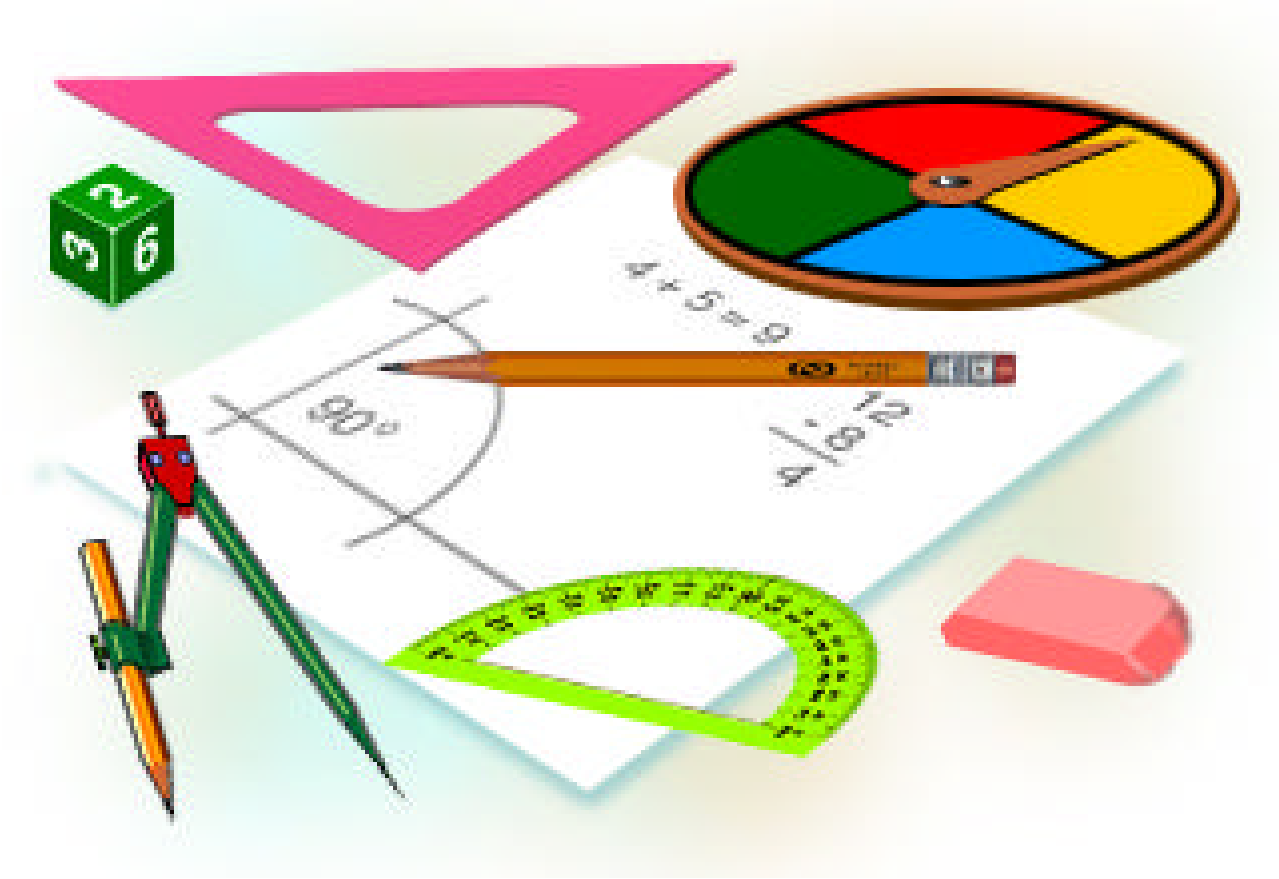
The Next Step

Mathematics Applications for Adults



Book 14014 – Measurement

OUTLINE

Mathematics - Book 14014

Measurement
Time
demonstrate an understanding of divisions of time.
interpret and use numeric dating.
Money
make change in dollars and cents to $20.00.
count change back orally beginning with the cost of an item and amount tendered.
find unit cost.
Metric Measurement
use metric measurement to estimate and measure linear, volume and mass measurements.
use correct units for linear, volume and mass measurements.
use a chart to convert from large to small (and vice versa) metric units.
find perimeter of rectangle, square, triangle and any multi-sided figure.
Word Problems with Measurement
solve one/two step problems with addition, subtraction, multiplication and division of whole numbers, time, money, temperature, and metric measurement.

THE NEXT STEP

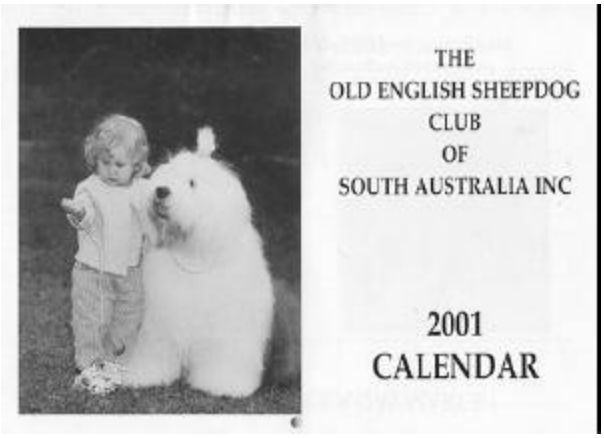
Book 14014

Measurement

Time

A ***day*** is the time it takes earth to spin around once on its *axis*, or twenty-four hours. (The axis is an imaginary pole that runs through the middle of the planet from the North Pole to the South Pole.) Seven days make up one *week*. Twenty-eight to thirty-one days make up one ***month***. A month is the approximate time needed for the moon to revolve once around earth. The lunar month actually takes twenty-nine days, twelve hours, forty-four minutes, and three seconds.

Twelve months make up one ***year***. A year is the time it takes earth to revolve once around the sun, or 365 days, five hours, forty-eight minutes, and forty-six seconds.

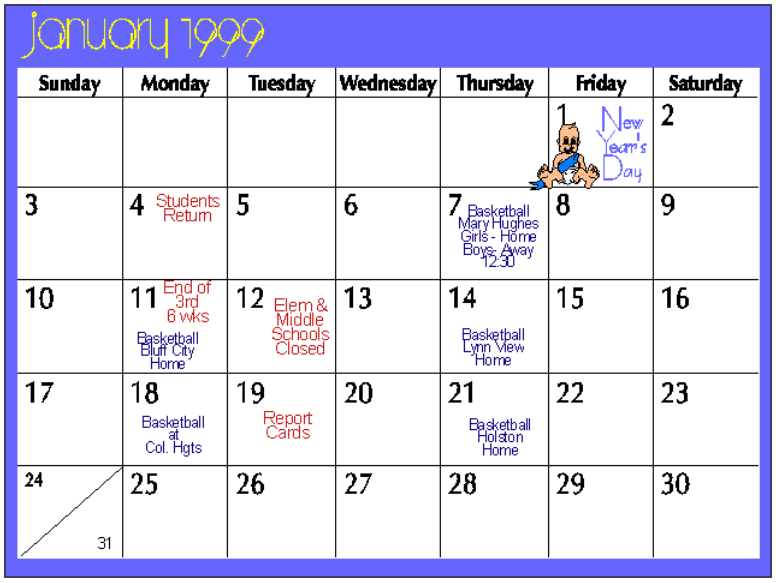


Calendars are tools that help us group days into weeks, months, and years. The calendar used throughout the world today is called the ***Gregorian*** calendar.

