|  |  |
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| **Whole Number Place Value and Adding and Subtracting Whole Numbers** | |
| **Enrichment Investigation #1** | |
| Common Core State Standard(s):  4.NBT.1  4.NBT.2  4.NBT.4  4.OA.3 | Standard(s) for Mathematical Practice:   1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics   6. Attend to precision |
| Materials Needed:   * Blackline Masters:   + *Going Green Home Renovation Project*   + *Pricing Chart*   + *Going Green Budget*   + *Bank Balance Sheet*   + *Going Green Follow-Up Questions* * Calculators (optional) | |
| Instructions:   1. Students will use the above handouts to work through the “Going Green” Home Renovation Project. A family wants to complete four energy efficient projects. Students have to evaluate the cost of each renovation, keep track of debits and credits to an account using a balance sheet, and calculate annual savings from four energy efficient upgrades. 2. Students will use the information provided in the handouts to complete follow-up questions. | |
| Sources: | |

**“Going Green” Home Renovation Project**

The Parker Family is looking to remodel their home, making it more energy efficient. They have been researching various home improvements that will save energy while also saving money on energy bills. They have been gathering estimates from various home improvement stores and would like to get started on the projects as soon as possible. The Parker Family would like to complete all the remodels now, however they will need to space out these home improvements over time to fit into their budget. They need your help to decipher how long it will take to complete all four of the projects on their “Going Green” remodel.

**Projects included in the Parker’s “Going Green” Remodel**

* Replace all the existing lighting and wiring in the house with the newest energy efficient lighting system from “Green Lighting”
* Upgrade the appliances in the house with energy-efficient appliances (refrigerator, dishwasher, range, washer and dryer)
* Replace all the windows in the house with energy-efficient windows
* Install Specialized Solar/Wind Panels on the roof of the house to produce energy for the home

**Some important information about the finances for this project...**

* The family has a “Going Green” account that they add money to each month to save-up for the energy efficient upgrades. Mrs. Parker puts 30 tens into the account the last day of each month, while Mr. Parker contributes 22 tens on the 15th of each month.
* At the start of the remodeling, the Parkers had 120 hundreds in their “Going Green” account.

**Some final details...**

* The Parkers decided to change all of the appliances and the light bulbs to begin their remodeling project. These first two projects will start January 1st.

**Lighting + Wiring Pricing Chart**

|  |  |  |
| --- | --- | --- |
| **Type of Light Bulb** | **Price in $** | **Annual Savings on Energy Bills** |
| multi-watt bulb | 6 tens + 3 hundreds + 5 ones | 5 ones + 15 tens |
| 15 watt bulbs | 15 tens + 5 ones | 5 tens +55 ones |
| 30 watt bulbs | 20 tens + 25 ones | 9 tens + 5 ones |
| 45 watt bulbs | 20 tens +100 ones | Eighty-five dollars |

**Appliances Pricing Chart**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Appliances** | **Dishwasher** | **Refrigerator** | **Range** | **Washer & Dryer** |
| Price | 69 tens | 14 hundreds | 895 ones | 165 tens |
| Annual Savings on Energy Bills | 11 tens | 14 tens | 13 tens | 12 tens |

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8BRIN7BK\MC900389388[1].wmfWindows Pricing Chart**

|  |  |  |
| --- | --- | --- |
| **Size** | **Price in $** | **Annual Savings on Energy Bills** |
| Small Window | 29 tens | 5 ones |
| Large Window | 52 tens | 1 tens + 5 ones |

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\3DUJGEJW\MC900437827[1].wmfSolar/Wind Panels Pricing Chart**

|  |  |  |
| --- | --- | --- |
| **Size** | **Price in $** | **Annual Savings on Energy Bills** |
| Small Panel | 35 ones | 28 tens + 5 ones for entire unit of panels |
| Large Panel | 34 tens |

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSOHPPFM\MC900441938[1].wmf“Going Green” Budget Sheet**

**The Parker Family needs your help to calculate the cost and annual savings for each of their energy-efficient upgrades. Using the Pricing Chart, complete the chart below. Show your work on a separate sheet of paper.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Energy-Efficient Remodel** | **# Needed** | **Cost for Each** | **Total Price** | **Yearly Savings on Energy Bills** |
| Replace all the lights with energy efficient lights | One multi-watt bulb |  |  |  |
| One 15 watt bulb |  |  |
| One 30 watt bulb |  |  |
| One 45 watt bulb |  |  |
| Replace the Appliances:   * Dishwasher * Refrigerator * Range * Washer & Dryer | 1 of each | Dishwasher |  |  |
| Refrigerator |  |
| Range |  |
| Washer + Dryer |  |
| Replace Windows in the house | 10 small windows  10 large windows |  |  |  |
|  |  |  |
| Solar/Wind Panels | 100 small panels  10 large panels |  |  |  |
|  |  |

**Bank Balance Sheet for “Going Green” Account**

**The Parker Family uses this Bank Balance Sheet to help keep track of debits and credits for their “Going Green” Account. They use this spreadsheet to document their contributions (credits) to the account, including bonuses, while also calculating payments (debits) towards the completion of an Energy Efficient Remodel. Your task is to complete this Bank Balance Sheet for the Parker Family, showing all credits and debits to the account from the beginning of the project to the completion of all four “Green” projects. Hint: Do not forget the money Mr. and Mrs. Parker deposit throughout each month.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Transaction** | **Debit (-)** | **Credit (+)** | **Balance** |
| January 1, \_\_\_\_\_ | Beginning Balance |  | 120 hundreds | $ |
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**“Going Green” Follow-Up Questions**

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1. After replacing their appliances, lighting and wiring with energy efficient products, how many months will the Parker Family have to save before they are able to complete their next project?
2. Which “Going Green” project do you think the Parker Family should complete next? Why?
3. What is the total cost of all the “Going Green” Projects?
4. After all the “Going Green” projects are complete, how much can the Parker family anticipate saving on Energy Bills in the next year?
5. How many months will it take the Parker Family to complete the “Going Green” projects?
6. The Parker Family is quite proud of the energy efficient remodels they have made to their home, as well as all the money they are saving. Many of the neighbors have asked about the prices of these projects so Mrs. Parker has decided to compare and contrast the prices in a chart. Complete the chart below with the missing information. In the spaces between the products use greater than (>), less than (<), or equal to (=) to compare the items.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Light & Wiring Pricing Chart** | | | | | | | |
| Product | 30 Watt Bulb |  | Multi-Watt Bulb |  | 45 Watt Bulb |  | 15 Watt Bulb |
| Cost |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Appliances** | | | | | | | |
| Product | Range |  | Refrigerator |  | Washer & Dryer |  | Dishwasher |
| Annual Savings |  |  |  |  |

