than 3 are: 1, 2, 2, 2.

$3 - 1 = 2$

$3 - 2 = 1$

$3 - 2 = 1$

$3 - 2 = 1$

The total distance is $2 + 1 + 1 + 1 = 5$

Step 2   The data greater than 3 are: 4, 5, 5.

$5 - 3 = 2$

$5 - 3 = 2$

$4 - 3 = 1$

The total distance is $2 + 2 + 1 = 5$

Solution   Since the total distances are the same, the mean of 3 is confirmed as the balancing point of the data.

The **range** is the difference between the greatest data value and the least data value.

Example 5

Sal records the outside temperature each day for 7 days at noon. The temperatures are shown below.

32°F, 33°F, 38°F, 27°F, 35°F, 39°F, 45°F

What is the range in the temperatures?

Strategy   Subtract the lowest temperature from the highest temperature.

The lowest temperature is 27°F.

The highest temperature is 45°F.

$45 - 27 = 18$

Solution   The range in the temperatures is 18°F.

Guided Practice

What are the median, mode, mean, and range of the data below?

58, 63, 58, 92, 84

Find the median.

The median is the middle number in a data set.

Order the numbers from least to greatest.

_____, _____, _____, _____, _____

The median is _____.

Find the mode.

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

The mode is _____.

Find the mean.

The mean is the average of the numbers in the data set.

Find the sum of the data. Then divide by the number of pieces of data.

_____ + _____ + _____ + _____ + _____ = _____

_____ ÷ 5 = _____

The mean is _____.

Find the range.

The range is the difference between the greatest number in the data set and the least number.

The greatest number is _____. The least number is _____.

_____ − _____ = _____

The range is _____.

The median is _____, the mode is _____, the mean is _____, and the range is _____.

Lesson Practice • Part 1

Choose the correct answer.

Use the information below for questions 1–4.

The weights of 5 cats are shown below.

18, 10, 15, 10, 12

1. What is the mode of the data?

   A. 10

   B. 12

   C. 18

   D. There is no mode.

2. What is the median of the data?

   A. 10

   B. 12

   C. 16

   D. 18

3. What is the range of the data?

   A. 6

   B. 8

   C. 18

   D. 26

4. What is the mean of the data?

   A. 10   C. 13

   B. 12   D. 65

Use the information below for questions 5–8.

The table shows the quiz scores of five students.

Test Scores

Student	Score
Anne	86
Ben	92
Carson	78
Dom	84
Evan	95

5. What is the mode of the data?

   A. 5

   B. 78

   C. 435

   D. There is no mode.

6. What is the median of the data?

   A. 78   C. 86

   B. 84   D. 95

7. What is the range of the data?

   A. 17   C. 78

   B. 19   D. 95

8. What is the mean of the data?

   A. 82   C. 86

   B. 84   D. 87

9. Marina says that the median and the mode of the data set below is 28.

32, 28, 16, 27, 38, 28, 23, 41, 10

Is Marina correct? Explain your answer.

_____

_____

_____

10. The line plot shows the number of minutes that it took a group of students to run a lap around a track.

Track Times (in minutes)

```
            X
X    X           X    X    X           X
7    8    9    10   11   12   13   14
```
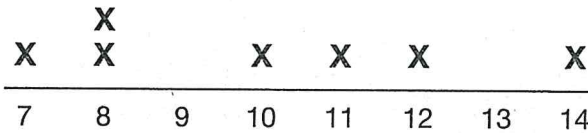
A. What is the mean of the data in the line plot? Show your work.

_____

_____

_____

B. Show that the mean you found in Part A is the balancing point of the data set.

Lesson Practice • Part 2

Choose the correct answer.

Use the information below for questions 1–4.

The number of miles that Kurt cycles each week for a 7-week period is shown below.

57, 54, 63, 64, 70, 64, 55

1. What is the mode of the data?

   A. 7

   B. 63

   C. 64

   D. There is no mode.

2. What is the median of the data?

   A. 61

   B. 63

   C. 64

   D. 70

3. What is the range of the data?

   A. 7   C. 16

   B. 10   D. 54

4. What is the mean of the data?

   A. 54   C. 63

   B. 61   D. 70

Use the information below for questions 5–8.

The table shows the number of pounds of vegetables a chef purchased at a farmers market for his restaurant.

Farmers Market

Vegetable	Number of Pounds
Kale	12
Onions	51
Asparagus	27
Tomatoes	53
Potatoes	81
Cauliflower	64

5. What is the mode of the data?

   A. 48

   B. 52

   C. 69

   D. There is no mode.

6. What is the median of the data?

   A. 48

   B. 52

   C. 69

   D. 81

7. What is the range of the data?

   A. 12   C. 81

   B. 69   D. 93

8. What is the mean of the data?

   A. 48   C. 81

   B. 52   D. 288

9. Giovanni says the median of the data set below is 14.

      12, 14, 19, 18, 16, 14, 26

What error did Giovanni make? Explain.

_____

_____

10. The line plot shows the scores that the student in Ms. Noga's Social Studies class received on a test.

Grades on Social Studies Test

```
X
X           X               X
X  X  X     X  X  X     X    X                    X
80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
```

A. What is the range of the scores in the line plot?

_____

B. What is the mode of the scores in the line plot?

_____

C. What is the median of the scores in the line plot?

_____

D. What is the mean of the scores in the line plot? Show your work.

_____

_____

_____

Lesson 22 Answers

Lesson 22

Guided Practice

What are the median, mode, mean, and range of the data below?

58, 63, 58, 92, 84

Find the median.

The median is the middle number in a data set.

Order the numbers from least to greatest.

58, 58, 63, 84, 92

The median is 63.

Find the mode.

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

The mode is 58.

Find the mean.

The mean is the average of the numbers in the data set.

Find the sum of the data. Then divide by the number of pieces of data.

$58 + 58 + 63 + 84 + 92 = 355$

$355 \div 5 = 71$

The mean is 71.

Find the range.

The range is the difference between the greatest number in the data set and the least number.

The greatest number is 92.

The least number is 58.

$92 - 58 = 34$

The range is 34.

The median is 63, the mode is 58, the mean is 71, and the range is 34.

Lesson Practice Part 1

1. A
2. B
3. B
4. C
5. D
6. C
7. A
8. D
9. Yes, Marina is correct.; Possible explanation: The mode is the number that occurs the most in a data set. In this set of data the number that occurs the most is 28. The median is the middle number in a set of data.

   10, 16, 23, 27, 28, 28, 32, 38, 41

   In this set of data the middle number is 28.
10. A. 10; Possible work: $7 + 8 + 8 + 10 + 11 + 12 + 14 = 70, 70 \div 7 = 10$

    B. Possible work: The mean I found in Part A is 10.

    Numbers less than 10:

    $10 - 7 = 3$

    $10 - 8 = 2$

    $10 - 8 = 2$

    $3 + 2 + 2 = 7$

    Numbers greater than 10:

    $11 - 10 = 1$

    $12 - 10 = 2$

    $14 - 10 = 4$

    $1 + 2 + 4 = 7$

    The sum of the distances on either side of the mean, 10, is the same, so 10 is confirmed as the balancing point of the data.

Lesson 22 Answers

Lesson Practice Part 2

1. C
2. B
3. C
4. B
5. D
6. B
7. B
8. A
9. Possible explanation: Giovanni used the mode, 14, which is the number that occurs the most in the data set and not the median. The median is the middle number in a data set.

