The top number of a fraction is called the numerator and tells how many parts of the whole are being considered. The bottom number is called the denominator and tells how many equal parts the whole is divided into. When you read a fraction, say the top number first and then the bottom number. For example, \( \frac{1}{8} \) is read as one-eighth.

Fractions refer to a part of the total. A fraction tells how many parts are in the whole and what fraction of the whole they represent. To write fractions:
Activity: Half-Life

Procedure

1. Place the second piece of paper in the crumpled box. All pieces of paper should be crumpled and the other piece should be placed in the box.
2. Use the scissors to cut the sheet of paper in half.
3. Label one shoe box, and the other shoe box.
4. Place the marked pen to label one shoe box, and the other shoe box.
5. Place the second piece of paper in the crumpled box. All pieces of paper should be crumpled and the other piece should be placed in the box.

Materials

- Paper
- Scissors
- Marker

Purpose

To demonstrate how radioactive materials change.

Exercise

Answer

1. What fraction of the children are sitting?
2. What fraction of the children are sitting, lying, and being?
3. What fraction of the children are playing together?
4. Are the children playing?
5. Are the children playing, sitting, and being?
6. What is the total number of boys present?
7. How many roses are in the water?
8. What fraction of the total number of roses are in the water?
Fractional Parts

Example 1

Question:
Carol spends 1/2 of each day studying. How many hours a day does she study?

Answer:
There are 24 hours in one day.

\[ \frac{1}{2} \times 24 = 12 \] hours

Problems

1. How many hours in one day?
2. What is 2/4 of 12 hours?
3. What is 3/6 of 12 hours?

Step 1: Write the numbers as fractions by placing the whole number over 1.

Step 2: Write the equivalent fraction with a common denominator.

Step 3: When the numerator is smaller than the denominator, as in the case of 1/2, express the remainder as a fraction.

Step 4: Divide the numerator by the denominator to find the fractional part.
Dip your hand inside the plastic bag and scoop up some materials.
Close the bag and shake vigorously to mix.
Place the marshmallows and gumdrops in the plastic bag.

Procedure
1 qt size
21 red gumdrops
1 marshmallow
78 miniature black gumdrops

Materials
To demonstrate the fractional parts of an activity: MIXTURE

Exercise
1. Fairy read 4 books during the month of August. If she read
1/4 of the books, how many mystery books did she read in
August?

Answer

Step 1
Step 2
Fraction of boys wearing tennis shoes:

Number of boys wearing tennis shoes:

worth mystery books. How many mystery books did she read in
August?

1/4 of the class consists of boys wearing tennis shoes.

Question 2

1/4 of MRS. Ruiz's Science class are boys. 1/4 of the boys in
the class wear tennis shoes. What part or fraction of the class is made
up of boys wearing tennis shoes?
Surface: North America makes up 1/3 of the earth's land.

\[
\begin{align*}
\frac{20}{1} &= 3 + \frac{60}{3} \\
\frac{0}{1} &= \frac{6}{1} \\
\frac{6}{1} &= \frac{9}{1} \\
\frac{10}{1} &= \frac{6}{1}
\end{align*}
\]

Answer

Step 2

Think:

```
Fairy read 30 mystery books during August.

\[
\frac{30}{1} = \frac{9}{1} \\
\frac{10}{1} = \frac{4}{1}
\]

Answer

Step 2

Think:

```
Solutions

```

Did You Know?

```
The mixture represents a sample of clean air, which contains virtually no significant composition.

Approximately 30% of carbon is used in organic compounds, 15% in nitrogen, 10% in oxygen, and 5% in sulfur.

Results

Count the number of marigold flowers and black globs in any sample taken from the bag. The black globs will be fewer red globs in the bag than are marigolds. In one sample, there were 15 red globs and 25 marigolds.

```

Step 2

Think:

```
11/14 days

Answer

Step 1

Think:

```
Answer

Step 1

Think:

```
remainder: \[ \frac{1}{4} \]

```
1 year has 365 days.

Answer: 365 days

Step 2

Think:

```
Step 1

Think:

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Step 1

Think:

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Step 1

Think:

