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Preface

Adventures in Pre-Algebra is designed to help prepare both elementary and high school students for success in the subject of algebra. This is accomplished by providing another tool for the teacher to vary classroom activities through cross-cultural math puzzles. A wide variety of material is offered to help the teacher integrate the puzzles into the curriculum without having to alter it. A teacher can easily blend the puzzles into an established course structure to add variety, to review or strengthen concepts, or to enrich through cross-cultural puzzles that enliven the interest of all students.

The present edition of Adventures in Pre-Algebra is a revision of the original 1973 edition of Adventures in Arithmetic Series and other cross-cultural math puzzles previously published. New stories are added. The format is now in a convenient binder to help the teacher more readily reproduce copies for the classroom.

Since the publication of the first edition, some math teachers are using integrated mathematics programs. Teachers often encounter students without basic math skills and without the structural foundation for such programs. Students are supposed to think and discover mathematics. But, if they have no foundation, the students especially in group activities can copy without learning from the student who understands. Thus, Adventures in Pre-Algebra can be an important source of materials for review of basic skills for students not ready for an integrated mathematics program, especially when traditional practice exercise are not available in integrated mathematics texts.

I wish to thank my students at both Piedmont Hills High School and Silver Creek High School in San José, California who used these puzzles over the past twenty-six years. These students gave me valuable insight for the improvement of this extensive work.

A.M.D.G.

Lawrence W. Swienciki, Ph.D.
Santa Fe, New Mexico
June 29, 1999
Suggested Uses

This book can be used in a variety of math classes preceding and including first year high school algebra. The classes can be in general mathematics, pre-algebra, introductory algebra, or a two year elementary algebra course. The various uses are discussed in each of these situations as experienced by the author.

In the subject of general mathematics or its equivalent, invariably at the junior high school or high school level, there are students who have been unsuccessful with the subject. Also the students vary in aptitude and study skills. Some students can have a resentment in taking the subject because, while they may think they understand the work, lack the facility to do it effectively. Under these conditions, the teacher needs a variety of ways to present the concepts to give the student the sense that the same bad experience is not being repeated. Adventures in Pre-Algebra has topics that overlap the subject of general mathematics. The puzzles can help the teacher provide drill or practice by presenting the work in a different framework. The students begin to use their imaginations and forget that the problems were done in a previous year. The stories have been extensively researched and have an interesting anecdotal conclusion that is worthy of the efforts of the students. Students from diverse backgrounds often appreciate stories related to their own cultural heritage.

In the general mathematics class that is taught by the teacher providing short lessons in front of the room and followed by student practice, the puzzles can be used following a lesson or as an introduction to the lesson. Another possibility is to have the students start the puzzle while the teacher is taking the roll. This sets a tone in the classroom that work starts immediately at the beginning of the period. Perhaps a student can be asked to distribute the puzzle to further expedite the lesson while the teacher takes care of the necessary clerical tasks.

I recommend that the teacher encourage the students to read the puzzles carefully. Often, students with poor math skills can have poor reading comprehension. Perhaps, they do too little reading. The teacher can encourage the reading when first introducing the use of these puzzles by reading it to the class and asking students questions or making comments on what is being read. In other words the teacher rouses the interest of the students by bringing the stories more to life. In this way the students realize that the stories have value: they are not just sitting on the page to be skipped. After the students complete a
puzzle, it is also possible to discuss the answer with the class. Finally, a teacher can ask a student to volunteer to read. In some cases requiring the students to read aloud is an embarrassment. However, the experienced teacher can best evaluate the situation.

When a general mathematics or pre-algebra class is individualized, a very effective way to use the puzzles is to run copies of several puzzles and have them available as extra credit. While not all students can be motivated in this way, some students can be so interested in the stories that they complete more math exercises than they would do without the stories. This of course depends upon the inclinations of the students.

In pre-algebra or introductory algebra texts, it is common to find a large volume of problems of a similar type. Although this is intended to give the students sufficient practice in recognizing the patterns, it can also be very tedious to work exercise after exercise of this type. The teacher can select some puzzles from *Adventures in Pre-Algebra* to replace those of the text. In this way the students get a sense of having something different, yet meet the same objective of having the practice they need to see the mathematical patterns.

*Adventures in Pre-Algebra* can be used to introduce a topic familiar to the class as a review, perhaps before a quiz, an examination, or the final examination. By this technique, the teacher can again vary the routine of the students.

When a student finishes a test early, a puzzle can be given as something that can occupy the time while waiting for the test to end. The student also gains further reinforcement of the subject matter. There are many variations to this idea. The puzzle can be given to the entire class after the test as an assignment or extra credit. It can be used as the basis for the lesson the next day.

The puzzles have a simple format. Once the students have completed one, they have no difficulty in being self-directed. Furthermore, since the puzzles are self-checking, the students can correct most of their own common errors. This can be an advantage for the teacher. More time can be spent with students having difficulty with the concept.

For the convenience of the teacher, the answers are provided at the end of the book. Both the correspondence and the actual concluding statement are provided. The answers are self-checking. They are correctly spelled, logical, and properly constructed. If this is not what the student finds, the location of the mistake is usually obvious.

The author grants permission to the teacher to reproduce up to 50 copies of any part of this book for use in his or her classroom.
The Riddle

Once an old Chinese gentleman wanted to find a good wife for his son. He knew that she should be virtuous and wise, not just pretty on the outside. The father presented a riddle to some village girls to see how thoughtful they were. He said: "You are to bring me two things: some wind wrapped in paper; and some fire wrapped in paper." One beautiful girl solved the riddle and brought the two things requested by the old gentleman. She became his daughter-in-law. To learn what the two things the girl brought, solve the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. \[ -\frac{1}{2} + \left( -\frac{3}{4} \right) \]

6. \[ \frac{1}{8} + \left( -\frac{1}{2} \right) \]

11. \[ -\frac{3}{8} + \left( -\frac{3}{8} \right) \]

2. \[ -\frac{1}{8} + \left( -\frac{1}{2} \right) \]

7. \[ 1 + \left( -\frac{7}{8} \right) \]

12. \[ 1 + \left( -\frac{1}{2} \right) \]

3. \[ -\frac{1}{2} + \frac{3}{4} \]

8. \[ -1 + \frac{7}{8} \]

13. \[ -1 + \frac{1}{2} \]

4. \[ \frac{1}{2} + \left( -\frac{3}{4} \right) \]

9. \[ -1 + \left( -\frac{7}{8} \right) \]

14. \[ -1 + \left( -\frac{1}{2} \right) \]

5. \[ -\frac{1}{8} + \frac{1}{2} \]

10. \[ -\frac{3}{8} + \left( \frac{3}{8} \right) \]

15. \[ -3\frac{1}{2} + 1\frac{1}{4} \]

A = \[ -\frac{3}{2} \]

E = \[ \frac{1}{4} \]

H = \[ -\frac{5}{4} \]

N = \[ -\frac{5}{8} \]

R = 0

B = \[ -\frac{15}{8} \]

F = \[ -\frac{3}{8} \]

I = \[ \frac{1}{2} \]

O = \[ -\frac{1}{2} \]

T = \[ -\frac{1}{8} \]

D = \[ \frac{1}{8} \]

G = \[ \frac{3}{8} \]

L = \[ -\frac{3}{4} \]

P = \[ -\frac{9}{4} \]

U = \[ -\frac{1}{4} \]
The Sacred Vision

Young Braves of the Cheyenne tribe used to fanatically seek visions of spirits. So real was the spiritual world to them that they took to isolation, fasting, and even the cruelest of self-inflicted tortures in an attempt to gain pity from a spirit. It was hoped the spirit would appear to the brave and show him the secret symbols that could be used to call for help. The spirit became the guardian of the young Cheyenne for life. After the vision, the brave would copy the symbols and place them in a pouch called the sacred medicine bundle.

To learn what happened if a Cheyenne was unable to have a sacred vision, solve the problems below.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. \(\_\_\_\_ - 3 + \(-2\)\)  
2. \(\_\_\_\_ - 2 + \(-10\)\)  
3. \(\_\_\_\_ + 2 + \(-3\)\)  
4. \(\_\_\_\_ + 3 + \(-2\)\)  
5. \(\_\_\_\_ + 9 + \(-7\)\)  
6. \(\_\_\_\_ + 7 + \(-9\)\)  
7. \(\_\_\_\_ - 3 + \(-7\)\)  
8. \(\_\_\_\_ 7 + \(-4\)\)  
9. \(\_\_\_\_ 4 + \(-7\)\)  
10. \(\_\_\_\_ 9 + \(-9\)\)  
11. \(\_\_\_\_ - 6 + \(-12\)\)  
12. \(\_\_\_\_ - 8.5 + .75\)  
13. \(\_\_\_\_ -.5 + 7.25\)  
14. \(\_\_\_\_ -.5 + \(-7\)\)  
15. \(\_\_\_\_ 1.7 + 9.8\)  
16. \(\_\_\_\_ 13.4 + 5\)  
17. \(\_\_\_\_ 4.6 + \(-3.7\)\)  
18. \(\_\_\_\_ 31 = \_\_\_\_ \_\_\_ + ?\)  
19. \(\_\_\_\_ 16 = \_\_\_\_ \_\_\_ \_\_\_ + ?\)  
20. \(\_\_\_\_ 3 = \_\_\_\_ \_\_\_ \_\_\_ + ?\)

A = -5  
B = 0  
C = -18  
D = -1  
E = -3  
F = 14  
G = 1  
H = 8.1  
I = 3  
L = -7.5  
M = -12  
N = -10  
O = 7.75  
P = 6  
R = 8.3  
S = 25  
T = 6.75  
U = -2  
V = -8.4  
Y = 2

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<td>1-7-12-13</td>
<td>15-9-17</td>
<td>8-7-3-8-1-7</td>
<td>1-7-3</td>
<td>2-1-3-9</td>
<td>1</td>
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<td>11-12-20-5</td>
<td>12-18</td>
<td>15-8-19</td>
<td>19-1-11-17-9-3</td>
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<td>2-9-3-8-11-8-7-9</td>
<td>10-6-7-3-14-9</td>
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</table>
Aleijadinho

