Strategies for Addition

Use Pictures and Equations to Represent Addition

\[4 + 5 = 9\]

Count On

\[5 + 3 = 8\]

Add 10 and More

\[10 + 4 = 14\]

Make a Ten

\[10 + 3 = 13\]

So, \(7 + 6 = 13\)

Use a Doubles Fact

\[4 + 5 = ?\]

\[4 + 4 = 8\]

\[8 + 1 = 9\]
Compare Numbers

24

28

28 is greater than 24.

28 > 24

45

54

45 is less than 54.

45 < 54

32

32

32 is equal to 32.

32 = 32

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Counting Minutes

12:20

Examples

4:30  30 minutes after 4 half past 4

4:15  15 minutes after 4 quarter past 4

A.M. and P.M.

12:00  noon or midnight

a.m.: times after midnight and before noon

p.m.: times after noon and before midnight

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Estimating Lengths

A centimeter ruler is a tool you can use to measure the length of an object in centimeter units.

The spoon is as long as two pieces of yarn, so a good estimate for the length of the spoon is 14 centimeters.

The crayon is 10 centimeters long.

A meter stick has a length of 1 meter.

A door has a length of 1 meter stick. So it is about 1 meter in length.

1 meter or 1 centimeter?

You need 100 centimeters to equal 1 meter.

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Area

Area is the measure of the number of unit squares needed to cover a surface.

Count unit squares.

1 2 3 4
5 6 7 8 9 10

10 square units

Add.

1 = 1 square foot
5 + 5 + 5 = 15 square feet

Multiply.

1 = 1 square inch
4 × 6 = 24 square inches

Find the area of combined rectangles.

1 = 1 square inch
1 × 4 = 4
2 × 7 = 14
4 + 14 = 18 square inches

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Comparing Fractions

Visual Models

\[
\begin{array}{c}
\frac{1}{4} \quad \frac{1}{4} \\
\frac{3}{8} \quad \frac{3}{8}
\end{array}
\]

\[
\begin{array}{c}
\frac{1}{8} \quad \frac{1}{8} \quad \frac{1}{8} \\
\frac{1}{8} \quad \frac{1}{8} \quad \frac{1}{8}
\end{array}
\]

\[
\begin{array}{c}
\frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3}
\end{array}
\]

So, \( \frac{5}{8} > \frac{2}{8} \)

Same Denominator

\[
\begin{array}{c}
0 \\
\frac{2}{8} \\
\frac{5}{8} \\
\frac{8}{8}
\end{array}
\]

Same Numerator

\[
\begin{array}{c}
\frac{1}{6} \quad \frac{1}{6} \quad \frac{1}{6} \\
\frac{1}{6} \quad \frac{1}{6} \quad \frac{1}{6}
\end{array}
\]

\[
\begin{array}{c}
\frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3}
\end{array}
\]

\[
\begin{array}{c}
\frac{2}{6} \\
\frac{2}{3}
\end{array}
\]

Missing Pieces

\[
\begin{array}{c}
\frac{7}{8} \\
\frac{2}{3}
\end{array}
\]

\[
\frac{1}{8} \text{ is less than } \frac{1}{3}
\]

So, \( \frac{7}{8} > \frac{2}{3} \)

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**Multiplication and Division Strategies**

**Think Multiply to Divide**
- \(15 \div 5 = \) 3
- \(5 \times 3 = 15\)
- \(15 \div 5 = 3\)

**Related Facts**
- \(4 \times 3 = 12\)
- \(3 \times 4 = 12\)
- \(12 \div 4 = 3\)
- \(12 \div 3 = 4\)

**Doubles**
- \(6 \times 8 = \)
- \(4 + 4\)
- \(6 \times 4 = 24\)
- 24 doubled is 48
- \(6 \times 8 = 48\)

**Distributive Property**
- \(3 \times 7 = \)
- \(3 \times 4 = 12\)
- \(3 \times 3 = 9\)
- \(12 + 9 = 21\)
- \(3 \times 7 = 21\)

**Count Equal Groups on a Number Line**

- \(4 \times 2 = 8\)
- \(8 \div 2 = 4\)

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Relate Fractions and Decimals

Tenths

\[ \frac{5}{10} = 1.5 \]

Compare Decimals

\[ 0.68 < 0.9 \]

Hundredths

\[ \frac{37}{100} = 0.37 \]

Fractions, Decimals, and Money

\[ \frac{75}{100} = 1.75 = 51.75 = 175\,\text{c} \]

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**Multiplication with Fractions**

**Represent Equal Shares**

What is $\frac{3}{4}$ of 8?

![Diagram showing 8 circles divided into 4 equal parts, with 3 parts shaded.](image)

$\frac{3}{4}$ of 8 is 6.

**Multiply Unit Fractions**

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

Divide the number line from 0 to 1 into halves, and divide each half into thirds.

![Number line with red line showing division into thirds and fractions.](image)

$\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$

**Multiply Fractions Using an Area Model**

![Area model with a grid divided into fractions.](image)

$\frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$

**Scaling**

$\frac{3}{4} \times \frac{2}{3}$ because $\frac{3}{4}$ < 1.

$\frac{5}{6} \times \frac{2}{3}$ because $\frac{5}{6} = 1$.

$\frac{2}{3} \times \frac{5}{6}$ because $\frac{2}{3} > \frac{1}{2}$.