1. The Smith Family lives next door to the Parker Family and would like to upgrade e the wiring and lighting in their home to energy efficient options. They have two different options to consider. Help them decide which option would cost less money by completing the chart.

|  |  |  |  |
| --- | --- | --- | --- |
| **Option A** | | **Option B** | |
| **Product** | **Price** | **Product** | **Price** |
| One 45 Watt Bulb |  | Two 45 Watt Bulbs |  |
| Two Multi-Watt Bulbs |  | Two 30 Watt Bulbs |  |
| Two 15 Watt Bulb |  | One 15 Watt Bulb |  |
| **Total Cost** |  | **Total Cost** |  |

Complete the following statement by writing greater than, less than, or equal to.

The cost of Option A is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the cost of Option B.

**“Going Green” Budget Sheet**

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSOHPPFM\MC900441938[1].wmfAnswer Key**

**The Parker Family needs your help to calculate the cost and annual savings for each of their energy-efficient upgrades. Using the Pricing Chart, complete the chart below. Show your work on a separate sheet of paper.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Energy-Efficient Remodel** | **# Needed** | **Cost for Each** | **Total Price** | **Yearly Savings on Energy Bills** |
| Replace all the lights with energy efficient lights | One multi-watt bulb | $365 | $365 + $155 + $225 +300 = 1,045 | $155 |
| One 15 watt bulb | $155 | $105 |
| One 30 watt bulb | $225 | $95 |
| One 45 watt bulb | $300 | $85 |
| Replace the Appliances:   * Dishwasher * Refrigerator * Range * Washer & Dryer | 1 of each | Dishwasher  $690 | $690 + $1,400 +$895 + $1,650 = $4,635 | $110 |
| Refrigerator  $1,400 | $140 |
| Range  $895 | $130 |
| Washer + Dryer  $1,650 | $120 |
| Replace Windows in the house | 10 small windows  10 large windows | $290 | 10 x $290 = $2,900 | 10 x $5 = $50 |
| $520 | 10 x $520 = $5,200 | 10 x $15 = $150 |
| Solar/Wind Panels | 100 small panels  10 large panels | $35 | 100 x $35 = $3,500 | $285 |
| $340 | 10 x $340 = $3,400 |

**Bank Balance Sheet for “Going Green” Account**

**The Parker Family uses this Bank Balance Sheet to help keep track of debits and credits for their “Going Green” Account. They use this spreadsheet to document their contributions (credits) to the account, including bonuses, while also calculating payments (debits) towards the completion of an Energy Efficient Remodel. Your task is to complete this Bank Balance Sheet for the Parker Family, showing all credits and debits to the account from the beginning of the project to the completion of all four “Green” projects.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Transaction** | **Debit (-)** | **Credit (+)** | **Balance** |
| January 1 | Beginning Balance |  | 120 hundreds | $12,000 |
| January 1 | Install Dishwasher | $690 |  | $11,310 |
| January 1 | Install Refrigerator | $1,400 |  | $9,910 |
| January 1 | Install Range | $895 |  | $9,015 |
| January 1 | Install Washer + Dryer | $1,650 |  | $7,365 |
| January 1 | Install Wiring and Light Bulbs | $1,045 |  | $6,320 |
| January 15 | Mr. Parker Deposit |  | $220 | $6,540 |
| January 31 | Mrs. Parker Deposit |  | $300 | $6,840 |
| February 15 | Mr. Parker Deposit |  | $220 | $7,060 |
| February 16 | Install Solar/Wind Panels | $6,900 |  | $160 |
| February 28 | Mrs. Parker Deposit |  | $300 | $460 |
| March 15 | Mr. Parker Deposit |  | $220 | $680 |
| March 31 | Mrs. Parker Deposit |  | $300 | $980 |
| April 15 | Mr. Parker Deposit |  | $220 | $1,200 |
| April 30 | Mrs. Parker Deposit |  | $300 | $1,500 |
| May 15 | Mr. Parker Deposit |  | $220 | $1,720 |
| May 31 | Mrs. Parker Deposit |  | $300 | $2,020 |
| June 15 | Mr. Parker Deposit |  | $220 | $2,240 |
| June 30 | Mrs. Parker Deposit |  | $300 | $2,540 |
| July 15 | Mr. Parker Deposit |  | $220 | $2,760 |
| July 31 | Mrs. Parker Deposit |  | $300 | $3,060 |
| August 15 | Mr. Parker Deposit |  | $220 | $3,280 |
| August 31 | Mrs. Parker Deposit |  | $300 | $3,580 |
| September 15 | Mr. Parker Deposit |  | $220 | $3,800 |
| September 30 | Mrs. Parker Deposit |  | $300 | $4,100 |
| October 15 | Mr. Parker Deposit |  | $220 | $4,320 |
| October 31 | Mrs. Parker Deposit |  | $300 | $4,620 |
| November 15 | Mr. Parker Deposit |  | $220 | $4,840 |
| November 30 | Mrs. Parker Deposit |  | $300 | $5,140 |
| December 15 | Mr. Parker Deposit |  | $220 | $5,360 |
| December 31 | Mrs. Parker Deposit |  | $300 | $5,660 |
| January 15 | Mr. Parker Deposit |  | $220 | $5,880 |
| January 31 | Mrs. Parker Deposit |  | $300 | $6,180 |
| February 15 | Mr. Parker Deposit |  | $220 | $6,400 |
| February 28 | Mrs. Parker Deposit |  | $300 | $6,700 |
| March 15 | Mr. Parker Deposit |  | $220 | $6,920 |
| March 31 | Mrs. Parker Deposit |  | $300 | $7,220 |
| April 15 | Mr. Parker Deposit |  | $220 | $7,440 |
| April 30 | Mrs. Parker Deposit |  | $300 | $7,740 |
| May 15 | Mr. Parker Deposit |  | $220 | $7,960 |
| May 31 | Mrs. Parker Deposit |  | $300 | $8,260 |
| June 1 | Install Windows | $8,100 |  | $160 |

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\M9MZFCT5\MC900441886[1].wmf “Going Green” Follow-Up Questions**

1. After replacing their appliances, lighting and wiring with energy efficient products, how many months will the Parker Family have to save before they are able to complete their next project? Since the Solar/Wind Panels are the least expensive of the two remaining projects, they can complete this project in 1 ½ months.
2. Which “Going Green” project do you think the Parker Family should complete next? Why?