Although Antonio Francisco Lisboa was the son of a humble African slave woman, he became one of the most famous sculptors of the New World during the colonial period. He was called Aleijadinho or the "little cripple" because he was born with a crooked back and never grew very tall. Aleijadinho spent most of his life in the rich Brazilian mining town of Ouro Preto carving many beautiful statues in wood and stone. It was here that the artist helped free many African slaves; he educated them in the art of sculpture. Later, Aleijadinho caught a dreadful disease which left him without the use of his hands. To learn how this affliction changed his life, solve the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. __ 12 + (- 12) + 4
2. __ -10 + 7 + (- 7)
3. __ 4 + (- 8)
4. __ 7 + (- 12) + (- 7)
5. __ 3 + (- 5) + (- 9)
6. __ 6 + (- 18) + 4
7. __ - 16 + 17 + (- 3)
8. __ - 6 + (- 7) + (- 5)
9. __ - 2.5 + 7.4
10. __ - 3.1 + (6.9) + (- 3.2)
11. __ 1.7 + (- 9.3) + 1.5
12. __ \(\frac{3}{5} + (-1\frac{1}{5})\)

13. __ \(\frac{1}{4} + (-\frac{1}{2}) + 1\frac{1}{4}\)
14. __ \(-\frac{5}{6} + 1\frac{2}{3}\)
15. __ \(\frac{1}{8} + (-\frac{3}{4})\)
16. __ \(-\frac{1}{9} + (-\frac{2}{3})\)
17. __ - 5 + 11 + (- 8) + 7
18. __ - 14 + (- 1) + (- 8) + 1
19. __ 11 + (- 5) + 18 + (- 5)
20. __ ? + (- 11) = 0
21. __ 17 + (- 6) + ? = - 4
22. __ - 15 + (- 3) + ? = 5

A = 4  F = 5  K = - 18  P = \(\frac{5}{6}\)  U = 23
C = 1  G = - 12  L = - 8  R = 19  V = \(-\frac{3}{5}\)
D = - 4  H = 4.9  M = - 10  S = \(-\frac{7}{9}\)  W = - 15
E = \(-\frac{5}{8}\)  I = 11  N = - 22  O = - 11  T = .6
J = - 2  Y = - 6.1

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As for you my sheep, says the Lord God, I will judge between one sheep and another between rams and goats.

Ez. 34, 17

Daniel

One like the son of man coming on the clouds of heaven.
Dn. 7, 13

Ezekiel

9-20-16 19-20-4-9-10. 1-6-15-20-7-1-3-20-18-9-5
La China Poblana

Several centuries ago, a beautiful but lonely Chinese princess named May Ling, lived in Peking, the Forbidden City. One day, the princess escaped from the palace and went to the beach. It was a long walk and the princess became so tired she fell asleep in the corner of an empty boat. When she awoke, she found herself on a pirate ship headed for Mexico where she was to be sold as a slave.

Fortunately, a wealthy merchant from Puebla bought May Ling and raised her as one of his own children. She was recognized for the beautiful embroidery on her skirts. Her brightly sequined oriental style designs of birds, flowers, dragons, and butterflies were so popular, Puebla women began to copy her work on their fiesta dresses.

To learn how the Chinese princess is honored in Mexico, solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. __ + 3 + (7) 10. __ ____ + (- 3) = - 6
2. __ - 3 + (- 7) 11. __ -.7 + (-4.2) + (-3.1)
3. __ + 3 + (- 7) 12. __ - 6 + _____ = 1
4. __ - 3 + (7) 13. __ _____ + (0) = -1
5. __ - 3 + (3) 14. __ 7 + (- 9)
6. __ 7 + _____ = 10 15. __ 8 + _____ = -8
7. __ \( \frac{1}{2} + (1 \frac{1}{2}) \) 16. __ \( -\frac{2}{3} + (-2) + (-2 \frac{1}{3}) \)
8. __ \( -\frac{1}{2} + (1 \frac{1}{2}) \) 17. __ - 6 + _____ = -13
9. __ \( 1 \frac{1}{4} + (-\frac{1}{8}) + (3 \frac{7}{8}) \) 18. __ 6 + _____ = 0

A = 2  E = -4  L = 3  P = 10  U = 0
B = 7  F = -1  M = -3  R = -6  X = -8
C = 1  H = 8  N = 4  S = -16  Y = -5
D = -7  I = 5  O = -2  T = -10

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2-14-17-7-16, 2-19-3  4-7-2-9-14-4-7-6
8-14-15-2-5-10-3  14-13  2-19-3  15-2-7-2-3  14-13  1-5-3-12-6-7,
10-3-11-9-8-14  9-15  8-7-6-6-3-17  6-7  8-19-9-4-7  1-14-12-6-7-4-7
When the Delaware (Lenape) traveled across the Great Plains to their home in Oklahoma, they described a terrifying spirit of destruction they named Kaoxën. This manětu or spirit appeared as a giant walking on his hands. With his long powerful hair, he entangled and swept away an entire forest or village. As this roaring monster approached, some Lenape burned tobacco and addressed him as “Grandfather.” Other Lenape burnt old moccasins and rubbish in defiance, advising the evil spirit to turn aside. To learn more about the frightful manětu, complete the problems below.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. \[ \_ - (5) \]
2. \[ \_ - (- 5) \]
3. \[ \_ \text{ additive inverse of 12} \]
4. \[ \_ - (- 12) \]
5. \[ \_ - (4 + 6) \]
6. \[ \_ \text{ negative of } - 10 \]
7. \[ \_ \text{ negative of 3} \]
8. \[ \_ - 8 + (- 9) \]
9. \[ \_ \text{ additive inverse of 7} \]
10. \[ \_ - (- 5 + 2) \]
11. \[ \_ 8 + (- 9) \]
12. \[ \_ - (- 7) \]
13. \[ \_ \text{ additive inverse of } - 9 \]
14. \[ \_ \text{ negative of negative 8} \]
15. \[ \_ - (- 2 + 10) \]
16. \[ \_ - (- 2) + 13 \]
17. \[ \_ \text{ negative of negative 6} \]
18. \[ \_ - (- 6 + 3) + (- 2) \]

\[
\begin{align*}
A &= 1 \\
B &= 15 \\
C &= -7 \\
D &= -1 \\
E &= 8 \\
F &= -3 \\
G &= 9 \\
H &= -8 \\
I &= -5 \\
L &= 12 \\
N &= 3 \\
O &= 6 \\
P &= -10 \\
R &= -17 \\
S &= -12 \\
W &= 5 \\
Y &= 10 \\
T &= 7
\end{align*}
\]
In the 15th century, the French people lived in fear because English armies controlled parts of France and outlaw bands terrorized the villages. It was then, as a young girl, Joan of Arc began to have visions of two beautifully robed queens – St. Marguerite and St. Catherine. Their voices instructed Joan to trust in God and lead the French armies against the English and crown King Charles VII at Rheims. But, when Joan went to the king, he doubted a woman could be sent by God to lead armies and unite a kingdom. He demanded proof. To learn how king Charles came to believe that Joan was sent to save the French people, solve the problems below.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

<p>| | | |</p>
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<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>8 + ___ = 0</td>
<td>12.</td>
</tr>
<tr>
<td>2.</td>
<td>___ + (\frac{1}{2}) = 0</td>
<td>13.</td>
</tr>
<tr>
<td>3.</td>
<td>___ additive inverse of zero</td>
<td>14.</td>
</tr>
<tr>
<td>4.</td>
<td>___ ((-3 + 2) + (-5 + 3))</td>
<td>15.</td>
</tr>
<tr>
<td>5.</td>
<td>___ 5 + additive inverse of - 5</td>
<td>16.</td>
</tr>
<tr>
<td>6.</td>
<td>___ negative of (9 + (- 4))</td>
<td>17.</td>
</tr>
<tr>
<td>7.</td>
<td>___ negative of 9 + (- 4)</td>
<td>18.</td>
</tr>
<tr>
<td>8.</td>
<td>___ - 3.5 + 7.9</td>
<td>19.</td>
</tr>
<tr>
<td>9.</td>
<td>___ (opposite of (\frac{1}{2})) + 1</td>
<td>20.</td>
</tr>
<tr>
<td>10.</td>
<td>___ - [- 4.5 + 3.9 + (- 2.1)]</td>
<td>21.</td>
</tr>
</tbody>
</table>

A = - 13   E = 5   J = -.3   N = \(\frac{2}{3}\)   S = - 2.7
B = 5.5   F = .3   K = -.6   O = - 5   T = \(\frac{1}{2}\)
C = \(\frac{11}{12}\)   G = 2.7   L = 0   P = \(\frac{5}{12}\)   X = \(-1\frac{2}{5}\)
D = \(-\frac{1}{2}\)   H = - 8   M = - 1   R = 4.4   Y = 16.7
MONSTER SLAYER

The Navajo Indians have many ancient stories about their homeland, its creation, and the order of things. One of their traditional stories describes the world as being once plagued by many evil monsters. For example, at Aztec, New Mexico, Kicking-from the rocks was a dreaded monster who hurled victims into the San Juan River. Near Taos the monster Rocks-that rush-together crushed people to death. Yé'ítseh, was a giant at Mt. Taylor, New Mexico who sucked people in. The world was a fearful place.

The ancient legend has it that two twins, monster slayers, came into the world and battled the evil monsters. Navajos say that their remains are still visible in their land. For example, when the giant Yé'ítseh was destroyed, his blood flowed out as a stream ten miles long. In some magical way, it was turned into a stream of black lava. However, Navajo legend has it that not all the monsters were destroyed. For if they were, mankind would not be alert and working. To discover the four monsters the Navajo claim are still in the world, solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. __ subtract 5 from 10
2. __ 12 minus 12
3. __ take 12 from 12
4. __ from 5 take 5
5. __ subtract 12 from 0
6. __ 15 (- 5)
7. __ 3 minus 7.25
8. __ 1 (-3, 4.75)
9. __ add 3.5, 73, - 8.75
10. __ - 5 minus -.35
11. __ - 4 (-2 + 3.5)
12. __ add 8.9, -3, 6.05, -2.52
13. __ take - .05 from 0.14
14. __ - .2 (-.04 - 3)
15. __ additive inverse of 2.75
16. __ take 3.25 from - 5
17. __ 3.25 - ___ = 1.5

A = 9.43 G = -12 L = -4.95 P = -8.25 T = 2.75
C = 20 H = -10 N = -.09 R = -4.65 V = 1.75
D = 15 I = -2.75 O = -4.25 S = 2.76 Y = -24
E = -5.5 K = 24

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7-9-1  12-5-11,  14-15-6-2-13-11-14-14,
16-7-17-11-10-8-3,  1-11-12-8-4.
THE MANDANS