   12, 14, 14, <u>16</u>, 18, 19, 26

   The middle number in this data set is 16.
10. A. 15

    B. 80

    C. 84

    D. 85; Possible work: $80 + 80 + 80 + 81 + 82 + 84 + 84 + 85 + 86 + 88 + 90 + 90 + 95 = 1,105$, $1,105 \div 13 = 85$

Line Graphs and Double Bar Graphs

Getting the Idea

A **line graph** is used to show how data changes over time.

Example 1

The line graph shows the miles traveled in a car over a 5-hour trip. How many miles did the car travel after 4 hours?

Miles Traveled over Time
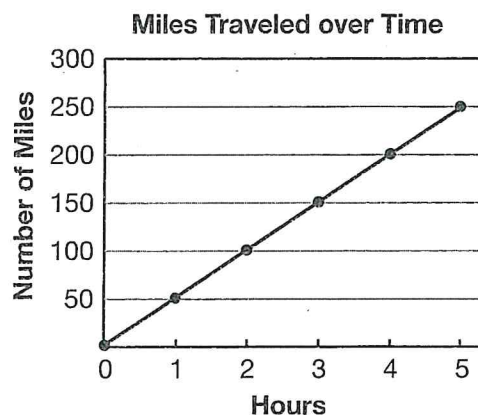
Strategy	Use the scales on the horizontal and vertical axes.
Step 1	Determine the intervals on the axes and what they represent.
	In this line graph, the horizontal axis uses an interval of 1 for the hours of travel. The vertical axis uses an interval of 50 for miles driven.
Step 2	Find the mark for 4 hours on the horizontal axis.
	Look up to find the corresponding point on the line.
Step 3	Look left to find the number on the vertical axis that corresponds to that point.
	The number is 200.
Solution	The car traveled 200 miles after 4 hours.

Segments of a line graph may rise, fall, or remain level. When the segment in a line graph rises from one point to the next, the data is increasing. When the segment falls from one point to the next, the data is decreasing. When the segment remains level, the data remains the same.

Example 2

This line graph shows the number of students with a perfect attendance record at Wilmore Middle School from September to January.

Perfect Attendance
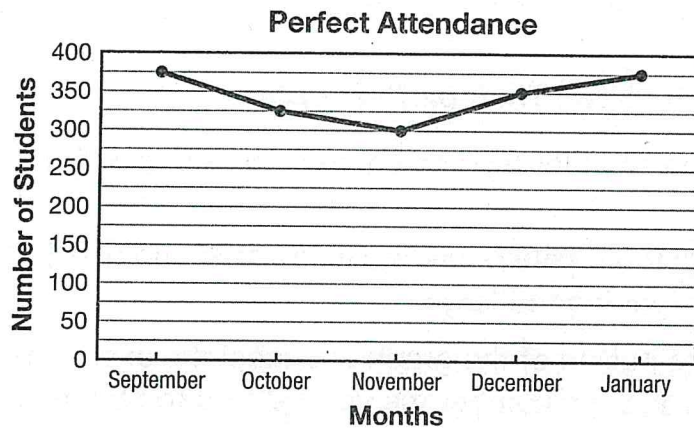
Between what two months did the number of students with perfect attendance decrease the most?

Strategy   **Compare the segments of the line that are falling.**

Step 1   Find the segments that are falling.

The segments between September and October and between October and November are falling.

This means that the number of students with perfect attendance decreased from September to November.

Step 2   Compare the steepness of the segments that are falling.

The segment from September to October is steeper than the segment from October to November.

This means that the change in the number of students with perfect attendance is greater from September to October.

Solution   **The greatest decrease in perfect attendance was between September and October.**

You can make a line graph to show change over time.

Example 3

The table shows the amount of money that Jimmy saved each week from his paper route. Make a line graph to represent the data.

How Much Jimmy Saved Each Week

Week	1	2	3	4	5
Money Saved	$50	$75	$50	$50	$25

Strategy   **Pick an interval. Then plot the data.**

Step 1   Pick an interval for the vertical axis that will make the line graph easy to read.

All of the numbers are multiples of $5, so use $10 to keep the graph from getting too large.

Step 2   Make the outline of the graph and label the axes. The greatest amount saved is $75, so number the vertical axis to $80. Also give the graph a title.

Step 3   Plot the point for each piece of data and connect the points with line segments.

Solution

How Much Jimmy Saved Each Week
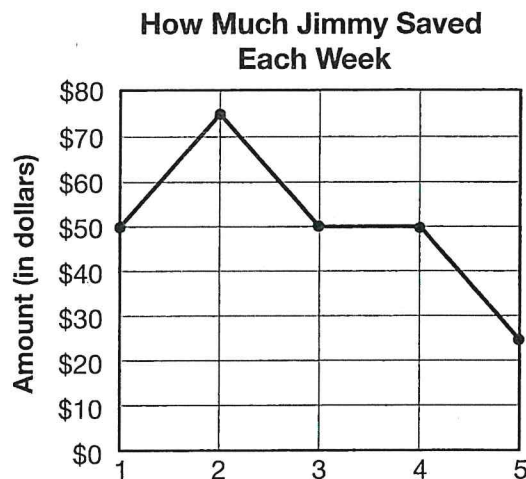
Example 4

The graph shows the amount of rain that fell each day over a 5-day period.

Daily Rainfall
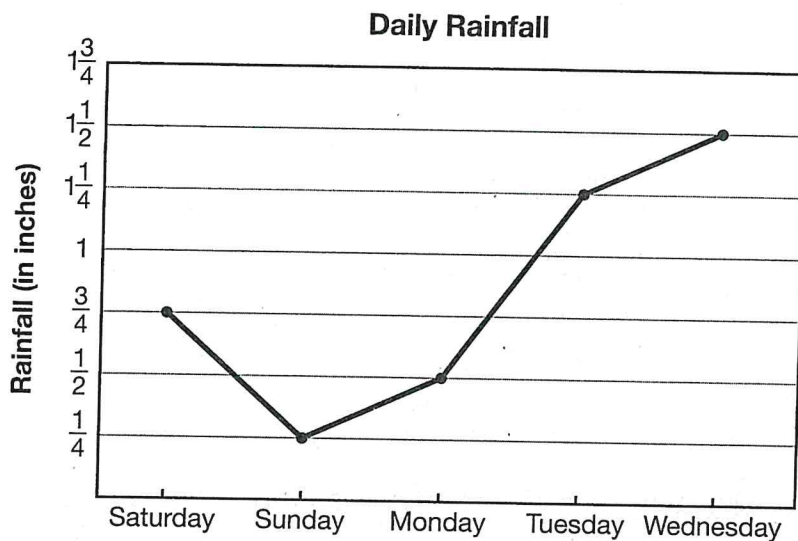
On which days did it rain more than $\frac{1}{2}$ inch?

Strategy   Use the scale on the vertical axis.

Step 1   Find the line that represents $\frac{1}{2}$ inch.

The line marked $\frac{1}{2}$ on the vertical axis represents $\frac{1}{2}$ inch of rainfall.

Step 2   Find all of the points above that line.

Since we are asked to find the days on which it rained "more than" $\frac{1}{2}$ inch, the point must be above the line and cannot be on the line.

The points for Saturday, Tuesday, and Wednesday show values greater than $\frac{1}{2}$.

Solution   **It rained more than $\frac{1}{2}$ inch on Saturday, Tuesday, and Wednesday.**

A **double-bar graph** displays two sets of related discrete data. A **key** tells you which set of data each kind of bar represents.