They should complete the Solar/Wind Panels next because this is less expensive than the energy-efficient windows. The goal is for the family to save money as soon as possible to begin saving money fast.

1. What is the total cost of all the “Going Green” Projects?

$20,680

1. After all the “Going Green” projects are complete, how much can the Parker family anticipate saving on Energy Bills in the next year? $1,425
2. How many months will it take the Parker Family to complete the “Going Green” projects? About 17 months
3. The Parker Family is quite proud of the energy efficient remodels they have made to their home, as well as all the money they are saving. Many of the neighbors have asked about the prices of these projects so Mrs. Parker has decided to compare and contrast the prices in a chart. Complete the chart below with the missing information. In the spaces between the products use greater than (>), less than (<), or equal to (=) to compare the items.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Light & Wiring Pricing Chart** | | | | | | | |
| Product | 30 Watt Bulb | **<** | Multi-Watt Bulb | **>** | 45 Watt Bulb | **>** | 15 Watt Bulb |
| Cost | **$225** | **$365** | **$300** | **$155** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Appliances** | | | | | | | |
| Product | Range | **<** | Refrigerator | **>** | Washer & Dryer | **>** | Dishwasher |
| Annual Savings | **$130** | **$140** | **$120** | **$110** |

1. The Smith Family lives next door to the Parker Family and would like to upgrade e the wiring and lighting in their home to energy efficient options. They have two different options to consider. Help them decide which option would cost less money by completing the chart.

|  |  |  |  |
| --- | --- | --- | --- |
| **Option A** | | **Option B** | |
| **Product** | **Price** | **Product** | **Price** |
| One 45 Watt Bulb | **$300** | Two 45 Watt Bulbs | **$300 x 2 = $600** |
| Two Multi-Watt Bulbs | **$365 x 2 = $730** | Two 30 Watt Bulbs | **$225 x 2 = $450** |
| Two 15 Watt Bulb | **$155 x 2 = $310** | One 15 Watt Bulb | **$155** |
| **Total Cost** | **$1,340** | **Total Cost** | **$1.205** |

Complete the following statement by writing greater than, less than, or equal to.

The cost of Option A is **greater than** the cost of Option B.

|  |  |
| --- | --- |
| **Whole Number Place Value and Adding and Subtracting Whole Numbers** | |
| **Enrichment Investigation #2** | |
| Common Core State Standard(s):  4.OA.3  4.NBT.1  4.NBT.3  4.NBT.4 | Standard(s) for Mathematical Practice:   1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics   6. Attend to precision  7. Look for and make use of structure |
| Materials Needed:   * Blackline Masters:   + *The Shopping Excursion Introduction*   + *Wake Home Store Advertisements* (4 pages)   + *The Shopping Excursion Lists* & F*ollow-up Questions* | |
| Instructions:   1. Distribute copies of all the above handouts. A family just purchased their dream home and each member is responsible for purchasing items for the house, while remaining within a given budget. By rounding, students will have to choose from a variety of items to go in the house. 2. Students should complete the follow-up questions and defend their thinking using mathematical thinking and reasoning. | |
| Sources: | |

C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSCG5BCA\MC900410517[1].wmfThe Shopping Excursion

The Hernandez family just bought their dream home, and now they need to furnish and decorate it! They have a lot of work ahead of them, but each family member is excited by the challenge. They want their home to be decorated and furnished as soon as possible, so they decide to divide and conquer the task at hand. Each family member has a budget to work with and a unique strategy for estimating the total cost of the items they purchase.

Mr. Hernandez is in charge of purchasing all the furniture for the house, including patio furniture. Since he has a lot of furniture to purchase, he plans on rounding each item to the nearest hundred. Mrs. Hernandez is responsible for buying all the area rugs for the house. She wants her estimate to be as close to the real price as possible, therefore she will round each item to the nearest ten dollars. Maria is in charge of picking out all the wall décor for the house. She would like to round each item to the nearest hundred dollars. Finally, Jose is responsible for the electronics and security throughout the house. He decides to estimate the cost by rounding each item to the nearest ten dollars.

The Hernandez Family needs your help! Using the information below and the *Wake Home Store* advertisements, create a shopping list for each member of the family. Don’t forget anything on the list or the home will not be complete. Also, be sure to round each price as outlined above. Good luck! ☺

|  |  |  |  |
| --- | --- | --- | --- |
| Family Member | Items to be Purchased | Budget for All Items | How will you round each of the prices? |
| Mr. Hernandez | 3 bedroom sets, 1 living room set, 1 kitchen table with chairs, 1 dining room table with chairs, & 1 patio set | $18,500 | Round to the nearest \_\_\_ |
| Mrs. Hernandez | 3 bedroom rugs, 1 rug for the living room, 1 rug for the dining room, & an indoor/outdoor rug for the patio | $6,500 | Round to the nearest \_\_\_ |
| Maria | 3 bedroom decoration bundles, one living room decoration bundle, & a dining room decoration bundle | $4,500 | Round to the nearest \_\_\_ |
| Jose | 1 living room entertainment system,ne home security system, & one computer package | $4,o00 | Round to the nearest \_\_\_ |

Wake Home Store

*…where we have ALL your home needs!*

Complete Bedroom Sets

|  |  |  |  |
| --- | --- | --- | --- |
| Bedroom Selections | | | |
| Option A | Option B | Option C | Option D |
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| $3,789 | $4,943 | $2,409 | $3,129 |
| Option E | Option F | Option G | Option H |
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| $3, 444 | $6,923 | $6, 412 | $5,449 |