In the early 1700's, rumor spread that there was, somewhere, a mysterious nation of white-skinned, Welsh-speaking Indians. They were always reported to be the next tribe, living a little further up the river, or just on the other side of the mountains. Soon, the rumor began to point to the Mandans of the upper Missouri River as the mysterious Welshmen. The first English-speaking white men reached their village in 1738. To learn what they found, work the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. __ .58 - .31
2. __ - 6 - 1.513
3. __ subtract .314 from -.818
4. __ from 11.631 take 7.18
5. __ add .415 to - 1.719
6. __ from - 2.581 take .081
7. __ the sum of -.91 and .13
8. __ from 3.3516 subtract - 3.1416
9. __ the difference of .9 and 1.9
10. __ subtract - 7.199 from 7.7
11. __ add - 2.9 and .041
12. __ from - 12 take - 7.315
13. __ the difference of .11 and .22
14. __ subtract 1.085 from - 1.365
15. __ - 3 - .99
16. __ subtract - 6.11 from - 5
17. __ 3 - .99
18. __ 1 - .993

A = 14.899    G = - 2.859    L = 2.01    P = -.78    U = - 1.132
B = - 4.685    H = - 2.45    M = 1.11    R = - 7.513    W = .007
D = .27        I = 4.451     N = 1 or - 1    S = - 1.304
E = 6.4932     K = - 3.99    O = - 2.662    T = ± .11
The Plumed Serpent

The Plumed Serpent *Quetzalcoatl* was the Aztec god of knowledge and master of the winds. According to the Aztec's *Book of Fate*, *Quetzalcoatl* was a chief of a Toltec tribe that existed more than one thousand years before the Aztec civilization. He was born in the year 1-Reed on the Aztec calendar, was said to be tall, to have white skin and a golden beard. *Quetzalcoatl* wore a mask of an eagle's head with a snake's mouth.

According to Aztec legend, another god, *Smoking Mirror*, forced the Plumed Serpent to leave Mexico. The Aztec calendar repeated every 52 years. Before *Quetzalcoatl* left, he promised to return in a year of 1-Reed to re-establish his kingdom. Solve the problems below to find how *Quetzalcoatl*'s promise was kept in the year 1-Reed, 1519.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

| 1. ___ | 0.9 - 0.5 | 9. ___ | 3.81 - 0.0194 |
| 2. ___ | -0.31 - 0.29 | 10. ___ | 12 - 7.697 |
| 3. ___ | 0.7287 - 0.8176 | 11. ___ | -0.9768 + 0.3989 |
| 4. ___ | -16 + 5.5 | 12. ___ | 1.9739 - 2.8416 |
| 5. ___ | 2.78 - 4 | 13. ___ | -9.75 - 4 |
| 7. ___ | -9.8045 - (-7.0584) | 15. ___ | 0.3 - 9.85 |
| 8. ___ | 0.005 - 0.0001 |

A = -10.5, H = -0.6, O = -0.0889, T = 3.7906
C = -2.7461, I = -0.5779, P = -13.75, U = -9.55
D = 4.303, M = -8.581, Q = -0.8677, Z = -3.5316
E = 0.4, N = 0.0049, R = -1.22

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Haida Crest Poles

The Haida Indians of British Columbia, Canada were masterful carvers of wood. They erected tall monuments of red cedar wood with fantastic representations of animals, important persons, and spirits. Most were painted in bold colors.

The monuments were known to outsiders as totem poles. But, the Haida did not worship them. A wealthy chief would commission an artist to carve a pole with his family crests, history, and legends. Some reached 60 ft. and were placed in front of the chief’s large community house where up to six hundred of his family lived. To learn more about the giant crest poles of the Haida, solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. ___ \(-5 \times (-3)\)  
2. ___ \(-3 \times (-2) \times (-5)\)  
3. ___ \(-2 \times (7) \times (-5)\)  
4. ___ \((-2)^3 \times (-3)\)  
5. ___ \((-3)^3\)  
6. ___ \((-2)^2 \times 7\)  
7. ___ \((-2) \times 7 \times (-2)^2\)  
8. ___ \((-2) \times (-3)^2\)  
9. ___ \(-4 \times (-12)\)  
10. ___ \((-2)^3 \times (-3)^2\)  
11. ___ \(-11 \times 12\)  
12. ___ \((-12)^2\)  
13. ___ \((-2)^6\)  
14. ___ \(-4 \times (-3) \times (-5)\)  
15. ___ \((-3)^4\)  
16. ___ \(-9 \times (-7)\)  
17. ___ \(-12 \times 12\)  
18. ___ \((-2)^5 \times (-3)\)  

A = 15    E = -72    L = 28    P = 48    W = 96  
B = -132   G = 63    M = 42    R = 144   Y = -30  
C = -27    H = 24    N = -144   S = 54  
D = 81    I = -56    O = 64    T = -60

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Scattered along the Rio Grande River in New Mexico are several Pueblo Indian towns belonging to a common language group known as Keres. Among them are the Acoma, Laguna, Chochiti, Zia, Santa Ana, Santo Domingo, and San Felipe.

The Acoma live on a reservation between Gallup and Albuquerque, New Mexico. They have a spectacular settlement or Pueblo atop a 357 ft. mesa known as Acoma or Sky City. On the top, there are ancient structures with mica windows, newer homes built in the original style with modern materials such as glass, and the beautiful mission church of San Estaban de Acoma built in 1629.

The mission is an imposing building with walls 10 ft. thick and 60 ft. high. All the materials had to be carried up by hand, including great timbers 40 ft. long with square section of 14 in. on the side. Since wood is scarce in this arid country, the logs were transported from mountains 30 miles away.

Among the prize possessions of the Acoma is a religious painting of St. Joseph in the mission itself. Many of the Acoma say that it has helped to cure sick people. So valuable to the Acoma was the painting that when it was taken from the church, they took the matter to court. After 50 years, the dispute ended with the painting being returned when the Supreme Court of the United States in 1857 ruled in the matter. To learn more about the Sky City of the Acoma, solve the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. __ $- 5 \times (- 28)$
2. __ $- 8 \times (- 47)$
3. __ $- 9 \times 83$
4. __ $- 10 \times 3 \times (- 25)$
5. __ $12 \times (- 9) \times 7$
6. __ $- 4 \times (- 3) \times (- 904)$
7. __ $3 \times (- 5) \times (- 314)$
8. __ $- 16$ squared
9. __ square of 20
10. __ $(100)^2$

11. __ $4 \times (- 3)^2$
12. __ $4 \times (- 3)^3$
13. __ $(- 27)^3$
14. __ $(- 2)^3 \times (- 4)^2$
15. __ cube of $- 8$
16. __ product of $- 12$ and 11
17. __ $(- 20)^2 \times 314$
18. __ $32 \times (- 4)^2$
19. __ $- 5$ cubed

A = 4,710  E = $- 19683$  I = 140  R = 36  V = $- 128$
B = 10,000  F = $- 512$  L = 376  S = 750  W = $- 756$
C = $- 108$  G = 125,600  N = 400  T = $- 132$  Y = $- 747$
D = 256  H = $- 125$  O = $- 10,848$  U = 512

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Croesus

Croesus, king of Lydia (now modern Turkey) in about 550 B.C., was famous for being the richest man in the world. As an example of his great wealth, when he visited Delphi to ask the oracle for advice, he took four pure gold bars weighing all together 570 pounds, 113 gold and silver bars weighing a total of 13,000 pounds, a solid gold lion weighing 570 pounds and a huge solid gold bowl that held 609 gallons. At Delphi, Croesus asked the oracle whether or not he should attack the Persians. The oracle replied, “If you attack the Persians, a great empire will be destroyed.” To learn how the oracle’s prediction came true, solve the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. __ $5 \times .5$
2. __ $-3.14 \times 5$
3. __ $- .9 \times -79$
4. __ $.05 \times (-9.4)$
5. __ $-.003 \times 800$
6. __ $-6.9 \times -.37$
7. __ $3.7 \times .014$
8. __ $96.2 \times -8.57$
9. __ $-.5 \times (-.5)$
10. __ $5.0 \times 5.0$

11. __ $-.01 \times .01$
12. __ $.73 \times .96$
13. __ $-.31 \times .29$
14. __ $.68 \times (-7.9)$
15. __ $(-5.37) \times (-3.17)$
16. __ $4.72 \times (-3.61)$
17. __ $(.013) \times 9.46 \times (-1)$
18. __ $3.1416 \times 3.5 \times (-.1)$
19. __ $-50.79 \times .384 \times (-.01)$
20. __ $-4.614 \times (-.1) \times 3.075$

A = 17.0229  E = .12298  I = .25  O = 71.1  T = 25
B = 2.553  F = -.824434  K = -15.7  P = -.47  U = -2.4
C = -17.0392  G = .7008  L = -5.372  R = -1.09956  W = -.0899
D = .0518  H = 1.418805  M = -.0001  S = .1950336  Y = 2.5

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Tekakwitha was her Mohawk Indian name, meaning “Move-all that-is-before her.” Born at Ossernonon, New York about 1656, she was an heroic daughter of the fierce Mohawk chief Kenhoronkwa. At the age of 4, the young girl lost her mother, father, and younger brother to smallpox. Tekakwitha survived, but was severely scarred and partially blinded by her disease. Tekakwitha had only one dream: to be baptized a Christian. But, her stepmother opposed her by heaping on her tasks to keep her busy, denied her food on Sundays, exposed her weakened eyes to harsh work in the blinding sun, and even tried to force the poor girl into an unwanted marriage. Still, Tekakwitha only responded with forgiveness and works of kindness to others. Finally, Tekakwitha escaped and made her way over 200 miles to the Christian community of Caughnawaga, Canada where she was baptized and took the name of Kateri. Her short life of 24 years was so filled with acts of loving kindness that in 1932 she was proposed as the first Native American candidate for sainthood. Learn a very unusual thing that happened at Kateri's death on August 5, 1675 by solving the problems below.

ONE, simplify each expression to find the answer in the table.
TWO, place the letter by the answer in the blank next to the problem.
THREE, match the numbers by the picture with the corresponding letters.