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Step 1

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Step 1

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Step 1

Think:

```
Step 1

Think:...
Exercises

1. Answer

\[ \frac{4}{9} = \frac{8}{18} \]

Think

\[ \frac{2}{9} = \frac{4}{18} \]

Question 1

Make the fractions equivalent.

Problems

By the same number

With a smaller denominator, divide the numerator and denominator.

Think

When changing a fraction with a small denominator to one with a
circle, this is expressed as \( \frac{4}{9} \). It is just as true to say that \( \frac{4}{9} \) is

Equivalent fractions represent the same amount of a

Equivalent fractions represent the same amount of a

Question 2

Make the fractions equivalent.

Equivalents
To demonstrate that equivalent fractions represent the same amount.

**Materials**
- Sheet of notebook paper
- Pencil
- Scissors
- Ruler

**Purpose**
- To form 6 straight lines.
- Place the ruler diagonally across the lines so that the ruler is edge to edge.
- Move to the next line and make another 6-in. (15-cm) mark.
- Place the ruler on the left and make a 6-in. (15-cm) mark over the line.
- Lay the ruler along the top edge of the paper.

**Procedure**
1. Lay the ruler along the top edge of the paper.
2. Line up a birthday cake into 16 equal pieces.
3. Lauren uses 100 common to each fraction in her sister's recipe.

\[
\begin{align*}
\text{a. } & \frac{16}{3} \quad \text{of 100} \\
\text{b. } & \frac{9}{4} \quad \text{of 100} \\
\text{c. } & \frac{25}{6} \quad \text{of 100} \\
\end{align*}
\]

Calculate the fraction of cake. How many people were served \( \frac{1}{8} \) of the cake?
3. a. Think

12 people were served.

\[ \frac{12}{75} = \frac{4}{25} \times \frac{3}{4} = \frac{3}{4} \times 4 = 12 \]

\[ \frac{16}{12} = \frac{4}{3} \times 4 = 16 \]

1. Think

Babe Ruth hit 25 home runs.

\[ \frac{25}{16} = \frac{25}{4} \times 4 = 25 \]

\[ \frac{8}{2} = \frac{8 + 2}{2} = \frac{10}{2} = 5 \]

\[ 8 \times \text{Think} = 4 \]

\[ 16 \text{ pennies} \]

\[ \frac{16}{100} = \frac{25}{4} \times \frac{4}{25} = \frac{1}{4} \]

\[ \frac{100}{25} = \frac{4}{2} \times \frac{4}{2} = 1 \]

\[ 25 \times 2 = 100 \]

\[ \frac{100}{75} = \frac{4}{3} \]

\[ \frac{9}{2} = \frac{9 + 2}{2} = \frac{11}{2} \]

\[ \frac{3}{4} \times 4 = 3 \]

\[ \frac{4}{3} \times 4 = 16 \]

\[ \frac{16}{12} = \frac{4}{3} \times 4 = 16 \]

\[ \frac{12}{75} = \frac{4}{25} \times \frac{3}{4} = \frac{3}{4} \times 4 = 12 \]

\[ \frac{16}{12} = \frac{4}{3} \times 4 = 16 \]

\[ \frac{25}{16} = \frac{25}{4} \times 4 = 25 \]

\[ \frac{8}{2} = \frac{8 + 2}{2} = \frac{10}{2} = 5 \]

\[ 8 \times \text{Think} = 4 \]

\[ 16 \text{ pennies} \]

\[ \frac{16}{100} = \frac{25}{4} \times \frac{4}{25} = \frac{1}{4} \]

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\[ \frac{100}{75} = \frac{4}{3} \]

\[ \frac{9}{2} = \frac{9 + 2}{2} = \frac{11}{2} \]

\[ \frac{3}{4} \times 4 = 3 \]

\[ \frac{4}{3} \times 4 = 16 \]

\[ \frac{16}{12} = \frac{4}{3} \times 4 = 16 \]

\[ \frac{12}{75} = \frac{4}{25} \times \frac{3}{4} = \frac{3}{4} \times 4 = 12 \]

\[ \frac{16}{12} = \frac{4}{3} \times 4 = 16 \]

\[ \frac{25}{16} = \frac{25}{4} \times 4 = 25 \]

\[ \frac{8}{2} = \frac{8 + 2}{2} = \frac{10}{2} = 5 \]

\[ 8 \times \text{Think} = 4 \]
Solutions

1. Step 1: Find the sum of the students.

Did You Know?

Peanuts generally range from 1 to 2 in. (2.5 to 5 cm) in length.

Results

The sum of the lengths divided by the total number of
Peanuts, 20.

Divide the sum of the length measurements by the number of

Activity: How Long?

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Group Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>0.5</td>
</tr>
<tr>
<td>24</td>
<td>0.5</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
</tr>
</tbody>
</table>

Carol's age?

4. The average age of Sheila and Emily is 22 years. What is

Matthew's intake

3. Matthew counted his food calories for 1 week. What was his total daily calorie intake for the week?

<table>
<thead>
<tr>
<th>Monday</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>1200</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1500</td>
</tr>
<tr>
<td>Thursday</td>
<td>1200</td>
</tr>
<tr>
<td>Friday</td>
<td>1800</td>
</tr>
<tr>
<td>Saturday</td>
<td>2000</td>
</tr>
</tbody>
</table>

Matthew

Add the 20 length measurements.

Measure and record the length of each peanut to the nearest inch.

Procedure

Material

20 peanuts in the shell

To determine the average length of a peanut.

Carson's age?

2. The average age of Sheila, Carmen, and Emily is 22 years. What is

Mathew's intake

Matthew counted his food calories for 1 week. What was his total daily calorie intake for the week?

<table>
<thead>
<tr>
<th>Monday</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>1200</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1500</td>
</tr>
<tr>
<td>Thursday</td>
<td>1200</td>
</tr>
<tr>
<td>Friday</td>
<td>1800</td>
</tr>
<tr>
<td>Saturday</td>
<td>2000</td>
</tr>
</tbody>
</table>
Step 2: Divide the sum of the calories by the number of days.

\[
\frac{0 + 1200 + 1300 + 1200 + 1800 + 2200 + 2000 + 11000}{8} = 1600 \text{ calories}
\]

Step 3: Find the sum of the calories.

\[
\frac{0 + 1200 + 1300 + 1200 + 1800 + 2200 + 2000 + 11000}{8} = 1600 \text{ calories}
\]

Carol is 19 years old.

Answer: 19

Think: The sum of 27 + 24 = 47, therefore:

Think: The sum of 23 + 24 = 46, therefore:

Think: The sum of 3 × 22 = 66

Think: The sum of scores:

\[
\frac{4.8 \times 9.2 + 9.2 + 9.7 + 10.0}{4.8} = 9.72
\]

Think: The average attendance:

\[
\frac{0 + 96 + 63 + 96}{4} = 69.8
\]

Think: The average attendance:

Answer: 98 is the average attendance.
Front and back of the notebook, multiply 2.25 x 3.5 x 2.

3. Diane wants to cover her bobby folder with stickers of tees. She needs 2.5 stickers to cover the width and 3.4 stickers to cover the height. 2.5 x 3.4. Multiply.

2. Locate the total number of digits after the decimal. To determine the number of decimal places in the product, multiply the number of decimal places in each factor.

Example

When the factors have more than one number, work with one number at a time.

$$\begin{align*}
4 \times 3.2 \times 5 &= 120 \\
4 \times 3 &= 12 \\
24 \times 5 &= 120 \\
12 \times 2 &= 24 \\
4 \times 3 &= 12
\end{align*}$$

Example

When multiplying two or more factors, multiply the first two numbers.

Think

When multiplying two or more factors, multiply the first two numbers. 2 place x 3 place = 6 places. 2.2 x 3.982 x 1.81 = 9.522. 3 places + 2 places + 3 places = 8 places.

Think

When multiplying two or more factors, multiply the first two numbers. 2 decimal places x 1.8 = 3.6. 0.31 x 4 = 1.24. 2 decimal places x 1 decimal place = 2 decimal places.

Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 8 = 9.92. 1.23 x 4 = 4.92. 1.23 x 2 = 2.46. 1.23 x 3.5 = 4.295. 1 decimal place x 2 decimal places = 3 decimal places.

Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 0.31 x 4 = 1.944. 1 decimal place x 1 decimal place x 1 decimal place = 3 decimal places.

Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 2 = 2.46. 1.23 x 4 = 4.92. 1.23 x 3.5 = 4.295. 1 decimal place x 1 decimal place x 1 decimal place = 3 decimal places.

Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 3.5 = 4.295. 1 decimal place x 1 decimal place = 1 decimal place. 1.23 x 4 = 4.92. 1.23 x 0.31 = 0.381. 1 decimal place x 2 decimal places = 3 decimal places.

Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 4 = 4.92. 1.23 x 3.5 = 4.295. 1.23 x 0.31 = 0.381. 1 decimal place x 2 decimal places x 1 decimal place = 4 decimal places.

Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 4 = 4.92. 1.23 x 3.5 = 4.295. 1.23 x 0.31 = 0.381. 1 decimal place x 2 decimal places x 1 decimal place = 4 decimal places.

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Think

When multiplying two or more factors, multiply the first two numbers. 1.23 x 4 = 4.92. 1.23 x 3.5 = 4.295. 1.23 x 0.31 = 0.381. 1 decimal place x 2 decimal places x 1 decimal place = 4 decimal places.
Double the number of sections, forming 256 sections.

The second fold produces 128 sections and an eighth fold would again produce the size paper more than six times because of the thickness of the paper. Six folds produce 64 sections. It is difficult to fold any further.

Procedure

1. Fold the paper in half.
2. Again in half to produce 4 sections.
3. Fold the paper in half to produce 2 sections.

Materials

Newspaper

A square of paper a specified number of times.

Activity: Doubling

To determine the number of sections formed by folding 1 = $0.01

the money received each day for 30 days starting with day 1. The pay received on the previous day of $0.02, calculated: the money received on day two would be twice the pay received on day one. How much would you receive on day 30? What do you think the pay received on day 30 would be? If the pay received on day 30 was $1,000,000, what day would you be paid? 

Purpose

Check your calculated answer. 

Open the paper after the sixth folding and count the sections to.
The total amount of money received during the 30 days is:

$ \frac{0.10 \times 0.02 + 0.08 + 0.04 \times 0.08 + 0.15}{0.15} = \frac{0.02 + 0.08 + 0.04 + 0.15}{0.15} = \frac{0.31}{0.15} = \frac{31}{15} ≈ 2.067 \text{ dollars}

To check your answer, add up the money received during the four different weeks:

- Week 1: $1.00
- Week 2: $0.08
- Week 3: $0.04
- Week 4: $0.15

Total money received during the four weeks:

$1.00 + $0.08 + $0.04 + $0.15 = $1.27

Product - 1 = Total money received

$1.27

Salary for days 1 to 4:

\[ \frac{3.68 × 0.02 + 3.05 × 0.04 + 3.42 × 0.08 + 1.72 × 0.15}{0.15} = \frac{0.0736 + 0.122 + 0.2736 + 0.258}{0.15} = \frac{0.8272}{0.15} = \frac{827.2}{15} ≈ 55.1466 \text{ dollars} \]

Note that the answer is rounded to the nearest cent.

### Solutions

<table>
<thead>
<tr>
<th>Day</th>
<th>Salary ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>2</td>
<td>3.00</td>
</tr>
<tr>
<td>3</td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>5.00</td>
</tr>
</tbody>
</table>

### Answer

15.75 stickers (more than 11.75).

3 decimal places: 13.750 → 13.75

1 decimal place: 13.75 × 3.5 = 48.3

2 decimal places: 48.3 → 48.35

1.25 feet (more than 1.1 feet).

2.5 decimal places: 1.75 → 1.750

1 decimal place: 1.75 × 4.5 = 7.9

2 decimal places: 7.9 → 7.95
Measurements

II

6 Centimeters
Stretched hand. The stretched hand is called a span. Count the number of spans made and record the length of the table in spans.

Multiply the number of spans times the circumference length of your hand.

If the result measurement is shorter than your stretched hand, continue to measure your hand across the edge of the table until the edge of your hand is as far as possible.

Mark the end of your thumb with the pencil.

Lay your stretched hand on the edge of the table, placing the end of your little finger on the pencil mark.

pick up the ruler on the table edge, place the little finger end of your little finger on the pencil mark.

2. How long is the paper clip?

3. What is the length of the adhesive bandage?
The width of the ribbon is equal to 22 mm.

The second measurement mark after the printed number 7 on the ruler equals 1 millimeter. The edge of the ribbon stops at the 5 mark. This measurement is equal to 5 mm. Each small division between the printed numbers on the ruler equals 0.5 mm.

**Problem 1.** What is the width of the ribbon in millimeters (mm)?

**Answer**

**Problem 2.** The length of the paper clip is 4.1 cm.

**Problem 3.** The length of the address badge is 7.8 cm.

**Solutions**

1. **Length**
   - **Towel length in the table is 49.6 cm of a second is now the standard meter.**
   - A more precise measurement is possible. The distance that light
   - travels in 1/299,792,458 of a second is now the standard meter.

2. **Width**
   - A more precise measurement is possible. The distance that light
   - travels in 1/299,792,458 of a second is now the standard meter.

3. **Height**
   - A more precise measurement is possible. The distance that light