7-Piece Sets (includes couch, loveseat, coffee table, two side tables & 2 lamps)

|  |  |  |  |
| --- | --- | --- | --- |
| Living Room Selections | | | |
| Option A | Option B | Option C | Option D |
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| $2,243 | $1,943 | $2,912 | $2,148 |
| Option E | Option F | Option G | Option H |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\4LL9VQ7I\MC900058059[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\4LL9VQ7I\MC900058065[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F5WBREEB\MC900230309[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F5WBREEB\MC900089970[1].wmf |
| $3,115 | $3,842 | $1,499 | $2,599 |

Wake Home Store

*…where we have ALL your home needs!*

Table Bundles (includes table and 6 chairs)

|  |  |  |  |
| --- | --- | --- | --- |
| Dining Room & Kitchen Selections | | | |
| Option A | Option B | Option C | Option D |
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| $999 | $765 | $1,122 | $1,521 |
| Option E | Option F | Option G | Option H |
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| $1,675 | $1,923 | $1,729 | $1,509 |

Outdoor Bundle (includes table, umbrella & 2 chairs)

|  |  |  |  |
| --- | --- | --- | --- |
| Patio Sets | | | |
| Option A | Option B | Option C | Option D |
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| $929 | $965 | $1,122 | $1,637 |
| Option E | Option F | Option G | Option H |
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| $1,275 | $1,196 | $1,591 | $909 |

Wake Home Store

*…where we have ALL your home needs!*

Floor Coverings (includes rug & rug pad)

|  |  |  |  |
| --- | --- | --- | --- |
| Rugs | | | |
| Option A | Option B | Option C | Option D |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F31ZHCFO\MC900287192[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900273180[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\4LL9VQ7I\MC900022299[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900013386[1].wmf |
| $999 | $825 | $1,199 | $1,237 |
| Option E | Option F | Option G | Option H |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F31ZHCFO\MC900022300[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8ZTC86Q3\MC900022301[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSCG5BCA\MC900350513[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\SCTUMN0C\MC900351174[1].wmf |
| $1,245 | $1,496 | $1,391 | $949 |

Wall Decoration Bundles (includes 4 pieces of artwork)

|  |  |  |  |
| --- | --- | --- | --- |
| Assorted Wall Décor | | | |
| Option A | Option B | Option C | Option D |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8ZTC86Q3\MC900437592[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\UMZ5VU04\MC900442118[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8ZTC86Q3\MC900433199[1].jpg | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\SCTUMN0C\MC900437597[1].png |
| $453 | $1,095 | $1,011 | $633 |
| Option E | Option F | Option G | Option H |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSCG5BCA\MC900441607[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900438387[1].jpg | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900442121[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\UMZ5VU04\MC900440174[1].png |
| $1,666 | $726 | $583 | $950 |

Wake Home Store

*…where we have ALL your home needs!*

Technology

|  |  |  |  |
| --- | --- | --- | --- |
| Living Room Entertainment System | | | |
| Option A | Option B | Option C | Option D |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\4LL9VQ7I\MC900432517[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8ZTC86Q3\MC900237957[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSCG5BCA\MC900439006[1].jpg | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900319266[1].wmf |
| $1,463 | $977 | $1,211 | $733 |
| Home Security System | | | |
| Option A | Option B | Option C | Option D |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\ZSCG5BCA\MP900405428[1].jpg | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900389364[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\UMZ5VU04\MC900441317[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\J00X1Z7U\MC900431570[1].png |
| $1,326 | $696 | $1,473 | $911 |
| Computer Packages | | | |
| Option A | Option B | Option C | Option D |
| C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8ZTC86Q3\MC900432646[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\4LL9VQ7I\MC900434800[1].png | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F5WBREEB\MC900019332[1].wmf | C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\8ZTC86Q3\MC900441328[1].png |
| $1,898 | $822 | $1,441 | $1,299 |

The Shopping Excursion

Using the *Wake Home Store* Advertisement create a shopping list for each member of the Hernandez Family. Be sure to include every item from the list. Fill in the chart below to organize the family’s purchases for the home. Be sure to stay within each family member’s given budget!

|  |  |  |  |
| --- | --- | --- | --- |
| Mr. Hernandez | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Total Price | |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Mrs. Hernandez | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F31ZHCFO\MC900410743[1].wmfThe Shopping Excursion

|  |  |  |  |
| --- | --- | --- | --- |
| Maria | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Total Price | |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Jose | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Total Price | |  |  |

Follow-Up Question:

Mr. Hernandez went to pay for his merchandise. He carefully had rounded all the prices of the furniture, but when he got to the counter to pay, he had underestimated the cost of the bill. He was short money! How could this be? Explain your thinking and give examples from above.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Shopping Excursion

Answer Key

|  |  |  |  |
| --- | --- | --- | --- |
| Family Member | Items to be Purchased | Budget for All Items | How will you round each of the prices? |
| Mr. Hernandez | 3 bedroom sets, 1 living room set, 1 kitchen table with chairs, 1 dining room table with chairs, & 1 patio set | $20,000 | Round to the nearest hundred |
| Mrs. Hernandez | 3 bedroom rugs, 1 rug for the living room, 1 rug for the dining room, & an indoor/outdoor rug for the patio | $15,000 | Round to the nearest ten |
| Maria | 3 bedroom decoration bundles, one living room decoration bundle, & a dining room decoration bundle | $10,000 | Round to the nearest hundred |
| Jose | 1 living room entertainment system, one home security system, & one computer package | $25,00 | Round to the nearest ten |

|  |  |  |  |
| --- | --- | --- | --- |
| Mr. Hernandez | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
| 1st Bedroom Set | B | $4,943 | $4,900 |
| 2nd Bedroom Set | C | $2,409 | $2,400 |
| 3rd Bedroom Set | E | $3,444 | $3,400 |
| Living Room Set | F | $3,842 | $3,800 |
| Kitchen Table Set | A | $999 | $1,000 |
| Dining Room Set | G | $1,729 | $1,700 |
| Patio Set | A | $929 | $900 |
| Total Price | | $18,295 | $18,100 |

|  |  |  |  |
| --- | --- | --- | --- |
| Mrs. Hernandez | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
| 1st Bedroom Rug | A | $999 | $1,000 |
| 2nd Bedroom Rug | B | $825 | $830 |
| 3rd Bedroom Rug | H | $949 | $950 |
| Living Room Rug | E | $1,245 | $1,250 |
| Dining Room Rug | C | $1,199 | $1,200 |
| Indoor/ Outdoor Rug | D | $1,237 | $1,240 |
| Total Price | | $6,454 | $6,470 |