Example 5

The double-bar graph shows the snowfall in two cities during a four-month period.

Snowfall in City A and City B
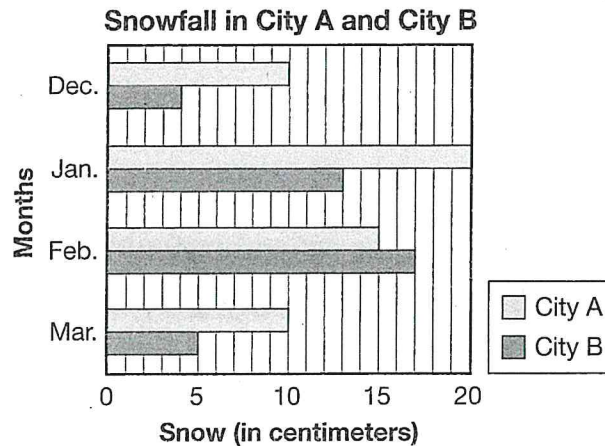
In what month did City A receive exactly twice as much snowfall as City B?

Strategy   Use the key and compare the lengths of the bars.

Step 1   Look at the key.

The light colored bars represent the snowfall in City A.

The dark colored bars represent the snowfall in City B.

Step 2   Eliminate unreasonable choices.

For February, the bar for City A is shorter than the bar for City B.

This means that City A received less snow than City B.

For January, the bar for City A is much less than twice as long as the bar for City B.

This means that City A received much less than twice the amount of snow that City B received.

January and February are unreasonable choices.

Step 3   Use the scale to find the snowfall in Cities A and B for December and March.

December: City A received 10 cm of snow. City B received 4 cm of snow.

10 cm is not exactly 2 times as much as 4 cm.

March: City A received 10 cm of snow. City B received 5 cm of snow.

10 cm is 2 times as much as 5 cm.

Solution   In March, City A received twice as much snowfall as City B.

To make a double-bar graph, make a key and choose an interval that will make the graph easy to read.

Example 6

In an election, four candidates ran for mayor. The table shows the numbers of votes that each candidate received from men and women. Make a double-bar graph to display the data.

Mayoral Election

Candidate	Votes from Men	Votes from Women
Dowd	100	250
Jimenez	200	175
Lee	175	225
Reynolds	250	125

Strategy Make a key and choose an interval. Then label the axes and draw the bars.

Step 1 Choose an interval that will make the graph easy to read.

All of the numbers are multiples of 25, so use 25.

Step 2 Make the outline of the graph and label the axes. Also give it a title.

Label the horizontal axis "Candidates," and list each candidate's name along it.

Label the vertical axis "Number of Votes," and number it from 0 to 275 in intervals of 25.

Title the graph "Mayoral Election."

Step 3 Make two sets of colored bars for each candidate. Make one for men and another for women.

Step 4 Make a key next to the graph that tells what each color bar represents.

Solution

Mayoral Election

Number of Votes (y-axis: 0 to 275 in increments of 25)

Candidates (x-axis): Dowd, Jimenez, Lee, Reynolds

Dowd: Men 100, Women 250
Jimenez: Men 200, Women 175
Lee: Men 175, Women 225
Reynolds: Men 250, Women 125

Key:
☐ Men
▨ Women
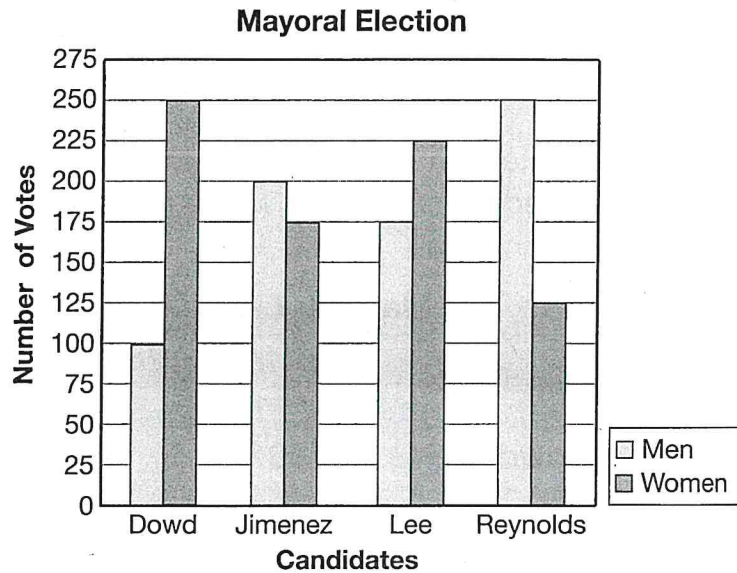
Example 7

A botanist is testing a new fertilizer. The double-bar graph shows the growth of two plants, one that was treated with the fertilizer and one that was not.

Plant Growth

Plant Height (in inches) (y-axis: 0.25 to 2.75 in increments of 0.25)

x-axis: 1 week, 2 weeks, 3 weeks, 4 weeks

1 week: Fertilizer 0.50, No Fertilizer 0.50
2 weeks: Fertilizer 1.00, No Fertilizer 0.75
3 weeks: Fertilizer 1.50, No Fertilizer 1.00
4 weeks: Fertilizer 2.25, No Fertilizer 1.50

KEY
■ Fertilizer
▧ No Fertilizer
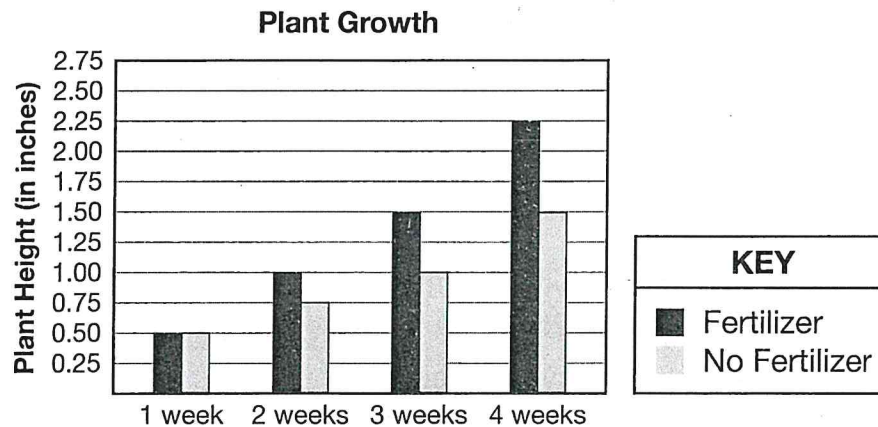
After 4 weeks, how much taller is the plant grown with fertilizer than without?

Strategy Use the key and find the lengths of the bars.

Step 1 Find the height of each plant after 4 weeks.

Look at the bars for "4 weeks."

The dark-colored bar represents the plant grown with the fertilizer, and it shows a height of 2.25 inches.

The light-colored bar represents the plant grown without the fertilizer, and it shows a height of 1.50 inches.

Step 2 Subtract to find the difference.

Subtract the height of the plant grown without fertilizer, 1.50, from the height of the plant grown with the fertilizer, 2.25.

$$\begin{array}{r} {\scriptstyle 1\ 12} \\ 2\llap{/}2\llap{/}5 \\ -1.50 \\ \hline 0.75 \end{array}$$

Solution **After 4 weeks, the plant grown with fertilizer is 0.75 inch taller than the plant grown without fertilizer.**

The table below shows the numbers of books checked out of the library by boys and girls in each fifth grade class in one school in January.

