OPERATIONS WITH DECIMAL NUMBERS

A COLUMN ADDITION AND SUBTRACTION

A.1 ADDING DECIMAL NUMBERS

Ex 1:

$$\begin{array}{r} 9.7 \\ +\ \ 0.5 \\ \hline \boxed{10.2} \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 9.7 \\ +\ \ 0.5 \\ \hline 1\ 0.2 \end{array}$$

Answer:

Ex 2:

$$\begin{array}{r} 2.4\ 6 \\ +\ 2.7 \\ \hline \boxed{5.16} \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 2.4\ 6 \\ +\ 2.7\ 0 \\ \hline 5.1\ 6 \end{array}$$

Answer:

Ex 3:

$$\begin{array}{r} 2\ 3.8\ 3 \\ +\ \ \ 2.7 \\ \hline \boxed{26.53} \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 2\ 3.8\ 3 \\ +\ 0\ 2.7\ 0 \\ \hline 2\ 6.5\ 3 \end{array}$$

Answer:

Ex 4: Calculate $2.46 + 2.7 =$ $\boxed{5.16}$

Answer:

$$\begin{array}{r} {\scriptstyle 1} \\ 2.4\ 6 \\ +\ 2.7\ 0 \\ \hline 5.1\ 6 \end{array}$$

- $2.46 + 2.7 = 5.16$

Ex 5: Calculate $290.3 + 120.2 =$ $\boxed{410.5}$

Answer:

$$\begin{array}{r} {\scriptstyle 1} \\ 2\ 9\ 0.3 \\ +\ 1\ 2\ 0.2 \\ \hline 4\ 1\ 0.5 \end{array}$$

- $290.3 + 120.2 = 410.5$

A.2 SUBTRACTING DECIMAL NUMBERS

Ex 6:

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

$$\begin{array}{r} 3\,{}^{1}\!\not{8} \\ -1 2.9 \\ \hline 0.9 \end{array}$$

Answer:

Ex 7:

$$\begin{array}{r} 1\ 0.8 \\ -\ \ 6.6 \\ \hline \boxed{4.2} \end{array}$$

$$\begin{array}{r} 1\,{}^{1}\!\not{0}.8 \\ -{}^{1}\!\not{0}\ 6.6 \\ \hline 0\ 4.2 \end{array}$$

Answer:

Ex 8:

$$\begin{array}{r} 2\ 0\ 0.2 \\ -\ \ \ 9.1 \\ \hline \boxed{191.1} \end{array}$$

$$\begin{array}{r} 2\,{}^{1}\!\not{0}\,{}^{1}\!\not{0}.2 \\ -{}^{1}\!\not{0}\,{}^{1}\!\not{0}\ 9.1 \\ \hline 1\ 9\ 1.1 \end{array}$$

Answer:

Ex 9: Calculate $120 - 20.5 =$ $\boxed{99.5}$

Answer:

$$\begin{array}{r} 1\,{}^{1}\!\not{2}\,{}^{1}\!\not{0}\,{}^{1}\!\not{0} \\ -1\ 1\,{}^{1}\!\not{2}\,{}^{1}\!\not{0}.5 \\ \hline 9\ 9.5 \end{array}$$

- $120 - 20.5 = 99.5$

Ex 10: Calculate $20.5 - 12.35 =$ $\boxed{8.15}$

Answer:

$$\begin{array}{r} 2\,{}^{1}\!\not{0}.5\,{}^{1}\!\not{0} \\ -1 1\ 2\,{}^{1}\!\not{3}\ 5 \\ \hline 8.1\ 5 \end{array}$$

- $20.5 - 12.35 = 8.15$

A.3 SOLVING REAL-WORLD PROBLEMS

Ex 11: If you have 20 dollars in your piggy bank and someone gives you an additional 10.50 dollars, how much do you have now?

Total=$\boxed{30.50}$ dollars

Answer:

- To solve this exercise, add the amount given to the amount you already have. You have 20 dollars and someone gives you 10.50 dollars, so the calculation is:

$$\text{Total} = 20 + 10.50 \text{ dollars}$$

$$\begin{array}{r} 2\ 0 \\ +\ 1\ 0.5 \\ \hline 3\ 0.5 \end{array}$$

-
- Total = 30.50 dollars

Ex 12: If you give a seller 10 dollars and buy an item costing 2.30 dollars, calculate how much money the seller should give you back.