C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\F31ZHCFO\MC900410743[1].wmfThe Shopping Excursion

|  |  |  |  |
| --- | --- | --- | --- |
| Maria | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
| 1st Bedroom Decoration Bundle | A | $453 | $500 |
| 2nd Bedroom Decoration Bundle | D | $633 | $600 |
| 3rd Bedroom Decoration Bundle | H | $950 | $1,000 |
| Living Room Decoration Bundle | F | $726 | $700 |
| Dining Room Decoration Bundle | E | $1,666 | $1,700 |
| Total Price | | $4,428 | $4,500 |

|  |  |  |  |
| --- | --- | --- | --- |
| Jose | | | |
| Item | Option Choice | Actual Price | Price After Rounding |
| Living Room Entertainment System | A | $1,463 | $1,460 |
| Home Security System | D | $911 | $910 |
| Computer Package | C | $1,441 | $1,440 |
| Total Price | | $3,815 | $3,810 |

Follow-Up Question:

Answers will vary….While rounding helps estimate the approximate cost of items, it is not exact. Sometimes you estimate more than the total cost, but sometimes it is less than the total cost. For example if you round the cost of Living Room Bundle F ($ 3,842) to the nearest hundred you round down to $3,800. So, Mr. Hernandez would be short $42. While if you round the cost of Living Room Bundle G to the nearest hundred ($1,499), you would round up to $1,500. In this case Mr. Hernandez would have had a surplus of $1.

|  |  |
| --- | --- |
| **Whole Number Place Value and Adding and Subtracting Whole Numbers** | |
| **Enrichment Investigation #3** | |
| Common Core State Standard(s):  4.NBT.1  4.NBT.2  4.NBT.4 | Standard(s) for Mathematical Practice:   1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others   6. Attend to precision  7. Look for and make use of structure  8. Look for and express regularity in  repeated reasoning |
| Materials Needed:   * Blackline Masters:   + *Before, After and In-Between*   + *Equivalent Values*   + *Comparing Numbers* | |
| Instructions:   1. Copy the above handouts for each student. Students can complete alone or working with a partner. These activities yield themselves to collaboration and discussion using higher-level place value understanding. Students are encouraged to work through the activities together, challenging each other and constructively engaging in math discussion. 2. Each activity challenges students to create a unique problem like the ones they just completed. Students are required to not only create a problem, but they must give an answer key with a detailed explanation of how someone might approach solving this problem. | |
| Sources:   * Adapted from activities on <http://braingenie.com/> | |

**Before, After, and In-Between**

* Part One: Analyze each statement carefully and fill in the missing numbers. Show your thinking! ☺ Use the example below as a model.

Example: 213 thousands and 768 ones is just before \_\_\_\_ hundreds and \_\_\_\_ ones.

One Approach….213,000 + 768 = 213,768 is just before 213,769 or 2,137 hundreds and 69 ones .

1. 459 hundreds comes just after \_\_\_\_ hundreds and \_\_\_\_\_ ones.
2. The number in-between 946, 329 and 946 thousands 331 ones is \_\_\_\_\_\_\_\_\_\_\_\_.
3. 37 ten thousands and 497 ones is just before \_\_\_\_\_ hundreds and \_\_\_\_ ones.
4. 100 thousands is just after \_\_\_\_ thousands, \_\_\_\_hundreds, \_\_\_\_tens and \_\_\_\_ ones.
5. The number just before 962 hundreds, 70 tens, and 3 ones is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. The number just after 9,872 tens and 47 ones is \_\_\_\_ hundreds and \_\_\_\_\_ ones.
7. 946 thousands, 37 hundreds, 12 tens, and 8 ones is just before \_\_\_\_hundreds and \_\_\_\_ ones.

Challenge

1. Now it’s your turn…create your own before, after, or in between problem! Using the examples above as a model, create an original problem. Be sure to include an answer key with a detailed explanation of how someone might approach this problem. ☺

**Equivalent Values**

* Part Two: Using your knowledge of place value, analyze and evaluate each expression. Examine each blank carefully! Use the example below to guide you.

Example: one million = \_\_\_ hundred thousands = \_\_\_ten thousands =\_\_\_thousands = \_\_\_\_ hundreds =\_\_\_\_ tens=\_\_\_\_\_ones

Answer: one million = 10 hundred thousands = 100 ten thousands = 1,000 thousands = 10,000 hundreds = 100,000 tens= 1,000,000 ones

1. nine hundred thousands = \_\_\_\_\_\_\_\_ hundreds = \_\_\_\_\_\_\_\_ tens = \_\_\_\_\_\_\_\_\_ ones
2. \_\_\_\_\_\_\_ hundreds = 200 thousands = \_\_\_\_\_\_\_ ten thousands = \_\_\_\_\_\_\_\_ hundred thousands
3. 7 hundred thousands = \_\_\_\_ thousands = \_\_\_\_\_\_\_\_\_\_hundreds = \_\_\_\_\_\_\_ones
4. 8 ten thousands = \_\_\_\_\_\_ hundreds = \_\_\_\_\_\_\_\_tens = \_\_\_\_\_\_\_\_\_\_ones
5. 94 thousands = \_\_\_\_\_ ten thousands and \_\_\_\_\_ tens = \_\_\_\_\_\_ ones
6. 4 ten thousands = \_\_\_\_\_\_ thousands = \_\_\_\_\_\_\_ hundreds = \_\_\_\_\_\_\_\_\_\_ tens
7. 995 thousands = \_\_\_\_\_\_ ten thousands and \_\_\_\_\_\_ hundreds
8. 643 thousands = \_\_\_\_\_\_\_\_\_ ten thousands and \_\_\_\_\_\_\_\_ thousands
9. Now it’s your turn…create your own equivalent value problem! Using the examples above as a model, create an original problem. Be sure to include an answer key with a detailed step-by-step explanation of how someone might approach solving this problem. ☺