   - travels in 1/299,792,458 of a second is now the standard meter.

**Did You Know?**

- To measure a foot, arm, or hand:
  - Use a metric ruler to measure length in millimeters.

**Millimeters**

7
Activity: METRIC TAPE

**Materials**
- Metric tape
- Scissors
- Marking pen

**Purpose**: To make and measure millimeter lengths with a paper

**Procedure**
1. Place chicken egg
2. Lay the ruler on the paper strip and use the pencil to mark the millimeter positions on the paper. Begin on the very edge of the paper strip.
3. Measure and cut a 20 mm x 280 mm paper strip.
4. Lossing and use the cut paper strip to trace across zero.
5. Use the paper strip marked ZERO.

**Ruler**

**Paper Strip**

**Results**

chicken egg from end to end. Lie the paper measuring tape you just made to measure a large

1. What is the length of the comb in millimeters?
2. How tall are the bristles on the toothbrush in millimeters?
3. There are 100 pages in the book. What is the thickness in millimeter?
Question

Determine the perimeter of each object.

Problems

1. The perimeter of the rectangular picture frame can be determined by adding together the lengths of all four sides. English

2. The comb is 65 mm long. Solution

3. The thickness of 100 pages is 15 mm. To determine the width of one page, divide 15 mm by 100. English

4. The thickness of one page is 0.15 mm.

\[
\begin{align*}
&0.0 \\
&0.0 \\
&0.0 \\
&0.0 \\
&1.5 \\
&1.5
\end{align*}
\]

Did You Know?

The smallest kind of leaf is held by the Venus flytrap, and

\[
\text{The smallest kind of leaf is held by the Venus flytrap of}
\]

Perimeter

8
3. The perimeter of this irregularly shaped park can be determined by adding together the lengths of all four sides.

**Metric**
- Step 1: 22 in. × 2 = 44 in.
- Step 2: 10 in. + 12 in. = 22 in.

**English**
- Step 1: 1.5 yd × 4 = 6.0 yd
- Step 2: 1.5 yd + 1.5 yd + 1.5 yd + 1.5 yd = 6.0 yd

Since all four sides are the same length, multiply the measure of one of the sides by four.

**Metric**
- 25 cm × 2 = 50 cm
- 25 cm + 30 cm = 55 cm

**English**
- 3 m + 2 m + 4 m + 5 m + 4 = 18 m
CENITIMETERS

INCHES

1. Line on the lid.
2. With the marking pen, write the word BEGIN on the lid 2 in. (5 cm).
3. Lower the center of the lid.
4. Use the marking pen to draw a 2 in. (5 cm) line from the lid's edge.
5. Mark a line 1 in. (2.5 cm) from the center of the lid's edge.
6. Cut a piece of paper strip from the index card.

Use these instructions to make a measuring wheel.

Procedure

Materials

To construct and use a measuring wheel.

RULER

ACTIVITY: ROLLER

EXERCISES

1. A rectangle has measurements of 100 in. (254 cm) x 29 in. (74 cm). What is the perimeter of the rectangle?

2. Determine the perimeter of this irregularly shaped polygon.

3. Arrange the four squares to form a structure with a perimeter of:

(a) 24 in. (60 cm)
(b) 20 in. (50 cm)
(c) 16 in. (40 cm)

4. 6.8 km = 4.8 km + 3.2 km + 6.4 km + 8 km + 6.4 km = 28.8 km
Solutions

A triangle wheel that measures one meter with each line.

Measure the base on a baseball field can be quickly measured with

Triangle wheels similar to your measuring wheel are used to
determine distances. The perimeter of houses or distances be-

Did You Know?

The perimeter of the book is determined by the number

Results

Inform the lid around the outer edge of the book.

Step 1. Hold the perimeter of the book by holding the pencil and

Place the BEGIn line on the edge of a book.

Insert one-half the length of the pencil through the center of the

To measure inches, number every fourth line. (Number every sec.

Each ¼ in. (½ cm) section with the marking pen.

Use the paper strip to indicate the position of ¼ in. (½ cm) sections.

Multiply the distance halfway around the rectangle and

Of

100 in. + 69 in. = 169 in.

254 cm + 150 cm + 150 cm = 558 cm

Step 2. 139 in. x 2 = 278 in.

Step 2. 404 cm x 2 = 808 cm

Step 1. 254 cm + 150 cm = 404 cm

Step 1. 100 in. + 69 in. = 169 in.
**Diameter of a Circle**

- **Metric**
  - Radius = 2 cm
  - Diameter = 4 cm

- **English**
  - Radius = 8 in.
  - Diameter = 16 in.

**Question:** Study the diagrams and determine either the length of the radius or the diameter of each.

**Problems**

1. The radius of the diameter of a circle is equal to one-half the length of the circumference. A radius is a line that connects the center of a circle to any point on the circumference. Any line that passes through the center of a circle is called a diameter. A straight line that begins and ends on a circle is called a chord.

2. To measure the diameter of a circle, arrange the four squares to form one large square.
Activity: CENTER POINT

Procedure

Materials

Paper

Drinking glass

Index card

To find the center of a circle

Purpose

Materials

Paper

Drinking glass

Index card

To find the center of a circle

Procedure

- Use the ruler to draw a line between points A and D.
- Use the ruler to draw a line between points C and D.
- Place the center of the card so that it touches a different place on each side of the card.
- Place a corner of the index card on each point.
- Remove the glass from the paper.
- Place the glass upside down on the paper.
- Study the diagrams and determine the length of the radius and the diameter of each.

Exercises

<table>
<thead>
<tr>
<th>Diameter</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 cm</td>
<td>6 1/2 in</td>
</tr>
<tr>
<td>12 cm</td>
<td>4 1/2 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 cm</td>
<td>2 1/4 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm</td>
<td>8 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 cm</td>
<td>4 3/4 in</td>
</tr>
</tbody>
</table>
2. The average diameter of a human hair is about 0.0025 mm.

Did You Know?

- One of the figures shows the relationship between diameter and radius in metric and English units. The diagram illustrates that the diameter is twice the radius in both systems.
- The solutions section is partially visible, suggesting calculations or problem-solving scenarios related to circles and their measurements.
- The text appears to be discussing the importance of understanding geometric properties, possibly in the context of science or education.

The image contains diagrams of circles with labeled diameters and radii, indicating a focus on geometric measurements and conversions between metric and English units.
Circumference of a Circle

1. A diameter of 10 in. (25 cm)

Exercise 1.

Determine the circumference of each circle using the formula:

\[ C = \pi d \]

where \( C \) is the circumference, \( \pi \) is approximately 3.14, and \( d \) is the diameter of the circle.

For each circle, calculate the circumference using the formula and the given diameter or radius.

1. 12.56 in
   \[ C = \pi d = 3.14 \times 4 \text{ in} \]
   Diameter = 4 in

2. 31.4 cm
   \[ C = \pi d = 3.14 \times 10 \text{ cm} \]
   Diameter = 10 cm

3. 3.14 in
   \[ C = \pi d = 3.14 \times \text{Radius} \]
   Radius = 1 in

4. 7.5 cm
   \[ C = \pi d = 3.14 \times 2 \times 3.75 \text{ cm} \]
   Radius = 3.75 cm

5. 4 in
   \[ C = \pi d = 3.14 \times 8 \text{ in} \]
   Diameter = 8 in

Example: The formula for the circumference of any circle divided by its diameter equals the approximation of \( \pi \).

\[ \frac{C}{d} = \pi \approx 3.14 \]
Did You Know?

The circumference of the earth at the equator is 40,075.66 miles (64,373.07 km). The circumference around the earth's poles is 40,008 miles (64,234.39 km). The earth's radius is 3,963.2 miles (6,378.1 km).

Procedure

1. A piece of string about 6 in. (15 cm) long.
2. A second pencil and a loop.
3. A second piece of string about 6 in. (15 cm) long.
4. A child is swining an 80-cm (200 cm) long rope.

Activity: Run Around

1. Put the two loops so that the string is about 6 in. (15 cm) long.
2. A pencil is used to draw a circle with radius 6 in. (15 cm).
3. A second pencil is used to draw a circle with radius 5.5 in. (14 cm).
4. How far does the pencil travel in one complete turn?

Results

The point of the pencil moves along the circumference of a circle. The length of the string is equal to the radius of the circle.

Change the length of the string and repeat until a complete circle is drawn.

Pull the pencil lid to the string outwar to stretch the string.

Locuting the paper and hold this pencil stationary.

Stand a second pencil in the center of the loop with the eraser end of the string.

Place the loop in the center of the paper.

The one end of the string around a pencil and the other in the other.

Cut a pencil of string about 6 in. (15 cm) long.

Pensil

Paper

Scissors

Ruler

Measurements

To draw circles of different diameters.
3. The distance traveled by a point on the edge of the record in four

- 1256 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 61 cm = 122 cm
  - Radius = 61 cm
  - Metric: 78.5 cm

- 314 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 12 cm = 24 cm
  - Radius = 12 cm
  - Metric: 37.7 cm

- 351.68 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 114 cm = 228 cm
  - Radius = 114 cm
  - Metric: 113.816 m

- 283.72 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 90 cm = 180 cm
  - Radius = 90 cm

- 280 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 80 cm = 160 cm
  - Radius = 80 cm

- 214 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 67 cm = 134 cm
  - Radius = 67 cm

2. The length of the rope equals the radius of the circle, and the
distance traveled by the ball in one turn equals the circumference

- 94.2 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 15 cm = 30 cm
  - Radius = 15 cm

- 37.68 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 6 cm = 12 cm
  - Radius = 6 cm

- 331.84 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 106 cm = 212 cm
  - Radius = 106 cm

- 313 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 90 cm = 180 cm
  - Radius = 90 cm

1. B. The distance traveled by a point on the edge of the record in four

- 351.68 cm
  - Formula: c = \pi \times d
  - \pi = 3.14
  - Diameter = 2 \times 114 cm = 228 cm
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  - Formula: c = \pi \times d
  - \pi = 3.14
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  - Radius = 114 cm

Total distance = 879.2 cm

English

Total distance = 138.16 m

Metric

Total distance = 34.54 in

Metric

Total distance = 37.68 in

Metric

Total distance = 502.4 in

English

Formula: c = \pi \times d

\pi = 3.14

Diameter = 2 \times 160 in

Radius = 80 in

English

2. The length of the rope equals the radius of the circle, and the
distance traveled by the ball in one turn equals the circumference

- 94.2 cm
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Total distance = 879.2 cm

English

Total distance = 138.16 m

Metric

Total distance = 34.54 in

Metric

Total distance = 37.68 in

Metric
Area of Rectangles

1. What is the area of the bulletin board?

Exercise

Problem

Example 1

Width = Length x Width

Example 2

Width = Length x Width
Procedure:

1. Cut eight string, each about 24 in. (60 cm) long.
2. Measure and cut a 10 in. (25 cm) square from the plastic bag.
3. Place the square bag on the work area. Be sure the four corner strings are the same length; then tie all four ends together in a knot.
4. Join the parachute strings.

Join the parachute strings.

Use a string about 6 in. (15 cm) long to attach a washer to the knot ends located in a knot.

Be sure the four free strings are the same length; then tie all four ends together in a knot.

Join the parachute strings.

Time it takes for each to reach the ground.

Insert the parachute units to the one at the top, and observe the

Loosely wrap the string around the folded plastic.

Fold the plastic in half.

Position the plastic.

To set the parachute, hold each in the center of the plastic sheet.

The four strings in a knot and attach the washer to the knot with

plastic and the four remaining strings.

Make a second larger parachute using a 24 in. (60 cm) square of

plastic and the four remaining strings.

Join the parachute strings.

Use a string about 6 in. (15 cm) long to attach a washer to the knot ends located in a knot.

Be sure the four free strings are the same length; then tie all four ends together in a knot.