1. ___ (0.5)(0.4)  
2. ___ (0.2)(-0.5)  
3. ___ (-0.4)(-0.2)  
4. ___ (2.5)(-3.4)  
5. ___ (0.06)(-5)  
6. ___ (-0.7)(0.5)(-7)  
7. ___ 3(10)(-0.1)  
8. ___ -4(-2.5)(-0.4)  
9. ___ -1.5(0.4)(6)  
10. ___ (-0.4)(-0.1)(0.5)  
11. ___ -(0.3)(0.5)  
12. ___ 5(-1.6)(-0.04)  
13. ___ 200(-0.008)  
14. ___ -5(0.04)  
15. ___ (-4.9)(0.5)  
16. ___ -16(-0.25)  
17. ___ -25(0.016)  
18. ___ -100(-0.1)(-0.1)  
19. ___ -50(0.25)(0.4)

A = -1.6  E = -2.45  K = 0.2  O = -5  T = 4  
B = 0.32  F = -3  L = -0.3  P = -0.1  U = -0.4  
C = -0.15  H = -8.5  M = -1  R = -3.6  X = 0.02  
D = 2.45  I = -0.2  N = 0.08  S = -4

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THE GREAT WALL

About 200 B.C., Emperor Ch’in ordered a force of millions of Chinese people to begin work on the Great Wall of China. Within 7 years, 1,850 miles of brick and granite wall were built separating China from Mongolia. The wall was 30 ft. thick at the base and tapered up to 20 ft., forming a continuous roadway 30 ft. above the ground. Square towers 40 ft. high were placed two bow shots apart along the wall as outposts for archers. Later, Emperor Ch’in’s successors added to the Great Wall, making its total length almost 4,000 miles. To learn more about the Great Wall of China, simplify each multiplication problem below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. ___ (-2)(5) 10. ___ (0.8)(-7)(0.05)
2. ___ (-5)(-2) 11. ___ -3(4+7)
3. ___ (-3)(-\frac{2}{3}) 12. ___ (0.7)(2)(0.2)
4. ___ -\frac{1}{2}(8) 13. ___ -5(-2+5)
5. ___ (0.5)(-14) 14. ___ (-1)^2
6. ___ (-36)(-0.25) 15. ___ (-1)^3
7. ___ (-3)(-5)(4) 16. ___ -2(-3)(0)(13.5)
8. ___ -\frac{1}{2}(-4)(-6) 17. ___ -\frac{1}{4}(-6\frac{1}{2})(-1\frac{1}{2})
9. ___ (0.4)(-0.7)(10) 18. ___ (-56)(\frac{3}{7})(\frac{1\frac{6}{7}}{7})(-\frac{7}{3})

A = -2.8  H = 0  M = 2  S = -0.28  W = 1\frac{5}{7}
B = -33  I = 9  N = -7  T = 0.28  Y = -1
E = -15  K = 60  O = -4  U = 1
F = 10  L = -10  R = -12  V = 104

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Stairway of the Sky

The Bambute people of Central Africa were the famous pigmy race who dwelt in the dense forests near the Congo River. They lived simple lives and showed little interest in accumulating material possessions. However, the Bambute were remarkable hunters and had great skill in music and poetry.

The Bambute lived near a series of swift rapids they called the Stairway of the Sky because it resembled a giant stairway leading out of the forest to a high plateau. They told stories of a cannibal tribe dwelling at the top who burned their victims to death on high wooden towers. Although few Bambute ventured to ascend the Stairway of the Sky, reports of a strange animal inhabiting the region circulated. Discover the mystery of the rare animal by solving the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. __ product of 3 and 5 12. __ product of −3 and −6
2. __ 2 (−7) 13. __ (−3)(3)(−3)
3. __ −2 (−7) 14. __ (−4)^2
4. __ the multiplicative identity 15. __ −3 cubed
5. __ 4(−5)(−7)(−8)(0)(3) 16. __ 6(−3)
6. __ 5(−1)(2)(−1) 17. __ product of −3, 4, and −2
7. __ product of −3 and 4 18. __ (−1)(−1)(−1)(−1)(−1)
8. __ −3 squared 19. __ product of 5 and −5
10. __ −8 times −2 21. __ (−2)^3
11. __ (−5)^2

A = −14  E = 14  I = 1  N = 0  S = −12
B = 16  F = −8  K = −16  O = 27  T = −1
C = 18  G = 24  L = 25  P = 15  U = 9
D = −18  H = −24  M = −25  R = 10  W = −5
          Y = −27

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Hatshepsut

One of the most remarkable women of the ancient world was Hatshepsut, queen of ancient Egypt (1500–1482 B.C.). Upon the death of her husband Thutmose II, she ruled Egypt as pharaoh. She wore the Double Crown (the sign of the king of upper and lower Egypt) and was worshiped as a god. Hatshepsut was remembered for a peaceful reign: erecting great monuments and keeping trade routes open. To learn more about this great woman of history, solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. __ 10 ÷ (-5) 11. __ -121 ÷ 11
2. __ 36 ÷ (-6) 12. __ -7 ÷ 0
3. __ (-36) ÷ (-4) 13. __ -110 ÷ (-11)
4. __ -49 ÷ 7 14. __ 117 divided by -9
5. __ -64 ÷ (-8) 15. __ -68 ÷ (-4)
6. __ -108 ÷ 9 16. __ 105 ÷ (-7)
7. __ 0 ÷ (-3) 17. __ -100 ÷ (-5)
8. __ 32 ÷ (-8) 18. __ -112 ÷ 8
9. __ 36 ÷ 12
10. __ -60 divided by -12

A = -13  F = -15  N = 9  T = undefined
B = 3  H = 17  O = 5  U = -7
C = 8  I = -14  P = -6  W = 0
D = -11  L = -2  R = 10
E = -12  M = 20  S = -4

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Sphinx of Queen Hatshepsut

8-15-6  7-10-13-6  17-14-8-5-4-1-18-3-6  11-13-6-8-8
14-3-11 12-15-6  16-14-1-8-6  9-6-14-13-11
Ashanti legend has it that the ancient African King Kwadwo was so impressed with the stories about his neighbor King Kwabena that he made a visit to see for himself. For several days King Kwadwo was generously entertained with feasting, music, sports, and hunting. He was greatly puzzled because he saw that his neighbor had the same laws and customs. How could it be that the people of Kwabena were happier and more prosperous than his subjects? After observing carefully King Kwadwo noticed that King Kwabena ate with his left hand. That must be the reason for the great happiness in his neighbor’s land. When King Kwadwo returned to his own country, he ordered all his people to eat with their left hands to bring happiness to his kingdom. To learn the outcome of the new law, solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. ___ $-5 + 4 + (-6)$
2. ___ $7 - 9$
3. ___ $9 - 7$
4. ___ $3 \times -\frac{1}{3} \times (-3)$
5. ___ $10 \div (-2)$
6. ___ quotient of $(-12) \div (-2)$
7. ___ $0 \div 13$
8. ___ $-3 + 5 - 8$
9. ___ $(-4)$ squared
10. ___ $4 \times (-9) \times \frac{1}{4}$
11. ___ divisor of $16 \div (-8)$
12. ___ product of $-4$ and $-2$
13. ___ $(-3 + 7) \div (-\frac{1}{4})$
14. ___ $11$ minus $-2$
15. ___ $(9 + \frac{1}{4}) \times (-\frac{1}{3})$
16. ___ $(-1 + 3) \div (-\frac{1}{4} \times \frac{1}{9})$
17. ___ remainder of $76 \div (-8)$
18. ___ $(3 \div 4) \times (-4)$
19. ___ $-(12 \div 3)$

A = 6  E = 3  I = -2  O = -6  U = -16
B = 13  F = -7  K = -9  R = 16  W = -12
C = 12  G = -3  L = 4  S = -5  Y = -8
D = 2  H = -4  N = 0  T = 8

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MAIDENS OF THE SUN

After Pizarro defeated King Atahualpa in 1531, he marched his army of
conquistadors unopposed to the Inca capital of Cuzco. He found the temple of
the Sun god so rich in treasure that the surrounding gardens had flowers and
trees made from gold. But, the one hundred beautiful Inca maidens of the Sun
god who lived and worshiped there were not to be found. Inca legend has it
that the Sun god lifted them into the sky and carried them off to a fabulous
city built by spirits. In 1911, Dr. Hiram Bingham believed he discovered this
city called Machu Picchu high in the Andes mountains of Peru. To learn more
about the fabulous city, solve the problems below.

ONE, simplify each expression to find the answer in
the table.

TWO, place the letter by the answer in the blank next
to the problem.

THREE, match the numbers by the picture with the
corresponding letters.

1. ___ $-20 \div 5$
2. ___ $-20 \div (-5)$
3. ___ $18 \div (-6)$
4. ___ $-21 \div (-3)$
5. ___ $\frac{-90}{15}$
6. ___ $\frac{-40}{-5}$
7. ___ $\frac{-60}{-12}$
8. ___ $\frac{-3}{4} \div \frac{-1}{8}$
9. ___ $1 + \frac{1}{7}$
10. ___ $-15 + \frac{5}{3}$
11. ___ $\frac{-2}{3}, \frac{9}{-6}$
12. ___ $\frac{-1}{8} + \frac{1}{-64}$
13. ___ $-2 \times (-\frac{1}{4}) \times -\frac{6}{3}$
14. ___ $\frac{-4}{3} + \frac{1}{-9}$
15. ___ $\frac{1}{-2} + 2$
16. ___ $.5 \div (-1.5)$
17. ___ $-8 + \frac{1}{-2}$
18. ___ $(-3 + 15) \div (-6)$
19. ___ $\frac{-1}{4} + \frac{1}{-2}$
20. ___ $(-24 + 6) \div (-6)$
21. ___ $\frac{-1}{2} + \frac{1}{-4}$

A = 7
B = 1
C = -4
D = -1
E = 6
F = -$\frac{1}{3}$
G = 4
H = -7
I = -2
K = -6
L = $\frac{1}{2}$
M = -$\frac{1}{4}$
N = 3
O = -8
P = 9
Q = 5
R = -9
S = 5
T = 8
U = 2
V = 16
W = -3
X = 12

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The ancient Chinese emperor Yu Wang had a beautiful wife Pao Ssu. She was unhappy and never smiled. The emperor hired clowns and jugglers; still, Pao Ssu would not smile. However, it did please her when the emperor ordered the servants to tear silk – she loved to hear the shredding sound.