The astronomer Sosigenes was asked by Julius Caesar to create a calendar for the Roman Empire. The calendar was based on the solar year of 365 days. The year was divided into twelve months. Each month lasted thirty or thirty-one days, with the exception of February, which lasted either twenty-eight or twenty-nine days. The Julian calendar is the basis for the Gregorian calendar that was introduced by Pope Gregory VIII in 1582. The names used for the months in the Roman calendar were used in the Julian calendar. These names are also used today.

Roman	Gregorian	Roman	Gregorian
Januarius	**January**	**Quintilis**	**July**
Februarius	**February**	**Sextilis**	**August**
Martius	**March**	**September**	**September**

Aprilis	**April**	**October**	**October**
Maius	**May**	**November**	**November**
Junius	**June**	**December**	**December**



The names we use for weekdays come from the Saxons of England. The Saxons named the days for the planets and their gods.

SUN'S day .....Sunday
MOON'S day .....Monday
TIW'S day .....Tuesday
WODEN'S day .....Wednesday
THOR'S day.....Thursday
FRIGG'S day .....Friday
SATURN'S day .....Saturday

Sosigenes made a mistake in the Julian calendar, but nobody found the mistake for hundreds of years. He made every fourth year a leap year, but these leap years made the calendar too long to measure the cycle of the sun. By the 1500s, the Julian calendar was almost two weeks ahead of the actual solar year.

Pope Gregory VIII fixed the mistake in 1582. Leap years were now added to the calendar every four years except for the years that begin new centuries, unless the number of the new century can be divided evenly by 400.

The century date 1900 was not a leap year (1900 ¸ 400 = 4 3/4), but the year 2000 was a leap year (2000 ¸ 400 = 5).

Pope Gregory VIII's calendar is accurate to within sixteen seconds per year. That's the reason we still use it today.

⇒ **Remember: 30 days has September**
April, June, and November,
All the rest have 31,
Except February which has 28 days clear
And 29 each leap year.

Numeric Dating

Numeric dating is the way of recording the date with 8 digits.
year: the last two digits 1977 = 77
month: 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12
day: number of the day

The three styles are:	d/m/y	01/11/95
	y/m/d	95/11/01
	m/d/y	11/01/95

These are all different ways of writing November 1, 1995.

Numeric dating is usually used when filling in forms.

Remember all the concerns that we had around the year 2000? This was all due to the fact that we were using numeric dating. As the year 2000 was approaching, we had a problem with computers that were reading only the last 2 digits of the year. If the computers were not 2000 compatible, they were reading 20<u>01</u> as 1901 or 20<u>21</u> as 1921.

Express the following with numeric dating using y/m/d.

1) Christmas 1942
2) July 1, 1999
3) Halloween 1975
4) Valentine's Day 1920
5) Your birthday

We divide ***days*** into 24 ***hours***, but hours are divided into ***60*** parts. Roman astronomers called each division a ***par minuta*** or "small part of an hour." From the Latin name comes our word ***minute***. These early astronomers also divided minutes into *60* equal parts. They called each division ***par seconda***, or ***second***.

Measures of Time

60 seconds (sec) = 1 minute (min)
60 minutes = 1 hour (hr)
24 hours = 1 day
7 days = 1 week (wk)
12 months (mo), or 52 weeks, or 365 days = 1 year (yr)
366 days = 1 leap year

Fill in the answer

1. 49 mins = _____ secs
2. 56 mins 10 secs = _____ secs
3. 59 mins = _____ secs
4. 52 mins 16 secs = _____ secs
5. 31 mins = _____ secs
6. 4 mins 3 secs = _____ secs
7. 7 hours = _____ mins
8. 1 day 47 mins = _____ mins
9. 60 secs = _____ mins

10. 4 days 7 hours = _____ mins
11. 25,200 secs = _____ hours
12. 2,520 mins 43,200 secs = _____ hours
13. 180 mins = _____ hours
14. 17 hours 540 mins = _____ hours
15. 456 hours = _____ days
16. 791 days 1,440 mins = _____ days
17. 432 hours = _____ days
18. 176 days 17,280 mins = _____ days
19. 12 days 2,510 mins = _____ hours _____ mins
20. 638 mins = _____ hours _____ mins
21. 23 hours 2,243 mins = _____ hours _____ mins
22. 2,583 mins = _____ hours _____ mins

Schedule

A table that lists activities and the times they happen
Example:

FLIGHTS FROM MIAMI TO NEW YORK CITY	
Each flight lasts about 2 hours and 45 minutes.	
Airline	**Departure Time**
Airline A	9:10 A.M.
Airline B	10:15 A.M.
Airline C	12:50 P.M.
Airline D	1:20 P.M.

Parts of Schedules

1) Schedules Have Titles

The title is a short description of the topic or main idea.

Example: Plane Schedule

FLIGHTS FROM MIAMI TO NEW YORK CITY
The *title* gives the route for each plane (Miami to New York City)

2) Schedules Often Contain Tables

A table is a list of words and numbers written in rows and columns. Columns are read up and down. Rows are read across.

Each flight lasts about 2 hours and 45 minutes.	
Airline	**Departure Time**
Airline A	9:10 A.M.
Airline B	10:15 A.M.
Airline C	12:50 P.M.
Airline D	1:20 P.M.

This *table* gives the times when each plane leaves and the airline that each plane flies for.

3) Schedules Often Have Symbols

Symbols provide additional information. A key is often used to give the meaning or value of a symbol.

Practice Exercise

FLIGHTS FROM MIAMI TO NEW YORK CITY	
Each flight lasts about 2 hours and 45 minutes.	
Airline	**Departure Time**
Airline A	9:10 A.M.
Airline B	10:15 A.M.
Airline C	12:50 P.M.
Airline D	1:20 P.M.

1. At what time does Airline D's flight leave from Miami?

2. At about what time does Airline D's flight arrive in New York City?

3. About how long does Airline D's flight take to get to New York City?

4. At about what time will the earliest flight leaving from Miami arrive in New York City?

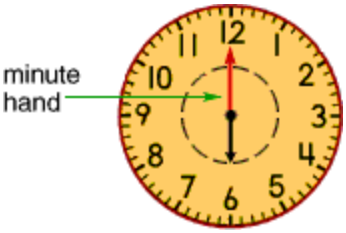
5. If you flew round-trip on Airline C's flight, about what time could you expect to arrive back in Miami if you didn't have to wait in New York City?

