# PROFICIENCY CHALLENGE 9 ANSWER KEY

AMV = “Answers May Vary”

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| **1** | a | Two possible solutions are:<br><br>$\begin{array}{r} 605 \\ +481 \\ \hline 1086 \end{array}$ $\begin{array}{r} 706 \\ +391 \\ \hline 1097 \end{array}$<br><br>Notice both of these solutions have O representing 0, and the value of T + N is always 10. |
| | b | The solution is:<br>$\begin{array}{r} 9567 \\ +1085 \\ \hline 10652 \end{array}$ |
| | c | The solution is:<br>$\begin{array}{r} 757 \\ 757 \\ +\ 45 \\ \hline 1559 \end{array}$ |
| | d | The solution is:<br>$\begin{array}{r} 526485 \\ +197485 \\ \hline 723970 \end{array}$ |

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| **2** | The first two pairs of expressions show equivalence, but not the last. |

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| **3** | Viviana is not correct about the expressions being equal. The variable and constant terms have to match, but in this case on the variable terms match. So even though twice $3x$ is $6x$, we also need twice 9, which is 18. So our equivalent expressions would be $2(3x-9)$ and $6x-18$. |

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| **4** | AMV; One possible solution is: $3x+2-x$ and $2(x+4)-6$ both of which are equivalent to $2x+2$. |

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| **5** | Both C and F have appropriate statements. |

# PROFICIENCY CHALLENGE 10 ANSWER KEY

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| **1** | $1\frac{1}{2}$ slices<br><br>Niki gets one slice, so there are three slices left for the two girls. Sam and Brianna each get $1\frac{1}{2}$ slices. |

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| **2** | $1\frac{1}{2}$ slices<br><br>The six friends would take a total of 9 slices. That leaves 3 slices. Vince takes an additional one and one-half slices leaving one and one-half slices. |

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| **3** | 7 buses<br><br>The museum requires one adult (or more) for every 12 students. To take all 171 students, we need at least 15 adults. Now we look at the buses. Each bus needs two adults. If a bus holds 30 people, and two are adults, there is room for 28 students on each bus. That means we can fit 168 students (and 12 adults) into 6 buses. That's not quite enough. If we order a $7^{th}$ bus, we can fit an additional 3 students and 3 adults. So we need 7 buses total. |

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| **4** | a | $7\frac{1}{2}$ |
| | b | 48 |
| | c | 12 |
| | d | 14 |

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| **5** | Solution methods may vary. The solution is $x = 8$ |

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| **6** | a | The triangle weighs 9 oz., a trapezoid weighs 4.5 oz., and the square weighs 18 oz. |
| | b | The triangle weighs 1 oz., a trapezoid weighs $\frac{5}{8}$ oz., and the square weighs $1\frac{1}{8}$ oz. |
| | c | The triangle weighs $\frac{1}{4}$ oz., a trapezoid weighs $\frac{1}{8}$ oz., and the square weighs $\frac{1}{2}$ oz. |
| | d | Yes, it is possible. If the total weight is 24 ounces, then each side weighs 12 ounces. That means the two squares weigh a total of 12 ounces, or 6 ounces each. On the left side of the balance, there are three weights. As long as the trapezoids have the same weight, and the total weight of two trapezoids and one triangle is 12 ounces, the balance remains balanced. So two possible solutions are: triangle weighs 2 ounces, and each trapezoid weighs 5 ounces; OR triangle weighs 6 ounces, and each trapezoid weighs 3 ounces. |
| | e | Sometimes it is true, but not always. For example: (a) was true, (c) was not. |

# PROFICIENCY CHALLENGE 11 ANSWER KEY

AMV = "Answers May Vary"

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| **1** | a | The multiplier is 2. |
| | b | The multiplier is 3. |
| | c | The multiplier is 10. |
| | d | The multiplier is $\frac{1}{2}$ (or the divider is 2). |

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| **2** | a | The multiplier is 2 because $240 \bullet 2 = 480$. $60 \bullet 2 = 120$ and $120 \bullet 2 = 240$ so the missing number is 120 and the multiplier is 2. |
| | b | The multiplier is $\frac{1}{2}$ (or the divider is 2) and the missing number is 4. Since $16 \bullet \frac{1}{2} = 8$ and $8 \bullet \frac{1}{2} = 4$ and $4 \bullet \frac{1}{2} = 2$ . |
| | c | The missing values are 4 and 324, and the multiplier is 3. Since $12 \bullet 3 = 36$ and $36 \bullet 3 = 108$ the multiplier must be 3. I know that 4 times 3 is 12, so the first missing value is 4. Lastly, $108 \bullet 3 = 324$ and the second missing value is 324. |
| | d | The missing values are 1 and 4, and the multiplier is 4. Since $16 \bullet 4 = 64$ and $64 \bullet 4 = 256$, the multiplier is 4. Then working backward, I know that 4 times 4 is 16, so the second missing number is 4. But I also know that 1 times 4 is 4, so the first missing number was 1. |

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| **3** | Each of the sequences given is arithmetic, meaning you add (or subtract) the same value to get the next term. Geometric sequences require multiplication (or division) by the same number. That is, 3 times 2 gives 6, but 6 times 2 does not give us 9. |

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| **4** | Changing Xandra's number of bracelets to 100 and Zeke's number of bracelets to 5 will result in columns representing equivalent ratios. |