One night, the emperor ordered all the signal fires on the palace wall to be lighted. Soon, a massive force of Chinese people assembled outside the walls ready to protect their ruler. When the emperor called down, “Go home! Its only a joke!” Pao Ssu broke out laughing for the first time. To learn how Pao Ssu changed the history of China in 771 B.C., solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. ___ $-2 \div 10$
2. ___ $10 \div (-2)$
3. ___ reciprocal of 5
4. ___ reciprocal of $\frac{1}{4}$
5. ___ $4 \div (-1)$
6. ___ $\frac{1}{2} \div (-\frac{1}{2})$
7. ___ $-\frac{1}{4} \div (-2)$
8. ___ $-2 + (-\frac{1}{4})$
9. ___ reciprocal of $-8$
10. ___ $-20 \div 2$
11. ___ $-8 \times (-\frac{1}{4})$
12. ___ $-8 \div (-\frac{1}{4})$
13. ___ $\frac{1}{2} \div 0$
14. ___ $0 \div \frac{1}{2}$
15. ___ $3 \frac{1}{2} \div (-\frac{1}{4})$
16. ___ reciprocal of 1
17. ___ $(-\frac{1}{2}) \div (-5)$
18. ___ $(-\frac{1}{2}) \times (-5)$
19. ___ $-3\frac{1}{4} \div 2\frac{1}{2}$
20. ___ $-3\frac{1}{4} \times 2\frac{1}{2}$
21. ___ divide $-20$ by $-2$

A = $\frac{1}{8}$  F = $\frac{1}{5}$  I = $-\frac{1}{8}$  M = $-\frac{65}{8}$  P = $-1$  U = $-10$
C = $-0.5$  G = $-5$  K = 0  N = $-4$  R = 32  V = $\frac{5}{2}$
D = undefined  H = 1  L = $\frac{1}{10}$  O = $-\frac{13}{10}$  S = 2  W = 8
E = 4

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8-16-4  21-16-4  21-7-12  21-7-12  11  9-5-18  7-13-4  13  1-16-9-5-7,
21-16-4  7-5-2-12-15  1-16-9-5-4-11-4  6-4-19-6-17-4
12-4-3-10-11-4-13  21-19  16-4-17-6  21-16-4  4-20-6-4-12-19-12.
HANNIBAL

During the early Punic Wars between Carthage and Rome, the Carthaginian General, Hamilcar Barca had a son, Hannibal. He taught Hannibal his plan to destroy Rome by crossing the Alps with elephants and later using the animals to attack the city.

At the age of 29, Hannibal left Spain for Rome with an army of 102,000 men. By the time they had crossed the mountains, only a third of the army was left. Then, as Hannibal descended the Italian side of the Alps, his path was cut off by rocks so large even the elephants could not budge them.

To learn how the famous African general, Hannibal, moved his army through the rocks, work the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. \( \_ \_ \_ - 5 \div 5 \)
2. \( \_ \_ \_ - 5 \div (-5) \)
3. \( \_ \_ \_ \text{reciprocal of } \frac{1}{2} \)
4. \( \_ \_ \_ 3 \div (-1) \)
5. \( \_ \_ \_ \text{quotient of } (-6) \div 3 \)
6. \( \_ \_ \_ \text{dividend of } (-6) \div 3 \)
7. \( \_ \_ \_ \text{divisor of } (-6) \div 3 \)
8. \( \_ \_ \_ \text{remainder of } (-6) \div 3 \)
9. \( \_ \_ \_ (-1) \times (4) \times (-3) \)
10. \( \_ \_ \_ 16 \div (-2) \)
11. \( \_ \_ \_ \text{remainder of } 31 \div (-13) \)
12. \( \_ \_ \_ \text{divide } -18 \text{ by } -3 \)
13. \( \_ \_ \_ -36 \text{ divided by } 4 \)
14. \( \_ \_ \_ 21 \div (-3) \)
15. \( \_ \_ \_ (-2) + \frac{1}{6} \)
16. \( \_ \_ \_ \text{quotient of } -125 \div 25 \)
17. \( \_ \_ \_ (-\frac{1}{2}) + (-\frac{1}{16}) \)
18. \( \_ \_ \_ \text{reciprocal of } -8 \)
19. \( \_ \_ \_ \frac{-36}{-4} \)
20. \( \_ \_ \_ -21 \div (-3) \)
21. \( \_ \_ \_ -6 \div \_ \_ \_ = \frac{1}{3} \)
22. \( \_ \_ \_ \text{reciprocal of } 8 \)

\[
\begin{array}{cccccccc}
A = 0 & E = \frac{1}{8} & I = -6 & N = -2 & S = -5 & W = -18 \\
B = -12 & F = -7 & K = -\frac{1}{8} & O = 8 & T = 1 & Y = -1 \\
C = -9 & G = 9 & L = 5 & P = -3 & U = 7 \\
D = 3 & H = 12 & M = 6 & R = 2 & V = -8 \\
\end{array}
\]

Copyright, Lawrence W. Swienciki Ph.D., 1999
8-14-2-22-3  12-8-18-6-5-19  14-6-3-22-16  5-22-8-3  2-9-22
3-17-13-18-16,  10-6-5-22-19-8-3  21-8-16  4-17-20-3-22-7
17-10-22-3  2-9-22-12.  2-9-22  12-22-5  21-22-3-22  17-3-7-22-3-22-7
2-17  15-3-22-8-18  2-9-22  3-17-13-18  21-6-2-9  4-6-13-18-16.
6-2  13-3-20-12-15-11-22-7  22-8-16-6-11-1.
One of the great explorers and pioneers of the Southwest was Padre Eusebio Francisco Kino (1645–1711). He loved the Pima and Tohono O’odam Indians and worked hard to improve their lives by preaching the Gospel and building the missions of San Miguel, Magdalene, Altar, Sonorita, Santa Cruz, and San Pedro. The Jesuit priest also introduced cattle raising to help the Indians. Later, the missions and ranches became an important part in the growth of the state of Arizona.

Before Padre Kino’s coming to the region of Baja California, Arizona, and Sonora, Mexico, few people knew much about these areas. It was thought that Baja California was a big island. Padre Kino traveled many thousands of miles by horse helping the Indians. It was his great knowledge of mathematics, astronomy, and map making that resulted in the entire region being carefully mapped and historically recorded. To learn more about Padre Kino, solve the problems below.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. ___ \(0.01 \div 0.001\) 
2. ___ \(-0.5 \div 0.2\) 
3. ___ \(-1.25 \div (-0.5)\) 
4. ___ \(0.25 \div (-0.625)\) 
5. ___ \(0.001 \div 0.01\) 
6. ___ \((-0.2)^2\) 
7. ___ \((-0.3)(0.5) \div (-0.1)\) 
8. ___ \((-0.7 \div 2.8)\) 
9. ___ \((0.4 - 2.6) \div 1.1\) 

<table>
<thead>
<tr>
<th>A</th>
<th>F</th>
<th>L</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>.04</td>
<td>2.5</td>
<td>-.25</td>
<td>-250</td>
</tr>
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<td>C</td>
<td>G</td>
<td>N</td>
<td>S</td>
</tr>
<tr>
<td>-.2</td>
<td>-.75</td>
<td>10</td>
<td>-.4</td>
</tr>
<tr>
<td>D</td>
<td>H</td>
<td>O</td>
<td>T</td>
</tr>
<tr>
<td>1.5</td>
<td>-.125</td>
<td>2</td>
<td>.75</td>
</tr>
<tr>
<td>E</td>
<td>I</td>
<td>P</td>
<td>U</td>
</tr>
<tr>
<td>-.2</td>
<td>-6</td>
<td>.1</td>
<td>-2.5</td>
</tr>
</tbody>
</table>

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The Great Wager

The Ball game called *Tlachtli* was an important sport to the Aztecs. It had great religious significance and was often played to predict the future. One game of *Tlachtli*, long to be remembered, took place between the Mexican cities of Texcoco and Tenochtitlán. Nezahualpilli, the chief of Texcoco, staked his entire wealth against three turkeys owned by the Aztec King Montezuma. The odds were uneven because the Aztecs were the strongest nation in Mexico. The game was played to determine whether the astrologers of Texcoco spoke the truth when they claimed that Mexico would soon be ruled by strangers. A set of five games was played to resolve the question. Work the problems below to learn about the unusual outcome of these games.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. \[ (-8) - (+7) \]
2. \[ 0 - (-5) \]
3. \[ [(-3) + (-6)] - (-4) \]
4. \[ |-5| + |-3| \]
5. \[ -|-8| \]
6. \[ add -8, -3, |-4|, 6 \]
7. \[ take 4 from -5 \]
8. \[ -(3 - 5) - (2 - 9) \]
9. \[ subtract 5 from 9 \]
10. \[ |3 - 5| - |7 - 5| \]
11. \[ |0 - 7| - 6 \]
12. \[ 8 - |0 - 6| \]
13. \[ from |-8| take (4 - 14) \]
14. \[ add -3, 5, and |-5| \]
15. \[ [12 + (-5)] - (-3) \]
16. \[ take -6 from 0 \]
17. \[ subtract |5| from |-5| \]
18. \[ [-1 + (-3) + 2] - (-2 + 3) \]
19. \[ add |-12|, -3, and (7 - 5) \]
20. \[ take 6 from 0 \]
21. \[ |[(0 - 3) + (0 - 4)] + (0 - 5)| \]
22. \[ [(0 - 3) + (0 - 4)] + (0 - 5) \]

<table>
<thead>
<tr>
<th>A = 4</th>
<th>E = -5</th>
<th>H = 5</th>
<th>N = 11</th>
<th>R = 2</th>
<th>V = -3</th>
</tr>
</thead>
<tbody>
<tr>
<td>B = 0</td>
<td>F = 1</td>
<td>I = -10</td>
<td>O = -9</td>
<td>S = -8</td>
<td>W = -6</td>
</tr>
<tr>
<td>C = 10</td>
<td>G = 6</td>
<td>L = 8</td>
<td>P = 12</td>
<td>T = 7</td>
<td>Z = 18</td>
</tr>
<tr>
<td>D = -15</td>
<td>M = 9</td>
<td>Q = -12</td>
<td>U = -1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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The Eight Headed Serpent

According to Japanese legend, a fierce monster terrified the people of Izumo, a land west of Japan. The monster was a huge serpent with eight heads and eight tails. In each of the heads, a pair of large eyes glowed like embers in a fire. Moss and dark fungus grew over the creature’s back and streams of fire shot out of its belly.

Each year the beast demanded a victim to relieve its hunger. Only an old man, his wife and one daughter remained in Izumo. Eight of the man’s daughters had already been eaten by the creature. When it was time for the next victim, a man named Susanowo offered to save the family if the last daughter would marry him as a reward for his brave deed.