6. How much later does Airline C's flight leave for New York City than Airline B's flight?

7. How much later does Airline D's flight arrive in New York City than Airline B's flight?

Hour Hand

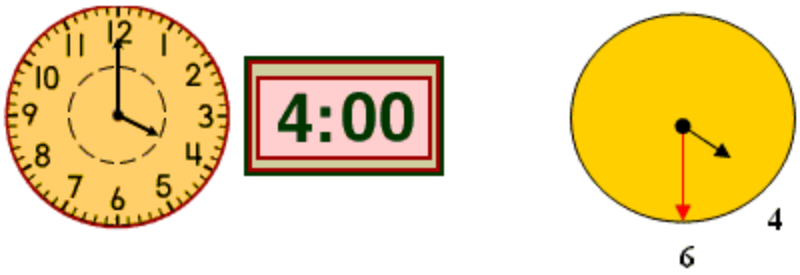
Minute Hand



O'clock

The clock shows 1 **o'clock**

Half Hour



A **half hour** is 30 minutes, so when the **minute hand** reaches the six and the hour hand remains on four, the new time will be **4:30.**

A **quarter hour** is 15 minutes, so when the **minute hand** rests on 3 and the hour hand moves to 5, the new time will be **5:15** or **quarter past** or **quarter after 5.**

When the **minute hand** moves to 9 and the hour hand remains on 5, the new time will be **5:45** or **quarter to 5.**

Standard time means the measurement of the day in two blocks of twelve hours each. The twelve hours from midnight to just before noon are ***a.m.*** hours. The twelve hours from noon until just before midnight are ***p.m.*** hours. The abbreviations "a.m." and "p.m." come from the Latin for ***ante meridiem*** and ***post meridiem***, meaning ***before*** (ante) and ***after*** (post) midday or noon (***meridiem***).

Today many clocks and watches use the battery-powered vibrations of a quartz crystal to keep time. The natural vibration of a quartz crystal is 100,000 times per second. Modern clocks and watches show the time in digital as well as analog displays.

Digital

Analog

How to Tell Time

This clock demonstrates how minutes are to be read on an analog clock face. We know that there are 60 minutes in one hour, so the minute hand indicates the number of minutes that we are to read. In this picture, the minute hand (the longer red hand) is pointing at the 2 which stands for 10 minutes. The hour hand (the shorter blue hand) is pointing at the 9. We can read the time as "10 minutes after 9", "10 minutes past 9", or "9:10". You could even say that it is "50 minutes before 10", because it will take another 50 minutes before the hour hand points at the 10.

To figure out the minutes on a clock face, you must skip count by fives. For example, the 1 represents 5 minutes, the 2 represents 10 minutes, the 3 represents 15 minutes…and so on.

Digital time is read from left to right. The first number stands for hours and the second number, after the colon, stands for minutes.
The clock above reads “10:20”. That means 10 hours and 20 minutes. You will also notice that the numbers are proceeded by the letters “P.M.” which tells us that this clock is reading “10:20 in the evening”, “20 minutes after 10”, “20 minutes past 10”, “40 minutes before 11”, or “40 minutes to 1”.

Practice Exercise

Draw the hands on the clocks.

10:13 1:26 5:56

9:38

4:37

11:33

7:25

12:40

2:02

What time is it?

_____ _____ _____

_____ _____ _____

_____ _____ ----------

Military Time

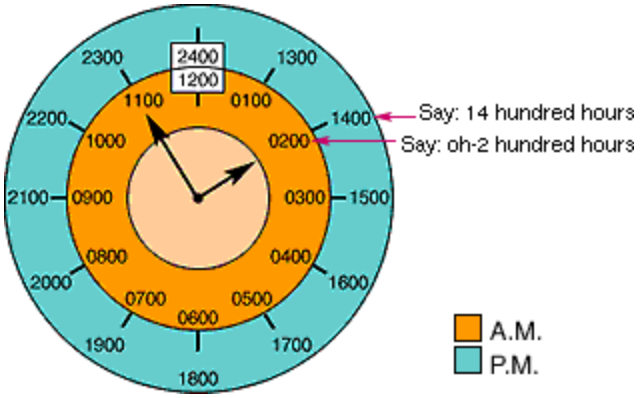
Standard time can be confusing. For example, eight o'clock can mean eight in the morning or eight in the evening. To avoid confusion, scientists created a 24-hour clock. The hours are numbered ***1*** through ***24***, beginning at midnight. This way of counting the hours in a day is called ***military time***. People who use military time say the time in a special way. For example, 11:00 is not called "eleven o'clock," but "eleven hundred hours."

Standard Time	24-Hour Time	Military Time
12:01 midnight	00:00	0001 hours
1:00 am	01:00	0100 hours
2:00 am	02:00	0200 hours
3:00 am	03:00	0300 hours
4:00 am	04:00	0400 hours
5:00 am	05:00	0500 hours
6:00 am	06:00	0600 hours
7:00 am	07:00	0700 hours
8:00 am	08:00	0800 hours
9:00 am	09:00	0900 hours
10:00 am	10:00	1000 hours
11:00 am	11:00	1100 hours
12:00 noon	12:00	1200 hours
1:00 pm	13:00	1300 hours
2:00 pm	14:00	1400 hours
3:00 pm	15:00	1500 hours
4:00 pm	16:00	1600 hours
5:00 pm	17:00	1700 hours
6:00 pm	18:00	1800 hours
7:00 pm	19:00	1900 hours
8:00 pm	20:00	2000 hours
9:00 pm	21:00	2100 hours
10:00 pm	22:00	2200 hours
11:00 pm	23:00	2300 hours
12:00 midnight	24:00	2400 hours

24-Hour Clock

A clock that does not use A.M. or P.M.

Example:



Money

The word ***dollar*** comes from the German word for a large silver coin, the ***Thaler***. In 1781, ***cent*** was suggested as a name for the smallest division of the dollar. Thomas Jefferson, third President of the United States and an amateur scientist, thought that the dollar should be divided into 100 parts. The word ***cent*** comes from the Latin ***centum***, which means one hundred.

1 penny = 1 cent (¢)
1 nickel = 5 cents
1 dime = 10 cents
1 quarter = 25 cents
1 dollar ($) = 100 cents

Penny (Cent)

Nickel

Dime

Quarter

Dollar (Loonie)

Toonie

Canadian money is created in decimal-based currency. That means we can add, subtract, divide, and multiply money the same way we do any decimal numbers.

The basic unit of Canadian currency is the “loonie” or dollar. The dollar has the value of one on a place value chart. The decimal point separates dollars from cents, which are counted as tenths and hundredths in a place value chart.