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plastic and the four remaining strings.

Make a second larger parachute using a 24 in. (60 cm) square of

plastic and the four remaining strings.
Answer: Yes, 1 quart is enough paint.

10 ft.² is covered by 1 quart. 9.6 ft.² is less than 10 ft.², so yes, 1 quart is enough paint.

2.

66 m² = 11.1 m × 6 m
A = Length × Width

Answer: Yes, 1 quart is enough paint.

Think: 10 ft.² is covered by 1 quart. 10.4 ft.² is less than 11 ft.².
The height in this triangle is also one of the sides.

**Question:** Find the area of the triangle.

\[
A = \frac{1}{2} \times b \times h
\]

**Think:**

Area = \( \frac{1}{2} \times 10 \text{ cm} \times 20 \text{ cm} = 100 \text{ cm}^2 \)

Thus:

\[
\frac{1}{2} \times 10 \text{ cm} = 5 \text{ cm}
\]

**Think:**

Area = \( \frac{1}{2} \times 8 \text{ in.} \times 16 \text{ in.} = 64 \text{ in.}^2 \)

Thus:

\[
\frac{1}{2} \times 8 \text{ in.} = 4 \text{ in.}
\]

**Think:**

Area = \( \frac{1}{2} \times 4 \text{ in.} \times 8 \text{ in.} = 16 \text{ in.}^2 \)

**Formula:**

\[
A = \frac{1}{2} \times b \times h
\]

**Purpose:** To find the area of a triangle when the formula is known.

**Area of Triangles**
Activity: EQUAALS

Purpose: To demonstrate how to find the area formula for triangles.

Procedure

1. Find the area of the sail on the boat.

2. Find the area of the sign if it has a height of 15 in. (38 cm) and a base of 10 in. (25 cm).

Materials

- Red crayon
- Pencil
- Triangle paper
- Scissors

Calculation:

\[ A = \frac{1}{2} \times b \times h \]

Think:

\[ \text{Area} = \frac{1}{2} \times 15 \text{ cm} \times 10 \text{ cm} \]

Base = 15 cm
Height = 10 cm

Formula: \[ A = \frac{1}{2} \times b \times h \]

Think:

\[ \frac{1}{2} \times 6 \text{ in.} = 3 \text{ in.} \]

Think:

\[ \frac{1}{2} \times 4 \text{ in.} = 2 \text{ in.} \]
The largest pyramid, Quetzalcoatl, is located in Mexico. This structure is 117 ft (35.6 m) tall with a base area of 45 acres. 

**Did You Know?**

A = \frac{1}{2} \times \text{base} \times \text{height}.

The area of each triangle can be calculated by multiplying the area of the triangle by \frac{1}{2}.

The rectangle is made of two triangles, each with the same total surface area. The area of a rectangle is calculated by using the formula:

A = \text{length} \times \text{width}.

**Solutions**

1. \(A = 12.5 \text{ cm} \times 38 \text{ cm} = 475 \text{ cm}^2\)

Thus, \(A = \frac{1}{2} \times 12.5 \text{ cm} = 12.5 \text{ cm}^2\).

2. \(A = 5 \text{ in} \times 15 \text{ in} = 75 \text{ in}^2\)

Thus, \(A = \frac{1}{2} \times 10 \text{ in} = 5 \text{ in}^2\).

3. \(A = 2 \text{ m} \times 8 \text{ m} = 16 \text{ m}^2\)

Thus, \(A = \frac{1}{2} \times 4 \text{ m} = 2 \text{ m}^2\).

4. \(A = 6.5 \text{ ft} \times 26 \text{ ft} = 169 \text{ ft}^2\)

Thus, \(A = \frac{1}{2} \times 13 \text{ ft} = 6.5 \text{ ft}^2\).

- Combine the two triangles to form one rectangle.
- Compare the sizes of the two triangles.
- Compare the size of the rectangle.
Problem 23

A circular rug has a radius of 7 ft. What is the area of the rug?

Formula: \[ A = \pi r^2 \]

\( A = 3.14 \times 7^2 = 153.86 \text{ ft}^2 \)

Think

When multiplying these numbers together, work with two numbers at a time. Multiply the first two. Then multiply the product of these two numbers by the third number.

Think

Think

Think

Think

Calculate

Calculate

Calculate

Calculate

Find the area of a cookie that has a diameter of 4 in.

\[ A = \pi \times \text{radius}^2 \]

\( A = 3.14 \times 2^2 = 12.56 \text{ in}^2 \)

Think

Think

Think

Think

The formula \( A = \pi r^2 \) is read as:

To find the area of a circle, use the formula \( A = \pi r^2 \).

Area of Circles

13
Activity: HOW BIG?

Purpose: Demonstrate the effect a change in radius has on the area of a circle.

Materials:
- Strips of paper
- Scissors
- Ruler
- Spool of thread

Procedure:
1. Use the circular objects to draw three separate circles on the paper.
2. Use scissors to cut each circle from the paper.
3. Place the paper in the palm of your hand with the pin pointing up.
4. Position the hole in the spool over the pin.
5. Remove any paper covering the hole through the thread spool then blow through the spool to blow the paper onto your hand.
6. Remove your hand from beneath the paper while continuing to blow through the spool.
7. Repeat the procedure using the larger paper circles.

Exercises:

<table>
<thead>
<tr>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 3.14 cm x 5 cm = 78.5 cm²</td>
</tr>
<tr>
<td>2. 5 cm x 5 cm = 1.25 cm</td>
</tr>
<tr>
<td>3. 1.25 cm x 10 cm = 12.5 cm</td>
</tr>
<tr>
<td>4. 3.14 cm x 5 cm = 15.7 cm</td>
</tr>
<tr>
<td>5. 15 cm x 5 cm = 75 cm</td>
</tr>
</tbody>
</table>

Think:
- The exact size of a circle is not important.

Formula: A = \pi r^2
the area of the circle to determine the amount of unused material.

3. Calculate the area of the 30-cm square of material and subtract.

\[
A = 30 \times 30 = 900 \text{ cm}^2
\]

Width = 30 cm
Length = 30 cm
Formula: \( A = \text{Length} \times \text{Width} \)

English

Think

\[
4.14 \times 4.14 = 16.98 \text{ in}^2
\]

\[
\frac{1}{2} \times 6 \text{ in} = 9 \text{ in}
\]

Formulas:

English

Think

\[
\frac{1}{2} \times 8 \text{ in} = 4 \text{ in}
\]

Diameter = 8 in.
Formula: \( A = \pi \times r^2 \)

Solutions

If was cut into 64 0.250 in. pieces.
The largest recorded pizza had a diameter of 1.197 in. (6361 cm)

Did You Know?

large for the air to hold up. The largest circle fails.

Try this activity to keep the paper from falling. The circle has to go too

Try this activity to keep the paper from falling. The circle has to go too

the paper. The air flows out between the paper and the food, producing

Reasons:
The smaller circles do not fall, but stay on the bottom of
Surface Area

14
Activity: Rainbow Necklace

1. Determine the surface area of the cereal box.

2. Determine the surface area of the open toy box.

Exercises

Even though the shape of an object changes, its surface area can remain the same.

Materials
- Pencil
- Scissors
- Notebook paper

Purpose
To demonstrate that surface area can remain the same.

Metric
- Surface area
  - Front area
  - Left-side area
  - Right-side area
  - Bottom area
  - Top area

- 262 cm²
  - 15 cm × 10 cm = 150 cm²
  - 5 cm × 15 cm = 75 cm²
  - 15 cm × 10 cm = 150 cm²
  - 5 cm × 15 cm = 75 cm²
  - 10 cm × 5 cm = 50 cm²
  - 10 cm × 5 cm = 50 cm²

English
- Surface area
  - Back area
  - Right-side area
  - Left-side area
  - Front area
  - Bottom area
  - Top area

- 88 in²
  - 4 in × 6 in = 24 in²
  - 2 in × 6 in = 12 in²
  - 4 in × 6 in = 24 in²
  - 2 in × 6 in = 12 in²
  - 4 in × 2 in = 8 in²
  - 4 in × 2 in = 8 in²
**Did You Know?**

The small intestine of a human is about 22 ft. long. If this coiled tube is stretched out, its length is about 60 ft.

---

**Procedure**

1. Cut across the fold at points A and B. Stop about 1/4 in. (1 cm) from the edge of the paper.
2. Fold the rectangle in half along the long side.
3. Score the edge of the paper.
4. Cut along the scored lines.
5. Carefully stretch the paper open. Slip the rainbow-colored sections around your neck.

---

**Notice**

- The surface area of the paper remained the same as the original sheet.
- The shape of the paper changed from a rectangle to a rectangle with a curved edge.
- The color of the paper changed from a rainbow-colored sheet to a single color.

---

**Colors**

- red
- orange
- yellow
- green
- blue
- purple

---

**Instructions**

- Use the scissors to cut each of the 12 lines on the rectangle.
- Cut the rectangle from the paper with the scissors.
- Color the rectangle with the different colors.
- Draw a rectangle on the back of the paper that is 4 in. (10 cm) wide and 1.75 in. long.
- Use a pencil to draw a rectangle on the back of the paper that is 4 in. (10 cm) wide and 1.75 in. long.
1. The toy box is an open box with five square sides. Since each of the five sides has the same area, the total surface area of the box can be determined by multiplying the area of one of the sides by five.

2. The total surface area is 51.5 in.². The top, left, right, front, and back sides all have the same area. To find the area of one side, divide the total surface area by five.

   - Top Area: \( \frac{51.5 \text{ in.}^2}{5} = 10.3 \text{ in.}^2 \)
   - Back Area: \( \frac{51.5 \text{ in.}^2}{5} = 10.3 \text{ in.}^2 \)
   - Right Area: \( \frac{51.5 \text{ in.}^2}{5} = 10.3 \text{ in.}^2 \)
   - Front Area: \( \frac{51.5 \text{ in.}^2}{5} = 10.3 \text{ in.}^2 \)
   - Left Area: \( \frac{51.5 \text{ in.}^2}{5} = 10.3 \text{ in.}^2 \)

3. The length of each side is 3 in., the width is 2 in., and the height is 1 in.

4. The area of each side is:
   - Top: \( \frac{2 \times 3 \text{ in.}}{2} = 3 \text{ in.}^2 \)
   - Back: \( \frac{2 \times 3 \text{ in.}}{2} = 3 \text{ in.}^2 \)
   - Right: \( \frac{2 \times 3 \text{ in.}}{2} = 3 \text{ in.}^2 \)
   - Front: \( \frac{2 \times 3 \text{ in.}}{2} = 3 \text{ in.}^2 \)
   - Left: \( \frac{2 \times 3 \text{ in.}}{2} = 3 \text{ in.}^2 \)

5. The total surface area is calculated by summing the areas of all sides:
   - \( 
     \text{Total Surface Area} = 
     \begin{align*}
     &3 \text{ in.}^2 + 3 \text{ in.}^2 + 3 \text{ in.}^2 + 3 \text{ in.}^2 + 3 \text{ in.}^2 \\
     &= 15 \text{ in.}^2
     \end{align*}
   \)
Volume of Prisms

Volume of Rectangular Prisms

Volume of Cubes and Rectangular Prisms

15
Activity: MEASURING BOX

Procedure:
1. Cut out the drawing and fold to make a cube with 4 in. (10 cm) sides.
2. On the still paper, draw a full-sized enlargement of the pattern shown using your ruler.
3. A pitcher holding 22 in.³ (2000 cm³) of water is used to fill an apartment. How much water is needed to fill an apartment? Would 25 pitchers of water fill the apartment?

Materials:
- Pencil, white, all purpose
- Pencil, white, all purpose
- Glue, white, all purpose
- Scissors
- Ruler
- Still paper
- Large bottle

Hold the large bottle to hold the box.

To determine how much water a 4 in. (10 cm) cube will hold.

Exercise:
1. What is the volume of the room?
Did You Know?

The largest box of pop was measured 2 ft (77 cm) x 25 ft (7.7 m) x 25 ft (7.7 m) x 6.6 ft (1.98 m). The box was filled by Jones High School in Orlando, Florida, Dec. 11, 1998.

**How much does a volume of 64 in³ (1000 cm³) of water weigh?** A liter of water weighs 1 kg.

**Results**

The box will hold 1 gal (1 liter) of water. A 4 in. (10 cm) cube has a volume of 64 in³ (1000 cm³). This volume equals 1 gal.

**Materials**

- Overturning
- Slowly pour the water from the bottle into the box until the box is full.

**Equipment**

- Place the box in a bowl to catch any water spills.
- Fill the gal (1 liter) bottle with water.
- Allow the glue to thoroughly dry.
- Make the box waterproof.
- Cover the seams inside the box with a generous layer of glue to close.
- Use the glue to secure the tabs.
Problem

Volume by Displacement

16

Answer: No. 25 pitchers of water will not fill the aquarium.
Procedure

1. Fill a fish bowl with water.
2. Fill the second fish bowl with water.
3. Each metal ball displaces 0.1 liters. Study the picture to determine the number of balls in the jar.
4. How much of the water is displaced by the toy diver?
5. What is the volume of the fish?

Materials
- Marking tape
- Fish bowls
- 2 rubber bands

Purpose
To compare the volume of your hand.

Activity: Same Size
To determine the number of balls, divide the displaced volume of

\[
\frac{4.8 \text{ gal (liquids)}}{0.4 \text{ gal (bills)}} = 12 \text{ bills}
\]

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\]

Volume of bill

Water volume

Volume of diver

Water volume + Volume of diver

\[
\begin{align*}
\text{Volume of diver} &= 0.387 \text{ gal (liquids)} \\
\text{Water volume} &= 0.104 \text{ gal (liquids)} \\
\text{Volume of diver} &= 16.85 \text{ gal (liquids)}
\end{align*}
\]

Volume of bill

Water volume + Volume of bill

\[
\begin{align*}
\text{Water volume} &= 2.897 \text{ gal (liquids)} \\
\text{Water volume + Volume of bill} &= 4.87 \text{ gal (liquids)}
\end{align*}
\]

The volume of the diver is

\[