Change returned=$\boxed{7.70}$ dollars

Answer:

- To solve this exercise, you subtract the cost of the item from the amount given to the seller. You give the seller 10 dollars and the item costs 2.30 dollars, so the calculation is:

$$\text{Change returned} = 10 - 2.30 \text{ dollars}$$

$$\begin{array}{r} {}^{1}1{}^{1}0.0 \\ -1\ \ 2.3 \\ \hline 7.7 \end{array}$$

-
- Change returned = 7.70 dollars

Ex 13: If you start with 230.20 dollars and someone gives you an additional 95 dollars, how much do you have now?

Total=$\boxed{325.20}$ dollars

Answer:

- To solve this exercise, add the amount given to the amount you already have. You have 230.20 dollars and someone gives you 95 dollars, so the calculation is:

$$\text{Total} = 230.20 + 95 \text{ dollars}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 2\ 3\ 0.2 \\ +\ \ 9\ 5 \\ \hline 3\ 2\ 5.2 \end{array}$$

-
- Total = 325.20 dollars

Ex 14: If you give a cashier 20 dollars and buy a sandwich that costs 6.45 dollars, calculate how much money the cashier should give you back.

Change returned=$\boxed{13.55}$ dollars

Answer:

- To solve this exercise, you subtract the cost of the sandwich from the amount given to the cashier. You give the cashier 20 dollars and the sandwich costs 6.45 dollars, so the calculation is:

$$\text{Change returned} = 20 - 6.45 \text{ dollars}$$

$$\begin{array}{r} 2\ 0{}^{1}0{}^{1}0 \\ -\ \ 6{}^{1}4\ 5 \\ \hline 1\ 3.5\ 5 \end{array}$$

-
- Change returned = 13.55 dollars

B COLUMN MULTIPLICATION

B.1 MULTIPLYING DECIMAL NUMBERS

Ex 15:

$$\begin{array}{r} 2.4 \\ \times\ 1.5 \\ \hline \\ \hline \boxed{3.6} \end{array}$$

$$\begin{array}{rl} 2.4 & \leftarrow 1 \text{ decimal place} \\ \times\ 1.5 & \leftarrow 1 \text{ decimal place} \\ \hline 1\ 2\ 0 & \\ 2\ 4 & \\ \hline 3.6\ 0 & \leftarrow 2 = 1 + 1 \text{ decimal places} \end{array}$$

Answer:

Ex 16:

$$\begin{array}{r} 4\ 9 \\ \times\ 1.5 \\ \hline \\ \hline \boxed{73.5} \end{array}$$

$$\begin{array}{rl} 4\ 9 & \leftarrow 0 \text{ decimal places} \\ \times\ 1.5 & \leftarrow 1 \text{ decimal place} \\ \hline 2\ 4\ 5 & \\ 4\ 9 & \\ \hline 7\ 3.5 & \leftarrow 1 = 0 + 1 \text{ decimal place} \end{array}$$

Answer:

Ex 17:

$$\begin{array}{r} 1\ 0.2 \\ \times\ \ 2.3 \\ \hline \\ \hline \boxed{23.46} \end{array}$$

$$\begin{array}{rl} 1\ 0.2 & \leftarrow 1 \text{ decimal place} \\ \times\ \ 2.3 & \leftarrow 1 \text{ decimal place} \\ \hline 3\ 0\ 6 & \\ 2\ 0\ 4 & \\ \hline 2\ 3.4\ 6 & \leftarrow 2 = 1 + 1 \text{ decimal places} \end{array}$$

Answer:

Ex 18: Calculate $1.25 \times 0.23 =$ $\boxed{0.2875}$

Answer:

$$\begin{array}{r} 1.2\,5 \\ \times\, 0.2\,3 \\ \hline 3\,7\,5 \\ 2\,5\,0 \\ \hline 0.2\,8\,7\,5 \end{array} \begin{array}{l} \leftarrow \text{2 decimal places} \\ \leftarrow \text{2 decimal places} \\ \\ \\ \leftarrow 4 = 2 + 2 \text{ decimal places} \end{array}$$

- $1.25 \times 0.23 = 0.2875$

Ex 19: Calculate $300 \times 0.99 =$ $\boxed{297}$

Answer:

$$\begin{array}{r} 3\,0\,0 \\ \times\, 0.9\,9 \\ \hline 2\,7\,0\,0 \\ 2\,7\,0\,0 \\ \hline 2\,9\,7.0\,0 \end{array} \begin{array}{l} \leftarrow \text{0 decimal places} \\ \leftarrow \text{2 decimal places} \\ \\ \\ \leftarrow 2 = 0 + 2 \text{ decimal places} \end{array}$$

- So, $300 \times 0.99 = 297$

B.2 SOLVING REAL-WORLD PROBLEMS

Ex 20: If a man's height is 1.6 times that of his daughter, who is 125 cm tall, determine the height of the man.