$1.11	**ones = dollars**	**.**	**tenths = dimes**	**hundredths = pennies**
one cent				**1**
ten cents		**.**	**1**	**0**
one dollar	**1**	**.**	**0**	**0**

$4.63	**ones = dollars**	**.**	**tenths = dimes**	**hundredths = pennies**
three cents				**3**
sixty cents		**.**	**6**	**0**
four dollars	**4**	**.**	**0**	**0**

$1.11 = $1.00 + 10Ë + 1Ë is read as 1 dollar and 11 cents
$4.63 = $4.00 + 60Ë + 3Ë is read as 4 dollars and 63 cents

When you write down amounts of money using the dollar sign, ***$***, you write the amounts the same way as you write decimal numbers—in decimal notation. There is a separate cents sign, ***Ë***. The cents sign does not use decimal notation. So if you have to add cents to dollars, you have to change cents to dollar notation.

8Ë = $.08

36Ë = $.36

100Ë = $1.00

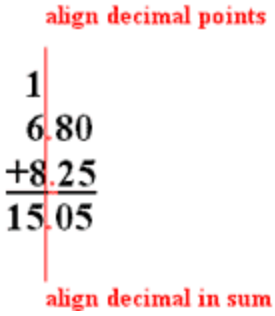
Fill in the blank.

1. 3 quarters, 4 pennies equals _____ cents.
2. **613** cents equals _____ quarters, _____ nickels, _____ dollars, _____ dimes, _____ pennies.
3. 8 dollars equals _____ cents.
4. 9 nickels equals _____ cents.
5. 2 nickels, 5 pennies, 1 quarter, 2 dollars, 2 dimes equals _____ cents.
6. **170** cents equals _____ dimes, _____ dollar, _____ nickel, _____ quarter.

7. 8 pennies equals _____ cents.
8. 3 pennies, 1 dime equals _____ cents.
9. **100** cents equals _____ nickels, _____ quarters.
10. **153** cents equals _____ nickels, _____ dollar, _____ dimes, _____ pennies.
11. 4 dollars, 2 pennies, 2 nickels equals _____ cents.
12. 8 quarters equals _____ cents.
13. 5 dollars, 3 dimes, 1 penny, 2 nickels equals _____ cents.
14. 5 dollars equals _____ cents.
15. **56** cents equals _____ dimes, _____ penny, _____ nickels.
16. 4 pennies, 4 dollars, 2 quarters, 3 dimes equals _____ cents.
17. **555** cents equals _____ dollars, _____ nickel, _____ dimes.
18. 4 quarters equals _____ cents.
19. 9 pennies equals _____ cents.
20. 4 pennies, 4 nickels, 4 quarters, 5 dollars equals _____ cents.
21. **74** cents equals _____ quarter, _____ dimes, _____ nickels, _____ pennies.
22. 4 pennies equals _____ cents.

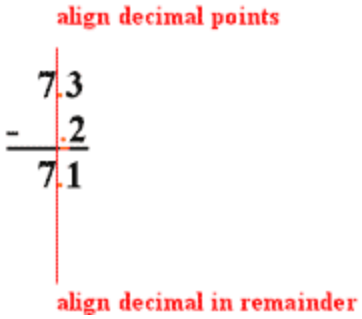
Adding decimals is easy.

First, align the decimal points of the decimals. Then treat decimal fractions like whole numbers, aligning the decimal point in the sum.



Subtracting decimals is easy.

First, align the decimal points of the decimals. Then treat decimal fractions like whole numbers, aligning the decimal point in the remainder.



To multiply decimals, treat them as if they were whole numbers, at first ignoring the decimal point.

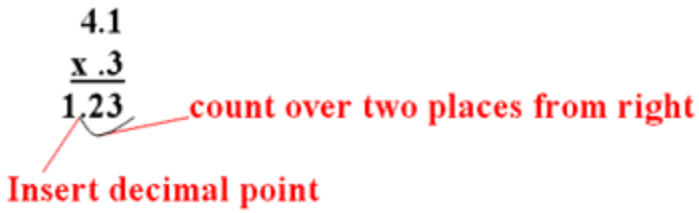
4.1
x .3
123

Next, count the number of places to the right of the decimal

point in the multiplicand. Add this to the number of places to the right of the decimal point in the multiplier.

4.1 multiplicand ---------- one place
x .3 multiplier ---------- +one place
two places

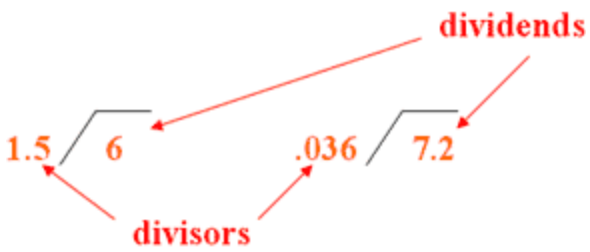
Last, insert the decimal point in the product by counting over from the right the appropriate number of places.



Here are two other examples:

8.9	**65.003**
x 1.0	**x .025**
0 0	**325015**
8 9 0	**1300060**
8. 9 0	**1.625075**

Begin dividing decimals the same way you would divide whole numbers.



(Note that 6 = 6.0.)

Write the divisor as a whole number. Do this by multiplying the divisor by a ***10, 100, 1,000, 10,000,*** or some other ***power*** of ***10***.

To find the ***powers*** of a number, multiply the number over and over by itself. The ***first power*** is the number. The ***second power*** is the product of the number multiplied once by itself. The ***third power*** is the number multiplied twice by itself, and so on. For example:

$2^1 = 2 \times 1$ **$2^2 = 2 \times 2$** **$2^3 = 2 \times 2 \times 2$**

$10^1 = 10 \times 1$ **$10^2 = 10 \times 10$** **$10^3 = 10 \times 10 \times 10$**

Þ ***There is a special way of writing the power of a number called an exponent. It's the tiny number written above and to the right of the number.***

Continue the division process by multiplying the divisor by a power of ***10*** large enough to make it into a whole number.

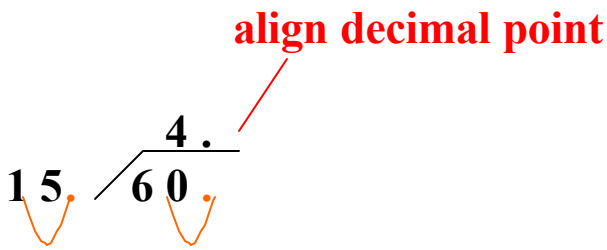
1.5 x 10 = 15

power of ten

Then multiply the dividend by the same power of 10.

6 x 10 = 60

Continue the division process as usual.

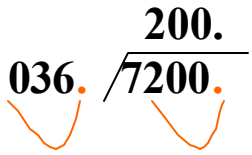


Align the decimal point in the remainder with the decimal point in the dividend.

Here is another example:

.036 7.2
.036 x 1,000 = 36

7.2 x 1,000 = 7,200



Practice Exercise

Adding and Subtracting Money

Solve for each of the given problems.

1. \$34.03 +95.13	2. \$80.21 -24.43	3. \$71.01 +58.33	4. \$95.88 -20.99	5. \$62.97 -49.14
6. \$39.79 -18.47	7. \$62.26 +84.21	8. \$29.74 +81.09	9. \$50.04 +26.58	10. \$88.51 +41.17
11. \$29.89 -27.94	12. \$11.94 -11.25	13. \$16.26 -10.36	14. \$79.26 +44.68	15. \$68.07 +18.08
16. \$29.94 -29.85	17. \$79.16 -75.21	18. \$62.00 -15.61	19. \$36.77 +26.46	20. \$15.83 +24.23

Multiplication

Solve each problem.

