OPERATIONS ON DECIMAL NUMBERS

A COLUMN ADDITION AND SUBTRACTION

Method Column addition and subtraction

1. Line up the decimal points vertically. Fill in any zeros where necessary.
2. Add or subtract the numbers as if they were whole numbers.
3. Place the decimal point in the sum or difference so that it lines up vertically with the numbers being added or subtracted.

Ex: Calculate $3.83 + 2.7$.

Answer:

- Line up the decimal points vertically and fill in zeros where necessary:

$$\begin{array}{r} 3.8\ 3 \\ +\ 2.7\ 0 \\ \hline \end{array}$$

- Add the hundredths digits: $3 + 0 = 3$

$$\begin{array}{r} 3{,}8\ 3 \\ +\ 2{,}7\ 0 \\ \hline 3 \end{array}$$

- Add the tenths digits: $8 + 7 = {}^{1}5$, carry ^{1}

$$\begin{array}{r} {\scriptstyle 1} \\ 3{,}8\ 3 \\ +\ 2{,}7\ 0 \\ \hline 5\ 3 \end{array}$$

- Add the ones digits: $1(\text{carry}) + 3 + 2 = 6$

$$\begin{array}{r} {\scriptstyle 1} \\ 3{,}8\ 3 \\ +\ 2{,}7\ 0 \\ \hline 6{,}5\ 3 \end{array}$$

- So, $3.83 + 2.7 = 6.53$

Ex: Calculate $3.8 - 2.9$.

Answer:

- Line up the decimal points vertically and fill in any zeros where necessary:

$$\begin{array}{r} 3.8 \\ -\ 2.9 \\ \hline \end{array}$$

- Subtract the tenths digits: ${}^{1}8 - 9 = 9$, with ^{1} borrowed.

$$\begin{array}{r} 3.{\scriptstyle 1}8 \\ -\ 2.9 \\ \hline .9 \end{array}$$

- Subtract the ones digits: $3 - 1 \text{ (borrow)} - 2 = 0$

$$\begin{array}{r} 3.8 \\ -\,2.9 \\ \hline 0.9 \end{array}$$

- So, $3.8 - 2.9 = 0.9$

B COLUMN MULTIPLICATION

Method Column multiplication

1. Multiply the decimals as if the decimals were whole numbers.
2. The number of decimal places in the product is the sum of the number of decimal places in each factor.

Ex: Calculate 3.48×2.9.

Answer:

- Set up the column multiplication:

$$\begin{array}{r} 3.4\,8 \\ \times \quad 2.9 \\ \hline \\ \hline \end{array}$$

- Multiply the bottom tenth digit: $348 \times 9 = 3132$

$$\begin{array}{r} 3.4\,8 \\ \times \quad 2.9 \\ \hline 3\,1\,3\,2 \\ \hline \end{array}$$

- Multiply the bottom one digit: $348 \times 2 = 696$.

$$\begin{array}{r} 3.4\,8 \\ \times \quad 2.9 \\ \hline 3\,1\,3\,2 \\ 6\,9\,6 \\ \hline \end{array}$$

- Add the results: $3132 + 6960 = 10092$

$$\begin{array}{rl} 3.4\,8 & \leftarrow 2 \text{ decimal places} \\ \times \quad 2.9 & \leftarrow 1 \text{ decimal place} \\ \hline 3\,1\,3\,2 & \\ 6\,9\,6 & \\ \hline 1\,0.0\,9\,2 & \leftarrow 3 = 2 + 1 \text{ decimal places} \end{array}$$

- So, $3.48 \times 2.9 = 10.092$ with 3 decimal places.

C LONG DIVISION

Method Long Division by a Whole Number

When the divisor is a whole number, follow these steps:

1. Place the Decimal Point: Align the decimal point in the quotient directly above the decimal point in the

dividend.

2. Divide as Whole Numbers: Perform the division as if both the dividend and divisor are whole numbers.
3. Bring Down Digits: Starting from the left of the dividend, bring down digits one at a time to continue the division process.
4. Handle Decimal Places: When you reach the decimal point in the dividend, place the decimal point in the quotient and continue dividing by bringing down the digits after the decimal point (tenths, hundredths, etc.).

Ex: Calculate $34.4 \div 4$.

Answer:

- **Set up the long division**:

$$4\overline{)34.4}$$

- **Place the decimal point**: Align the decimal point in the quotient directly above the decimal point in the dividend. Check how many times 4 fits into 34:
  - $8 \times 4 = 32 \leq 34$
  - $9 \times 4 = 36 > 34$

  So, 4 fits into 34 **8 times**.

$$\begin{array}{r} 8. \\ 4\overline{)34.4} \\ \underline{32} \\ 2 \end{array}$$

- **Continue the division**:
  - Subtract 32 from 34 to get a remainder of 2.
  - Bring down the next digit (4) to make 24.
  - Check how many times 4 fits into 24: $6 \times 4 = 24$
  - So, 4 fits into 24 **6 times**.

$$\begin{array}{r} 8.6 \\ 4\overline{)34.4} \\ \underline{32} \\ 2.4 \\ \underline{2.4} \\ 0 \end{array}$$

- **Final result**:
  - The remainder is 0, so the division is complete.
  - Therefore, $34.4 \div 4 = 8.6$.