Man's height= $\boxed{200}$ cm

Answer:

- To solve this exercise, you multiply the daughter's height by 1.6 to find the man's height. The daughter's height is 125 cm, so the calculation is:

$$\text{Man's height} = 1.6 \times 125 \text{ cm}$$

$$\begin{array}{r} 1.6 \\ \times\, 1\,2\,5 \\ \hline 8\,0 \\ 3\,2 \\ 1\,6 \\ \hline 2\,0\,0.0 \end{array}$$

- Man's height = 200 cm

Ex 21: You buy 3 kg of apples. The price per kilogram is \$ 1.5. Find the total cost.

Total cost = $\boxed{4.5}$ dollars

Answer:

- To solve this exercise, multiply the number of kilograms by the price per kilogram:

$$\text{Total cost} = 1.5 \times 3$$

$$\begin{array}{r} 1.5 \\ \times\, 3 \\ \hline 4.5 \end{array}$$

- Therefore, the total cost is \$4.5.

Ex 22: If the price of an item is 1.75 times the price of another item that costs 40 dollars, find the price of the more expensive item.

Price of the more expensive item= $\boxed{70}$ dollars

Answer:

- To solve this exercise, you multiply the price of the cheaper item by 1.75 to find the price of the more expensive item. The cheaper item's price is 40 dollars, so the calculation is:

$$\text{Price of the more expensive item} = 1.75 \times 40 \text{ dollars}$$

$$\begin{array}{r} 1.7\,5 \\ \times\quad 4\,0 \\ \hline 7\,0\,0\,\cdot \\ \hline 7\,0.0\,0 \end{array}$$

- Price of the more expensive item = 70 dollars

Ex 23: You buy 2.5 kg of beef meat. The price per kilogram is 14 dollars. Find the total cost.

Total cost = $\boxed{35}$ dollars

Answer:

- To solve this exercise, multiply the number of kilograms by the price per kilogram:

$$\text{Total cost} = 14 \times 2.5$$

$$\begin{array}{r} 1\,4 \\ \times\, 2.5 \\ \hline 7\,0 \\ 2\,8 \\ \hline 3\,5.0 \end{array}$$

- Therefore, the total cost is 35 dollars.

C LONG DIVISION

C.1 DIVIDING BY WHOLE NUMBERS

$$2\overline{)44.2}$$

Ex 24: Calculate $44.2 \div 2 =$ $\boxed{22.1}$

Answer:

$$\begin{array}{r} 22.1 \\ 2\overline{)44.2} \\ \underline{4} \\ 04 \\ \underline{4} \\ 0.2 \\ \underline{2} \\ 0 \end{array}$$

- $44.2 \div 2 = 22.1$

$$8\overline{)97.6}$$

Ex 25: Calculate $97.6 \div 8 =$ $\boxed{12.2}$

Answer:

$$\begin{array}{r} 12.2 \\ 8\overline{)97.6} \\ \underline{8} \\ 17 \\ \underline{16} \\ 1.6 \\ \underline{1.6} \\ 0 \end{array}$$

-
- $97.6 \div 8 = 12.2$

$$5\overline{)154.5}$$

Ex 26: Calculate $154.5 \div 5 =$ $\boxed{30.9}$

Answer:

$$\begin{array}{r} 30.9 \\ 5\overline{)154.5} \\ \underline{15} \\ 04.5 \\ \underline{4.5} \\ 0 \end{array}$$

-
- $154.5 \div 5 = 30.9$

$$20\overline{)60.2}$$

Ex 27: Calculate $60.2 \div 20 =$ $\boxed{3.01}$

Answer:

$$\begin{array}{r} 3.01 \\ 20\overline{)60.20} \\ \underline{60} \\ 0.20 \\ \underline{20} \\ 0 \end{array}$$

-
- $60.20 \div 20 = 3.01$

$$13\overline{)33.8}$$

Ex 28: Calculate $33.8 \div 13 =$ $\boxed{2.6}$

Answer:

$$\begin{array}{r} 2.6 \\ 13\overline{)33.8} \\ \underline{26} \\ 7.8 \\ \underline{7.8} \\ 0 \end{array}$$