(1) \$42.96 × 5	(2) \$37.18 × 5	(3) \$67.27 × 4	(4) \$90.48 × 2	(5) \$63.14 × 5

(6) $21.74 × 5	(7) $43.22 × 2	(8) $72.93 × 2	(9) $78.98 × 6	(10) $95.77 × 7
(11) $46.59 × 6	(12) $39.18 × 4	(13) $84.33 × 9	(14) $34.41 × 7	(15) $67.84 × 8

Division

Solve each problem.

1.	$4\overline{)\$49}$	**2.**	$3\overline{)\$23.58}$	**3.**	$9\overline{)\$47.79}$
4.	$10\overline{)\$188.10}$	**5.**	$9\overline{)\$169.29}$	**6.**	$7\overline{)\$102.69}$
7.	$6\overline{)\$38.70}$	**8.**	$9\overline{)\$69.57}$	**9.**	$7\overline{)\$24.22}$
10.	$10\overline{)\$82.30}$	**11.**	$4\overline{)\$71.96}$	**12.**	$3\overline{)\$26.70}$
13.	$2\overline{)\$23.66}$	**14.**	$8\overline{)\$110.80}$	**15.**	$2\overline{)\$31.22}$
16.	$8\overline{)\$138.16}$	**17.**	$4\overline{)\$60.32}$	**18.**	$10\overline{)\$132.70}$

Making Change

Change is the difference between how much something costs and the amount of money given.

toothpaste 59Ë

You give the cashier $1.00
$1.00
- .59
Your change $ .49

soap = $1.59
towel = $4.50
shampoo = $3.60
total = $9.69
You give $10.00
$10.00
- 9.69
Your change $ .41

Change can be returned in different combinations.

41 cents =
4 dimes + 1 penny
2 dimes + 4 nickels + 1 penny
1 dime + 6 nickels + 1 penny
8 nickels + 1 penny
1 quarter + 1 dime + 1 nickel + 1 penny
41 pennies

Practice Exercise

How much is the money worth?

1. 

$ _____

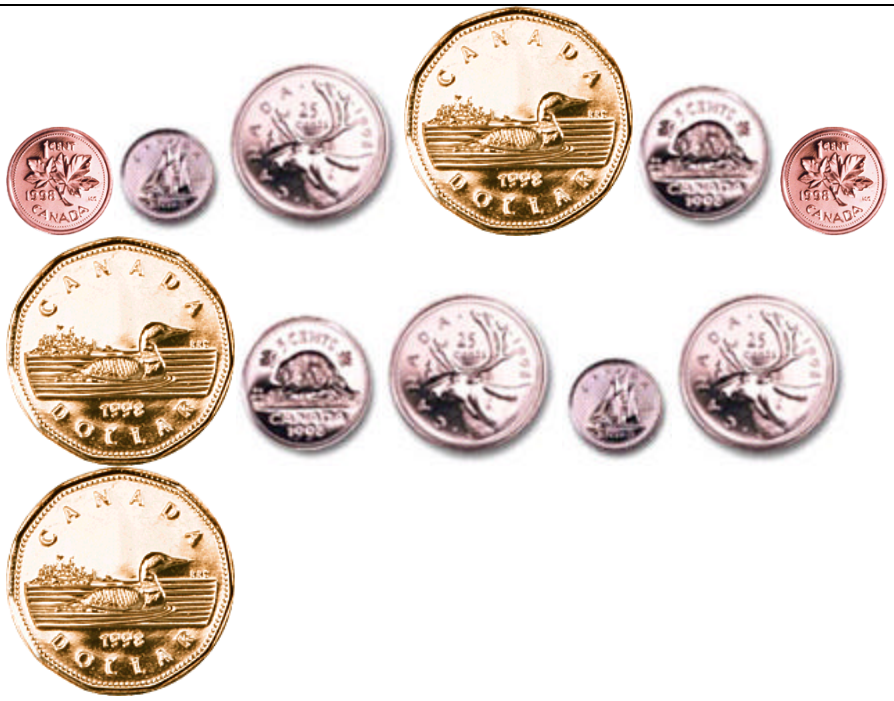
2. 

$ _____

3. 

$ _____

4.



$ _____

5.

$ _____

6.

$ _____

7.

$ _____

8.

$ _____

In this exercise, circle the coins needed to equal the amount of money shown.

1.

Circle **46** cents!

2.

Circle **16** cents!

3.

Circle **79** cents!

4.

Circle **11** cents!

5.

Circle **86** cents!

6. 

Circle **40** cents!

Unit Pricing

Family members are consumers as well as workers. They spend a considerable amount of money to purchase food and other items that they need or desire. To obtain the maximum value for their money it is important to shop wisely. One way to stretch a dollar in the supermarket is to compare *unit prices* of items. A unit price is the amount charged for a single unit of measure such as one ounce or one pound. The unit price of an item is frequently printed on a price label along with the total cost of the item. If two items are of the same quality, it is worthwhile to buy the item that is a cent or two less per unit. Small savings repeated many times add up to big savings. The following formula may be used to compute the unit price of an item:

Unit Price = (Price of Item) ÷ (Weight of Item)

Example 1: If a ten pound bag of potatoes costs $1.25, what is the price per pound of the potatoes?

Solution: Price per pound $1.25 ÷ 10 = $.125

The unit price is approximately 13 cents per lb.

Example 2: Is it better to buy a 2 pound jar of jelly for $1.18 or a 3 pound jar of the same jelly for $1.68?

Solution:

$1.18 ÷ 2 = $.59 per pound

$1.68 ÷ 3 = $.56 per pound

The 3 pound jar for $1.68 is the better buy.

Use the advertised prices from the stores below to answer the questions that follow.

FRED'S FOODS

Margarine **2** 8-oz. cups **.69**
48 size, Indian River seedless grapefruit **7** for **$1**
orange juice ½-gallon cont. **69Ë**

GERT'S GROCERIES

Margarine **3** 8-oz. cups **99Ë**
Indian River Seedless Grapefruit (48 size) **6** for **89Ë**
Orange Juice 64-oz. btl. **59Ë**

SAM'S STORE

Margarine 1-lb. pkg. **59Ë**
Florida Seedless Grapefruit **4** for **49Ë**
Orange Juice **3** 1 qt. conts**. $1.00**

What is the price of 8 ounces of margarine

1. **at Fred's Foods?**
2. **at Gert's Groceries?**
3. **at Sam's Store? (1 pound = 16 ounces.)**
4. **Which store has the cheapest margarine?**

What is the price of one seedless grapefruit

5. **at Fred's Foods?**
6. **at Gert's Groceries?**
7. **at Sam's Store?**
8. **Which store has the cheapest grapefruit?**

What is the price of one quart (32 ounces) of orange juice

9. **at Fred's Foods? (1 gallon = 4 quarts)**
10. **at Gert's Groceries?**
11. **at Sam's Store?**
12. **Which store has the cheapest orange juice?**

Metric Measurement

In the 1790s, French scientists worked out a system of measurement based on the ***meter***. The meter is one ten-millionth of the distance between the North Pole and the Equator. The French scientists made a metal rod equal to the length of the standard meter.

