Day 1 Brain Teasers - Solutions

Batch I - Vikings
Time Limit: 30 Minutes

June 10, 2019

1 Simple Algebra

1. A business executive received a $6,000 bonus check from her company at the end of the year. This was 5% of her annual salary. How much was her annual salary before receiving the bonus?

   Let d = her annual salary.
   5% of her salary equals her yearly bonus. Your equation will be:
   $(5\%)d = \$6000$
   $0.05d = 6000$
   $0.05d \div 0.05 = 6000 \div 0.05$
   $d = 6000 \div 0.05$
   $\underline{d = \$120000}$

2. A farmer is raising a pig that weighed 20 kg. when he bought it. He Expects it to gain 12 kg per month. He will sell it when it weighs 200 kg. How many months will it be before he will sell the animal?

   $12x + 20 = 200$
   $12x + 20 - 20 = 200 - 20$
   $12x + (20 - 20) = 200 - 20$
   $12x + (0) = 180$
   $\frac{12x}{12} = \frac{180}{12}$
   $x = 15$
   The farmer would have to wait 15 months before selling his pig.

3. After putting 324 stuffed bears into packing crates, there were 54 crates filled with bears. If each crate contained the same number of bears, how many bears were in each packing crate?

   $54b = 324$
   $54b \div 54 = 324 \div 54$

$b = 324 \div 54$
$b = 6$
There are 6 bears in each packing crate

4. Solve the following equations for x:

   (a) $11x + 7 = 3x - 9$
   $11x - 3x = -9 - 7$
   $8x = -16$
   $\underline{x = -2}$

   (b) $20x - 3x - 11 = 9x + 43$
   $20x - 3x - 9x = 43 + 11$
   $8x = 54$
   $x = \frac{54}{8}$
   $\underline{x = \frac{27}{4} = 6.75}$

2 Tricky Brain Teasers

1. When I went to the store, I purchased four items.
   The following shows the cost of three of the items:

   (a) 1.50

   (b) 3.00

   (c) 4.00

   The line to the checkout was pretty long, so to quench my boredom I started playing with my phone calculator while waiting.
   I found out, to my surprise, that the four prices of the four items I purchased added to the same number as I got when I multiplied the four prices together. What was the price of the fourth item?

   Solution:
   Let the price of the 4th item be P.
   $1.50 + 3.00 + 4.00 + P = 1.50 \times 3.00 \times 4.00 \times P$ $8.50 + P = 18P$
   $8.50 = 18P - P$
   $8.50 = 17P$
   $P = \dfrac{8.50}{17}$
   $\underline{P = 0.50}$

2. Diophantus was a Greek mathematician who lived in the third century. He was one of the first mathematicians to use algebraic symbols. Most of what is known about Diophantus's life comes from an algebraic riddle from around the early sixth century. The riddle states:
Diophantus's youth lasted one sixth of his life. He grew a beard after one twelfth more of his life. After one seventh more of his life, he married. 5 years later, he and his wife had a son. The son lived exactly one half as long as his father, and Diophantus died four years after his son.
How many years did Diophantus live?

Solution:
Let **D** be the number of years Diophantus lived, and let **S** be the number of years his son lived. Then the above word problem gives the two equations:
$D = (\frac{1}{6} + \frac{1}{12} + \frac{1}{7})D + 5 + S + 4$
$S = \frac{1}{2}D$
By substituting S in the first equation we get:
$D = (\frac{14+7+12}{84})D + \frac{1}{2}D + 9$
$D - \frac{75}{84}D = 9$
$\frac{9}{84}D = 9$
$\underline{D = 84}$