Books Checked Out in January

Class	Checked Out by Boys	Checked Out by Girls
Ms. Stewart	16	22
Mr. Becker	24	18
Mrs. Ruiz	20	24
Ms. Jones	14	28

Make a double-bar graph to display the data.

THINKING IT THROUGH

Give the graph a title. _____

Choose an interval that will make the graph easy to read.

The data are all multiples of 2, so a good interval for this data set is 4.

Label the axes.

Label the horizontal axis _____.

Label the vertical axis _____.

How many different colored bars need to be drawn for each class? _____

Make a _____ next to the graph to tell what each color of bar represents.

Make your double-bar graph in the space below.

Lesson Practice • Part 1

Choose the correct answer.

Use the line graph to answer questions 1 and 2.

The graph shows the bus fares each year for Cheetah Bus Lines.
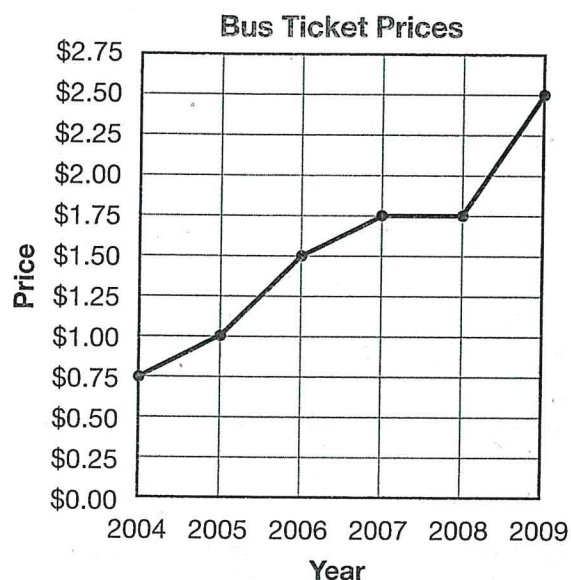
Bus Ticket Prices

1. Between which years did the cost of a bus ticket remain the same?

   A. 2004 and 2005

   B. 2005 and 2006

   C. 2006 and 2007

   D. 2007 and 2008

2. What was the greatest increase in the price of a bus ticket between two years?

   A. $0.25   C. $0.75

   B. $0.50   D. $1.00

Use the line graph to answer questions 3 and 4.

The line graph shows the high temperature for each day in a week.

High Temperatures
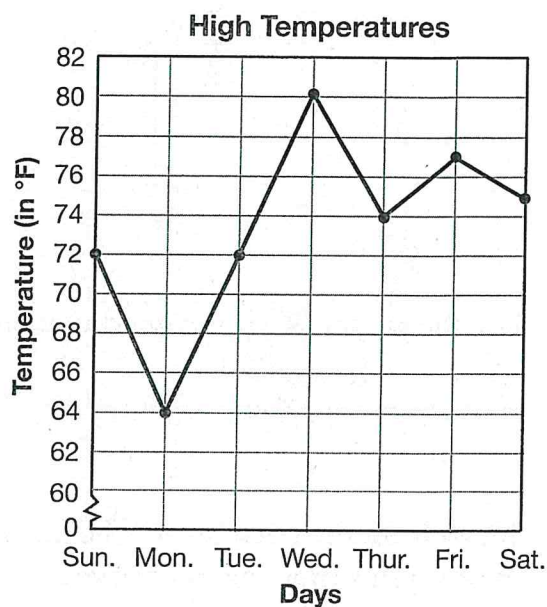
3. What is the difference between the greatest high temperature and the least high temperature?

   A. 8°F   C. 16°F

   B. 14°F   D. 18°F

4. Between which two days did the high temperature decrease the most?

   A. Sunday and Monday

   B. Wednesday and Thursday

   C. Thursday and Friday

   D. Friday and Saturday

5. Lana weighed her puppy, Rover, on the first day of each month. The graph shows Rover's weight for a 6-month period.
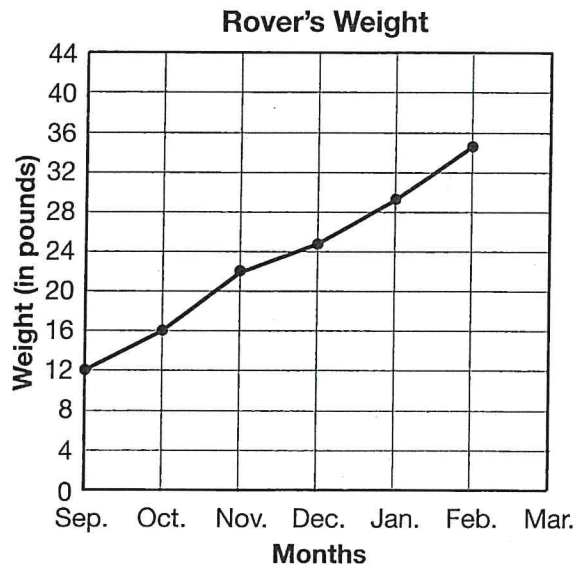
Rover's Weight

Use the graph. What is a good estimate of Rover's weight on March 1?

_____

6. Jonah is on the track team. The line graph shows his 100m sprint times over 5 weeks of training.

Between which two weeks did his time improve the most?

Jonah's Sprint Times

_____
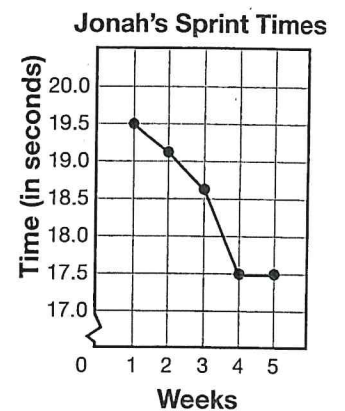
Lesson Practice • Part 2

Choose the correct answer.

Use the double-bar graph for questions 1 and 2.

The double-bar graph shows the favorite hobbies of students in the fifth grade.
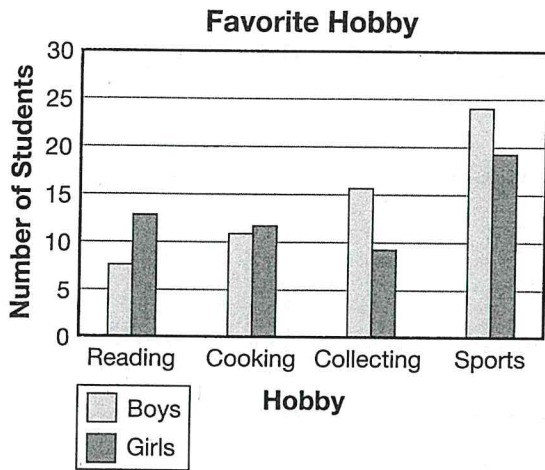
Favorite Hobby

1. Which is the girls' least favorite hobby?

    A. reading

    B. cooking

    C. collecting

    D. sports

2. Which hobby is closest to being equally liked by boys and by girls?

    A. reading

    B. cooking

    C. collecting

    D. sports

Use the double-bar graph for questions 3 and 4.

The graph shows the number of boys and girls in each grade from third to sixth.