\text{Volume of diver} = 0.387 \text{ gal (liquids)}
\]

The volume of water is

\[
\text{Water volume} = 0.104 \text{ gal (liquids)}
\]

The volume of the diver and water is

\[
\text{Volume of diver + Water volume} = 16.85 \text{ gal (liquids)}
\]

The volume of the bill is

\[
\text{Volume of bill} = 2.897 \text{ gal (liquids)}
\]

The volume of water and the bill is

\[
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To measure and determine equivalent liquid capacities.

\[
\begin{align*}
1 \text{ tsp} &= 5 \text{ ml} \\
1 \text{ tbsp} &= 15 \text{ ml} \\
1 \text{ cup} &= 250 \text{ ml} \\
1 \text{ liter} &= 1000 \text{ ml} \\
1 \text{ quart} &= 4 \text{ cups}
\end{align*}
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To measure and determine equivalent liquid capacities.

\[
\begin{align*}
1 \text{ tsp} &= 5 \text{ ml} \\
1 \text{ tbsp} &= 15 \text{ ml} \\
1 \text{ cup} &= 250 \text{ ml} \\
1 \text{ liter} &= 1000 \text{ ml} \\
1 \text{ quart} &= 4 \text{ cups}
\end{align*}
\]
procedure

1. Fill jar with one-half-cup (4 oz) of water
2. Recalibrate plastic 250 ml capacity 2-qt (2-liter) bowl
   measuring cup
   dishwash detergent
   4-fl oz bottle of hand soap
   wristwatch cockroach
   1.5 ml (1/5 ml) of borax
2. Build a borax solution by filling one of the 1/5 liter jars with water.

3. Use to measure the liquid

   By using the dimensions provided. Describe a method that she can

   added to fill the pitcher.

   of orange juice concentrate and water. How much water was
   Jennifer makes a 2 gal pitcher of orange juice by combining 500 ml

   globe solutions

   18 ml hydrogen peroxide + 18 ml water
   15 ml sodium borate solution + 1 fl oz water

   globe solutions

   To measure and use equivalent capacities.

   Purpose: THE GLOB

   Recipe: "Chocolate Milk"

   Ingredients:

   2 cups chocolate syrup
   1 cup milk

   From the kitchen of Kimberly

   Suit unit:

   1. Revive Kimberly's recipe for chocolate milk using milliliter measure.
1. Fill bucket B with 4 liters of water. 
2. Fill bucket A with 3 liters of water from bucket B.
3. Pour the 1 liter of water from bucket A into bucket B.
4. Fill bucket B again and pour the 4 liters of water into the fish bowl.

Result: A white, puffy glob is formed that stretches and breaks easily when pulled apart. 

You can make different colored globs by adding a drop of food color.

Think:
- Volume of bucket = Volume of water + Volume of glue
- 2 liters + 500 ml = 2500 ml
- 1 liter + 10 ml = 1000 ml
- 1 cup milk = 250 ml
- 1 tsp = 5 ml
- 1 cup = 250 ml

Think:
- 2 tbsp = 2 x 5 ml = 10 ml chocolate syrup

Think:
- 1 cup milk = 250 ml

Think:
- 1 tsp = 5 ml

Solutions:

1. Parry bowl.
2. Place the glob on a plastic bag for 2 minutes.
3. Use the stirring spoon to dip the glob out of the bowl.
4. Pour the glue solution into the bowl containing the parry.
5. Store the glob inside the plastic bag and seal to store.
6. Wash your hands when you are finished.
Problem

1. Which object has a greater mass?

2. Which object will balance the child on the see-saw?

3. How many boxes of paper clips are needed to balance the 1500 g object?

4. Choose the object that you think will balance the see-saw.

5. Find an object that has a large amount of mass, such as the bowling ball.

Exercise:

Find the smallest object on the scale. Is it a larger, medium, or small mass.

Object A

Object B

Object C

Object D

Object E

Object F

Object G

Object H

Object I

Object J

Object K

Object L

Object M

Object N

Object O

Object P

Object Q

Object R

Object S

Object T

Object U

Object V

Object W

Object X

Object Y

Object Z

Object AA

Object AB

Object AC

Object AD

Object AE

Object AF

Object AG

Object AH

Object AI

Object AJ

Object AK

Object AL

Object AM

Object AN

Object AO

Object AP

Object AQ

Object AR

Object AS

Object AT

Object AU

Object AV

Object AW

Object AX

Object AY

Object AZ

Object AAA

Object AAB

Object AAC

Object AAD

Object AAE

Object AAF

Object AAG

Object AAH

Object AAI

Object A AJ

Object AKK

Object ALL

Object AAM

Object AAN

Object AAO

Object AAP

Object AAQ

Object AAR

Object AAS

Object AAT

Object AAU

Object AAV

Object AAW

Object AAX

Object AAY

Object AAZ

Object AAAA

Object AAAAB

Object AAAAC

Object AAAAD

Object AAAAE

Object AAAAF

Object AAAAG

Object AAAAH

Object AAAAI

Object AAAAJ

Object AAAAK

Object AAAAL

Object AAAAM

Object AAAAN

Object AAAAO

Object AAAAP

Object AAAAQ

Object AAAAR

Object AAAAS

Object AAAAT

Object AAAAU

Object AAAAV

Object AAAAW

Object AAAAX

Object AAAAY

Object AAAAZ

Object AAABA

Object AAABB

Object AAABC

Object AAABD

Object AAABE

Object AAABF

Object AAABG

Object AAABH

Object AAABI

Object AAABJ

Object AAABK

Object AAABL

Object AAABM

Object AAABN

Object AAABO

Object AAABP

Object AAABQ

Object AAABR

Object AAABS

Object AAABT

Object AAABU

Object AAABV

Object AAABW

Object AAABX

Object AAABY

Object AAABZ

Object AAACA

Object AAACB

Object AAACC

Object AAACD

Object AAACE

Object AAACF

Object AAACG

Object AAACH

Object AAACI

Object AAACJ

Object AAACK

Object AAACL

Object AAACC

Object AAACM

Object AAACN

Object AAACO

Object AAACP

Object AAACQ

Object AAACR

Object AAACS

Object AAACT

Object AAACU

Object AAACV

Object AAACW

Object AAACX

Object AAACY

Object AAACZ

Object AAADA

Object AAADB

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**Did You Know?**

The brachiation is believed to have been about 26 ft (8 m) tall.

**Procedure**

Place a coin in the left cup.

Add paper clips to the right cup, one at a time, until the cups are balanced.

Balance the coin will depend on the mass of the coin that you use.

The results of the balance will give you an equal mass and balance on the apple chips.

**Materials**

- Coin
- Small paper clips
- 2 paper cups
- Heavy book
- Scissors
- Pencil
- Tape

**Procedure**

Place both cups on a flat surface.

Add paper clips to one side until they are level.

Balance the coin again.

Bend the wire arms up or down to make the two paper cups level.

**Materials**

- Wire coat hanger
- Paper cup
- Book
Choose the item that weighs closest to 16 pounds.

Problem

Reference Items:
- 2000 pound (T) = 1 ton (T)
- 16 ounces (oz) = 1 pound (lb)
- To become more familiar with weight measurements

1 oz = 1 oz
1 lb = 1 lb
1 ton = 1 ton

15 boxes = 15 boxes
1000 =
15000 =
100 =

One box of paper clips = 100

3. Think
FORCE

Procedure

Rock:
- Tie one end of the rubber band securely to the string around the rock.
- Cut the rubber band to form one long strip.
- Tie the string around the rock.
- Fill the bucket 1/3 full with water.

Materials
- Bucket
- Rubber band
- Scissors

Large rock (a brick)

Activity

To demonstrate forces that affect weight.

Purpose

1. Which object weighs 2 ounces?
2. Which object weighs 1 pound?
3. What is the weight of the elephant?
4. Three kilos were placed inside a basket to weigh them. If the basket weighs 4 pounds, how much does each kilo weigh?
Divide your weight by 6 to determine your weight on the moon.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Weight on Earth (lb)</th>
<th>Weight on Moon (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mars</td>
<td>36 lb</td>
<td>6 lb</td>
</tr>
<tr>
<td>Sun</td>
<td>27,900 lb</td>
<td>450 lb</td>
</tr>
<tr>
<td>Moon</td>
<td>117 lb</td>
<td>20 lbs</td>
</tr>
<tr>
<td>Earth</td>
<td>1,060 lb</td>
<td>170 lbs</td>
</tr>
</tbody>
</table>

Weight is a result of the pull of gravity. Other celestial bodies have different degrees of gravity due to their mass and distance from the observer. The greatest natural satellite is Earth's Moon, which has nearly 1/6 the pull of gravity on Earth's surface.

Did You Know?

- Weight of the rock.
- Weight on different bodies in our solar system.
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**Think**

- Least weight = Paperclip
- Medium weight = Cereal
- Largest weight = Baby

**Answer**

The baby weighs the most.

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Thus, the reading on the thermometer is 15°C.

Thus, the reading on the thermometer is 50°F. Each mark equals 2°F. The height of the liquid in the thermometer is at the Fahrenheit scale.

**Problem**

**Question** Take temperature readings from the two thermometers.

**Example:** 30°C is read as 30 degrees Celsius. The symbol for the word degree is a small raised circle. °C is read as degree Celsius.

The Fahrenheit and °C is read as degrees Celsius.

The symbol for the word degree is a small raised circle. °F is read as degree Fahrenheit.

**Purpose** To read Fahrenheit and Celsius thermometers.
1. Read the thermometer.

2. Which thermometer reads 10.5°C?

3. Read the thermometer.

4. Which thermometer reads 69°F?

5. Use the labels on the diagram to find the temperature of each of the following.

a. Body temperature of humans in degrees Celsius
   - A. 72°F
   - B. 39°C

b. Body temperature of humans in degrees Fahrenheit
   - A. 39°F
   - B. 10°C

Exercise
Procedure

1. Place the bottle in the ice water.
2. Remove the bottle from the ice water. The ice cube will melt when the bottle is removed to room temperature.
3. Fill one of the soup bowls half full with warm water from the faucet.
4. Fill the second bowl to the brim half full with cold water from the faucet.
5. Place the straw in the warm water.
6. While the straw is in the water, place your index finger over the open end of the straw.
7. Hold the straw closed with your finger while lifting the straw out of the cup.
8. Remove the bottle when the colored water is deep blue and all drops of blue color have filled the water.

Materials
- Warmly-colored cup (250 mL)
- Glass soda bottle
- Blue color
- Ice cubes
- Straw, small
- Liquid thermometer

To demonstrate how a thermometer works.
4. Thermometer A reads 69.5°F.

10.5°C. Between 10°C and 11°C and can be read as 10.5°C.

The height of the liquid in the thermometer is halfway between 68°F and 70°F and is read as 69°F.

The height of the liquid in the thermometer A is halfway between 1°C and 2°C. Since each mark equals 1°C, the ten-minute reading is 1.5°C.

Thus, the reading on Thermometer B reads 10.5°C.

Each mark above 20°C. Each mark equals 1°C. If this were a body thermometer, the height of the liquid is at the midpoint between 8°F and 2°F. The reading is 10°F.

Thus, the reading on Thermometer is 8°F.

Thus, the reading on Thermometer is 8°F. Each mark equals 2°C. The height of the liquid in the thermometer is at the midpoint between 37°C and 38°C. The reading is 37.5°C.

Solutions

1. Did you know?  
   a. Body temperature of humans = 98.6°F  
   b. Body temperature of humans = 37°C

Humans cannot live with a body temperature above 108°F (42.8°C) or lower than 95°F (35°C). What can humans do in hot weather when the air temperature is above 100°F (38°C)?
Bar Graph

1. Who is older, Daryl or Jennifer?
2. Which children are older than Daryl?
3. Who are the children who are younger than Jennifer?
4. Who is the oldest?
5. List the ages of the children.

Problem

Use the vertical bar graph to answer questions.

Questions:

1. Which box on the graph has the same value, and the shaded value is always 0.

2. Fill in the blank to complete the sentence. Each bar graph makes comparing information easier. Each bar graph makes comparing information easier.

Graphing

III
1. How many animals are slower than man?
2. Which animal is the fastest?
3. Which animal is the slowest?
4. How many animals have the same speed?
5. Which animal does each square represent?

Exercise

<table>
<thead>
<tr>
<th>Animal</th>
<th>Speed (Km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>40</td>
</tr>
<tr>
<td>Elephant</td>
<td>50</td>
</tr>
<tr>
<td>Lion</td>
<td>60</td>
</tr>
<tr>
<td>Chicken</td>
<td>10</td>
</tr>
<tr>
<td>Grizzly</td>
<td>80</td>
</tr>
<tr>
<td>Pig</td>
<td>40</td>
</tr>
<tr>
<td>Man</td>
<td>60</td>
</tr>
</tbody>
</table>

1. Determine all speeds in miles per hour and in kilometers per hour.
2. Use the following bar graph to answer Questions a through f.
3. Answer: Jennifer 6 years
   Kimberly 9 years
   Laura 5 years
   Dawn 4 years