**Multiply Whole Numbers by Fractions**

$\frac{3}{4} \times 20 = \frac{3}{4} \times \frac{20}{1} = \frac{60}{4} = 60 \div 4 = 15$
Customary and Metric Measurement

×10  ×10  ×10  ×10  ×10  ×10

kilo- (k)  hecto- (h)  deka- (da)  meter (m) liter (L) gram (g)  deci- (d)  centi- (c)  milli- (m)

÷10  ÷10  ÷10  ÷10  ÷10  ÷10

Metric Conversions
1 meter = 100 centimeters
1 meter = 1,000 millimeters
1 kilometer = 1,000 meters

1 liter = 1,000 milliliters
1 kilogram = 1,000 grams

Customary Conversions
1 foot (ft) = 12 inches (in.)
1 yard (yd) = 3 feet
1 mile (mi) = 5,280 feet
1 mile = 1,760 yards

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 2 cups
1 quart (qt) = 2 pints
1 gallon (gal) = 4 quarts

1 pound (lb) = 16 ounces (oz)
1 ton (T) = 2,000 pounds

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Area of Triangles and Special Quadrilaterals

Area of Parallelograms

The area $A$ of a parallelogram is the product of its base $b$ and its height $h$.

$$A = bh$$

$b = 6 \text{ cm}$

$h = 3 \text{ cm}$

$$A = 6 \times 3 = 18 \text{ cm}^2$$

Area of Triangles

The area $A$ of a triangle is half the product of its base $b$ and its height $h$.

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

$8 \text{ m}$

$20 \text{ m}$

$$A = \frac{1}{2} (20)(8) = 80 \text{ square meters}$$

Area of Trapezoids

The area of a trapezoid is half its height multiplied by the sum of the lengths of its two bases.

$$A = \frac{1}{2}h(b_1 + b_2)$$

$17 \text{ ft}$

$16 \text{ ft}$

$39 \text{ ft}$

$$A = \frac{1}{2} 16(17 + 34) = 448 \text{ square feet}$$

Area of Composite Figures

You can find the areas of composite figures by breaking the figures into rectangles, triangles, or other familiar shapes. Then you can apply the area formulas.

Area of small rectangle = $6 \times 4 = 24 \text{ square meters}$

Area of triangle = $\frac{1}{2} (8)(4) = 16 \text{ square meters}$

Area of large rectangle = $14 \times 6 = 84 \text{ square meters}$

Total area = $24 + 16 + 84 = 124 \text{ square meters}$

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Real-World Relationships Between Variables

Representing Equations

The equation \( y = x + 2 \) can be represented in a table or as a graph.

<table>
<thead>
<tr>
<th>( x )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Write Equations from Verbal Descriptions

A freight train moves at a constant speed of 50 miles per hour.

Use the information to make a model.

\[
\text{Distance traveled (miles)} = \text{Distance traveled per hour} \cdot \text{Time (hours)}
\]

\[
y = 50x
\]

Write Equations from Tables

Write an equation to represent the relationship between \( x \) and \( y \) in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>6</td>
<td>16</td>
<td>26</td>
<td>36</td>
</tr>
</tbody>
</table>

A. Look for a pattern.
Each \( y \)-value is 4 less than the corresponding \( x \)-value.
B. Use the pattern to write an equation.
\( y = x - 4 \)

Write Equations from Graphs

A. Read the ordered pairs from the graph.

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
</tr>
</tbody>
</table>

B. Look for a pattern.
Each \( y \)-value is 20 more than the corresponding \( x \)-value.
C. Use the pattern to write an equation.
\( y = x + 20 \)

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**Types of Probability**

**Theoretical Probability**
Based on possible outcomes when all outcomes are equally likely

**Formula:**
\[ P(\text{event}) = \frac{\text{number of outcomes in the event}}{\text{total number of equally likely outcomes}} \]

**Experimental Probability**
Based on the outcomes of an experiment

**Formula:**
\[ P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}} \]

**Types of Events**

**Simple**
Outcomes resulting from a single event

**Example:**

**Compound**
Outcomes resulting from more than one simple event happening together

**Example:**

**Vocabulary**
- The set of all possible outcomes from a probability experiment is known as a **sample space**.
- A **simulation** is the process of using a model to recreate a situation to find probability.

**Three ways to express probability ratios:**
1. _____ fraction
2. _____ decimal
3. _____ percent

**Three ways to list the sample space:**
1. _____ table
2. _____ tree diagram
3. _____ organized list

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The Pythagorean Theorem

**Pythagorean Theorem**

If $a$ and $b$ are legs and $c$ is the hypotenuse, $a^2 + b^2 = c^2$.

**Converse of the Pythagorean Theorem**

If the sum of the squares of the two shorter legs of a triangle is equal to the square of the longest side, then the triangle is a right triangle.

If $a^2 + b^2 = c^2$, then the triangle is a right triangle.

**Apply the Pythagorean Theorem**

A 32-inch baseball bat fits diagonally inside this box. What is the diagonal of the base of the box? Round to the nearest whole number.

$25^2 + x^2 = 32^2$

$625 + x^2 = 1024$

$x^2 = 399$

$x = 20$ inches

**Apply the Pythagorean Theorem in the Coordinate Plane**

Brady walks directly from his location at point $B$ to see his friend Phil at point $P$.

How far does Brady walk, rounded to the nearest tenth of a foot?

$d = \sqrt{30^2 + 15^2}$

$d = \sqrt{1125}$

$d = 33.5$ feet

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Read and Write 6, 7, 8, 9, and 10

6 six

7 seven

8 eight

9 nine

10 ten

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Count and Write 11 to 14

Count and write 11

\[
10 + 1 = 11
\]

Count and write 12

\[
12 = 10 + 2
\]

Count and write 13

\[
13 = 10 + 3
\]

Count and write 14

\[
10 + 4 = 14
\]

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