NAME _____ DATE _____ PERIOD ____

4-1

Study Guide and Intervention

Multiplying Decimals by Whole Numbers

When you multiply a decimal by a whole number, you multiply the numbers as if you were multiplying all whole numbers. Then you use estimation or you count the number of decimal places to decide where to place the decimal point. If there are not enough decimal places in the product, annex zeros to the left.

EXAMPLE 1 **Find 6.25 × 5.**

Method 1 Use estimation.

Round 6.25 to 6.
6.25 × 5 → 6 × 5 or 30

```
  1 2
 6.25
 × 5
31.25
```

Since the estimate is 30 place the decimal point after 31.

Method 2 Count decimal places.

```
 6.25   ← There are two places to the right of the decimal point.
 × 5
31.25   ← Count the same number of decimal places from right to left.
```

EXAMPLE 2 **Find 3 × 0.0047.**

```
   2
0.0047   There are four decimal places.
× 3
0.0141   ← Annex a zero on the left of 141 to make four decimal places.
```

Lesson 4-1

When you write a number greater than ten as the product of a decimal and 10 raised to a whole number power, you are writing the number in scientific notation. The whole number factor is a power of ten.

EXAMPLE 3 **Write 8.2×10^5 in standard form.**

Method 1 Use order of operations.

Evaluate 10^5 first. Then multiply.

$8.2 \times 10^5 = 8.2 \times 100{,}000$
$= 820{,}000$

So, $8.2 \times 10^5 = 820{,}000$.

Method 2 Use mental math.

Move the decimal point 5 places.

$8.2 \times 10^5 = 8.20000 \times 10^5$
$= 820{,}000$

EXERCISES

Multiply.

1. 8.03 × 3 ≈ 24 see notes
2. 6 × 12.6 ≈ 78
3. 2 × 0.012
4. 0.0008 × 9

Write each number in standard form.

5. 2.32 × 10^2 → 232 → (232)
6. 6.8 × 10^2 → 680 → (680)
7. 5.2 × 10^3 → 5200 → (5200)
8. 1.412 × 10^4 → 14120 → (14,120)

2.32 × 100

1) 8.03 × 3 = 24.09

2) 12.6 × 6 = 75.6

NAME _____ DATE _____ PERIOD ____

4-1 Practice: Word Problems

Multiplying Decimals by Whole Numbers

1. **COOKING** Norberto uses three 14.7 oz cans of chicken broth when he makes his delicious tortilla soup. How many total ounces of chicken broth does he use?

14.7 × 3 = 44.1 oz

Norberto uses 44.1 oz of chicken broth when he makes tortilla soup.

2. **TIME** Amanda works on a farm out in the hills. It takes her 2.25 hours to drive to town and back. She usually goes to town twice a week to get supplies. How much time does Amanda spend driving if she takes 8 trips to town each month?

each week: 2.25 + 2.25 = 4.50

4.50 × 4 = 18.00

3. **EXERCISE** The local health club is advertising a special for new members: no initiation fee to join and only $34.50 per month for the first year. If Andy joins the health club for one year, how much will he spend on membership?

34.50 × 12

4. **BIKING** In order to train for a cross-state biking trip, Julie rides her bike 34.75 miles five times a week. How many total miles does she ride each week?

5. **MONEY** David wants to buy 16 bolts from a bin at the hardware store. Each bolt costs $0.03. How much will David pay for the bolts?

6. **INSECTS** One wing of a Royal Moth is 0.75 inch across. How wide is the moth's wingspan when both wings are open?

7. **COSTUMES** KJ is making costumes for this year's samba parade. The pattern she is using calls for 2.125 yards of fabric for each costume. How many yards of fabric will she need to make 34 costumes?

8. **PLANETS** Earth is 1.496×10^8 kilometers from the Sun. What is this distance written in standard form?

1.496 00000

149,600,000

The Earth is 149,600,000 kilometers from the Sun.

Lesson 4–1

NAME ________________ DATE ________ PERIOD ____

4-2 Study Guide and Intervention

Multiplying Decimals

When you multiply a decimal by a decimal, multiply the numbers as if you were multiplying all whole numbers. To decide where to place the decimal point, find the sum of the number of decimal places in each factor. The product has the same number of decimal places.

EXAMPLE 1 Find 5.2 × 6.13.

Estimate: 5 × 6 or 30

```
   5.2  ← one decimal place
×  6.13 ← two decimal places
   156
    52
  312
31.876  ← three decimal places
```

The product is 31.876. Compared to the estimate, the product is reasonable.