Student Population
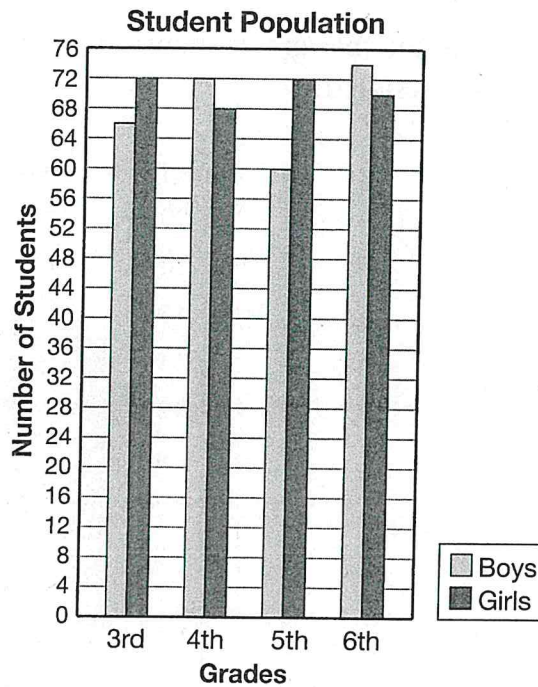
3. Which grade has the fewest boys?

    A. third

    B. fourth

    C. fifth

    D. sixth

4. Which statement about the fifth grade is true?

    A. There are 4 more girls than boys in the fifth grade.

    B. There are 12 more boys than girls in the fifth grade.

    C. There are 4 fewer boys than girls in the fifth grade.

    D. There are 12 more girls than boys in the fifth grade.

---

5. The double-bar graph shows the number of votes that each candidate received for fifth-grade president.

Votes for Fifth-Grade President
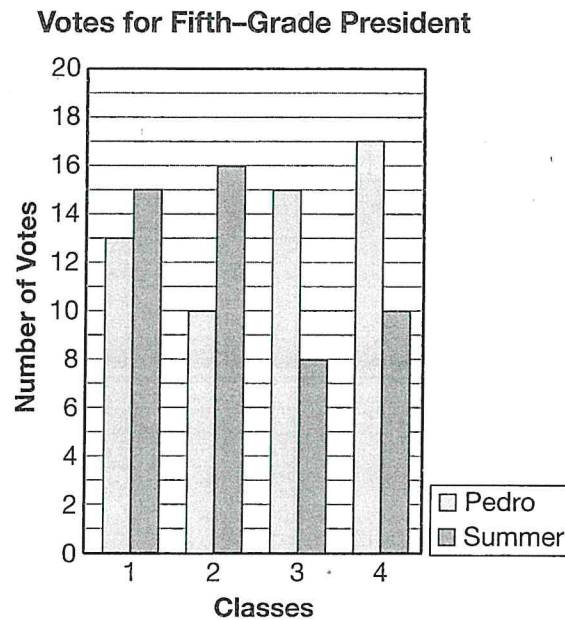
    A. Who won the election?

    _____

    B. How many more votes did the winner receive?

    _____

Lesson 23 Answers

Lesson 23
Guided Practice
Give the graph a title. **Books Checked Out in January.**
Label the horizontal axis **Class.**
Label the vertical axis **Number of Books.**

How many different colored bars need to be drawn for each class? **two**
Make a **key** next to the graph to tell what each color of bar represents.

Graphs may vary. Possible graph:

Books Checked Out in January
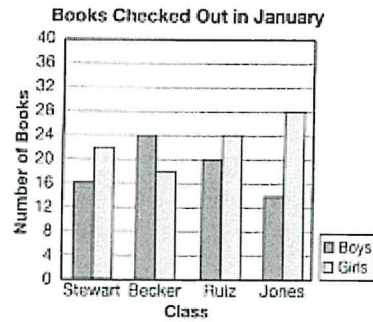
Lesson Practice Part 1
1. D
2. C
3. C
4. A
5. Answers may vary. Possible estimate: 38 pounds
6. between weeks 3 & 4

Lesson Practice Part 2
1. C
2. B
3. C
4. D
5. A. Pedro
   B. 6 more votes

Numerical Mental Express

Multiply each decimal by 10.

$2.15 \xrightarrow{\times 10}$ _____

$21.5 \xrightarrow{\times 10}$ _____

$1.895 \xrightarrow{\times 10}$ _____

$4.07 \xrightarrow{\times 10}$ _____

$23.70 \xrightarrow{\times 10}$ _____

$52.9 \xrightarrow{\times 10}$ _____

$500.0 \xrightarrow{\times 10}$ _____

High Temperatures Last Week
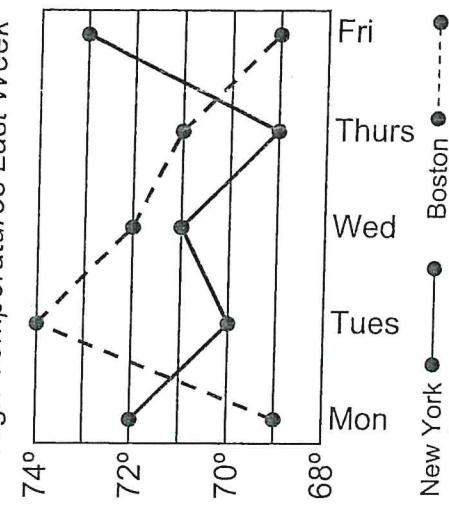
New York ●———● Boston ●------●

On which day was the temperature 71° in Boston?

How much warmer was it in New York than Boston on Friday?

How much warmer was it in Boston on Tuesday than Monday?

B) Carlos wrote the factors of 12 and Miranda wrote the factors of 16. What is the greatest common factor of 12 and 16?

A) Tamira can type 40 words per minute. At this rate, how many words can she type in $3\frac{1}{2}$ minutes?

C) Aaron wrote 5 decimal numbers.

List the numbers in order from least to greatest.

0.235   1.230   0.532

0.320   1.320

Thursday

Complete the factor tree of 24. Then write the prime factorization.

24

4 × 6

_____

Find the volume of the cube.

9 m, 9 m, 9 m

Volume = _____ meters³

Change each mixed number to an improper fraction.

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

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

$7\frac{1}{2} =$

$8\frac{1}{2} =$

$9\frac{1}{2} =$

$12\frac{1}{2} =$

A) Harvey shipped 3 packages that had a total mass of 10 kg. If the 1st and 2nd packages had a combined mass of 5.5 kg, what was the mass of the 3rd package?
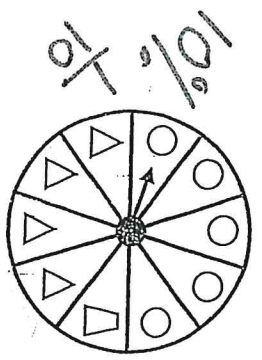
B) The utility company charges Mr. Yuán $59.95 each month for electricity. About how much money does the company charge him each year?

C) Alexia made a game spinner.

If she spins the spinner 100 times, about how many times is the spinner likely to point to the trapezoid?

1 BASIC FACTS

☐ + 5
14

_____
_____
_____

40 = ___ x ___
10 = ___ x ___
32 = ___ x ___

63 ÷ 7 =
40 ÷ 8 =
4 ÷ 2 =

11 - 6 =
12 - 6 =
17 - 8 =

2 ALGORITHMS

59.493 seconds
58.361 seconds
+ 60.005 seconds

212°F
- 16°F

3 yards 6 inches
x 7

43)$98.04

3 PROBABILITY STATISTICS

What is the average price of the five plants we bought?

$23 $4
$3 $22 $23

4 DECIMAL NUMBERS

Color and write five hundredths as a decimal and fraction.