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| **5** | AMV; One solution is:<br>2, 6<br>11, 33<br>14, 42<br>24, 72<br>The only other possibility is to switch the two columns, and/or interchange rows. |

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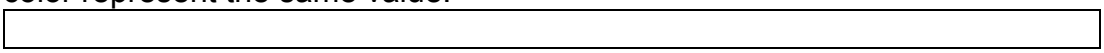
| **6** | a | AMV; For example: $x + 3 = 6$, $3x = 9$, and $2(x + 1) - 5 = 3$ |
| | b | AMV; For example: $2x = 1$, $6x + 1 = 4$, and $4(x + 2) - 3 = 2x + 6$ |

# PROFICIENCY CHALLENGE 11 ANSWER KEY (Continued)

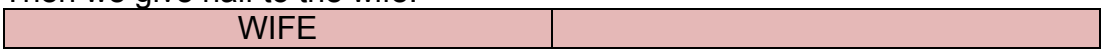
**7**

$320,000 is the value of the total estate.

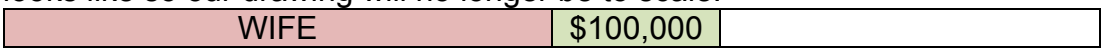
Using a diagram:
Let the full bar represent the entire estate's value and any portions with the same color represent the same value.



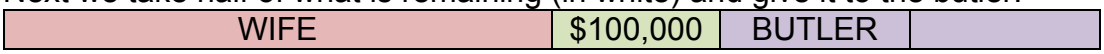
Then we give half to the wife.



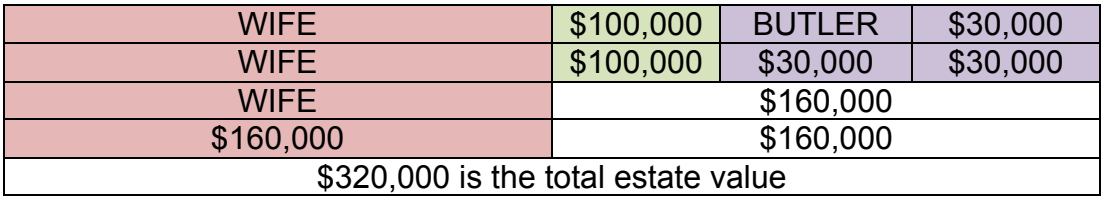

Next we give $100,000 to the daughter. We don't know exactly what $100,000 looks like so our drawing will no longer be to scale.




Next we take half of what is remaining (in white) and give it to the butler.




Last, the problem tells us that the remaining money is $30,000 donated to charity. Now, we can go back the other direction using our diagram.
We know the last bit (in white) is $30,000, which is the same amount the butler received. Plus an additional $100,000 the daughter received brings the total so far to $160,000. And this is the same amount the wife received. So Mr. Moneybags' estate was worth $320,000.



# PROFICIENCY CHALLENGE 12 ANSWER KEY

AMV = "Answers May Vary"

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| **1** | 12.5% of her paycheck.<br><br>Francine used to save 10% of $4000, which is $400. $400 is $\frac{1}{8}$ or 12.5% of $3200. So Francine is now saving 12.5% of her reduced paycheck. |

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| **2** | The combined average is 90%.<br><br>Since there are different numbers of students in each class, consider each student received the average score, and our combined average will be $\frac{92 \bullet 30 + 86 \bullet 15}{30 + 15} = 90$. |

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| **3** | There are $(75 \textit{years})(365 \frac{\textit{days}}{\textit{year}})(24 \frac{\textit{hours}}{\textit{day}})(60 \frac{\text{min}}{\textit{hour}})(60 \frac{\text{sec}}{\text{min}}) = 2{,}365{,}200{,}000$ seconds in 75 years (not counting leap years).<br><br>30% of 2,365,200,000 seconds is 709,560,000 seconds sleeping. |

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| **4** | Monday she took 10 cookies.<br>Tuesday, Wednesday and Thursday she took 18 cookies (each night).<br>On Friday, there were 36 cookies left.<br><br>Monday night Brenda took 10% of 100 cookies, or 10 cookies. This leaves 90 more. Tuesday night she took 20% of the 90 cookies, or 18 cookies. This leaves 72 cookies. On Wednesday she took 25% of the 72 cookies, or 18 cookies, leaving 54 cookies. On Thursday, she took one-third of the 54 cookies, or 18 cookies, leaving 36 cookies. |

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| **5** | AMV; If we assume Sweeny has at least one of each, that takes care of 7 wheels. Then there are 10 more wheels to account for. The table below has some possible solutions, but others are possible. |

| Bicycles | Tricycles | Wagons |
|---|---|---|
| 6 | 1 | 1 |
| 4 | 1 | 2 |
| 3 | 3 | 1 |

# PROFICIENCY CHALLENGE 12 ANSWER KEY (Continued)

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| **6** | 322.56<br><br>84% of 96% of 400 is 322.56. It must have the same value as 96% of 84% of 400 because multiplication is commutative and associative. That is,<br>$\frac{84}{100}(\frac{96}{100} \bullet 400) = (\frac{84}{100} \bullet \frac{96}{100}) \bullet 400 = (\frac{96}{100} \bullet \frac{84}{100}) \bullet 400 = \frac{96}{100}(\frac{84}{100} \bullet 400)$. |

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| **7** | AMV; For example:<br>18 is 30% of 60.<br>12 is 20% of 60.<br>30 is 50% of 60. |