By the 1980s, the French metal bar was no longer a precise measure for the meter. Scientists figured out a new standard for the meter. They made it equal to 1/299,792,548 of the distance light travels in a vacuum in one second. Since the speed of light in a vacuum never changes, the distance of the meter will not change.

The French scientists developed the ***metric*** system to cover measurement of length, area, volume, and weight.

Metric Length Equivalents

Metric Unit	Abbreviation	Metric Equivalent
millimeter	mm	.1 centimeter
centimeter	cm	10 millimeters
decimeter	dm	10 centimeters
meter	m	100 centimeters
decameter	dam	10 meters
hectometer	hm	100 meters
kilometer	km	1000 meters

Metric Weight Equivalents

Metric Unit	Abbreviation	Metric Equivalent
milligram	mg	.001 gram
centigram	cg	10 milligrams
decigram	dg	10 centigrams
gram	g	1,000 milligrams
decagram	dag	10 grams
hectogram	hg	100 grams
kilogram	kg	1,000 grams

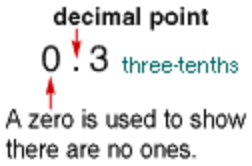
Metric Volume Measures

Metric Unit	Abbreviation	Metric Equivalent
milliliter	ml	.001 liter
centiliter	cl	10 milliliters
deciliter	dl	10 centiliters
liter	l	1,000 milliliters
decaliter	dal	10 liters
hectoliter	hl	100 liters
kiloliter	kl	1,000 liters

Decimal Point

A period that separates the whole numbers from the fractional part of a number; or that separates dollars from cents

Example:



Kilometers	**Hectometers**	**Decameters**	**Meters**	**Decimeters**	**Centimeters**	**Millimeters**
Kilograms	**Hectograms**	**Decagrams**	**Grams**	**Decigrams**	**Centigrams**	**Milligrams**
Kiloliters	**Hectoliters**	**Decaliters**	**Liters**	**Deciliters**	**Centiliters**	**Milliliters**

To use this chart, if a question asks you how many grams that you can get from 200 centigrams, for example, try this:

Start by putting down the number:

200

If we don't see a decimal point, the number is a whole number; and therefore, a decimal point may be inserted to the right of the last digit:

200.

Now, using your chart, start at centigrams and count back to grams (two spaces to the left).

Move the decimal point in your number the same amount of spaces in the same direction:

2.00

The answer to the question is that 200 centigrams is equal to 2 grams.

If a questions asks you to tell how many millimeters are is 8.3 decimeters, try this:

Write down the number:

8.3

We already see a decimal point, so there is no need to guess where to place it:

8.3

Now, using your chart, start at decimeters and count forward to millimeters (two spaces to the right).

Move the decimal point in your number the same amount of spaces in the same direction:

830.

The answer to the question is that 830 millimeters is equal to 8.3 decimeters.

Fill in the answer.

1.	4 cl = _____ ml	2.	11000 g = _____ kg	3.	70 mm = _____ cm
4.	9000 L = _____ kl	5.	10 mm = _____ cm	6.	3 g = _____ cg

7. 5 kl = _____ L

8. 1200 cl = _____ L

9. 3000 L = _____ kl

10. 20 mg = _____ cg

11. 800 cm = _____ m

12. 2 kg = _____ g

13. 500 cl = _____ L

14. 7000 g = _____ kg

15. 9 cg = _____ mg

16. 6000 ml = _____ L

17. 400 cl = _____ L

18. 11 cm = _____ mm

19. 1100 cm = _____ m

20. 10000 mm = _____ m

21. 200 cl = _____ L

22. 6000 g = _____ kg

23. 100 cl = _____ L

24. 9000 mm = _____ m

25. 10000 g = _____ kg

26. 3 cg = _____ mg

27. 1000 g = _____ kg

28. 7 g = _____ cg

29. 80 mg = _____ cg

30. 4000 L = _____ kl

31. 5 cl = _____ ml

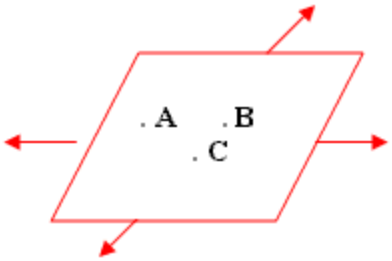
32. 8 km = _____ m

33. 100 mm = _____ cm

Geometric Shapes

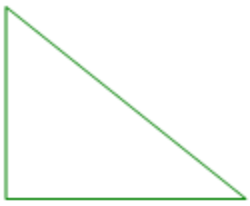
Polygons are two-dimensional, or flat, shapes, formed from three or more line segments that lie within one ***plane***.

Planes are an infinite set of points that make up a flat surface. Planes extend in all directions to infinity but have no thickness.



Plane ABC

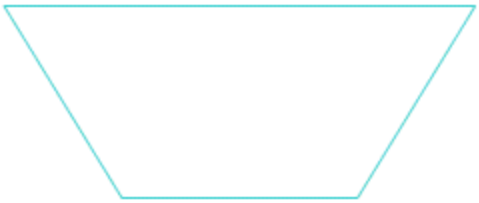
The line segments in polygons form angles that meet at points called ***vertexes*** (corners). Polygons come in many shapes and sizes, including:



Triangles are polygons that have three sides and three vertexes.

Quadrilaterals are polygons that have four sides and four vertices.

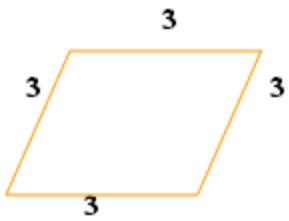
Parallelograms are quadrilaterals that have parallel line segments in both pairs of opposite sides.



Trapezoids are quadrilaterals that have one pair of parallel sides.

Squares are rectangles that have sides of equal length.

Rectangles are parallelograms formed by line segments that meet at right angles. A rectangle always has four right angles.



Rhombuses are parallelograms that have sides of equal length.