EXAMPLE 2 Evaluate 0.023*t* if *t* = 2.3.

0.023*t* = 0.023 × 2.3 Replace *t* with 2.3.

```
 0.023 ← three decimal places
×  2.3 ← one decimal place
    69
   46
0.0529 ← Annex a zero to make four decimal places.
```

EXERCISES

Multiply.

1. 7.2 × 2.1
2. 4.3 × 8.5
3. 2.64 × 1.4
4. 14.23 × 8.21 see notes
5. 5.01 × 11.6
6. 9.001 × 4.2 see notes

Evaluate each expression if *x* = 5.07, *y* = 1.5, and *z* = 0.403.

7. 3.2*x* + *y*

3.2(5.07) + (1.5)

```
   5.07
 ×  3.2
   1014
+ 15210
  16.224

  16.224
+  1.500
  17.724
```

8. *yz* + *x*
9. *z* × 7.06 − *y*

4) 14.23 × 8.21 ≈ 14 × 8 ≈ 80 + 32 ≈ 112

14 = 10 + 4

```
   14
 ×  8
  112
```

```
     14.23
 ×    8.21
      1423
     28460
 + 1138400
   116.8283
```

116.8283

6) $9.001 \times 4.2 \approx 9 \times 4 \approx 36$

$$\begin{array}{r} 9.001 \\ \times \quad 4.2 \\ \hline 18002 \\ +36004\,0 \\ \hline 37.8042 \end{array}$$

37.8042

NAME _____ DATE _____ PERIOD ____

4-2 Practice: Word Problems

Multiplying Decimals

1. **GIFTS** Colin is filling 4.5 ounce bottles with lavender bubble bath that he made for gifts. He was able to fill 7.5 bottles. How many ounces of bubble bath did he make?

2. **GROCERY** Iona's favorite peaches are $2.50 per pound at the local farmers' market. She bought 3.5 pounds of the peaches. How much did she spend?

3. **SHOPPING** Jennifer is buying new school clothes. The items she wants to buy add up to $132.50 before sales tax. Sales tax is calculated by multiplying the total amount by 0.08. What is the amount of sales tax for the items?

4. **DRIVING** Ana bought a van that holds 20.75 gallons of gas and gets an average of 15.5 miles per gallon. How many miles can she expect to go on a full tank?

5. **INCOME** Ishi makes $8.50 an hour rolling sushi at Kyoto Japanese Restaurant. His paycheck shows that he worked 20.88 hours over the past two weeks. How much did Ishi make before taxes?

6. **TRAVEL** Manny is on vacation in France. He rented a car to drive 233.3 kilometers from Paris to Brussels and wants to figure out the distance in miles. To convert from kilometers to miles, he needs to multiply the total kilometers by 0.62. How many miles will Manny drive? see notes

6)

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1} \\ 2333 \\ \times\ 062 \\ \hline 4666 \\ +\ 139980 \\ \hline 144646 \end{array}$$

Manny drove 144.646 miles from Paris to Brussels.

NAME _____ DATE _____ PERIOD ____

4-3

Study Guide and Intervention

Dividing Decimals by Whole Numbers

When you divide a decimal by a whole number, place the decimal point in the quotient above the decimal point in the dividend. Then divide as you do with whole numbers.

EXAMPLE 1 Find $8.73 \div 9$.

Estimate: $9 \div 9 = 1$

$$\begin{array}{r} 0.97 \\ 9\overline{)8.73} \\ -0 \\ \hline 87 \\ -81 \\ \hline 63 \\ -63 \\ \hline 0 \end{array}$$

← Place the decimal point directly above the decimal point in the quotient.

Divide as with whole numbers.

$8.73 \div 9 = 0.97$ Compared to the estimate, the quotient is reasonable.

EXAMPLE 2 Find $8.58 \div 12$.

Estimate: $10 \div 10 = 1$

$$\begin{array}{r} 0.715 \\ 12\overline{)8.580} \\ -84 \\ \hline 18 \\ -12 \\ \hline 60 \\ -60 \\ \hline 0 \end{array}$$

← Place the decimal point.

Annex a zero to continue dividing.

$8.58 \div 12 = 0.715$ Compared to the estimate, the quotient is reasonable.

EXERCISES

Divide.

