79. It is said that a picture is worth a thousand words. It is also claimed that words are a dime a dozen. Assuming these propositions are true, what is the dollar value of a picture?

\[
\begin{align*}
1 \text{ pic} &= 1000 \text{ words} \\
12 \text{ words} &= \$0.10 \\
\Rightarrow \quad 1 \text{ word} &= \frac{\$0.10}{12} \\
\Rightarrow \quad 1 \text{ pic} &= 1000 \left(\frac{\$0.10}{12}\right) \\
&= \$8.33
\end{align*}
\]

80. Multiply $52_{\text{six}} \cdot 34_{\text{six}}$ (without converting to base ten).

81. (a) Does 4|0? Explain your answer.

Yes! $4 \mid 0 \Rightarrow 0 = 4 \cdot q \Rightarrow q = 0$

(b) Does 0|4? Explain your answer.

No! $0 \mid 4 \Rightarrow 4 = 0 \cdot q \Rightarrow \text{no } q \in I \text{ exists}$

82. Jim paid $330 for a new radar detector to sell in his shop. He wants to price it so that he can offer a 10% discount and still make 20% of the price he paid for it. At what price should the radar detector be marked?

\[
\begin{align*}
330(0.20) &= 66 \\
\Rightarrow \quad x - 0.10x &= 39.6 \\
\Rightarrow \quad 0.9x &= 39.6 \\
\Rightarrow \quad x &= \frac{39.6}{0.9} \\
\Rightarrow \quad x &= \$440
\end{align*}
\]

83. Multiply $312_{\text{four}} \cdot 23_{\text{four}}$ (without converting to base ten).
84. Divide \(24312_{six} \div 4_{six}\) (without converting to base ten).

85. Using the words “divisible”, “divisor”, “multiple”, “factor”, “divides”, describe the relationship between the numbers 2 and 12 as many was as possible.

86. Divide \(1435_{six} \div 3_{six}\) (without converting to base ten).

\[
14_{six} = 10 \text{ units}
\]

87. Fill each blank space with a single digit that makes the corresponding statement true. Find all possible answers.

(a) \(6|58_x|_2\)
- Check \(5 + 8 + ? + 2 = 15 + ?\)
- Sum of digits divisible by 3.

- Must be divisible by 2 \(\checkmark\) and 3

- If 0, then 15 \(\checkmark\)
- If 1, then 16 \(\times\)
- 2: then 17 \(\times\)
- 3: then 18 \(\checkmark\)

(b) \(24|4_x|856\)
- Must be divisible by 4, 2, and 3 \(\checkmark\)
- Check

88. Multiply \(768_{nine} \cdot 57_{nine}\) (without converting to base ten).

\[
768_{nine} \\
\times 57_{nine} \\
\hline 6032_{nine} \\
\downarrow 42740 \\
\hline 48772_{nine}
\]
89. Decide if the number 746,988 is divisible by each of the following numbers, and briefly explain how you reached this decision:

(a) 2
(b) 3
(c) 4
(d) 5
(e) 6
(f) 8
(g) 9
(h) 10
(i) 11

90. Divide $1021_{three} \div 2_{three}$ (without converting to base ten).

\[ \begin{array}{c}
2_{\text{base} 3} \sqrt{1021_{\text{base} 3}} \\
- \quad \frac{12}{2} \\
\hline
12 \\
- \quad \frac{11}{1} \\
\hline
11 \\
- \quad \frac{11}{0} \\
\hline
0
\end{array} \]

91. Write an algebraic equation for the pay, $P$, for $t$ hr if you are paid $12$ for the first hour and $8$ for each additional hour.

\[ P = 12 + 8(t-1) \]

92. Compute the following without a calculator: $4^8 + (-4)^8 + 4^8 + (-4)^8$

\[ = 4^8 + 4^8 + 4^8 + 4^8 \]
\[ = 4^8(1+1+1+1) = 4^8 \cdot 4 = 4^9 \]

93. Multiply $3024_{five} \cdot 43_{five}$ (without converting to base ten).

94. Compute the following without a calculator: $3^{450} + 3^{449}$

\[ = 3^{449}(3 + 1) \]
\[ = 4 \cdot 3^{449} \]
95. A student says that 1 is the identity for division. How do you respond?

\[
\text{No, } \frac{1}{a} \neq \frac{a}{1} \neq a
\]

96. Divide $376_{10} \div 5_{10}$ (without converting to base ten).

97. Fill each blank space with a single digit that makes the corresponding statement true. Find all possible answers.

(a) $11|8\_193$

\[
\begin{align*}
(3 + 1 + 8) - (9 + ?) &= \# \text{ divisible by } 11 \\
12 - (9 + ?) &= \text{ if } 0, \text{ then } 3x \\
&\quad \text{ if } 1, \text{ then } 2x \\
&\quad \text{ if } 2, \text{ then } 01 \times \\
&\quad \text{ if } 3, \text{ then } 01
\end{align*}
\]

(b) $8|831\_0$

\[
\begin{align*}
1?0 \text{ must be divisible by } 8 \\
\text{ try } 1, \text{ no } \\
\text{ try } 2, \text{ yes } \text{ keep trying}
\end{align*}
\]

98. Compute the following without a calculator: $-2(-3)^2 + | -8 | - (-2)^3 - 5 \cdot 3$

\[
\begin{align*}
-2(9) + 8 - (-8) - 15 \\
-18 + 16 - 15 \\
-17
\end{align*}
\]

99. Order the following from least to greatest:

$0.45, 0.445, 0.4\bar{5}, 0.45\bar{4}, \frac{4}{9}$
100. Two bells ring at 8:00AM. For the remainder of the day, one bell rings every half hour and the other bell rings every 45 min. What time will it be when the bells ring together again?

\[ \begin{align*}
30 &= 2 \cdot 3 \cdot 5 \\
45 &= 3^2 \cdot 5 \\
\text{LCM}(30,45) &= 90 \\
\therefore 8 \text{am} + 90 \text{min} &= 9:30 \text{am}
\end{align*} \]

101. Use a factor tree to find the prime factorization of 24,500.

\[ 2^2 \cdot 5^3 \cdot 7^2 \]

102. Use a factor tree to find the prime factorization of 19,224

\[ 2^3 \cdot 3^3 \cdot 89 \]

103. If there are 9 boys and 6 girls at a party and the host wanted each to be given exactly the same number of candies that could be bought in packages containing 12 candies, what is the fewest number of packages that could be bought?

\[ \begin{align*}
15 &= 3 \cdot 5 \\
12 &= 2^2 \cdot 3 \\
\text{LCM}(15,12) &= 60 \\
60 \div 12 &= 5 \text{ packages}
\end{align*} \]

104. Change 6.93\overline{2} to a rational number in the form \(\frac{a}{b}\), where \(a\) and \(b\) are integers \((b \neq 0)\).

\[ \begin{align*}
n &= 6.93\overline{2} \\
1000n &= 6932.\overline{2} \\
-100n &= -693.\overline{2} \\
900n &= 6239 \\
\frac{6239}{900} &= \frac{6239}{900}
\end{align*} \]