-
- $33.8 \div 13 = 2.6$

C.2 DIVIDING BY DECIMAL NUMBERS

Ex 29: Calculate:

$$44.2 \div 0.2 = \boxed{221}$$

Answer:

- To divide by a decimal, we must first change the problem so the divisor is a whole number. We can do this by multiplying both numbers by 10.

$$44.2 \div 0.2 \xrightarrow{\times 10} 442 \div 2$$

- Now, we perform the long division for $442 \div 2$:

$$\begin{array}{r} 221 \\ 2\overline{)442} \\ \underline{4} \\ 04 \\ \underline{4} \\ 02 \\ \underline{2} \\ 0 \end{array}$$

- The result of the equivalent problem is 221.

Therefore, $44.2 \div 0.2 = 221$.

Ex 30: Calculate:

$$6.75 \div 0.5 = \boxed{13.5}$$

Answer:

- To make the divisor (0.5) a whole number, we need to move the decimal point one place to the right. We must do the same to the dividend (6.75).

$$6.75 \div 0.5 \xrightarrow{\times 10} 67.5 \div 5$$

- Now, we perform the long division for $67.5 \div 5$:

$$\begin{array}{r} 13.5 \\ 5\overline{)67.5} \\ \underline{5} \\ 17 \\ \underline{15} \\ 2.5 \\ \underline{2.5} \\ 0 \end{array}$$

- The result of the equivalent problem is 13.5.

Therefore, $6.75 \div 0.5 = 13.5$.

Ex 31: Calculate:

$$8.19 \div 0.03 = \boxed{273}$$

Answer:

- To make the divisor (0.03) a whole number, we must move the decimal point two places to the right. We must do the same to the dividend (8.19).

$$8.19 \div 0.03 \xrightarrow{\times 100} 819 \div 3$$

- Now, we perform the long division for $819 \div 3$:

$$\begin{array}{r} 273 \\ 3\overline{)819} \\ 6 \\ \hline 21 \\ 21 \\ \hline 09 \\ 9 \\ \hline 0 \end{array}$$

- The result of the equivalent problem is 273.

Therefore, $8.19 \div 0.03 = 273$.

C.3 SOLVING REAL-WORLD PROBLEMS

Ex 32: If you share \$1.00 equally among 4 friends, how much does each friend get?

$$\text{Share per friend} = \boxed{0.25}\ \$$$

Answer:

- To solve this exercise, you divide \$1.00 by 4. The calculation is:

$$\$1.00 \div 4 = \$0.25$$

$$\begin{array}{r} 0.25 \\ 4\overline{)1.00} \\ 8 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$

-
- Each friend receives \$0.25.

Ex 33: The cost of 6 pens is \$38.10. Find the cost of 1 pen.

$$\text{Cost of 1 pen} = \boxed{6.35}\ \$$$

Answer:

- To solve this exercise, you divide the total cost by the number of pens. The total cost is \$38.10 for 6 pens, so the calculation is:

$$\text{Cost of 1 pen} = \$38.10 \div 6$$

$$\begin{array}{r} 6.35 \\ 6\overline{)38.10} \\ 36 \\ \hline 2.1 \\ 1.8 \\ \hline 30 \\ 30 \\ \hline 0 \end{array}$$

-
- The cost of 1 pen is \$6.35.

Ex 34: A container holds 4 liters of juice that is distributed equally among 5 bottles. How many liters does each bottle contain?

$$\text{Juice per bottle} = \boxed{0.80}\ \text{liters}$$

Answer:

- To solve this exercise, you divide 4 liters by 5. The calculation is:

$$4 \text{ liters} \div 5 = 0.80 \text{ liters}$$

$$\begin{array}{r} 0.8 \\ 5\overline{)4.0} \\ 4.0 \\ \hline 0 \end{array}$$

-
- Each bottle contains 0.80 liters of juice.

Ex 35: A cake recipe requires 2.5 cups of flour to make a cake for 4 people. Find the amount of flour needed per person.

$$\text{Flour needed per person} = \boxed{0.625}\ \text{cups}$$

Answer:

- To solve this exercise, you divide the total amount of flour by the number of people. The total amount of flour is 2.5 cups for 4 people, so the calculation is:

$$\text{Flour needed per person} = 2.5 \text{ cups} \div 4$$

$$\begin{array}{r} 0.625 \\ 4\overline{)2.500} \\ 2.4 \\ \hline 10 \\ 8 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$

-
- The amount of flour needed per person is 0.625 cups.