1. $4\overline{)9.2}$ see notes
2. $5\overline{)4.5}$ see notes
3. $8.6 \div 2$ see notes
4. $2.89 \div 4$ see notes
5. $4\overline{)3.2}$
6. $3\overline{)7.2}$
7. $7.5 \div 5$
8. $3.25 \div 5$

Lesson 4–3

1)

$$\begin{array}{r} \times 23 \\ \hline 4\,|\,92 \\ -8\downarrow \\ \hline 12 \\ -12 \\ \hline 0 \end{array}$$

2)

$$\begin{array}{r} \times 09 \\ \hline 5\,|\,45 \\ -0\downarrow \\ \hline 45 \\ -45 \\ \hline 0 \end{array}$$

3)

$$\begin{array}{r} \times 43 \\ \hline 2\,|\,86 \\ -8\downarrow \\ \hline 06 \\ -6 \\ \hline 0 \end{array}$$

4)

$$\begin{array}{r} 0.7225 \\ \hline 4\,|\,2.8\,9\,0\,0\,0 \\ -0\downarrow \\ \hline 28 \\ -28 \\ \hline 09 \\ -8 \\ \hline 10 \\ -8 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

NAME ______________________ DATE __________ PERIOD ____

4-3

Practice: Word Problems

Dividing Decimals by Whole Numbers

1. ENTERTAINMENT Frank, Gina, Judy, and Connie are splitting their dinner bill. After tip, the total is $30.08. How much does each owe if they split the bill four ways?

2. FOOD There are 25 servings in a 12.5 ounce bottle of olive oil. How many ounces are in a serving?

25⟌12.5

3. RUNNING Isabella has found that she stays the most fit by running various distances and terrains throughout the week. On Mondays she runs 2.5 miles, on Tuesdays 4.6 miles, on Thursdays 6.75 miles, and on Saturdays 4.8 miles. What is the average distance Isabella runs on each of the days that she runs? Round to the nearest hundredth of a mile.

4. BUSINESS Katherine spends $1,089.72 each month for rent and supplies to run her hair salon. If she charges $18 for a haircut, how many haircuts must Katherine do to cover her monthly expenses? Round to the nearest whole number.

5. CONSTRUCTION It took Steve and his construction crew 8 months to build a house. After expenses, he was left with $24,872.67 for himself. On average, how much did Steve make per month? Round to the nearest dollar.

6. GRADES Shane wants to figure out what grade he is getting in math. His test scores were 85.6, 78.5, 92.5, 67, and 83.7. What was his average test score? What grade will he receive?

Grade	Average Score
A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	50 – 59

Lesson 4–3

2) 25⟌12.5 → 00.5

- 125

0

→ 0.502

There are 0.5 ounces in a serving of olive oil.

3)

$$4.60 + 2.50 + 4.80 + 6.75 = 18.65$$

$$18.650000 \div 4 = 4.6625$$

- 16
26
- 24
25
- 24
10
- 8
20
- 20
0

4.6625 ≈ 4.66 miles

Isabella runs about 4.66 miles each week.

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4-4

Study Guide and Intervention

Dividing by Decimals

When you divide a decimal by a decimal, multiply both the divisor and the dividend by the same power of ten. Then divide as with whole numbers.

EXAMPLE 1 Find 10.14 ÷ 5.2.

* move decimal SAME number of places

Estimate: 10 ÷ 5 = 2

Multiply by 10 to make a whole number.

5.2)10.14 → 52)101.40

Multiply by the same number, 10.

1.95
52)101.40
− 52
494
− 468
260
− 260
0

Place the decimal point. Divide as with whole numbers.

Annex a zero to continue.

10.14 divided by 5.2 is 1.95.
Check: 1.95 × 5.2 = 10.14 ✓

Compare to the estimate.

EXAMPLE 2 Find 4.09 ÷ 0.02.

0.02)4.00 → 2)409.0

Multiply each by 100.

204.5
2)409.0
− 4
00
− 0
09
− 8
10
− 10
0

Place the decimal point. Divide.