5. Think! Start at the right end of each animal's bar and follow the number on the scale.
Activity: Bean Growth

Procedure

1. Measure the distance from the tip of the bean to the top of the tape at 24 hours (1 day). Record as the growth for day 1.
2. Measure the growth from the tip of the bean to the top of the tape. Mark the beginning of the growth measurement.
3. When the first sign of a leaf appears, place a piece of tape on the glass to hold the growth.
4. Keep the paper moist and observe each day until the beans start to grow.

Materials
- 4 paper towels
- Beads
- Measuring tape
- Pencil
- Ruler
- Tape
- Drinking glass

Purpose
To graph the growth of a bean.

Average life span of animals

- Cat: 12 years
- Cow: 20 years
- Pig: 15 years
- Horse: 20 years
- Chicken: 10 years
- Dog: 10 years
- Zebra: 20 years
- Tiger: 20 years
- Elephant: 60 years
- Chimp: 20 years
- Bear: 20 years
- Giraffe: 20 years

The glass should be evenly spaced and about 1 in. (2.5 cm) from the top of the glass. Place the beads between the paper towel and the glass. The beans should be evenly spaced and about 1 in. (2.5 cm) from the top of the glass.
**Did You Know?**

The tallest recorded height of a sunflower plant is 34 ft 5 in.

**Time to Grow!**

Use the measurements to construct a bar graph.

- Continue to measure and record the growth for 7 days.

**Solutions**
Problem

Answer

Question 1

To interpret information on a line graph, it is necessary to start from zero on a line graph. The right does not always represent the highest point on the graph, and the left does not represent the lowest point on the graph. A line is formed by joining the points in order to create a graph of the data. Information is recorded as points on the graph. A line is the best way to interpret information on a line graph.

Question 2

What number is the most likely to be the answer?

Test Grades Answer

Grades on Math Tests

0

10

20

30

40

50

60

70

80

90

100

Test

Grades

Question 3

How many bars are higher to the right than is

22

Line Graph

Answer

Pie

bar that ends on the 10-year line.

Find 10 years on the scale and move up and until you reach a

2 x 5 years = 10 years

Multiply the rabbit's life span by 2.

Life span of the rabbit = 5 years

bar to the right and then down to the scale.

Determine the life span of the rabbit by following the rabbit's

Once the bar of the cat

same distance as that of the dog.

How many bars extend to the right exactly the

Difference = 9 years

- 10 years

- 19 years

Life span of the bear = 9 years

- 10 years

- 19 years

Determine the life span of the bear and the pig by following the

Difference between the numbers.

The bear lives 9 years longer than the pig.

Answer

Think

Where can I find a bar that is longer than a bar on the same line?
c. What was his highest pulse rate?

b. How long did he exercise?

a. What is Russell’s normal pulse rate?

d. How long did it take his pulse to return to normal?

The graph to answer questions a through d.

1. Robert buys candy with his allowance money. The number of candy bars he ate during 1 week is recorded on the line graph. Use the graph to answer these questions:

   - Which day has the lowest point on the line?
   - Which day has the highest point on the line?
   - Which day were the most candy bars eaten?
   - Which two days were more than three bars of candy eaten?
   - How many days did Robert not eat candy?

   a. Wednesday night

   Answer: Wednesday night

   b. Thursday

   Answer: Thursday

   c. Thursday

   Answer: Thursday

   d. Thursday

   Answer: Thursday

   e. Wednesday night

   Answer: Wednesday night

   1. How different is his pulse rate before and after exercising on Wednesday?

   RussellExercise.png

The graph to answer questions a through d.

1. How many bars of candy did Robert eat during the week?

2. How many bars of candy did Robert eat during the week?

3. What was your highest pulse rate?

   a. 3. Think

   Answer: 3. Think

   b. 3. Think

   Answer: 3. Think

   c. 3. Think

   Answer: 3. Think

   d. 3. Think

   Answer: 3. Think

   3. On which day did Robert watch television instead of studying?
Did you know?

moving objects in space

This is what happens to an object.

End of the ruler to each mark.

Measure and record the initial and current or distances from the paper and position of the marble.

As each second is announced, your partner should mark on the paper the position of the marble.

Count the number of each second until 4 seconds have passed.

Start timing as soon as the marble touches the paper.

The marble is at the mark when the paper.

Your partner should be ready with a pencil to mark the position of the marble.

Keep the marble, allowing it to roll down the center groove in the ruler.

Hold the marble at the top of the ruler.

Place one end of the ruler on the edge of the book and the other end on the paper.

Position the book on the edge of the paper tray.

Place 6 sheets of paper on the floor to form a long path.

Procedure

Materials

helper

timer, second hand

pencil

marble

notebook paper

Purpose

To use a distance versus time graph to compare the speed of an object at different times.

Activity: How Fast?
150 beats per minute

Two minutes

What is the highest point on the line? Follow this line. The number of minutes passed between these points is greater than 3 minutes. How many stop. If they increase at 1 minute and when did the rate start to increase and when did

70 beats per minute

What was the beginning and ending pulse rate?

\[ 4 + 2 + 1 + 6 + 4 = 17 \]

How many candy bars did he eat each day? Add Tuesday, Wednesday, and Thursday

Two, Wednesday, and Thursday

Representing candy bars?

Which days have points on the horizontal line?

Sunday, Friday, and Saturday

Hi line representing 3 candy bars?

Which days have points higher than the position-

Who, Friday

Which day has the highest point on the line?

d. Think

Solutions
Exercises

15 books
10 books + 5 = 25 books
How many symbols follow Davin's name? The 1

Answer
25 books
2/3 symbols = 20 + 5 = 25 books
equal half of 10 or 5.
There are 2/3 symbols. The half symbol would
How many symbols follow Jennifer's name?

Davin

Answer

Think

Think

Jennifer

Problem

Read, symbols show that involving large or small numbers.
Express 10 books. Then read. Pictographs are fun and easy to
interpret and construct Pictographs.

Pictograph
Procedure

1. Center the egg holder in the bottom of the jar.
2. Fill the jar with water.
3. Hold one coin at a time above the water's surface.
4. Drop each coin so that it falls through the water and into the egg holder.
5. Draw a picture on the paper. Record the number of coins that fell into the egg holder during 10 turns. Using a circie to represent each coin in the holder.
6. Draw a picture on the paper. Record the number of coins that fell into the egg holder during 10 turns.

Materials
- 1 gallon (4 liters) jar
- 10 coins

Purpose
To collect data and record it as a photograph.

Activity: Coin Drop

Balloon
400 balloons were prepared for Saturday. Were there enough balloons?

a. How many people attended the carnivals during the 3 days?

b. On which day were 250 balloons given away?

c. On which two days were the most balloons given away?

d. On which day were the least amount of balloons given away?

e. How much money was collected from the sales of the balloons?

Grades 5-6 think...
- Glass of lemonade was prepared for Saturday. How many glasses of lemonade can be made?

Bar graph:

Sunday: 350 people attended.
Saturday: 420 people attended.
Friday: 300 people attended.
April: 50 people attended.

Questions to answer:
1. Use 10 coins for each turn.
2. A balloon was given to each person attending a school carnival.
3. How much money was collected from the sales of the balloons?
4. On which day were the most balloons given away?
5. On which two days were the most sales made?
6. On which day were the least amount of balloons given away?
**Did You Know?**

<table>
<thead>
<tr>
<th>Light changes direction when it enters water, as did the coins.</th>
<th>Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A. Think</td>
<td>Solutions</td>
</tr>
<tr>
<td>Coins dropped in holder</td>
<td></td>
</tr>
</tbody>
</table>

**Friday**

day that 250 balloons were given away.

Thus, the day having 5 balloon symbols is the

\[ \text{Number of people} - \text{Number of balloons} \]

\[ \text{526.00} \]

260 glasses x $0.10 = $26.00

Each 10 cents, 26 symbols x $10 = $260

How many total glasses were sold? Count all of

Sunday

Which day had the least amount of money was

Friday and Saturday

Which two days have the most symbols?

Lauran drank 5 glasses of lemonade

Prepared (70) - Sold (65) = 5 glasses

How many were sold? How many prepared?

How many were sold and the number of glasses sold.

Find the difference between the number of

Saturday

Which day has the largest number of glass symbols?
Questions

1. Twenty children were asked about their favorite snacks. Find the number of children that ate each type of snack.

Problems

The same as 60/100 or 60% is a decimal number by dividing the numerator by 100. Thus 60% is 0.6. Percent means 100/100, sixty hundredths. Percent numbers can be expressed as percents. Percent symbol, ' % ', means hundredths. 60% is read as "sixty percent." Percent is a special ratio that compares a number to 100. The percent of a circle graph is usually shown as a percent where each 25 percent of the circle is divided into 4 equal sections. The larger the area of the graph used, the greater the percent.

To interpret information on a circle graph,

Circle Graph

Yes, there were 50 extra balloons.

400 balloons - 350 balloons = 50 balloons
7 symbols = 70 people

Day?

How many people received balloons on Saturday?

800 people attended the carnival.

16 x 50 = 800 people
7 balloon symbols = 350 people - Total attendance
1. Use the circle graph to answer Questions 1 through 3 about the class.

Note: The sum of the number of children who like the different snacks is equal to 20, the total number of children.

The circle graph shows the percentages of hair color in a class of 30 hair color.

Each hair color

a. red
b. black
c. brown

1. How many liters of oxygen are in the balloon?
   - 2.52 liters of 2.52 liters of oxygen in the balloon

2. What percentage of the air in the balloon is nitrogen?
   - 78% of the volume of air in the balloon is oxygen.

3. Find the part of the circle labeled nitrogen.
   - 100% is the sum of all the percentages in any circle graph.

   a. Think
   - 78% + 21% + 1% = 100%

   b. Think
   - 78% of 20 children = 0.78 x 20 = 15 children
   - 21% of 20 children = 0.21 x 20 = 4.2 children
   - 1% of 20 children = 0.01 x 20 = 0.2 children

   c. Think
   - 12 children like candy
   - 60% of 20 children = 0.60 x 20 = 12 children

   d. Think
   - 7 children like potato chips
   - 35% of 20 children = 0.35 x 20 = 7 children

   e. Think
   - 39% like raisins
   - 60% like candy
   - 39% like potato chips
Activity: Color Wheel

**Purpose:**
To use a circle graph of colors to demonstrate blending.

**Materials:**
- Cardboard
- Tempera paints: red, blue, and yellow
- Paintbrush
- Graph paper
- Color wheel

**Procedure:**
1. Draw a circle graph of colors on the card using tempera paints.
2. Blend colors to see the resulting colors.
3. Use the graph to determine how many minutes Ryan spends on his daily homework time.

**Procedure:**
1. Leave the pencil to dry.
2. Allow the pencil to dry.
3. Color each section of the circle with a different color: red, blue, and yellow.
4. Cut a 2.4 in (60 cm) length of string.
5. Insert the string into the holes of the pencil and thread it through the other hole.
6. Run the string through one of the holes and back through the other hole.
7. Pull the string until it is tight.
8. Form a loop and slide the paper into the center of the string.
9. Hold the string in the direction so that it winds in the opposite direction.
10. Pull outward on both ends of the string until it is tight.
11. Turn the pencil around until the string is lightly twisted.
12. Move the pencil to the center of the string.