To learn how Susanowo destroyed the eight headed monster, simplify the problems below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. \[ (-5)(2) \]
2. \[ (-3)^2 \]
3. \[ (-2)^3 \]
4. \[ |-5| -11| \]
5. \[ -2 - 5| \]
6. \[ |(0 - 7) - (7 - 0)| \]
7. \[ |-10| ÷ (-2) \]
8. \[ -5 ÷ |-\frac{1}{4}| \]
9. \[ |-9 ÷ 3| \]
10. \[ (4 - 16) ÷ (-2) \]
11. \[ |2 + (-3)| - (7 - 4 + 10) | \]

A = 14  E = 9  I = -5  N = -8  S = -6  Y = -3
B = -12  F = -32  K = 30  O = -4  T = 25
C = -25  G = 0  L = 6  R = -15  U = -10
D = 4  H = 10  M = 3  W = -20

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1-2  13-20-7-18-16-2-15  13-1-2  11-2-6-4-13  11-14
19-12-12-2-20-7-3-17  7-13  2-7-17-1-13  11-19-8-10-4
19-12  4-6-16-2.  8-1-2-3  13-1-2  11-2-6-4-13
11-2-18-6-9-2  15-20-5-3-16,  1-2  18-5-13  19-12-12
2-6-18-1  1-2-6-15  8-7-13-1  1-7-4  4-8-19-20-15.

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The Tulares

On June 24, 1797, Padre Fermin Lasuen founded Mission San Juan Bautista to serve the Tulare Indians of California. The Franciscan padres taught the Indians many new skills, but music brought the greatest joy.

Padre Tapis taught the mission Indians to read music by devising a system of colored notes. By writing notes in black, yellow, red, and green colors, each Tulare could easily learn to read his part. Many beautiful pieces of music were performed.

Although mission life brought happiness to many Tulare, some warlike Tulares living near San Juan Bautista attacked the mission. To learn how Padre Tapis not only stopped the attack, but won the unfriendly Indians over to join the mission, solve the equations below.

ONE.

simplify each expression to find the answer in the table.

TWO.

place the letter by the answer in the blank next to the problem.

THREE.

match the numbers by the picture with the corresponding letters.

1. ___ \(|x| = 2\)
2. ___ \(|x| = 5\)
3. ___ \(|x| = -2\)
4. ___ \(|x - 2| = 5\)
5. ___ \(|x - 5| = 2\)
6. ___ \(3|x - 2| = 6\)
7. ___ \(-3|x - 2| = -9\)
8. ___ \(|x - 5| = 0\)
9. ___ \(|x| = 0\)
10. ___ \(|x| - 7 = 0\)
11. ___ \(-7|x| + 21 = 0\)
12. ___ \(|x| - 7 = -3\)

13. ___ \(7|x - 7| = 14\)
14. ___ \(3|2x| = 9\)
15. ___ \(|-3x| = 24\)
16. ___ \(2|x - 5| + 4 = 9\)
17. ___ \(|x - 1| = 0\)
18. ___ \(|x + 1| = 1\)
19. ___ \(|x - 1| = 1\)
20. ___ \(2|x - 3| = 3\)

A = \{-1.5\} \quad E = \{-2.0\} \quad I = \{0\} \quad O = \{0.4\} \quad T = \{-5.5\}
B = \{-2.2\} \quad F = \phi \quad L = \{5\} \quad P = \{3.7\} \quad U = \{1\}
C = \{-7.7\} \quad G = \{0.5\} \quad M = \{-3.7\} \quad R = \{-8.8\} \quad Y = \{3/2.9/2\}
D = \{-3/2.3/2\} \quad H = \{-4.4\} \quad N = \{-3.3\} \quad S = \{9.5\} \quad Z = \{0.2\}

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Mission San Juan Bautista

12-18  7-4-7-19-18-14  2-12-18  2-17-8-7-15-18-13  1-20
5-8-7-20-9-11-16  13-2-15-7-11-16-18  4-17-13-9-10  3-15-6-4
Hawaiians say the the Menehune were the first to inhabit their islands. They were less than one meter in height and had broad shoulders. Great stone dikes for collecting fish and stone dams were some of their accomplishments. But, the Little People always worked at night. If a project could not be completed in a single night, it was left unfinished.

The Menehune left the Hawaiian Islands centuries ago, but traces of their work still remain such as the fish pond on the island of Kauai illustrated on the next page.

The Menehune were tremendous workers and their services were greatly desired. To learn what each Menehune received for his single nights work, solve the problems below.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. __ | $x$ | < 5  
2. __ | $x$ | > 5  
3. __ | $x - 2$ | < 3  
4. __ | $x - 2$ | > 3  
5. __ | $2x$ | ≤ 10  
6. __ | $-2x$ | ≥ 10  
7. __ | $2x - 5$ | < 25  
8. __ | $2x + 5$ | > 25  
9. __ | $-2 | x + 5 | \leq 30$

E: $-5 < x < 5$  
M: $x < -15 \lor x > 10$  
P: $-1 < x < 5$

H: $x > 5 \lor x < -5$  
N: $-5 \leq x \leq 5$  
R: $x \leq -5 \lor x \geq 5$

I: $-10 < x < 10$  
O: $x \in \mathbb{R}$  
S: $x < -1 \lor x > 5$

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The World Ash Tree

Vikings believed a gigantic tree, the World Ash, rose above the earth and held the world together. Its three roots penetrated into every kingdom. Near the tree's base ran a bubbling stream from which three mysterious goddesses called Norns drew water and clay to nourish the roots. Vikings said that if the tree died, the world would end.

To learn why the Norns tied ropes to the World Ash tree and spun strange webs, solve the problems below.

**ONE.** Analyze the each set below and find an equivalent set in the table at the bottom of the page.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. ___ {whole numbers less than 3}  
2. ___ {three, eight, fourteen}  
3. ___ {natural numbers less than 3}  
4. ___ {digits in 3402}  
5. ___ {odd numbers less than 9}  
6. ___ {whole numbers between 0 and 5}  
7. ___ {counting numbers less than 1}  
8. ___ {whole numbers less than 12}  
9. ___ {all one digit odd numbers}  
10. ___ {natural numbers greater than 2}  
11. ___ {even numbers between 1 and 10}  
12. ___ {even numbers greater than 2}  
13. ___ {prime numbers less than 9}  
14. ___ {whole numbers between 0 and 5. inclusive}  
15. ___ {all two digit numbers}  
16. ___ {even prime numbers less than 1,000}  

A = {0,1,2}  
D = φ  
E = {1,2}  
F = {2,4,6,8}  
G = {1,3,5,7,9}  
H = {4,6,8,...}  
L = {10,11,12,...99}  
M = {0,2,3,4}  
N = {2}  
O = {0,1,2,3,4,5}  
R = {1,3,5,7}  
S = {3,4,5,...}  
T = {0,1,2,3,...,11}  
U = {2,3,5,7}  
V = {3,8,14}  
W = {1,2,3,4}  

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The Marionette War

About 200 B.C., a fierce Tartar army, accompanied by their king and queen, invaded China. Emperor Han Kao-Tsu retreated with his army into the walled city of Pin Ch'eng. But the enemy laid siege to the city. The Chinese knew their food would not last long and devised an unusual plan to break the siege. The emperor ordered history's first marionettes to be made. These stringed dolls were life-size models of beautifully robed women. Early one morning, the marionettes were paraded along the walls of Pin Ch'eng. Amazingly, the Tartars broke camp within a day to return to their own country in the north.

Learn why the Chinese plan succeeded in breaking the siege, simplify the set relationships below.

**ONE.** simplify each expression to find the answer in the table.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1.</td>
<td></td>
<td>{1,2} ∪ {3,4}</td>
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<td>2.</td>
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<td>{1,2,3} ∪ {1,2}</td>
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<td>3.</td>
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<td>{1,3} ∩ {1,2}</td>
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<td>4.</td>
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<td>{1,2} ∩ {1,2}</td>
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<tr>
<td>5.</td>
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<td>{1,2} ∩ {3,4}</td>
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<tr>
<td>6.</td>
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<td>φ ∪ {1,3}</td>
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<tr>
<td>7.</td>
<td></td>
<td>{1,3,4} ∪ {2,3,5}</td>
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<tr>
<td>8.</td>
<td></td>
<td>{1,3,4} ∩ {2,3,5}</td>
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<tr>
<td>9.</td>
<td></td>
<td>{even numbers} ∪ {0,2}</td>
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<tr>
<td>10.</td>
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<td>{2,4,6} ∩ {2,3,5}</td>
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<td>11.</td>
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<td>{2,3,5} ∩ {2,3,6}</td>
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<td>12.</td>
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<td>{even numbers} ∩ {2,4}</td>
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<td>13.</td>
<td></td>
<td>{2,4,6} ∪ {2,4,6}</td>
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<tr>
<td>14.</td>
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<td>{1} ∪ {3,5}</td>
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<tr>
<td>15.</td>
<td></td>
<td>{odd numbers} ∪ {1,3}</td>
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<tr>
<td>16.</td>
<td></td>
<td>{0} ∪ {0,1,2}</td>
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<td>17.</td>
<td></td>
<td>{0} ∩ {0,1,2}</td>
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<td>18.</td>
<td></td>
<td>{ } ∪ {2,3}</td>
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<tr>
<td>19.</td>
<td></td>
<td>{prime numbers} ∩ {2,3,4,5}</td>
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<tr>
<td>20.</td>
<td></td>
<td>{odd numbers} ∩ {4,5}</td>
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<tr>
<td>21.</td>
<td></td>
<td>{prime numbers} ∪ {2}</td>
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<tr>
<td>22.</td>
<td></td>
<td>{3} ∪ {5}</td>
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</table>

A = {1,3}  H = {2,3,5,6}  N = {2,3}  T = {odd numbers}
B = {1,3,5} I = {3}  O = {2,3,5}  U = {2,4,6}
C = {5} J = {1,2,3,4}  P = {2}  V = {3,5}
D = {0} K = {1}  Q = φ  W = {1,2}
E = {1,2,3,4,5} L = {0,1,2}  R = {prime numbers}
F = {1,2,3} M = {2,4}  S = {even numbers}
15-11-7  15-6-21  15-6-21  5-13-7-7-18  4-6-9  1-7-6-16-19-13-9
19-2   15-11-7  14-7-6-13-15-8-2-13-16  4-19-12-7-18  9-11-7
9-6-4.  9-11-7  20-19-18-22-8-18-20-7-17  11-7-21
11-13-9-14-6-18-17  19-2  11-7-21
11-19-12-7-9-8-20-3-18-7-9-9.
Too-Tok-A-Nah’s Triumph

Long, long ago, when mountains and rivers were still young, Miwok Indian legend has it that two bear cubs fell asleep, in Yosemite valley, on a rock that grew until it reached the sky. When the mother discovered her cubs’ plight, she gathered together all of the animals in the valley to try to rescue them. Every animal tried and failed. The group was very sad. Suddenly, they saw little too-tok-a-nah, the inch worm, scaling the face of the rock. Inch by inch, by day and by night, he climbed until he reached the top. There, legend has it, he found the frightened cubs and led them home.