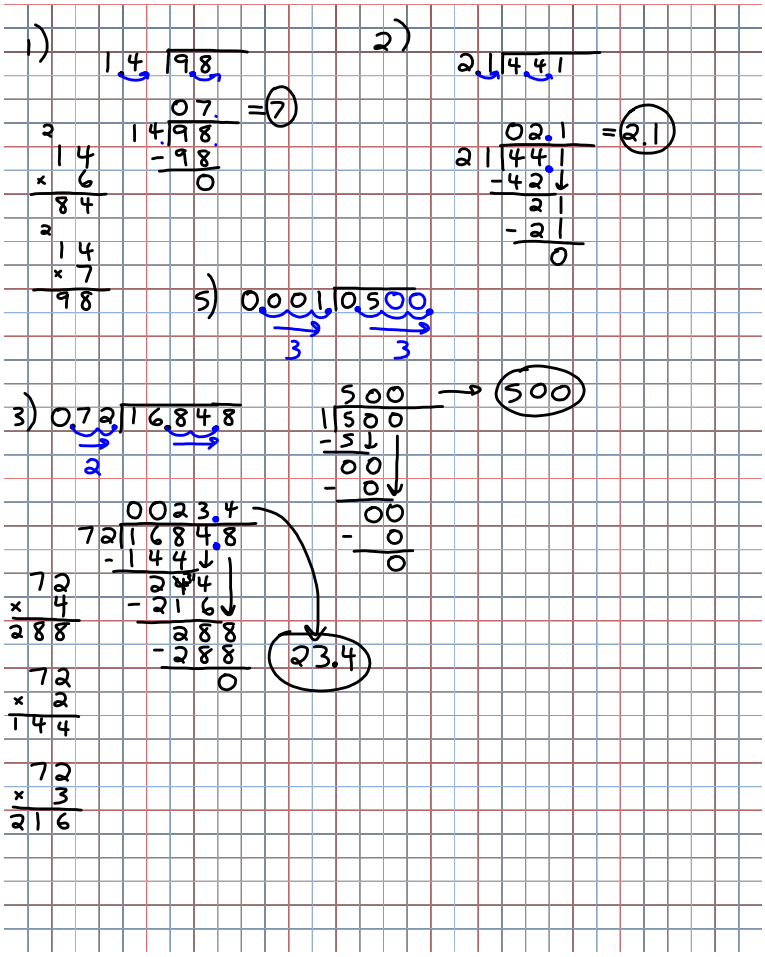
Write a zero in the dividend and continue to divide.

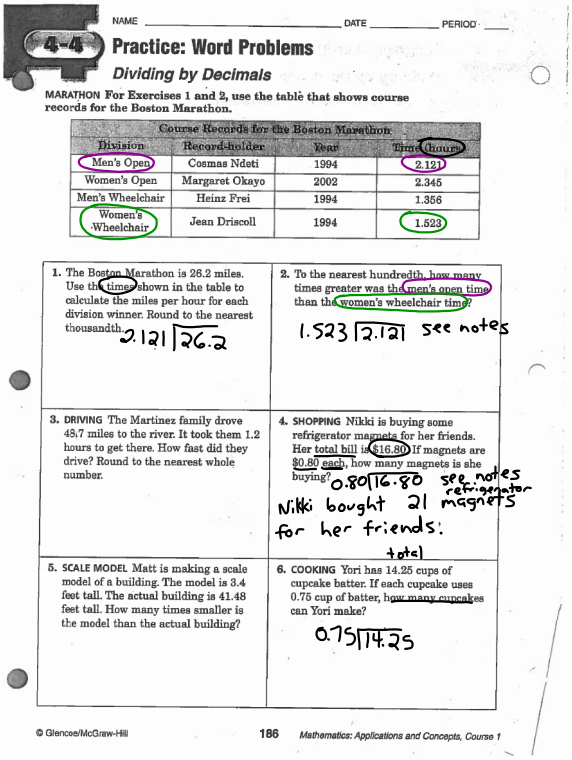
4.09 ÷ 0.02 is 204.5.
Check: 204.5 × 0.02 = 4.09 ✓

EXERCISES

Divide.

1. 1.4)9.8 — see notes
2. 2.1)4.41
3. 0.72)16.848 — see notes
4. 8.652 ÷ 1.2
5. 0.5 ÷ 0.001 — see notes
6. 9.594 ÷ 0.06





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4-4

Practice: Word Problems

Dividing by Decimals

MARATHON For Exercises 1 and 2, use the table that shows course records for the Boston Marathon.

Course Records for the Boston Marathon

Division	Record-holder	Year	Time (hours)
Men's Open	Cosmas Ndeti	1994	2.121
Women's Open	Margaret Okayo	2002	2.345
Men's Wheelchair	Heinz Frei	1994	1.356
Women's Wheelchair	Jean Driscoll	1994	1.523

1. The Boston Marathon is 26.2 miles. Use the times shown in the table to calculate the miles per hour for each division winner. Round to the nearest thousandth.