_____
_____

5 FRACTIONAL FORMS

What fraction?

0   A   1
_____

What fraction?

Reduce this improper fraction.

$\frac{9}{3}$ = _____

Compare. Use >, <, or =.

$\frac{4}{6}$ ◯ $\frac{3}{6}$

6 PROBLEM SOLVING

Beth created this design to cover a rip in her jacket. It took half-an-hour to plan the design and two-and-a-quarter hours to cut and sew the fabric to the jacket. How much time did it take Beth to save her favorite jacket?

7 ADDING AND SUBTRACTING FRACTIONS

$\frac{5}{8}$
$- \frac{1}{8}$

$\frac{9}{10}$
$+ \frac{3}{5}$

$3\frac{2}{5}$
$- 1\frac{1}{5}$

$3\frac{1}{4}$
$+ 4\frac{3}{8}$

8 VOCABULARY GEOMETRY

The three kinds of angles are acute, obtuse, and _____.
In the parallelogram, A and C are _____ angles.
In the parallelogram, B and D are _____ angles.
Right _____ are formed by perpendicular lines.

A   D
B   C

9 AREA VOLUME PERIMETER

Find the perimeter.

7 m
5.2 m   5.2 m
5.2 m   5.2 m
7 m

P = _____

How long is a side of this square pool if the area is 36 square meters?

_____

Find the volume.

1 m
4 m   2 m

V = _____

10 METRIC MEASURES

Give the length in centimeters and millimeters. _____ or _____

cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Find the volume of the cube.

9 m × 9 m × 9 m

Volume = **729** meters³

9 × 9 × 9

Complete the factor tree of 24. Then write the prime factorization.

24
4 × 6
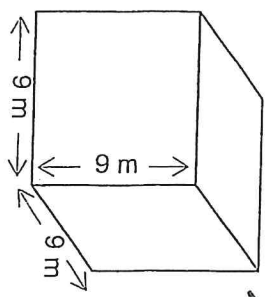
2 × 2 × 2 × 3

2 × 2 × 2 × 3

Change each mixed number to an improper fraction.

$1\frac{1}{2} = \frac{3}{2}$ $3\frac{1}{2} = \frac{7}{2}$ $7\frac{1}{2} = \frac{15}{2}$

$8\frac{1}{2} = \frac{17}{2}$ $9\frac{1}{2} = \frac{19}{2}$ $12\frac{1}{2} = \frac{25}{2}$
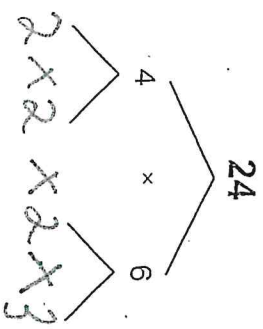
A) Harvey shipped 3 packages that had a total mass of 10 kg. If the 1st and 2nd packages had a combined mass of 5.5 kg, what was the mass of the 3rd package?

10
−5.5
4.5 kg

B) The utility company charges Mr. Yuán $59.95 each month for electricity. About how much money does the company charge him each year?

$720

60 × 12 = $720

C) Alexia made a game spinner.

If she spins the spinner 100 times, about how many times is the spinner likely to point to the trapezoid??

10 times

10%

Name

Multiply each decimal by 10.

2.15 ×10 → 21.5

1.895 ×10 → 18.95

4.07 ×10 → 40.7

23.70 ×10 → 237

52.9 ×10 → 529

500.0 ×10 → 5000

High Temperatures Last Week

74°
72°
70°
68°

Mon   Tues   Wed   Thurs   Fri
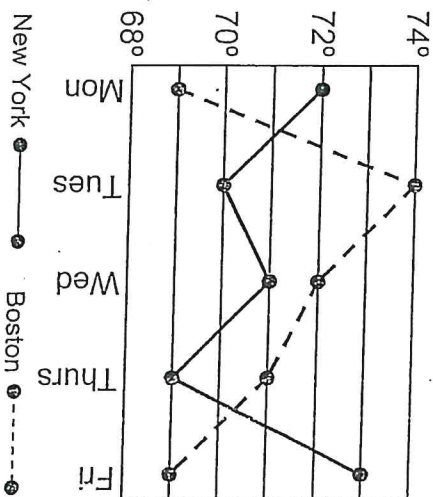
New York ●——●   Boston ●----●

On which day was the temperature 71° in Boston?

Thursday

How much warmer was it in New York than Boston on Friday? 40

How much warmer was it in Boston on Tuesday than Monday? 5°

A) Tamira can type 40 words per minute. At this rate, how many words can she type in $3\frac{1}{2}$ minutes?

120
× 40

B) Carlos wrote the factors of 12 and Miranda wrote the factors of 16. What is the greatest common factor of 12 and 16? 4

12: 1 2 3 4 6
16: 1 2 4 (4) 8 16

C) Aaron wrote 5 decimal numbers.

List the numbers in order from least to greatest.

0.235   1.230
0.320   0.532
1.320

0.235, 0.320, 0.532, 1.230, 1.320
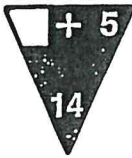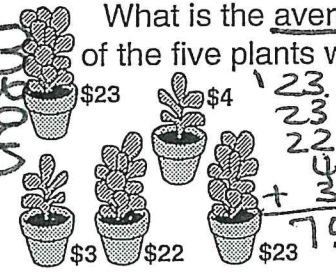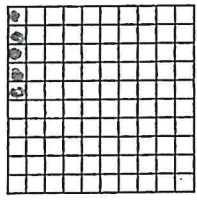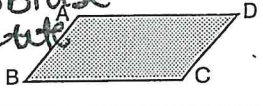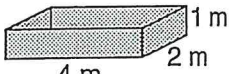
DROPS IN THE BUCKET - MATH LEVEL E   NUMBER 28

NAME __Key__   SCORE _____

1 BASIC FACTS

▽ +5 = 14

$5 + 9 = 14$
$9 + 5 = 14$
$14 - 9 = 5$
$14 - 5 = 9$

$40 = 8 \times 5$
$10 = 2 \times 5$
$32 = 8 \times 4$

$63 \div 7 = 9$
$40 \div 8 = 5$
$4 \div 2 = 2$

$11 - 6 = 5$
$12 - 6 = 6$
$17 - 8 = 9$

2 ALGORITHMS

59.493 seconds
58.361 seconds
+ 60.005 seconds

177.859 sec.

$1\,12°F$ (10)
$- 16°F$
$196°F$

3 yards 6 inches
22 yds
6 is
3 yds
×9
42 in

×7
129
798 in
21 yds

43
3
129

$43)\overline{\$98.04}$
-86
120
-86
34

2.28

3 PROBABILITY STATISTICS

What is the average price of the five plants we bought?

$23, \$4, \$3, \$22, \$23$

23
23
22
4
+ 3
75

$5)\overline{75}$
-5
25

15

4 DECIMAL NUMBERS

Color and write five hundredths as a decimal and fraction.

.05

$\frac{5}{100}$

5 FRACTIONAL FORMS

What fraction?
A on number line 0 to 1
$\frac{2}{4} = \frac{1}{2}$

What fraction?
$\frac{7}{10}$ or $\frac{3}{10}$

Reduce this improper fraction.
$\frac{9}{3} = 3$

Compare. Use >, <, or =.
$\frac{4}{6} > \frac{3}{6}$

6 PROBLEM SOLVING

Beth created this design to cover a rip in her jacket. It took half-an-hour to plan the design and two-and-a-quarter hours to cut and sew the fabric to the jacket. How much time did it take Beth to save her favorite jacket?