Polygons

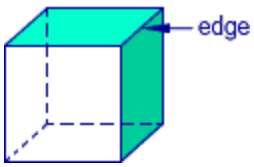
Name	Number of sides
triangle	**3**
quadrilateral	**4**
square	**4 equal and perpendicular (meet at right angles)**
rectangle	**4 perpendicular**
rhombus	**4 equal opposite parallel**
parallelogram	**4 opposite parallel**
pentagon	**5**
hexagon	**6**
heptagon	**7**

octagon	**8**
nonagon	**9**
decagon	**10**
undecagon or hendecagon	**11**
dodecagon	**12**
icosagon	**20**

Edge

The line segment where two faces of a solid figure meet

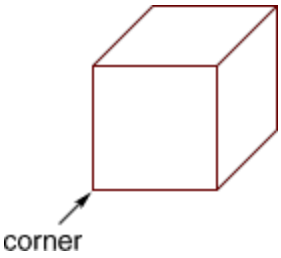
Example:



Corner (Vertex)

The place where two or more edges meet

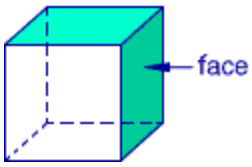
Example:



Face

A flat surface of a solid figure

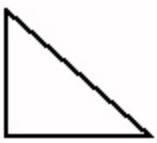
Example:



Practice Exercise

Write down the name for each polygon.

1.  **Hexagon**

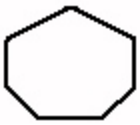
2.  _____

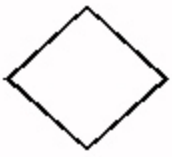
3.  _____

4.  _____

5.  _____

6.  _____

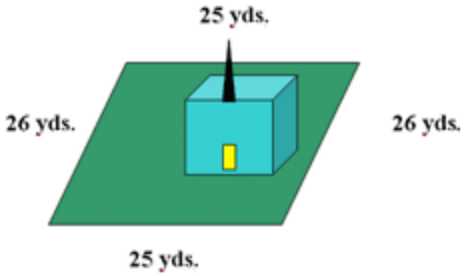
7.  _____

8.  _____

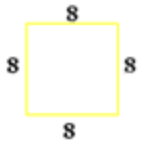
Calculating Perimeter

To measure flat spaces we calculate ***perimeter***. Perimeter is the distance around a two-dimensional or flat shape.

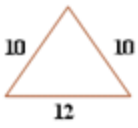
Perimeter is calculated in different ways, depending upon the shape of the surface. The perimeter of a surface outlined by straight lines is calculated by adding together the lengths of its sides.



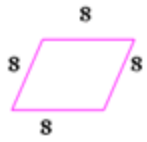
25 + 26 + 25 + 26 = 102 yds. perimeter of the rectangular lot



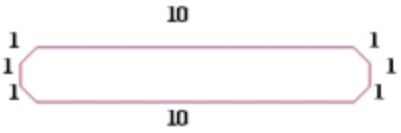
8 + 8 + 8 + 8 = 4 x 8 = 32
4s (4 sides) = perimeter of a square



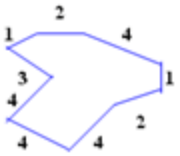
10 + 10 + 12 = 32
3s (3 sides) = perimeter of a triangle



8 + 8 + 8 + 8 = 4 x 8 = 32
4s = perimeter of a rhombus



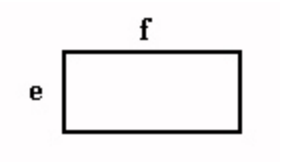
1 + 1 + 10 + 1 + 1 + 1 + 10 + 1 = 26
8s = perimeter of an irregular octagon



4 + 1 + 2 + 4 + 4 + 4 + 3 + 1 + 2 = 25
all sides = perimeter of an irregular polygon

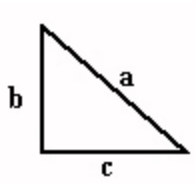
Practice Exercise

Find the perimeter.

1. 

e = 6 m
f = 11 m

34 m

2. 

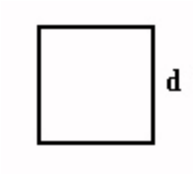
a = 3 in
c = 4 in
b = c

_____

3. 

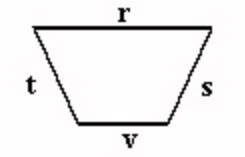
All sides equal 5 m

_____

4. 

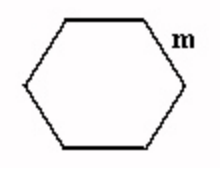
The side d of this square is 33 cm

_____

5. 

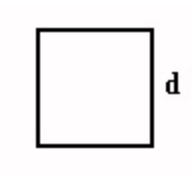
v = 4 m
t = 8 m
r = 13 m
s = t

_____

6. 

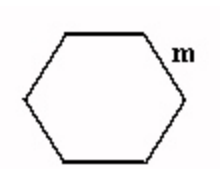
m = 21 cm
All sides are equal

_____

7. 

The side d of this square is 39 m

_____

8. 

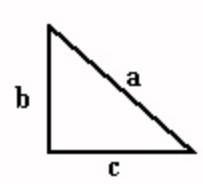
m = 16 cm
All sides are equal

_____

8. 

All sides equal 12 ft

_____

10. 

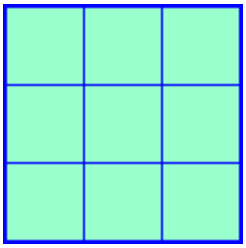
a = 5 cm
c = 6 cm
b = c

_____

Area

The number of square units needed to cover a given surface

Example:



The area is 9 square units.

Square Unit

The unit used to measure area

Example:

1 square unit

Word Problems with Measurement

1. Matt measured a board and found it was 30.6 centimeters wide. How many millimeters is that?

2. Tim, a delivery person, drove 21.68 kilometers. How many meters did he drive?

3. The length of a rectangular field is 0.015 kilometers and the width is 25 meters. What is the length of a fence that goes all around the field?

4. George bought a 2.8-kilogram package of ground beef. How many grams did he buy?

5. Sheila weighed a portion of vegetables. It weighed 90 grams. How many milligrams is the portion of vegetables?

6. A nutrition label on a can of mixed nuts says the fat content is 9 grams per serving and the sodium is 400 milligrams per serving. Which amount is smaller?

1. Tammy bought 5 cans of evaporated milk. Each can has a capacity of 354 milliliters. How many milliliters did she buy? How many liters?

2. Sammy needs 80 milliliters of liquid to run a lab test. He wants to run the test twelve times. How much liquid will he use?