2.121 | 26.2

2. To the nearest hundredth, how many times greater was the men's open time than the women's wheelchair time?

1.523 | 2.121 see notes

3. **DRIVING** The Martinez family drove 49.7 miles to the river. It took them 1.2 hours to get there. How fast did they drive? Round to the nearest whole number.

4. **SHOPPING** Nikki is buying some refrigerator magnets for her friends. Her total bill is $16.80. If magnets are $0.80 each, how many magnets is she buying?

0.80 | 16.80 see notes refrigerator magnets

Nikki bought 21 magnets for her friends.

total

5. **SCALE MODEL** Matt is making a scale model of a building. The model is 3.4 feet tall. The actual building is 41.48 feet tall. How many times smaller is the model than the actual building?

6. **COOKING** Yori has 14.25 cups of cupcake batter. If each cupcake uses 0.75 cup of batter, how many cupcakes can Yori make?

0.75 | 14.25

2)

$1523 \overline{)2121}$

$1.392 \rightarrow 1.392 \approx 1.39$

$1523 \overline{)2121.0000}$

-1523

5980

-4569

14110

-13707

4030

-3046

The men's open time was about 1.39 times greater than the women's wheelchair time.

$2 \quad 1$
$1523 \times 4 = 6092$

$1 \quad$
$1523 \times 3 = 4569$

$4 \; 2 \; 2$
$1523 \times 9 = 13707$

$1 \quad$
$1523 \times 2 = 3046$

4)

$080 \overline{)1680}$

$0021. \rightarrow 21$

$80 \overline{)1680.}$

-160

80

-80

0

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4-5 Study Guide and Intervention

Perimeter

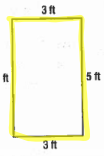
Lesson 4-5

The distance around any closed figure is called its **perimeter**. To find the perimeter, add the measures of all the sides of the figure.

Finding Perimeter

Figure	Words	Symbols
Rectangle	The perimeter P of a rectangle is the sum of the lengths and widths. It is also two times the length ℓ plus two times the width w.	$P = \ell + \ell + w + w$ $P = 2\ell + 2w$
Square	The perimeter P of a square is four times the measure of any of its sides s.	$P = 4s$

EXAMPLE 1 **Find the perimeter of the rectangle.**



Estimate: $5 + 5 + 5 + 5 = 20$

$P = 2\ell + 2w$	Write the formula.
$P = 2(5) + 2(3)$	Replace ℓ with 5 and w with 3.
$P = 10 + 6$	Multiply.
$P = 16$	Add.

The perimeter of the rectangle is 16 feet. Compared to the estimate, the answer is reasonable.

EXAMPLE 2 **Find the perimeter of the square.**

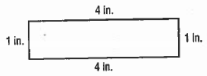
$P = 4s$	Write the formula.
$P = 4(6)$	Replace s with 6.
$P = 24$	Multiply.

The perimeter of the square is 24 inches.

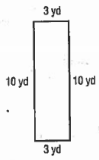
EXERCISES

Find the perimeter of each figure.

1.



2.



3.

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4-5 Practice: Word Problems

Perimeter

Lesson 4-5

1. **GEOGRAPHY** The state of Colorado is nearly rectangular. It is about 589 kilometers by 456 kilometers. What is the perimeter of Colorado?

589 km
456km 456km
589km

589
589
456
+456

2. **FRAMING** How many inches of matting is needed to frame an 8.5 inch by 11 inch print?

3. **GARDENING** Jessica wants to put a fence around her 10.5 foot by 13.75 foot rectangular garden. How many feet of fencing will she need?

4. **SEWING** Amy is making pillows to decorate her bed. She is going to make three square pillows that are each 2 feet by 2 feet. She wants to use the same trim around each pillow. How many feet of trim will she need for all three pillows?

5. **JOGGING** Before soccer practice, Jovan warms up by jogging around a soccer field that is 100 yards by 130 yards. How many yards does he jog if he goes around the field four times?

6. **POSTER** Ted is making a stop sign poster for a talk on safety to a first grade class. He will put a strip of black paper around the perimeter of the stop sign. Each of the stop sign's eight sides is 16.34 inches. How long a strip of paper will he need?

16.34
× 8

7. **FLAG** Jo is making a triangular banner. Each of the three sides is 14.567 inches long. If she puts a braided trim around the banner, how much trim will she need?