30 min
60
60
+ 15
105 min

2hr 45min

7 ADDING AND SUBTRACTING FRACTIONS

$\frac{5}{8}$
$- \frac{1}{8}$
$\frac{4}{8} = \frac{1}{2}$

$\frac{9}{10}$
$+ \frac{3}{5} \to \frac{6}{10}$
$\frac{15}{10} = 1\frac{5}{10}$

$1\frac{1}{2}$

$3\frac{2}{5}$
$- 1\frac{1}{5}$
$2\frac{1}{5}$

$3\frac{1}{4} \to \frac{2}{8}$
$+ 4\frac{3}{8} \to \frac{3}{8}$
$7\frac{5}{8}$

8 VOCABULARY GEOMETRY

The three kinds of angles are acute, obtuse, and __right__.
In the parallelogram, A and C are __congruent__ angles. obtuse
In the parallelogram, B and D are __congruent__ angles. acute
Right __angles__ are formed by perpendicular lines.

Parallelogram labeled A, D, B, C

9 AREA VOLUME PERIMETER

Find the perimeter.
Hexagon: 7 m, 5.2 m, 5.2 m, 5.2 m, 5.2 m, 7 m
14
20.8
34.8
P = ___m___

How long is a side of this square pool if the area is 36 square meters?
$l \times w$
$6 \times 6 = 36$
6

Find the volume.
1 m, 2 m, 4 m
$4 \times 2 = 8$
$8 \times 1 = 8$
V = ___8___

10 METRIC MEASURES

Give the length in centimeters and millimeters. __13.5cm__ or __135mm__

13½, 13 5/10

ruler cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14

-1 96
-2 93
-3 89
-4 85
-5 81
-6 78
-7 74
-8 70
-9 67
-10 63
-11 59
-12 56
-13 52

#

$13\frac{5}{10}$
$13\frac{1}{2}$

```
  43                           2.28
 x 2                     43 )$98.04
 ___                        -86
  86                        ____
                             120
      2                     - 86
  43  43                    ____
   3   8                     344
 ___  ___                   -344
 129  344                   ____
                              0


                         4̶2̶
                        -36
                        ____
                          5
```

Convert each fraction to a decimal.

$\dfrac{3}{4} = \dfrac{75}{100} =$ _____

$\dfrac{4}{5} = \dfrac{80}{100} =$ _____

$\dfrac{1}{25} = \dfrac{4}{100} =$ _____

Round each number to the nearest tenth.

$36.78 \rightarrow$ **36.8**

$50.55 \rightarrow$ _____

$612.14 \rightarrow$ _____

$784.09 \rightarrow$ _____

$978.01 \rightarrow$ _____

Capacity		
1 gallon	=	4 quarts
1 quart	=	2 pints
1 pint	=	2 cups
1 cup	=	8 ounces

How many pints equal 1 gallon?

How many ounces equal 2 pints?

A) Barbara studied math for $\dfrac{1}{4}$ of an hour. She studied geography for 20 minutes. She studied history for $\dfrac{1}{2}$ of an hour. How many minutes did Barbara study?

B) Each day that Demont works, he delivers 30 to 50 pizzas. Estimate the number of pizzas he will deliver if he works 20 days.

C) Fayina can choose 1 shirt and 1 pair of pants.

How many combinations of 1 shirt and 1 pair of pants are possible?

Shirts	Pants
Red	Black
Blue	Green
	Pink
	Yellow

Find each missing decimal.

$0.500 + 0.500 = 1.000$

_____ $+ 0.400 = 1.000$

$0.300 +$ _____ $= 1.000$

_____ $+ 0.900 = 1.000$

$0.800 +$ _____ $= 1.000$

Complete the tables.

m	100	300	700	1000
km	0.1	0.3	0.7	

mL	800	1000	1300	1800
L	0.8	1.0	1.3	

Draw a reflection of each figure.
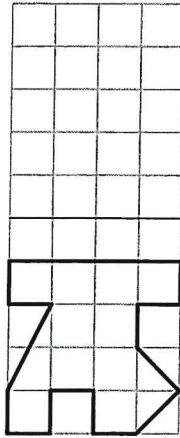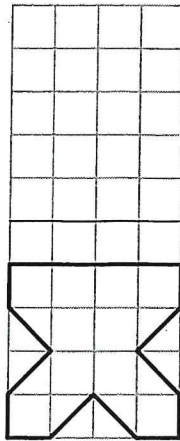
A) Alex earns $12 each hour at his job. He wants to buy a bicycle that costs $100. How many hours must Alex work to earn enough money to buy the bicycle?

B) Angelina was born in 1998. Her father was born in 1964. How old was Angelina's father on the day she was born?

C) Belinda bought a new rug.

What is the perimeter of the rug?

5 m

$2\frac{1}{2}$ m

1 BASIC FACTS

8 + ☐ / 12

_____

_____

_____

30 = ___ x ___

54 = ___ x ___

21 = ___ x ___

24 ÷ 6 =

4 ÷ 4 =

49 ÷ 7 =

4 + 8 =

6 + 3 =
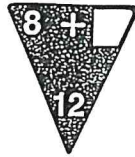
5 + 7 =

2 ALGORITHMS

35.5 miles
87.9 miles
+ 76.2 miles

65,000
- 7,301

$82.59
x 45

78)9142

3 PROBABILITY STATISTICS

Students Per Class	
Mr. Smith	32
Miss James	22
Mrs. Glazier	31
Mrs. Garcia	29
Mr. O'Neil	16
Total	130

What is the average number of students in a class?

4 DECIMAL NUMBERS

Color and write sixteen hundredths as a decimal and fraction.

_____

_____

5 FRACTIONAL FORMS

What fraction?

A
0 ———————— 1

_____

What fraction?

_____
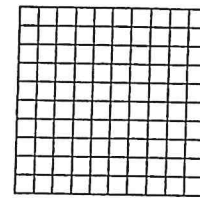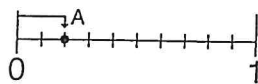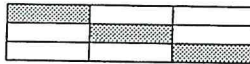
Reduce this improper fraction.

$\frac{30}{10}$ = _____

Compare. Use >, <, or =.
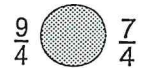
$\frac{9}{4}$ ◯ $\frac{7}{4}$

6 PROBLEM SOLVING

Thirty-two people were waiting in line to tour the old castle with a guide.
Brenda was nineteenth.
How many were in front of her? _____
How many were behind her? _____
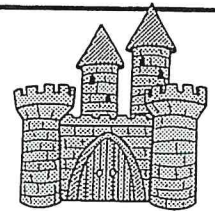
7 ADDING AND SUBTRACTING FRACTIONS

$\frac{3}{4}$
$+ \frac{1}{4}$

$\frac{4}{5}$
$- \frac{1}{10}$

$4 \frac{7}{8}$
$- 1 \frac{5}{8}$

$1 \frac{3}{8}$
$+ 2 \frac{1}{4}$

8 VOCABULARY GEOMETRY

Is the dark line a radius, diameter, or circumference? Label each.

A. _____ B. _____ C. _____ D. _____

9 AREA VOLUME PERIMETER

Tell the volume of each box. Circle the one that would hold the most popcorn.