3. Jerry has to be in school for 8 hours each weekday. How many minutes does he spend in school each week?

10. Jim works 8 hours a day, 5 days a week. How many hours does he work in one week?

11. Mary has 13 vacation days. Joe has 3 weeks. Who has more vacation days?

12. The local furniture store was advertising a 36-hour marathon sale. Was the sale more or less than 2 days?

Answer Key

Book 14014 - Measurement

Page 7

1. 42/12/25 **2.** 99/07/01 **3.** 75/10/31
4. 20/02/14 **5.** accept any reasonable answer

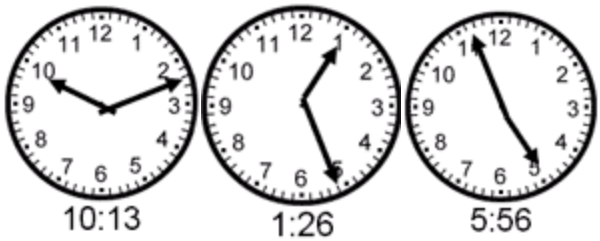
Page 8

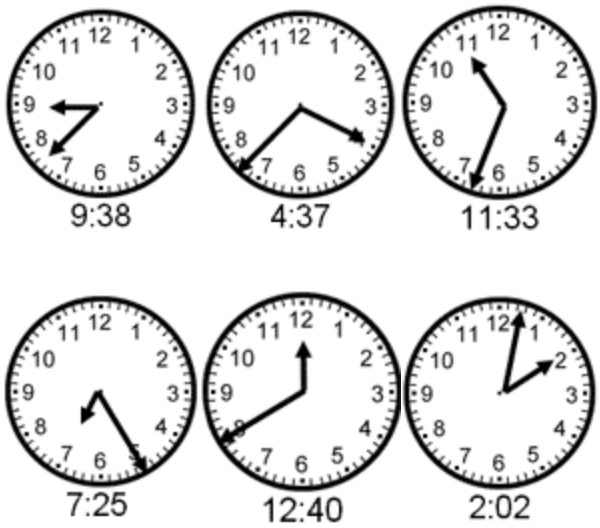
1. 2940 secs **2.** 3370 secs **3.** 3540 secs
4. 3136 secs **5.** 1860 secs **6.** 103 secs
7. 420 mins **8.** 1487 mins **9.** 1 min
10. 6180 mins **11.** 7 hours **12.** 54 hours
13. 3 hours **14.** 26 hours **15.** 19 days
16. 792 days **17.** 18 days **18.** 188 days
19. 329 hours 50 mins **20.** 10 hours 38 mins
21. 60 hours 23 mins **22.** 43 hours 3 mins

Page 12

1. 1:20 p.m. **2.** 4:05 p.m.
3. 2 hours and 45 mins **4.** 11:55 a.m.
5. 6:20 p.m. **6.** 2 hours and 35 mins
3. 3 hours and 5 mins

Page 16





Page 17 **Row 1:** 6:03, 12:53, 10:04
Row 2: 11:37, 1:13, 4:44
Row 3: 3:07, 2:17, 5:25

Page 23 **1.** 79 cents **2.** 4 quarters, 2 nickels, 4 dollars, 10 dimes, 3 pennies **3.** 800 cents **4.** 45 cents **5.** 260 cents **6.** 4 dimes, 1 dollar, 1 nickel, 1 quarter **7.** 8 cents **8.** 13 cents **9.** 5 nickels, 3 quarters **10.** 2 nickels, 1 dollar, 4 dimes, 3 pennies **11.** 412 cents **12.** 200 cents **13.** 541 cents **14.** 500 cents **15.** 4 dimes, 1 penny, 3 nickels **16.** 484 cents **17.** 5 dollars, 1 nickel, 5 dimes **18.** 100 cents **19.** 9 cents **20.** 624 cents **21.** 1 quarter, 3 dimes, 3 nickels, 4 pennies **22.** 4 cents
*****Note***There could be more than one solution for questions 2, 9, 10, 15, 17 and 21. Accept any reasonable response.**

Page 29

1. $129.16 **2.** $55.78 **3.** $129.34
4. $74.89 **5.** $13.83 **6.** $21.32
7. $146.47 **8.** $110.83 **9.** $76.62
10. $129.68 **11.** $1.95 **12.** $0.69
13. $5.90 **14.** $123.94 **15.** $86.15
16. $0.09 **17.** $3.95 **18.** $46.39
19. $63.23 **20.** $40.06 **21.** $1014.68
22. $418.17 **23.** $79.48 **24.** $920.17
25. $528.15 **26.** $22.82 **27.** $1437.77
28. $2.26 **29.** $270.47 **30.** $1104.55

Page 29

1. $214.80 **2.** $185.90 **3.** $269.08
4. $180.96 **5.** $315.70 **6.** $108.70
7. $86.44 **8.** $145.86 **9.** $473.88
10. $670.39 **11.** $279.54 **12.** $156.72
13. $758.97 **14.** $240.87 **15.** $542.72

Page 30

1. $12.25 **2.** $7.86 **3.** $5.31 **4.** $18.81
5. $18.81 **6.** $14.67 **7.** $6.45 **8.** $7.73
9. $3.46 **10.** $8.23 **11.** $17.99
12. $8.90 **13.** $11.83 **14.** $13.85
15. $15.61 **16.** $17.27 **17.** $15.08
17. $13.27

Page 32

1. $0.30 **2.** $5.10 **3.** $2.76 **4.** $4.07
5. $0.15 **6.** $1.41 **7.** $1.71 **8.** $2.92

Page 34

1. 1 quarter, 1 dime, 2 nickels, and 1 penny **or** 1 quarter, 2 dimes, and 1 penny **2.** 1 nickel and 1 penny **3.** 3 quarters and 4 pennies **or** 2 quarters, 2 dimes, 1 nickel, and 4 pennies **or** 2

quarters, 1 dime, 3 nickels, and 4 pennies **4.** 1 dime and 1 penny **5.** 3 quarters, 2 nickels, and 1 penny **or** 3 quarters, 1 dime, and 1 penny **6.** 1 quarter, 1 dime, and 1 nickel **or** 1 quarter and 3 nickels **or** 2 dimes and 4 nickels

Page 37 **1.** 35 cents **2.** 33 cents **3.** 30 cents **4.** Sam's Store **5.** 14 cents **6.** 15 cents **7.** 12 cents **8.** Sam's Store **9.** 35 cents **10.** 30 cents **11.** 33 cents **12.** Gert's Groceries

Page 42 **1.** 40 ml **2.** 11 kg **3.** 7 cm **4.** 9 kl **5.** 1 cm **6.** 300 cg **7.** 5000 L **8.** 12 L **9.** 3 kl **10.** 2 cg **11.** 8 m **12.** 2000 g **13.** 5 L **14.** 7 kg **15.** 90 mg **16.** 6 L **17.** 4 L **18.** 110 mm **19.** 11 m **20.** 10 m **21.** 2 L **22.** 6 kg **23.** 1 L **24.** 9 m **25.** 10 kg **26.** 30 mg **27.** 1 kg **28.** 700 cg **29.** 8 cg **30.** 4 kl **31.** 50 ml **32.** 8000 m **33.** 10 cm

Page 48 **2.** Triangle **3.** Triangle **4.** Octagon **5.** Rhombus **6.** Pentagon **7.** Heptagon **8.** Square

Page 50 **2.** 11 in **3.** 15 m **4.** 132 cm **5.** 33 m **6.** 126 cm **7.** 156 m **8.** 96 cm **9.** 36 ft **10.** 17 cm

Page 51 **1.** 306 mm **2.** 21680 m

3. 80 m **or** .08 km **4.** 2800 g
5. 90000 mg **6.** The amount of sodium.
7. 1770 ml, 1.77 L **8.** 960 ml
9. 480 minutes **10.** 40 hours **11.** Joe
12. less