**Comparing Numbers**

* Part Three: Analyze and evaluate each statement. Insert the appropriate sign (<, > or =) to make the statements true. Show your thinking in the space below the chart to defend your answers. An example has been done for you below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 52 thousands, 64 ones | **<** | 52 thousands, 164 ones | **>** | 52 thousands, 63 ones |
| **52,000 + 64 = 52, 064** | **52,000 + 164 = 52, 164** | **52,000 + 63 = 52, 063** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 19 thousands, 1 hundred, 1 ones |  | 19 thousands, 101 ones |  | 19 thousands, 90 tens, 11 ones |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 99 ten thousands, 4 tens, 9 ones |  | 90 ten thousands, 40 tens, 9 ones |  | 9 ten thousands, 400 tens, 9 ones |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 999 thousands, 999 ones |  | 9 hundred thousands, 9 ten thousands, 99 hundreds |  | 9 hundred thousands, 9 ten thousands, 99 tens |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 67 hundreds, 43 tens, 2 ones |  | 67 hundreds, 43 ones, 43 tens |  | 67 hundreds, 2 tens, 43 ones |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 50 ten thousands, 5 thousands, 5 hundreds, 5 ones |  | 50 ten thousands, 50 thousands, 5 ones |  | 50 ten thousands, 50 hundreds, 5 ones |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 313 thousands, 15 hundreds, 12 ones |  | 313 thousands, 150 tens, 12 ones |  | 312 thousands, 150 hundreds, 12 ones |
|  |  |  |

Now it’s your turn…create your own equivalent value problem! Using the examples above as a model, create an original problem. Be sure to include an answer key with a detailed step-by-step explanation of how someone might approach solving this problem. ☺

**Before, After, and In-Between**

**Answer Key**

* Part One: Analyze each statement carefully and fill in the missing numbers. Show your thinking! ☺ Use the example below as a model.

Example: 213 thousands and 768 ones is just before \_\_\_\_ hundreds and \_\_\_\_ ones.

One Approach….213,000 + 768 = 213,768 is just before 213,769 or 2,137 hundreds and 69 ones .

1. 459 hundreds comes just after 458 hundreds and 99 ones.
2. The number in-between 946, 329 and 946 thousands 331 ones is 946,330.
3. 37 ten thousands and 497 ones is just before 3,704 hundreds and 97 ones.
4. 100 thousands is just after 99 thousands, 9 hundreds, 9 tens and 9 ones.
5. The number just before 962 hundreds, 70 tens, and 3 ones is 96,902.
6. The number just after 9,872 tens and 47 ones is 987 hundreds and 68 ones.
7. 946 thousands, 37 hundreds, 12 tens, and 8 ones is just before 9,498 hundreds and 29 ones.

Challenge

1. Now it’s your turn…create your own before, after, or in between problem! Using the examples above as a model, create an original problem. Be sure to include an answer key with a detailed explanation of how someone might approach this problem. ☺

Answers will vary. Check problem for accuracy and that the explanation is ground in mathematical thinking.

**Equivalent Values**

* Part Two: Using your knowledge of place value, analyze and evaluate each expression. Examine each blank carefully! Use the example below to guide you.

Example: one million = \_\_\_ hundred thousands = \_\_\_ten thousands =\_\_\_thousands = \_\_\_\_ hundreds =\_\_\_\_ tens=\_\_\_\_\_ones

Answer: one million = 10 hundred thousands = 100 ten thousands = 1,000 thousands = 10,000 hundreds = 100,000 tens= 1,000,000 ones

1. nine hundred thousands = 9,000 hundreds = 90,000 tens =900,000 ones
2. 2,000 hundreds = 200 thousands = 20 ten thousands = 2 hundred thousands
3. 7 hundred thousands = 700 thousands = 7,000 hundreds = 700,000 ones
4. 8 ten thousands = 800 hundreds = 8,000 tens = 80,000 ones
5. 94 thousands = 9 ten thousands and 400 tens = 94,000 ones
6. 4 ten thousands = 40 thousands = 400 hundreds = 4,000 tens
7. 995 thousands = 99 ten thousands and 50 hundreds There is more than one answer for this problem. Check to ensure that the total equals 995,000.
8. 643 thousands = 64 ten thousands and 3 thousands
9. Now it’s your turn…create your own equivalent value problem! Using the examples above as a model, create an original problem. Be sure to include an answer key. ☺ Answers will vary. Check for accuracy and that the problem includes an answer key.

**Comparing Numbers**

* Part Three: Analyze and evaluate each statement. Insert the appropriate sign (<, > or =) to make the statements true. Show your thinking in the space below the chart to defend your answers. An example has been done for you below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 52 thousands, 64 ones | **<** | 52 thousands, 164 ones | **>** | 52 thousands, 63 ones |
| **52,000 + 64 = 52, 064** | **52,000 + 164 = 52, 164** | **52,000 + 63 = 52, 063** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 19 thousands, 1 hundred, 1 ones | **=** | 19 thousands, 101 ones | **<** | 19 thousands, 90 tens, 11 ones |
| **19,101** | **19,101** | **19,911** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 99 ten thousands, 4 tens, 9 ones | **>** | 90 ten thousands, 40 tens, 9 ones | **>** | 9 ten thousands, 400 tens, 9 ones |
| **990,049** | **900,409** | **94,009** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 999 thousands, 999 ones | **>** | 9 hundred thousands, 9 ten thousands, 99 hundreds | **>** | 9 hundred thousands, 9 ten thousands, 99 tens |
| **999,999** | **999,900** | **990,990** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 67 hundreds, 43 tens, 2 ones | **<** | 67 hundreds, 43 ones, 43 tens | **>** | 67 hundreds, 2 tens, 43 ones |
| **7,132** | **7,173** | **6,763** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 50 ten thousands, 5 thousands, 5 hundreds, 5 ones | **<** | 50 ten thousands, 50 thousands, 5 ones | **>** | 50 ten thousands, 50 hundreds, 5 ones |
| **505,505** | **550,005** | **505,005** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 313 thousands, 15 hundreds, 12 ones | **=** | 313 thousands, 150 tens, 12 ones | **<** | 312 thousands, 150 hundreds, 12 ones |
| **314,512** | **314,512** | **327,012** |