13. The ends of the string together.

**Questions:**
1. How much does Ryan spend studying this week?
2. How much does Ryan get each week?
3. The circle graph is a record of how Ryan spends his time in a 24-hour day.
   - Math
   - Science
   - History
   - Spelling
   - Art

**Optional:**
Separate subjects.
6 hours of studying each week
1.2 hours per week
50% x 2 = 1.2 hours per week

Weekdays are Monday through Friday. Thus he
59 hours of sleep each week
8.4 hours per week
35% x 24 hours = 8.4 hours

There are 7 days in a week. Multiply the time
18 minutes study time for spelling
60% x 60 = 36 minutes

30% of 300 children = number with red hair
10% of 30 = 3 children

40% of the paper is yellow. The color
use to paint the paper are blue, red, and yellow the color
has generated. Change the painting of the colors used. If the colors
40% of the time is spent on red.

12 minutes study time for art
20% x 60 = 12 minutes

25 minutes study time for math
25% x 60 minutes = study time for math
10% x 60 = 6 minutes

10% of 30 children = number with red hair
10% of 30 = 3 children

6 children with black hair
20% of 30 = 6 children

30 children with brown hair
30% of 30 = 9 children

9 children with blond hair
30% of 30 = 9 children

12 children with blond hair
40% of 30 = 12 children
Use the following data chart to construct a line graph:

<table>
<thead>
<tr>
<th>Day</th>
<th>Number of Cases Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>10</td>
</tr>
<tr>
<td>Tues</td>
<td>20</td>
</tr>
<tr>
<td>Wed</td>
<td>30</td>
</tr>
<tr>
<td>Thurs</td>
<td>10</td>
</tr>
<tr>
<td>Fri</td>
<td>35</td>
</tr>
</tbody>
</table>

Construct a line graph.

Graphs 25
1. Construct a bar graph to record the information about the types of classroom pets. Use the horizontal scale for the number of pets and be sure to start at 0.

<table>
<thead>
<tr>
<th>Number</th>
<th>Pet</th>
<th>Classroom Pets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Snake</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Guinea Pig</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hamsters</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>White mice</td>
<td></td>
</tr>
</tbody>
</table>

2. Construct a bar graph to record the information about the types of emergency calls. Use the horizontal scale for the time and the vertical scale for the number of calls, and be sure to start at 0.

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Emergency Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 AM</td>
<td>0</td>
</tr>
<tr>
<td>9 AM</td>
<td>1</td>
</tr>
<tr>
<td>12 NOON</td>
<td>2</td>
</tr>
<tr>
<td>3 PM</td>
<td>0</td>
</tr>
<tr>
<td>6 PM</td>
<td>1</td>
</tr>
<tr>
<td>Time</td>
<td>Calls Received</td>
</tr>
</tbody>
</table>

Exercises
1. Though there was no time with 0 calls, the vertical scale begins at 0.

2. Did you know?

3. Think:

4. Solutions:

5. Number of pets:

<table>
<thead>
<tr>
<th>Types of Animals</th>
<th>10 points</th>
<th>15 points</th>
<th>20 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guppies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guinea Pigs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hamsters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Mice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Pets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples of using this method are:

A school's relative score is often used by

Divide the circle into 16 parts and each part will be equal to 4 beads.

4 \times 16 = 64

What is the smallest number?

8 + 16 + 24 + 4 + 12 = 64

What is the total number of beads?
Angles

Angles

Remote from

An angle measures less than 90°. An acute angle is any angle that measures

An angle measures 90° and forms a square corner. A small square

The unit of measure for an angle is a degree. One degree is written as

The names of the angle are thus ∠ABC or ∠CBA. The

The vertex. Three letters are used to name an angle with the vertex as

A ray is a straight line with one endpoint. An angle is

To name and identify right, acute, and obtuse angles.

26
Exercises

1. Use an index card to identify each angle as right, acute, or obtuse.

Question

Problem

- Use an index card to identify each angle as right, acute, or obtuse.

An index card can be used to identify the different angles. Place the obtuse angle has one ray pointing away from the card. An acute angle has one ray under the card. An index card is easy to use. A right angle has both rays in line with the card. The acute angle is between one edge and a ray. The obtuse angle is between one edge and the corner of the card.
Fill the cookie sheet with water.

A small notch is to be cut on the base of each triangle-shaped perk.

The top of one triangle is to be a right angle; the top of the second triangle is to be acute, and the top of the third triangle is to be obtuse.

Draw three triangles about 1 in. (2.5 cm) high on the still paper.

Procedure

Materials

cookie sheet

scissors

pencil

pencil ruler

stiff paper

dish soap

toothpick

To demonstrate how the angle of a boat affects its

Activity: PUSH

Sides of this irregular-shaped figure.

3. Find the number of right, acute, and obtuse angles formed by the
1. a. Right angle

Solutions

2. a. Right angle
   b. Acute angle
   c. Acute angle

Did You Know?

- Boat the Slowest:
  The boat with the acute angle should be the fastest boat and the obtuse

Materials:
- The paper boats float across the surface of the water.
- Observe the movement of the boats.
- Each of your two partners
  - Each of your two partners
  - Motion the tips of three toothpicks with dish soap and give one to

Cook sheet placed with H2O

Pan the paper boats on the surface of the water on the edge of the
Use a protractor to measure the angles in diagrams A and B.

**Problem**

1. Since the angle is acute, $\angle KJM \neq 90^\circ$.
2. The sum of the angles of any triangle is $180^\circ$.
3. When two numbers will represent an acute angle (one that is less than $90^\circ$), and
4. Place the center mark of the instrument on the vertex of the

**Facts**

A protractor is an instrument used to measure angles in

**Purpose**

To measure angles using a protractor.
Activity: SUN CLOCK

To use a protractor to make a sun clock.

1. Use a protractor to measure the angles.

Exercises

1. What is the direction for these times?
   a. 7:00
   b. 3:00
   c. 2:00
   d. 1:00

2. The face of a clock can be used to give direction. If straight ahead is defined as North and the large hand points to the hour of 12, which of these choices is correct? (less than 90\(^\circ\), which of the angles choices 110\(^{\circ}\) or 70\(^{\circ}\), which of the angles choices 100\(^{\circ}\) or 90\(^{\circ}\), which of the angles choices 170\(^{\circ}\) or 100\(^{\circ}\))

Answer

1. Think

2. Think
Answer

The angle is obtuse (greater than 90°). Which of the angle choices, 45° or 140°, is obtuse?

1. a. Think

Solutions

Did You Know?

The sun is not moving across the sky as it appears to do from

Results

as time passes.

Observe the movement of the pencil's shadow around the sun clock

Notes on the axis toward the east

The sun is still in alignment with the earth; band motion to right. Instead the sun is stationary while the earth moves on.

Mark the positions of these angles on the cardboard:

Procedures

Turn the protractor around and mark each on the outside of the

0°, 30°, 60°, 90°, 120°, 150°.

Mark the positions of these angles on the cardboard:

Place the protractor to complete the circle.

0°, 30°, 60°, 90°, 120°, 150°.

Write the numbers 1 through 12 on the inside of the circle as they

Place the protractor on a piece of cardboard.

The numbers on the sun clock are 30° apart. The positions on the

Procedures

daylight saving time.

The hours (set your watch back 1 hour if you are doing this during

write the number that is the number of the pencil's shadow across the number 1 on

Mark the positions of these angles on the cardboard:

place the protractor on the ground and begin the clock to

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Write the numbers 1 through 12 on the inside of the circle as they

Procedure

be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.

Mark the positions of these angles on the cardboard:

Place the protractor on a piece of cardboard.

Procedure

Be sure the clock will be in direct sunlight.
1. 60° to the right
   - Answer: Right or left of 120° is acute. Which of the angle choices are 30° and 120°? Is the angle to the right?
   - Answer: 30°

2. 35°
   - Answer: Which of the angle choices are 35° and 145°? Which of these choices are acute angles? Which acute angle is between the numbered divisions? The angle is acute and touches the fifth mark.
   - Answer: 30°

3. 150° or 150°, is acute?
   - Answer: The angle is acute (less than 90°), which of the angle choices are 30° or 150°? Is the angle to the right?
Answer

What is the height at 30°?
- Position of the string: 90° - 60° = 30°

What is the difference between the string and stopping?
- On what degree did the string stop? 60°
- On what degree did the string start? 90°

Height Chart to determine the height of the tree.
- Use the readings from the astrolobe and the astrolabe.

Problem

<table>
<thead>
<tr>
<th>Angle in Degrees</th>
<th>Height in Feet</th>
<th>Height in Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80°</td>
<td>11.43</td>
<td>3.5</td>
</tr>
<tr>
<td>75°</td>
<td>11.43</td>
<td>3.5</td>
</tr>
<tr>
<td>70°</td>
<td>12.74</td>
<td>3.8</td>
</tr>
<tr>
<td>65°</td>
<td>12.74</td>
<td>3.8</td>
</tr>
<tr>
<td>60°</td>
<td>13.32</td>
<td>4.0</td>
</tr>
<tr>
<td>55°</td>
<td>13.32</td>
<td>4.0</td>
</tr>
<tr>
<td>50°</td>
<td>14.97</td>
<td>4.5</td>
</tr>
<tr>
<td>45°</td>
<td>14.97</td>
<td>4.5</td>
</tr>
<tr>
<td>40°</td>
<td>16.70</td>
<td>5.0</td>
</tr>
<tr>
<td>35°</td>
<td>16.70</td>
<td>5.0</td>
</tr>
<tr>
<td>30°</td>
<td>18.42</td>
<td>5.5</td>
</tr>
<tr>
<td>25°</td>
<td>18.42</td>
<td>5.5</td>
</tr>
<tr>
<td>20°</td>
<td>20.13</td>
<td>6.1</td>
</tr>
<tr>
<td>15°</td>
<td>20.13</td>
<td>6.1</td>
</tr>
<tr>
<td>10°</td>
<td>21.85</td>
<td>6.6</td>
</tr>
<tr>
<td>5°</td>
<td>21.85</td>
<td>6.6</td>
</tr>
<tr>
<td>0°</td>
<td>23.57</td>
<td>7.2</td>
</tr>
<tr>
<td>Height Chart</td>
<td>Angle in Degrees</td>
<td>Height in Feet</td>
</tr>
</tbody>
</table>

Feet

To use a Protractor to determine the height of distance.

Object

Using a Protractor

28
Solutions

On what degree did the string stop? 75°

1. Think
On what degree did the string start? 90°

The washer is a piece that pulls it downward the center of the earth.
For reasons because of the pull of gravity, the gravity acting on the washer continues to hang straight down while the motion.

Did You Know?
The angle increases as the height of the object increases.

Refer
Use the Astronomical Height Chart to determine the height of the object.

Steps
Before determine the angle of the hanging string.
1. Look through the straw at the top of the object and have your
2. Go to (5 ft)
3. Think

Answer 5.85 ft (1.8 m) is the height of the man.

36.7 ft - 34.87 ft = 1.8 ft

119.18 ft - 113.33 ft = 5.85 ft

The rope and the height of the rope.

What is the difference between the height of the man on the

What is the height at 90°? 119.18 ft (36.67 ft)

What is the difference between the starting and stopping

On what degree did the string stop? 75°

On what degree did the string start? 90°

Answer 37.32 ft (11.48 m) is the height of the rocket.

What is the height at 75°?

What is the difference between the starting and stopping

On what degree did the string stop? 75°

On what degree did the string start? 90°

Answer 26.79 ft (8.24 m) is the height of the flagpole.

What is the height at 15°?

What is the difference between the starting and stopping

Answer 26.79 ft (8.24 m) is the height of the flagpole.
Polygons are named according to the number of sides in the structure. Some of the smaller and more common polygons are:

- Triangle
- Pentagon
- Hexagon
- Heptagon
- Octagon
- Nonagon
- Decagon

The sides meet at vertices. The point where the sides of the polygon meet is called a vertex.