To learn how too-tok-a-nah was honored, read the statements below and find the equivalent set in the table.

**ONE.** analyze each expression to find the equivalent set in the table at the bottom of the page.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

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<tr>
<td>1. ___</td>
<td>natural numbers &lt; 5</td>
<td>12. ___</td>
<td>integers ≥ −2 and &lt; 2</td>
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<td>2. ___</td>
<td>whole numbers between 1 and 5</td>
<td>13. ___</td>
<td>whole numbers &lt; 5</td>
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<td>3. ___</td>
<td>integers between 2 and 5</td>
<td>14. ___</td>
<td>all square roots of whole numbers &lt; 100</td>
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<tr>
<td>4. ___</td>
<td>all counting numbers whose squares are &gt; 1 and &lt; 91</td>
<td>15. ___</td>
<td>integers ≥ −2 and ≤ 2</td>
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<td>5. ___</td>
<td>natural numbers &lt; 1</td>
<td>16. ___</td>
<td>whole numbers less than 16 and divisible by 3</td>
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<td>6. ___</td>
<td>integers &gt; −3 and &lt; 5</td>
<td>17. ___</td>
<td>whole numbers ≤ 5</td>
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<td>7. ___</td>
<td>squares of the first three whole numbers</td>
<td>18. ___</td>
<td>negative integers &gt; −4</td>
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<tr>
<td>8. ___</td>
<td>natural numbers ≤ 5</td>
<td>19. ___</td>
<td>integers whose absolute value equals 2</td>
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<tr>
<td>9. ___</td>
<td>whole numbers between 0 and 4</td>
<td>20. ___</td>
<td>whole numbers &lt; 1</td>
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<tr>
<td>10. ___</td>
<td>squares of the integers between −4 and 4</td>
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<tr>
<td>11. ___</td>
<td>whole numbers whose cubes are &lt; 45</td>
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</tr>
</tbody>
</table>

A = {3,4} G = {-3,-2,-1} M = {-2,-1,0,1,2,3,4} S = {0,1,4}  
B = {2,3,4} H = {-2,-1,0,1} N = {2,-2} T = {3,6,9,12,15}  
C = {0,1,4,9} I = {-2,-1,0,1,2} O = {0,1,2,3,4} U = {1,2,3,4,5}  
D = {0,1,2,3,4,5} K = {0,1,2,3} P = φ  
E = {1,2,3,4} L = {2,3,4,5,6,7,8,9} R = {0}  
W = {1,2,3}  
Y = {0,1,2,3,4,5,6,7,8,9}
Norsemen, always concerned about their futures, consulted the Volva, a woman who could tell people about the past or future. A Volva was received with great honor at Viking villages. A high platform was built for her ceremony and several women were chosen to assist her. On the platform the women formed a circle around the Volva who hovered over a large cauldron of witch’s broth. While the women chanted, the Volva motioned and mumbled over the bubbling pot, hoping to uncover the future. After the ceremony, she made her predictions.

Discover the reward the Volva received for her services, match the sets below.

<table>
<thead>
<tr>
<th>ONE.</th>
<th>simplify each expression to find the answer in the table.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWO.</td>
<td>place the letter by the answer in the blank next to the problem.</td>
</tr>
<tr>
<td>THREE.</td>
<td>match the numbers by the picture with the corresponding letters.</td>
</tr>
</tbody>
</table>

| 1. ___ | \{1,2,3\} \cup \{3,4\} | 12. ___ | \{1,5\} \cap (\{1,6\} \cup \{4,5\}) |
| 2. ___ | \{1,2,3\} \cup \{1,3\} | 13. ___ | \{1,4\} \cup (\{1,6\} \cap \{2,6\}) |
| 3. ___ | \{1,2,3\} \cap \{3,4\} | 14. ___ | \{5\} \cap \{5\} |
| 4. ___ | \{1,2,3\} \cap \{1,3\} | 15. ___ | \{2\} \cup \{2\} |
| 5. ___ | \{2,4\} \cup \{3\} | 16. ___ | (\{1,4\} \cap \{1,3\}) \cup (\{4,5\} \cap \{4,3\}) |
| 6. ___ | \{2,4\} \cap \{3\} | 17. ___ | (\{1,3\} \cap \{2,4\}) \cup (\{3,4\} \cup \{1,5\}) |
| 7. ___ | \emptyset \cup \{1,2\} | 18. ___ | (\{4\} \cup \{4\}) \cap (\{4\} \cup \{4\}) |
| 8. ___ | \{1,5\} \cap \{1,6\} \cap \{1,4\} | 19. ___ | (\{2\} \cup \{3\}) \cap (\{1,2,3\} \cup \{4,5\}) |
| 9. ___ | \{1,5\} \cup \{1,6\} \cup \{1,4\} |
| 10. ___ | (\{1,5\} \cup \{1,6\}) \cap \{1,5,6\} |
| 11. ___ | (\{1,5\} \cap \{1,6\}) \cup \{4,5\} |

| A = \{1\} | F = \{1,2,3,4\} | K = \{1,5,6\} | O = \{4\} | V = \{1,3,4,5\} |
| C = \{2,3\} | G = \{2,3,4\} | L = \{1,3\} | R = \{1,4,5,6\} | W = \emptyset |
| D = \{1,4,6\} | H = \{5\} | M = \{1,5\} | S = \{3\} | Y = \{1,4,5\} |
| E = \{1,2,3\} | I = \{1,2\} | N = \{2\} | T = \{1,4\} |

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16-14-2-11  6-2-9-2  5-7-17-2-15  8  5-9-2-8-16  1-2-8-3-16  8-16
6-14-7-19-14  16-14-2-11  6-2-9-2  3-2-9-17-2-13  5-18-8-16  '3
14-2-8-9-16-3  18-1  12-8-15-11  13-7-1-1-2-9-2-15-16
8-15-7-12-8-4-3.
Queen of Spades

Tchaikovsky's famous opera the *Queen of Spades* is based upon a classic Russian tale about a countess who loved, more than anything else, to gamble with cards. She learned the secret of three winning cards that could secure a fortune. One night she received a warning in a dream. It cautioned her that the next time anyone tried to learn the secret from her she would die.

Years later, a young soldier who was crazed over the legend of the three cards, sneaked into her room to demand the secret. The countess died of shock without giving him the secret. Later, her ghost appeared to the man. It named the three cards: *three, seven, and ace*.

Learn what happened to the soldier when he played those three cards at the gambling house, solve the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. \( (3.5 \times 7.1) \times 4.6 \)  
2. \( 8.8 \times (3.14 \times .5) \)  
3. \( .9 \times (.471 + .329) \)  
4. \( (6 - .934) \times .05 \)  
5. \( (3.14 \times .6) \div .4 \)  
6. \( (.51 \div 1.7) - .3 \)  
7. \( (.28 + .16) \div .25 \)  
8. \( (2.4 \times .3) \times .3 \)  
9. \( .28 \div (.16 \div .25) \)  
10. \( 41.625 \div (2 - .875) \)  
11. \( (31 - 9.27) - 4.567 \)  
12. \( 31 - (9.27 - 4.567) \)  
13. \( (.87 \times .56) \times 7.5 \)  
14. \( (.0055 \div .00011) \div .05 \)  
15. \( .35 \times (3 - .178) \)  
16. \( .64 \times (3.1 \times 2.5) \)  
17. \( (.95 + .05) \times .07 \)  
18. \( (4.8 \times .67) \div .024 \)

\[
\begin{align*}
A &= 114.31 & F &= 1,000 & L &= .07 & Q &= 26.297 & U &= .72 \\
C &= 17.163 & G &= 37 & N &= 7 & R &= 13.4 & W &= 3.654 \\
D &= 0 & H &= .9877 & O &= .4375 & S &= .2533 \\
E &= 4.71 & I &= .216 & P &= 4.96 & T &= 13.816
\end{align*}
\]

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15-5 13-9-7 2-15-5 14-8-18-4-2 2-13-9 15-1-7-6-4.
15-5 6-18-5-13 2-15-5 12-3-5-5-7 9-14 4-16-1-6-5-4 9-7
2-15-5 2-15-8-18-6 15-1-7-6 1-7-6 17-9-4-2. 2-15-5
10-15-9-4-2 9-14 2-15-5 11-9-3-7-2-5-4-4 1-16-16-5-1-13-5-6
17-1-3-10-15-8-7-10.
Ancient Egyptian priests guarded many secrets in mysterious carvings on the walls of their temples. Anyone other than the priests or pharaohs of Egypt who dared study the inscriptions was punished by death.

One dark night about 200 B.C., Bolos Democritos slipped into the temple of Isis at Alexandria and copied some magical formulas. But, it was not long after that the priests discovered his theft. The young man fled to the city of Mendes over 100 miles away. But, the priests caught up with him and murdered him in his bed one night.

Discover the mysterious formulas by completing the problems below.

**ONE,** simplify each expression to find the answer in the table.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. __ (4 + 7 + 13) ÷ 4
2. __ (8 + 7) ÷ (8 - 3)
3. __ 12 + 3(2 + 3)
4. __ (2)(6)(5 + 1)
5. __ \[
\frac{8 + 8(3 - 1)}{3}
\]
6. __ \[
\frac{4(6 - 2) - 4}{3}
\]
7. __ (3 + 1)(2 + 3)(2)
8. __ \[
\frac{9 + 8(8 - 2)}{8}
\]
9. __ \[
\frac{3(5) + 4(5)}{2 + 3}
\]
10. __ \[
\frac{12 + (3)(6)}{(2)(3)}
\]
11. __ \[
2[27 ÷ (15 + 12)]
\]
12. __ \[
11[13 - (3)(3)]
\]
13. __ \[
17 - (18 ÷ 6)
\]
14. __ \[
9 - \frac{3(6) + 2(7 + 2)}{4}
\]
15. __ \[
7(5 + 8) - 17
\]
16. __ \[
(1/2)(3)(2)(8)
\]

A = 7   F = 14   I = 40   N = 5   S = 27   V = 4
D = 15   G = 2   L = 6   O = 72   T = 44
E = 8   H = 74   M = 24   R = 3   U = 0
15-5  3-12-4-1-5  13-4-2-16-14-1-9-3  12-4  3-16-5-1-12
11-4-1-8  9-10-8  3-7-1-6-5-2  9-10-8  12-4  13-4-2-16
13-9-1-3-5  11-4-1-8.
Sea Chiefs

When Kantiagmiut hunters brought home their capture of a gray whale, they sometimes encountered the fierce killer whales. So terrifying were these creatures that the Eskimos called them the ocean's chiefs. They ranged in size from 20 to 30 ft., were very fast, and had about a dozen large cone-shaped teeth. These animals hunted in packs and were known to attack large whales three times their own size.