Now it’s your turn…create your own equivalent value problem! Using the examples above as a model, create an original problem. Be sure to include an answer key with a detailed step-by-step explanation of how someone might approach solving this problem. ☺ **Answers will vary. Check for accuracy in the answer key as well as a detailed explanation to support the answer.**

|  |  |
| --- | --- |
| **Whole Number Place Value and Adding and Subtracting Whole Numbers** | |
| **Enrichment Investigation #4** | |
| Common Core State Standard(s):  4.OA.3  4.OA.5  4.NBT.2  4.NBT.4 | Standard(s) for Mathematical Practice:   1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others   6. Attend to precision  7. Look for and make use of structure  8. Look for and express regularity in  repeated reasoning |
| Materials Needed:   * Blackline Masters:   + *Earning and Spending a Million* | |
| Instructions:   1. Students read through the above handout. Students must first complete a pattern to find out how much a person makes during his 20 month contract. Each month he gets paid double what he made the month before. 2. Next, students will have to evaluate different forms of numbers (standard, written, and expanded form) and calculate the cost of starting a business. 3. Students complete the follow-up questions on a separate sheet of paper. | |
| Sources: | |

**Earning and Spending a Million**

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When Antoine graduated from college with a Masters degree in finance, he went to work for an International Bank located in Research Triangle Park. Antoine was quite intelligent and negotiated his salary so that one day he could invest in his own business. He always was thinking ahead so he came up with a way to “trick” his employers. He told them that all they had to pay him was $1 the first month he worked for them, but after that, they would have to double his salary each month. The bank quickly agreed to these terms and Antoine was excited. Due to budget constraints, the bank could only offer Antoine a twenty month contract. He decides to save all the money he makes at the bank so he can pursue business adventures after his contract is over.

Complete the following chart to determine how much Antoine will make each month, and evaluate his cumulative money earned after each month.

|  |  |  |
| --- | --- | --- |
| **Month** | **Salary for the Month** | **Cumulative Total** |
| 1 | $1 | $1 |
| 2 | $2 | $3 |
| 3 | $4 | $7 |
|  |  |  |
|  |  |  |
|  |  |  |
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|  |  |  |

Antoine has a big plan. Once his two-year contract is over, he plans on purchasing his own business. Below are the expenses for his business. Help him calculate how much will be left in his bank account after he purchases the items needed to get his business running.

|  |  |  |  |
| --- | --- | --- | --- |
| **Business Expenses** | **Cost** | **Actual Cost in $** | **Money Left in Antoine’s Account** |
| **Starting Balance (Cumulative total after 2 years)** | | |  |
| Purchasing a Franchise | One hundred ninety-nine thousand, ninety-nine dollars |  |  |
| License Fees | Four thousand, six dollars |  |  |
| Initial Advertising for the Business | Eleven thousand, seven hundred, twelve dollars |  |  |
| Purchasing the Building for the Business | Ninety-one thousand, thirty-seven dollars |  |  |
| Initial Product to Sell | Eighty-four thousand, two hundred five dollars |  |  |
| Decorations for the Business | Nine thousand, nine dollars |  |  |
| Salaries for each employee for the first year | Two hundred sixty-one thousand, eighty-hundred forty-seven dollars |  |  |

Finally, Antoine can open his business… All his hard work has paid off! ☺

Answer the following questions on a separate sheet of paper.

1. Do you think Antoine negotiated a good deal? Should he have asked for more money? Defend your thinking with mathematical reasoning.
2. How much more will Antoine make in his second half of his employment at the International Bank than his first half of employment?
3. With the remaining money in his account, Antoine wants to buy a house and new car. If Antoine wants to leave $150,000 in his account, how much money does he have to purchase these items?

**Earning and Spending a Million Answer Key**

|  |  |  |
| --- | --- | --- |
| **Month** | **Salary for the Month** | **Cumulative Total** |
| 1 | $1 | $1 |
| 2 | $2 | $3 |
| 3 | $4 | $7 |
| **4** | **$8** | **$15** |
| **5** | **$16** | **$31** |
| **6** | **$32** | **$63** |
| **7** | **$64** | **$127** |
| **8** | **$128** | **$255** |
| **9** | **$256** | **$511** |
| **10** | **$512** | **$1,023** |
| **11** | **$1,024** | **$2,047** |
| **12** | **$2,048** | **$4,095** |
| **13** | **$4,096** | **$8,191** |
| **14** | **$8,192** | **$16,383** |
| **15** | **$16,384** | **$32,767** |
| **16** | **$32,768** | **$65,535** |
| **17** | **$65,536** | **$131,071** |
| **18** | **$131,072** | **$262,143** |
| **19** | **$262,144** | **$524,287** |
| **20** | **$524,288** | **$1,048,575** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Business Expenses** | **Cost** | **Actual Cost in $** | **Money Left in Antoine’s Account** |
| **Starting Balance (Cumulative total after 2 years)** | | | **$1,048,575** |
| Purchasing a Franchise | One hundred ninety-nine thousand, ninety-nine dollars | **$199,099** | **$849, 476** |
| License Fees | Four thousand, six dollars | **$4,006** | **$845, 470** |
| Initial Advertising for the Business | Eleven thousand, seven hundred, twelve dollars | **$11,712** | **$833,758** |
| Purchasing the Building for the Business | Ninety-one thousand, thirty-seven dollars | **$91,037** | **$742,721** |
| Initial Product to Sell | Eighty-four thousand, two hundred five dollars | **$84,205** | **$658,516** |
| Decorations for the Business | Nine thousand, nine dollars | **$9,009** | **$649,507** |
| Salaries for each employee for the first year | Two hundred sixty-one thousand, eighty-hundred forty-seven dollars | **$261, 847** | **$387,660** |

**Answers will vary for open-ended questions. He will have $237,660 to buy a house and a car.**

|  |  |
| --- | --- |
| **Whole Number Place Value and Adding and Subtracting Whole Numbers** | |
| **Enrichment Investigation #5** | |
| Common Core State Standard(s):  4.NBT.2 | Standard(s) for Mathematical Practice:   1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics   6. Attend to precision  7. Look for and make use of structure |
| Materials Needed:   * Blackline Masters:   + *Place Value Number Riddles*   + *Secure Passwords* | |
| Instructions:   1. Copy the above handouts for each student. Students can complete alone or working with a partner. These activities yield themselves to collaboration and discussion using higher-level place value understanding. Students are encouraged to work through the activities together, challenging each other and constructively engaging in math discussion. 2. Each activity challenges students to create a unique problem like the ones they just completed. Students are required to not only create a problem, but they must give an answer key with a detailed explanation of how someone might approach solving this problem. | |
| Sources:   * Ideas adapted from <http://braingenie.com/> | |

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\SCTUMN0C\MC900055589[1].wmfPlace Value Number Riddles**

**Part One: Mystery Numbers**

* Use the clues to figure out the mystery numbers.