A polygon is a simple closed figure formed by straight sides. To identify polygons:

- The number of straight sides
- The number of vertices
- The number of sides

For each structure, determine:

- It is a polygon, what kind of polygon?
- It is not a polygon.

Some questions to ask are:

- Is it a polygon?
- Yes, it is a polygon.

- Does it have straight sides?
- Yes, it is a polygon.

- It is a polygon, what kind of polygon?
- A polygon is a simple closed figure formed by straight sides.
Exercises

1. Name these common polygons.

2. For each structure A through C, determine:
   a. The number of straight sides.
   b. Is it a polygon?
   c. The name of the polygon.

3. Study the shapes of these creatures and identify those from the inhabited group that are from the imaginary planet of Zarp.

Which of these creatures are from Zarp?

These creatures are not from Zarp.
Did You Know?

180°, when placed together: The sum of the angles in any triangle equals 180°. The three vertices form the triangle in this activity form a straight line. The three sides of the triangle in any triangle equal 180°. The three segments form the triangle in this activity form a straight line.

### Activity: Three to Four

**Purpose:** To change the shape of polygons.

**Materials:** Tracing paper, scissors, marking pen, 1 sheet of paper by placing a short end against a longer side.

**Procedure:**
- Fold 1 sheet of paper by placing a short end against a longer side.
- Use the scissors to cut the rectangle from the end of the paper.
- Re-arrange the sections to form a different polygon.

**Results:** The triangle is cut and arranged to form a rectangle, a quadrilateral.

**Position sections A, B, and C as shown to form a quadrilateral.

**Conclusion:**
- C. Quadrilateral
- B. Yes
- A. 4 sides
- C. Octagon
- B. Yes
- A. 8 sides
- C. The pattern on soccer ball is that of a pentagon.
- B. A six-sided one is an example of a hexagon.

**Solutions**
Symmetry

Some figures have more than one line of symmetry as indicated by the line of symmetry.

A symmetric figure can be folded along a line of symmetry in a geometric figure.

30
1. Determine if the dotted lines are lines of symmetry for the figures.

2. How many lines of symmetry does this octagon have?

3. Take 4 sheets of paper, fold each sheet once. On each, draw an: 

   a. Circle
   b. Square
   c. Triangle
   d. Trapezoid

4. Make sure that the piece fits the shape when unfolded.

5. A, C, E, H

   Exercise 3.

   These capital letters make a cut so that the piece fits the shape when unfolded one of each. 

   3. B

   Answer

   Problem

   Answer

   Question

   On which line can the figure be folded to form two halves that exactly fit together?

   b. Think

   Answer

   think the
Answer

Two halves that exactly fit together!

On which line can the figure be folded to form

Solutions

Procedures

Did You Know?

Symmetry: Forming a shape or pattern with bikini arms
Results: Cutting half of a child on line of symmetry produces a

Use the scissors to cut along the dotted lines. Be sure not to cut
Be sure to draw line until to the edge of the paper
Just edge of the folded sheet will be the line of symmetry
Use the pencil to draw half of a person on the folded paper. The
Place the folded sheet of paper
Folded like a ham
Continue folding the ends back and forth until the entire sheet is
Turn the paper over and again fold the end over
Fold over about 1 1/2 (cm) of the end of 1 sheet of the paper

Purpose

Materials

To cut our symmetrical figures

Activity: Cut Outs

Lined the paper
1. Do diagrams a and b show mirror images?

2. The octagon has 8 lines of symmetry.

3. Reflections

Problem

To identify mirror images:

Answer

On which lines can the figure be folded to form two halves that exactly fit together?

Line B

On which lines can the figure be folded to form two halves that exactly fit together?

Line A

On which lines can the figure be folded to form two halves that exactly fit together?

Line C

On which lines can the figure be folded to form two halves that exactly fit together?

Line D

On which lines can the figure be folded to form two halves that exactly fit together?

Line E

On which lines can the figure be folded to form two halves that exactly fit together?

Line F

On which lines can the figure be folded to form two halves that exactly fit together?

Line G

On which lines can the figure be folded to form two halves that exactly fit together?

Line H

On which lines can the figure be folded to form two halves that exactly fit together?

Line I

On which lines can the figure be folded to form two halves that exactly fit together?

Line J

On which lines can the figure be folded to form two halves that exactly fit together?

Line K

On which lines can the figure be folded to form two halves that exactly fit together?

Line L

On which lines can the figure be folded to form two halves that exactly fit together?

Line M

On which lines can the figure be folded to form two halves that exactly fit together?

Line N

On which lines can the figure be folded to form two halves that exactly fit together?

Line O

On which lines can the figure be folded to form two halves that exactly fit together?

Line P

On which lines can the figure be folded to form two halves that exactly fit together?

Line Q

On which lines can the figure be folded to form two halves that exactly fit together?

Line R

On which lines can the figure be folded to form two halves that exactly fit together?

Line S

On which lines can the figure be folded to form two halves that exactly fit together?

Line T

On which lines can the figure be folded to form two halves that exactly fit together?

Line U

On which lines can the figure be folded to form two halves that exactly fit together?

Line V

On which lines can the figure be folded to form two halves that exactly fit together?

Line W

On which lines can the figure be folded to form two halves that exactly fit together?

Line X

On which lines can the figure be folded to form two halves that exactly fit together?

Line Y

On which lines can the figure be folded to form two halves that exactly fit together?

Line Z

On which lines can the figure be folded to form two halves that exactly fit together?

Line AA

On which lines can the figure be folded to form two halves that exactly fit together?

Line BB

On which lines can the figure be folded to form two halves that exactly fit together?

Line CC

On which lines can the figure be folded to form two halves that exactly fit together?

Line DD

On which lines can the figure be folded to form two halves that exactly fit together?

Line EE

On which lines can the figure be folded to form two halves that exactly fit together?

Line FF

On which lines can the figure be folded to form two halves that exactly fit together?

Line GG

On which lines can the figure be folded to form two halves that exactly fit together?

Line HH

On which lines can the figure be folded to form two halves that exactly fit together?

Line II

On which lines can the figure be folded to form two halves that exactly fit together?

Line JJ

On which lines can the figure be folded to form two halves that exactly fit together?

Line KK

On which lines can the figure be folded to form two halves that exactly fit together?

Line LL

On which lines can the figure be folded to form two halves that exactly fit together?

Line MM

On which lines can the figure be folded to form two halves that exactly fit together?

Line NN

On which lines can the figure be folded to form two halves that exactly fit together?

Line OO

On which lines can the figure be folded to form two halves that exactly fit together?

Line PP

On which lines can the figure be folded to form two halves that exactly fit together?

Line QQ

On which lines can the figure be folded to form two halves that exactly fit together?

Line RR

On which lines can the figure be folded to form two halves that exactly fit together?

Line SS

On which lines can the figure be folded to form two halves that exactly fit together?

Line TT

On which lines can the figure be folded to form two halves that exactly fit together?

Line UU

On which lines can the figure be folded to form two halves that exactly fit together?

LineVV

On which lines can the figure be folded to form two halves that exactly fit together?

Line WW

On which lines can the figure be folded to form two halves that exactly fit together?

LineXX

On which lines can the figure be folded to form two halves that exactly fit together?

Line YY

On which lines can the figure be folded to form two halves that exactly fit together?

Line ZZ

On which lines can the figure be folded to form two halves that exactly fit together?

Line AAAAAA

On which lines can the figure be folded to form two halves that exactly fit together?

Line BBBBBB

On which lines can the figure be folded to form two halves that exactly fit together?

Line CCCCCC

On which lines can the figure be folded to form two halves that exactly fit together?

Line DDDDDDD

On which lines can the figure be folded to form two halves that exactly fit together?

Line EEEEEEEE

On which lines can the figure be folded to form two halves that exactly fit together?

Line FFFFFFFF

On which lines can the figure be folded to form two halves that exactly fit together?

Line GGGGGGGG

On which lines can the figure be folded to form two halves that exactly fit together?

Line HHHHHHHH

On which lines can the figure be folded to form two halves that exactly fit together?

Line IIIIIIIIII

On which lines can the figure be folded to form two halves that exactly fit together?

Line JJJJJJJJJJ

On which lines can the figure be folded to form two halves that exactly fit together?

Line KKKKKKKKK

On which lines can the figure be folded to form two halves that exactly fit together?

Line LLLLLLLLLL

On which lines can the figure be folded to form two halves that exactly fit together?

Line MMMMMMMMMM

On which lines can the figure be folded to form two halves that exactly fit together?

Line NNNNNNNNNN

On which lines can the figure be folded to form two halves that exactly fit together?

Line OOOOOOOOOO

On which lines can the figure be folded to form two halves that exactly fit together?

Line PPPPPPPPPP

On which lines can the figure be folded to form two halves that exactly fit together?

Line QQQQQQQQQQ

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Correct

1. Print your name in the mirror so that it looks correct.
2. Place a piece of paper under the mirror's edge.
3. Observe the image of the letter seen in the mirror.
4. Use the pencil to print your name on the paper.
5. Place a sheet of paper under the edge of the mirror.
6. Line the image to see the mirror in the side of the shoe box.

Procedure

Materials

- Pencil
- Writing paper
- Shoe box

Purpose

To determine the direction of mirror images.

Activity: Mirror Images

Exercises

1. Are the images through a mirror images?
2. Are the pencils and mirror images, but the cups are not.
3. Predict the resulting image if a mirror is placed along the dotted line.

Think:

Will the two halves match if the picture is folded along the dotted line?
Solutions

1. Think: Will the two halves match if the picture is folded along the dotted line?

2. Think: If a fold could be made at the edge of the mirror, which

3. A key

Answer B

realized image would match the real object.

If a fold could be made at the edge of the mirror, which

C. No, both are right hands and are not mirror images.

D. Yes, the figures are mirror images.

E. Yes, the hands work are mirror images.

Answer A: Yes, the figures are mirror images.

Did You Know?

Mirror always gives you a reversed image.

You have never seen yourself as others see you looking into a

on each other.

and raise it upward, the outline and the mirror image would exactly fit

at an angle to the mirror. If you hold the paper at the edge of the mirror

let the letters appear to be upside down because the paper is placed

Results

Mirror images are backwards. Left is right and right is

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