Since it took several hours to land a harpooned gray whale, the killer whales sometimes became a serious problem. They might attack the dying whale and consume it before it could be brought to land. But, the Kantiagmiut people were inventive. They found a way to keep the killer whale away from their catch to cut long tubes of sea kelp and fling it over the gray whale. Discover why this worked by completing the problems below.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. ___ \((-1)^2 \cdot 3\)  
2. ___ \(- (1)^2 \cdot 3\)  
3. ___ \((-3)^2 \cdot 4 - 2\)  
4. ___ \((-3)^2 - 4 \cdot 2\)  
5. ___ \(- (3)^2 \div 9 + 9\)  
6. ___ \((-3)^2(-1)^3\)  
7. ___ \(7(0)(-8)(12)\)  
8. ___ \((-2)^3 \div (-2)\)  
9. ___ \((-2)^5 \div 2 - 2^2\)  
10. ___ \(- (3)^2 \cdot 3 \div 3^3\)  
11. ___ \((5)^2 \cdot (-1)^7\)  
12. ___ \((-2)^3 \cdot (-5)\)  
13. ___ \(-72 \div [-24 \div (-8)]\)  
14. ___ \(48 \div [60 \div (-5)]\)  
15. ___ \(14 \div (2^3 - 8)\)  
16. ___ \((-2)^5 \div 4 + 2\)  
17. ___ \((-2)^7 - 4 + 1\)  
18. ___ \((-2)^4 \cdot (9 - 15 \div 3)\)  
19. ___ \(- (1)^3 - (1)^5\)  
20. ___ \((- 2)^5 + (-2)^2\)  

A = 40  E = \(-132\)  I = \(-6\)  N = \(-2\)  T = 8
B = \(-1\)  F = 3  K = \(-25\)  O = \(-20\)  U = \(-9\)
C = \(-24\)  G = 4  L = \(-4\)  R = \(-28\)  W = 1
D: undefined  H = 64  M = 34  S = \(-3\)  Y = 0

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Bull Headed

By the age of twelve, Alexander the Great was a skilled horseman. One day, his father King Philip of Macedonia showed him a beautiful black horse named Bucephales, meaning bull-headed.

Bucephales, lived up to his name. None of the king’s horsemen were able to ride him. Philip let his son try. Using a clever trick, the young prince astonished Philip and his court by taming Bucephales. Simplify the problems that follow to discover how Alexander tamed the wild horse.

ONE, simplify each expression to find the answer in the table.

TWO, place the letter by the answer in the blank next to the problem.

THREE, match the numbers by the picture with the corresponding letters.

1. ___ 4 \cdot 7 + 2 
2. ___ 4 + 7 \cdot 2 
3. ___ 4(7 + 2) 
4. ___ 27 \div 9 - 5 
5. ___ -27 \div 9 - 5 
6. ___ -6 - 36 \div 9 
7. ___ (4 - 28) \cdot 3 
8. ___ 4 - 28 \cdot 3 
9. ___ 7 \cdot 8 - 4 \div 2 
10. ___ 7 \cdot 8 - 4 \div 2 + 4 
11. ___ 6(7 - 5) - 16 

12. ___ -7 \cdot 9 + 21 \div 7 
13. ___ 10 - 3(5 - 2) 
14. ___ -10 - 3(5 - 2) 
15. ___ -3(7 + 4) \cdot 3 - 1 
16. ___ -3(-7) - (4 \cdot 3 - 1) 
17. ___ -3(-7) + 4 \cdot 3 - 1 
18. ___ -(9 \cdot 2) 
19. ___ -(3 - 1 \cdot 6) 
20. ___ (3 - 1 + 6) 
21. ___ 4 \div (-8) + 4 \div 8 
22. ___ 4 \div (-8) - 4 \div 8 

A = -10 \hspace{1cm} E = -2 \hspace{1cm} I = -72 \hspace{1cm} N = -1 \hspace{1cm} S = 36 \hspace{1cm} X = 1 
B = -4 \hspace{1cm} F = 10 \hspace{1cm} K = -60 \hspace{1cm} O = -18 \hspace{1cm} T = 8 \hspace{1cm} Y = 58 
C = -19 \hspace{1cm} G = 30 \hspace{1cm} L = -80 \hspace{1cm} P = 0 \hspace{1cm} U = -8 
D = -100 \hspace{1cm} H = 32 \hspace{1cm} M = 18 \hspace{1cm} R = 54 \hspace{1cm} W = 3 

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Spirit of the Confused Mind

Ancient Lenape (Delaware Indian) custom discouraged anyone from talking about the dead, especially at night, but even at dawn or dusk. Legend has it that an evil spirit Tehtaongélémhes may come to take possession of a person’s mind. The person becomes confused and loses his sense of direction when travelling. The victim may not even know what he is saying. Lenape refer to this custom of not talking very much about the dead as Ktakimaok. If too much is said about the dead, their spirits will come up from the ground and Tehtaongélémhes, the spirit that confuses minds, will take over the mind of his victim. To learn another ancient Lenape custom, complete the substitution problems below.

**ONE,** substitute $u = -2$, $w = 0.5$, $x = 0.1$, $y = 2$, or $z = 3$ into each of the expressions that follow to find the answer in the table at the bottom.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. \[ x^2 \] 8. \[ (x - y)(x + y) \] 15. \[ -2u^4 \]
2. \[ -y^2 \] 9. \[ (x - y)^2 \] 16. \[ (w + x)^2 \]
3. \[ xwy \] 10. \[ (x + y)^2 \] 17. \[ (x - w)^2 \]
4. \[ -3y^2 \] 11. \[ 2x^2 - 3u^2 \] 18. \[ u^2(z - u) \]
5. \[ 3u^2 \] 12. \[ 2(x^2 - 3u^2) \] 19. \[ -x^2yz \]
6. \[ w^2 - x^2 \] 13. \[ x^3 \] 20. \[ u^3 - z^3 \]
7. \[ x^2 - w^2 \] 14. \[ -w^3 \]

\[
\begin{align*}
A &= 4.41 & E &= -12 & K &= 0.01 & P &= -4 & U &= 0.36 \\
B &= -0.125 & G &= 0.24 & L &= -0.06 & R &= -0.24 & V &= 0.1 \\
D &= 12 & I &= 0.001 & O &= 0.16 & T &= -3.99 & Y &= 3.61 \\
\end{align*}
\]
African Americans of the Old South have handed down a story about a preacher who met up with a ferocious lion. Immediately, the terrified man knelt down and prayed, "O Lord, save me from this beast, just as you saved Daniel in the lion’s den." Then he heard the lion muttering something. The preacher looked up and saw the lion kneeling down with his paws covering his eyes. “Brother, Lion, I see you’re praying along with me,” the preacher exclaimed.

To learn what unusual reply the lion gave the preacher, solve the problems below.

**ONE.** substitute \(a = 3\), \(b = 2\), or \(c = 5\) to find the value of each expression.

**TWO.** place the letter by the answer in the blank next to the problem.

**THREE.** match the numbers by the picture with the corresponding letters.

1. ___ \(a + 2\)  
2. ___ \(3b\)  
3. ___ \(c - 2\)  
4. ___ \(a ÷ 3\)  
5. ___ \(a + c\)  
6. ___ \(c - a\)  
7. ___ \(bc\)  
8. ___ \(a ÷ b\)  
9. ___ \(ac\)  
10. ___ \(b ÷ a\)

11. ___ \(abc\)  
12. ___ \(\frac{a + b + c}{4}\)  
13. ___ \(2a + 3b\)  
14. ___ \((ab)(ab)\)  
15. ___ \(4(a + b)\)  
16. ___ \(a(b + c)\)  
17. ___ \(c ÷ \frac{1}{5}\)  
18. ___ \(ab + bc\)

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<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
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<td>5</td>
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<th>O</th>
<th>R</th>
<th>S</th>
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<td>12</td>
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<tr>
<th>U</th>
<th>V</th>
<th>W</th>
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<tbody>
<tr>
<td>(\frac{2}{3})</td>
<td></td>
<td>15</td>
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The Zulu tribe of Africa was known for its elaborate art and its fearless warriors. Zulu women took great pride in the arrangements of their headdresses, called isicolo. Styles varied with region and marital status. Married women entwined their hair with long fibers and bound it with red clay. Often the designs looked like royal crowns.

To learn about another custom of Zulu women, complete the substitution problems below.

**ONE,** substitute the values \( x = 2, \ y = -3, \ \text{or} \ \ z = 5 \) in each of the expressions that follows. Simplify and find the answer in the table below.

**TWO,** place the letter by the answer in the blank next to the problem.

**THREE,** match the numbers by the picture with the corresponding letters.

1. \( \_ \ x^2 \) 2. \( \_ \ -x^2 \) 3. \( \_ \ -y \) 4. \( \_ \ -y^2 \) 5. \( \_ \ y^2 \) 6. \( \_ \ (x + y)^2 \) 7. \( \_ \ z^x \) 8. \( \_ \ 2y^x \) 9. \( \_ \ -2y^x \) 10. \( \_ \ (2y)^x \) 11. \( \_ \ (y + z)^3 \) 12. \( \_ \ x^2 + y^2 \) 13. \( \_ \ y^2 - x^2 \) 14. \( \_ \ x^2 - y^2 \) 15. \( \_ \ z(x^3 - y) \) 16. \( \_ \ z(y - x^3) \) 17. \( \_ \ xz^2 \) 18. \( \_ \ y^2z \) 19. \( \_ \ -y^2z \) 20. \( \_ \ y^3 \) 21. \( \_ \ -z^3 \) 22. \( \_ \ z^3 \)

**A = 9** \( \text{E = -4} \) \( \text{I = 4} \) \( \text{N = -18} \) \( \text{S = 25} \) \( \text{W = -125} \) \( \text{B = 36} \) \( \text{F = 8} \) \( \text{K = -55} \) \( \text{O = 1} \) \( \text{T = -9} \) \( \text{Y = 13} \) \( \text{C = -5} \) \( \text{G = 55} \) \( \text{L = 45} \) \( \text{P = 50} \) \( \text{U = 5} \) \( \text{D = -27} \) \( \text{H = 125} \) \( \text{M = 18} \) \( \text{R = 3} \) \( \text{V = -45} \)