I am a five-digit number. The sum of my digits is twenty-seven. My first digit is three times my second digit. My last digit is double my second digit. My third digit is one more than my second digit, and my fourth digit is four less than my first digit. What number am I?

I am a six-digit number. All my digits are the same, except my last digit. If you add two more ones to my number, it will make the smallest seven digit number. What number am I?

I am a five-digit number. The sum of my digits is 2 tens + 5 ones. My first digit is three more than my second digit. My third digit is three times my second digit. My fourth digit is twice my second digit, and my last digit is four times my second digit. What number am I?

I am a six-digit number. The sum of my digits is the product of 7 and 3. My first digit is the smallest, and my last digit is the largest. My second digit is 1/3 the value of my last digit, while my third digit is half the value of my last digit. My fifth digit is one more than my fourth digit. What number am I?

I am a six-digit number. Three of my digits are even, while the rest of them are odd. None of my digits are the same. My first digit is double my fifth digit. My second digit is double my third digit. My final digit is three more than my fifth digit. My fourth digit is one less than my second digit. The sum of my digits is the product of 3 and 11. What number am I?

Now it’s your turn…create your own number riddle! Using the examples above as a model, create your own mystery number riddle. Be sure to include an answer key with a detailed explanation of how someone might approach this problem. Be careful that your riddle only has one answer! ☺

**Part Two: Secure Passwords**

* Examine each clue carefully to find the mystery numbers. Prove and defend your thinking/reasoning on a separate sheet of paper.

1. Ben needs your help unlocking his safe! The digits of his safe are: *a, b, c, d, e,* and *f.* All the digits in the code are different. Use the clues to figure out the secret code.

\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

*a b c d e f*

Clues:

1. *c* is the only odd digit
2. *a* – *d = b*
3. *f* – *a = b*
4. *3 x b = a*
5. *b x d = f*
6. *2 x d = f*

What is the code to Ben’s safe? \_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

What strategies did you use to figure it out and how do you know you found the correct code?

1. Emma has money invested in the Stock Market but is having trouble remembering her online password to access her account. She needs your detective and math skills to unlock the mystery! Her password is a six-digit number in which the digits are: *a, b, c, d, e,* and *f.* Digits *a* and *b* are the only even digits. She wrote down the following clues in her journal to keep track of the password.

\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

*a b c d e f*

C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\UMZ5VU04\MC900237166[1].wmfClues:

1. *a* - *b = 2*
2. *a* – c = *e*
3. *b* + *c = e*
4. *c* and *f* are the same
5. *d – c = a*

Unfortunately, with these clues, there are two possible answers. What are the two possible answers?

\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_ or \_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

What is one additional clue Emma could add so that there is only one possible code? (Choose either answer from above and write an additional clue that satisfies the existing clues but narrows the code down to only one answer.)

**Place Value Number Riddles**

**C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\SCTUMN0C\MC900055589[1].wmfAnswer Key**

**Part One: Mystery Numbers**

* Use the clues to figure out the mystery numbers.

I am a five-digit number. The sum of my digits is twenty-seven. My first digit is three times my second digit. My last digit is double my second digit. My third digit is one more than my second digit, and my fourth digit is four less than my first digit. What number am I? **93,456**

I am a six-digit number. All my digits are the same, except my last digit. If you add two more ones to my number, it will make the smallest seven digit number. What number am I? **999,998**

I am a five-digit number. The sum of my digits is 2 tens + 5 ones. My first digit is three more than my second digit. My third digit is three times my second digit. My fourth digit is twice my second digit, and my last digit is four times my second digit. What number am I? **52,648**

I am a six-digit number. The sum of my digits is the product of 7 and 3. My first digit is the smallest, and my last digit is the largest. My second digit is 1/3 the value of my last digit, while my third digit is half the value of my last digit. My fifth digit is one more than my fourth digit. What number am I?

**123,456**

I am a six-digit number. Three of my digits are even, while the rest of them are odd. None of my digits are the same. My first digit is double my fifth digit. My second digit is double my third digit. My final digit is three more than my fifth digit. My fourth digit is one less than my second digit. The sum of my digits is the product of 3 and 11. What number am I? **863,547**

Now it’s your turn…create your own number riddle! Using the examples above as a model, create your own mystery number riddle. Be sure to include an answer key with a detailed explanation of how someone might approach this problem. Be careful that your riddle only has one answer! ☺ **Answers will vary. Check for accuracy and detailed explanation.**

**Part Two: Secure Passwords Answer Key**

* Examine each clue carefully to find the mystery numbers. Prove and defend your thinking/reasoning on a separate sheet of paper.

1. Ben needs your help unlocking his safe! The digits of his safe are: *a, b, c, d, e,* and *f.* All the digits in the code are different. Use the clues to figure out the secret code.

\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

*a b c d e f*

Clues:

1. C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\4LL9VQ7I\MC900238007[1].wmf *c* is the only odd digit
2. *a* – *d = b*
3. *f* – *a = b*
4. *3 x b = a*
5. *b x d = f*
6. *2 x d = f*

What is the code to Ben’s safe? **6-2-7-4-0-8**

What strategies did you use to figure it out and how do you know you found the correct code?

1. Emma has money invested in the Stock Market but is having trouble remembering her online password to access her account. She needs your detective and math skills to unlock the mystery! Her password is a six-digit number in which the digits are: *a, b, c, d, e,* and *f.* Digits *a* and *b* are the only even digits. She wrote down the following clues in her journal to keep track of the password.

\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

*a b c d e f*

C:\Documents and Settings\Administrator\Local Settings\Temporary Internet Files\Content.IE5\UMZ5VU04\MC900237166[1].wmfClues:

1. *a* - *b = 2*
2. *a* – c = *e*
3. *b* + *c = e*
4. *c* and *f* are the same
5. *d – c = a*

Unfortunately, with these clues, there are two possible answers. What are the two possible answers?

**8-6-1-9-7-1**  or **4-2-1-5-3-1**

What is one additional clue Emma could add so that there is only one possible code? (Choose either answer from above and write an additional clue that satisfies the existing clues but narrows the code down to only one answer.) **Answers will vary. Check to ensure that the clue rules out one of the answer choices.**