POP CORN — 5 in, 3 in, 4 in

POPCORN — 5 in, 2 in, 6 in

POPCORN — 2 in, 4 in, 8 in

10 METRIC MEASURES

Give the length in centimeters and millimeters.

_____ or _____

cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14

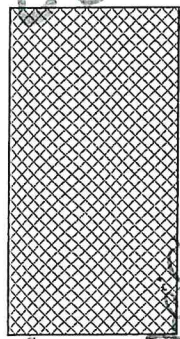© 1998, Mary Jo Hand

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Round each number to the nearest tenth.

36.78 → 36.8
50.55 → 50.6
612.14 → 612.1
784.09 → 784.1
978.01 → 978.0

Convert each fraction to a decimal.

$\frac{3}{4} = \frac{75}{100} = 0.75$

$\frac{4}{5} = \frac{80}{100} = 0.80$

$\frac{1}{25} = \frac{4}{100} = 0.04$

Capacity

1 gallon	=	4 quarts
1 quart	=	2 pints
1 pint	=	2 cups
1 cup	=	8 ounces

How many pints equal 1 gallon? 8

How many ounces equal 2 pints? 32

A) Barbara studied math for $\frac{1}{4}$ of an hour. She studied geography for 20 minutes. She studied history for $\frac{1}{2}$ of an hour. How many minutes did Barbara study?
1 hour 5 min 65 mins

B) Each day that Demont works, he delivers 30 to 50 pizzas. Estimate the number of pizzas he will deliver if he works 20 days.
About 800 Pizzas
30 (40) 50

C) Fayina can choose 1 shirt and 1 pair of pants. How many combinations of 1 shirt and 1 pair of pants are possible?
4x2=8 8 combinations

Shirts	Pants
Red	Black
Blue	Green
	Pink
	Yellow

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Name

Find each missing decimal.

0.500 + 0.500 = 1.000
.600 + 0.400 = 1.000
0.300 + .700 = 1.000
.160 + 0.900 = 1.000
0.800 + .266 = 1.000

Complete the tables.

m	100	300	700	1000
km	0.1	0.3	0.7	1.6

mL	800	1000	1300	1800
L	0.8	1.0	1.3	1.8
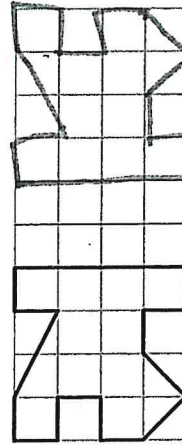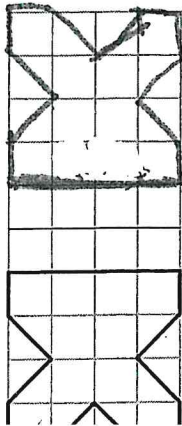
Draw a reflection of each figure.

A) Alex earns $12 each hour at his job. He wants to buy a bicycle that costs $100. How many hours must Alex work to earn enough money to buy the bicycle?
9

B) Angelina was born in 1998. Her father was born in 1964. How old was Angelina's father on the day she was born?
34 years

C) Belinda bought a new rug. What is the perimeter of the rug?
5 m $2\frac{1}{2}$ m   15 meters
2.5   2.5   5   5   2.5x2

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NAME ___Key___   SCORE ___

Left margin scores:
-1 | 97
-2 | 93
-3 | 90
-4 | 86
-5 | 83
-6 | 79
-7 | 76
-8 | 72
-9 | 69
-10 | 66
-11 | 62
-12 | 59
-13 | 55
-14 | 52
-15 | 48

1 BASIC FACTS

8 + 4 = 12
4 + 8 = 12
12 - 8 = 4
12 - 4 = 8

30 = 6 x 5   24 ÷ 6 = 4   4 + 8 = 12
54 = 9 x 6   4 ÷ 4 = 1   6 + 3 = 9
21 = 7 x 3   49 ÷ 7 = 7   5 + 7 = 12

2 ALGORITHMS

35.5 miles
87.9 miles
+ 76.2 miles
199.6 miles

65,000
- 7,301
57,699

$82.59
x 45
41295
+ 33036 0
371655
3716.55

78)9142

3 PROBABILITY STATISTICS

Students Per Class	
Mr. Smith	32
Miss James	22
Mrs. Glazier	31
Mrs. Garcia	29
Mr. O'Neil	16
Total	130

What is the average number of students in a class? (26)

26
5)130
-10
30

4 DECIMAL NUMBERS
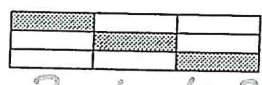
Color and write sixteen hundredths as a decimal and fraction.

0.16

$\frac{16}{100}$

5 FRACTIONAL FORMS

What fraction?

A
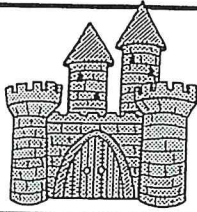0 -----A----- 1
$\frac{2}{10}$ = $\frac{1}{5}$

What fraction?
$\frac{3}{9}$ = $\frac{1}{3}$ $\frac{6}{9}$ = $\frac{2}{3}$

Reduce this improper fraction.
$\frac{30}{10}$ = 3

Compare. Use >, <, or =.
$\frac{9}{4}$ ◯ $\frac{7}{4}$

6 PROBLEM SOLVING

Thirty-two people were waiting in line to tour the old castle with a guide.
Brenda was nineteenth.
How many were in front of her? ___18___
How many were behind her? ___13___

32
-19
13

7 ADDING AND SUBTRACTING FRACTIONS

$\frac{3}{4}$
+ $\frac{1}{4}$
$\frac{4}{4}$ = 1

$\frac{4}{5}$ = $\frac{8}{10}$
- $\frac{1}{10}$
$\frac{7}{10}$

$4\frac{7}{8}$
- $1\frac{5}{8}$
$3\frac{2}{8}$ $3\frac{1}{4}$

$1\frac{3}{8}$
+ $2\frac{1}{4}$ = $\frac{2}{8}$
$3\frac{5}{8}$

8 VOCABULARY GEOMETRY

Is the dark line a radius, diameter, or circumference? Label each.

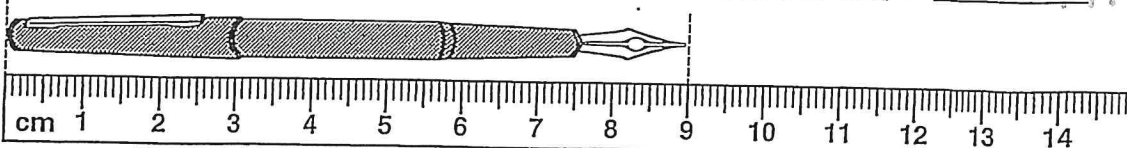A. radius   B. circumference   C. diameter   D. circumf.

9 AREA VOLUME PERIMETER

Tell the volume of each box. Circle the one that would hold the most popcorn.

5x3=15 15x4=60
POPCORN 5 in 4 in 3 in

5x2=10 10x6=60
POPCORN 5 in 6 in 2 in

2x4=8 8x8=64
POPCORN 2 in 8 in 4 in

10 METRIC MEASURES

Give the length in centimeters and millimeters. ___9cm___ or ___90mm___

cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14

$$82.59 \times 45$$

$$412.95$$
$$+\ 3303.60$$
$$3716.55$$

$$78\overline{)9142} = 117\ r16$$
$$-78$$
$$134$$
$$-78$$
$$562$$
$$-546$$
$$16$$

$$78 \times 2 = 156$$

$$78 \times 7 = 546$$