14.567in

14.567
× 3

8. **PYRAMIDS** The Great Pyramid at Giza, Egypt, has a square base, with each side measuring 0.229 kilometer. If you could walk once all the way around the pyramid at its base, how far could you walk?

0.229
0.229km
× 4

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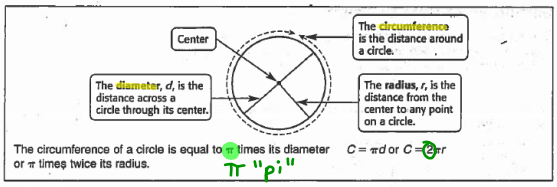
4-6 Study Guide and Intervention

Circumference



The circumference of a circle is equal to π times its diameter or π times twice its radius. $C = \pi d$ or $C = 2\pi r$

π "pi"

EXAMPLE 1 **Find the circumference of a circle whose diameter is 4.2 meters. Round to the nearest tenth.**

$C = \pi d$	Write the formula.
$\approx 3.14 \times 4.2$	Replace π with 3.14 and d with 4.2.
≈ 13.188	Multiply.
≈ 13.2	Round to the nearest tenth.

The circumference of the circle is about 13.2 meters.

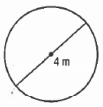
EXAMPLE 2 **Find the circumference of a circle whose radius is 13 inches. Round to the nearest tenth.**

$C = 2\pi r$	Write the formula.
$\approx 2 \times 3.14 \times 13$	Replace π with 3.14 and r with 13.
≈ 81.64	Multiply.
≈ 81.6	Round to the nearest tenth.

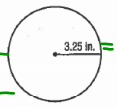
The circumference of the circle is about 81.6 inches.

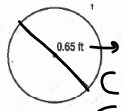
EXERCISES

Find the circumference of each circle shown or described. Round to the nearest tenth.

1. 

2. 3.25 × 2 = 6.50 × 3.14



3. 

$C = \pi d$

$C = 3.14(0.65)$

see notes

4. The radius of a circle measures 16 miles. What is the measure of its circumference to the nearest tenth?

5. Find the circumference of a circle whose diameter is 12.5 yards to the nearest tenth. see notes

6. What is the circumference of a circle with a radius of 2.05 inches to the nearest tenth?

3)

$$\begin{array}{r} 3.14 \\ \times\ 0.65 \\ \hline 1570 \\ +\ 18840 \\ \hline 20410 \end{array}$$

2.0410

≈ 2.0 ft

5) $d = 12.5$ yd

$C = \pi d$

$C = (3.14) \cdot (12.5)$

$$\begin{array}{r} 3.14 \\ \times\ 12.5 \\ \hline 1570 \\ 6280 \\ +\ 31400 \\ \hline 39250 \end{array}$$

39.250

$C \approx 39.3$ yd

NAME _____ DATE _____ PERIOD ____

4-6

Practice: Word Problems

Circumference

AUDIO MEDIA For Exercises 1–3, use the table that shows the sizes of three main audio media: vinyl, CD, and mini-disc. Use 3.14 for π.

Diameters of Audio Media	
Medium	Diameter (inches)
Vinyl Disc	12
Compact Disc (CD)	5
Mini Compact Disc (Mini-disc)	2.5

1. What is the circumference of a CD?

2. When a record player needle is placed on the outside edge of a vinyl record, how far does the needle travel in one rotation?

3. What is the difference between the circumference of a vinyl disc and a mini-disc?

4. **CROP CIRCLES** On June 8, 1992 a crop circle with an 18-meter radius was found in a wheat field near Szekesfehervar, 43 miles southwest of Budapest. What was its circumference?

$C = 2 \cdot \pi \cdot r$

$C = \pi(2 \cdot 18) = \pi(36) = 3.14 \times 36$

5. **SEQUOIAS** The largest living thing in the world is the General Sherman sequoia in Sequoia National Park, California. It is 272 feet high, has a diameter of 36.5 feet and has an estimated weight of 2,150 tons. What is the sequoia's circumference to the nearest tenth of a foot?

$C = \pi \cdot d$

$C = (3.14)(36.5)$

6. **MONSTER TRUCKS** A monster truck fleet uses 23 degree tires 66 inches tall, 43 inches wide, mounted on 25-inch diameter wheels. What is the circumference of a monster truck wheel to the nearest tenth of an inch?

$C = \pi \cdot d$

$= 3.14(25)$

3.14×25