PROBLEMS

1. Who lives in each house?
   - Sarah lives on a corner.
   - Julie lives on the same road as the school.
   - Phoebe could walk West from her house to Sarah’s house.
   - Rachel lives in house #3

2. Find the mystery number.
   a. Take the number that equals half a dozen.
   b. Then, subtract the number of vowels in the name of the eighth month of the year.
   c. Add that result to the number of letters in the last month of the year.
   d. Multiply that number times the greatest even number that is less than ten.
   e. Add that product to the number of hours in two days.

   The mystery number is __________.

3. Find the values of the symbols ∆, ○, and □ so that the sum of the rows and columns is the number provided:

<table>
<thead>
<tr>
<th></th>
<th>∆</th>
<th>∆</th>
<th>○</th>
<th>○</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>○</td>
<td>□</td>
<td>○</td>
<td>♣</td>
<td>78</td>
</tr>
<tr>
<td>∆</td>
<td>∆</td>
<td>□</td>
<td>□</td>
<td>♣</td>
<td>102</td>
</tr>
<tr>
<td>72</td>
<td>51</td>
<td>69</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Someone has stolen animals from the zoo! These animals are not normal though. Each peacock has three feathers, the kangaroos have two pouches, each leopard has five spots, the giraffe's necks are only four inches long, and the elephants all have two trunks! We don't know how many animals were stolen, but the Zoo Bandit left a clue for us: a letter. Use your multiplication and division skills to figure out how many of each type of animal was taken according to the clues that he left us.

Dear Zoo, I got you! —
I've taken your animals to start my own zoo! The giraffes will go in a special little place.
(16 inches of neck doesn’t need a lot of space.)

My zoo will be the best around
With the strangest animals ever found.
The leopards will be the biggest hit of all—
With 25 spots, they’re off-the-wall!

Kids will travel from near and far.
Those 8 elephant trunks will make me a star.
9 precious peacock feathers will make me rich.
As long as my plan goes off without a hitch!

Folks will come to see the kangaroos
With 14 pouches, how could I lose?
Signed,
The Zoo Bandit

5. The “smile” operation is defined by the table at right. For example, \( b \odot b = c \) and \( b \odot c = d \). Answer each of the remaining questions about this operation.

(a) Find \( c \odot e \)

(b) Find the letter that fits this rule: \( d \odot ? = c \)

(c) Find \( (a \odot b) \odot (c \odot d) \)

(d) Find all letter pairs \( \square \) and \( \circ \) where the answer is \( e \):
\( \square \odot \circ = e. \)
**PROBLEM 1 SOLUTION**

PROBLEM #1: Who lives in each house?

- Sarah lives on a corner.
- Julie lives on the same road as the school.
- Phoebe could walk West from her house to Sarah’s house.
- Rachel lives in house #3

SOLUTION:

<table>
<thead>
<tr>
<th>House #</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td></td>
</tr>
<tr>
<td>#2</td>
<td></td>
</tr>
<tr>
<td>#3</td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td></td>
</tr>
</tbody>
</table>

Who lives in house #1?  
Who lives in house #2?  
Who lives in house #3?  
Who lives in house #4?  
PROBLEM #2: Find the mystery number.

a. Take the number that equals half a dozen.
b. Then, subtract the number of vowels in the name of the eighth month of the year.
c. Add that result to the number of letters in the last month of the year.
d. Multiply that number times the greatest even number that is less than ten.
e. Add that product to the number of hours in two days.

The mystery number is _________.

SOLUTION:

What number equals half a dozen?

How many vowels are in the name of the eighth month of the year?

How many letters are in the last month of the year?

What is the greatest even number less than ten?

How many hours are in two days?

The mystery number is _________
**PROBLEM 3 SOLUTION**

**PROBLEM #3:** Find the values of the symbols $\triangle$, $\bigcirc$, and $\Box$ so that the sum of the rows and columns is the number provided:

<table>
<thead>
<tr>
<th></th>
<th>$\triangle$</th>
<th>$\triangle$</th>
<th>$\bigcirc$</th>
<th>$\bigcirc$</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Box$</td>
<td>$\bigcirc$</td>
<td>$\Box$</td>
<td>$\bigcirc$</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>$\triangle$</td>
<td>$\triangle$</td>
<td>$\Box$</td>
<td>$\Box$</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>51</td>
<td>69</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOLUTION:**

$\triangle = \underline{\hspace{2cm}}$

$\bigcirc = \underline{\hspace{2cm}}$

$\Box = \underline{\hspace{2cm}}$
### PROBLEM 4 SOLUTION

PROBLEM #4: Someone has stolen animals from the zoo! These animals are not normal though. Each peacock has three feathers, the kangaroos have two pouches, each leopard has five spots, the giraffe's necks are only four inches long, and the elephants all have two trunks! We don't know how many animals were stolen, but the Zoo Bandit left a clue for us: a letter. Use your multiplication and division skills to figure out how many of each type of animal was taken according to the clues that he left us.

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As long as my plan goes off without a hitch!

Folks will come to see the kangaroos
With 14 pouches, how could I lose?
Signed,
The Zoo Bandit

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock</td>
<td>______</td>
</tr>
<tr>
<td>Leopard</td>
<td>______</td>
</tr>
<tr>
<td>Elephant</td>
<td>______</td>
</tr>
<tr>
<td>Giraffe</td>
<td>______</td>
</tr>
<tr>
<td>Kangaroo</td>
<td>______</td>
</tr>
</tbody>
</table>
PROBLEM #5:
The “smile” operation ⊕ is defined by the table at right. For example, b ⊕ b = c and b ⊕ c = d. Answer each of the remaining questions about this operation.

\[
\begin{array}{cccccc}
\oplus & a & b & c & d & e \\
\hline
a & a & b & c & d & e \\
b & b & c & d & e & a \\
c & c & d & e & a & b \\
d & d & e & a & b & c \\
e & e & a & b & c & d \\
\end{array}
\]

SOLUTION:

(a) c ⊕ e = ____________________

(b) Find the letter that fits this rule: d ⊕ ? = c

? = ____________________

(c) Find (a ⊕ b) ⊕ (c ⊕ d) = ____________________

(d) Find all letter pairs □ and ○ where the answer is e: □ ⊕ ○ = e.

*Use as many of the lines of the tables as needed.*