Name: _____

Questions:

Calculate and **show** all work.

1. What is the initial concentration of a 100 mL solution that was used to make a 550 mL of a 25 g/L solution?

$C_1 = X$
$V_1 = 100mL$
$C_2 = 25\ g/L$
$V_2 = 550\ mL$

$C_1V_1 = C_2V_2$

$X\ (100mL) = (25\ g/L)(550mL)$

$X = \frac{25\ g/L \cdot 550mL}{100\ mL}$

$C_1 = 137.5\ g/L$

2. If 200 mL of water is added to a 100 mL solution and the new solution has a concentration of 125g/L, what was the initial concentration?

$C_1 = X\ g/L$
$V_1 = 100\ mL$
$C_2 = 125\ g/L$
$V_2 = 300mL$

$C_1V_1 = C_2V_2$

$(X\ g/L)(100mL) = (125\ g/L)(300\ mL)$

$X\ g/L = \frac{(125\ g/L)(300\ mL)}{(100\ mL)}$

$C_1 = 375\ g/L$

3. A 40 mL sugar solution with a concentration of 25 % m/V was made from 10 mL of the original solution. What was the original concentration?

$\frac{25\ g}{100mL}$

$C_1 = X\%$
$V_1 = 10\ mL$
$C_2 = 25\%$
$V_2 = 40\ mL$

$C_1V_1 = C_2V_2$

$(X)(10mL) = (25\%)(40\ mL)$

$X = \frac{25\% \cdot 40\ mL}{10\ mL}$

$X = 100\%$

Sample problem #2:

Calculate the final concentration of a 100 mL solution that was made from 50 mL of a 30% concentrated solution.

Step 1: **Decide** what type of information the problem gives us.

$C_1 = 30\%$

$C_2 = ?$

$V_1 = 50\ mL$

$V_2 = 100\ mL$

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Step 2:

Plug in all the known values into the dilution formula and **cross multiply**: $\frac{C_1}{C_2} = \frac{V_2}{V_1}$

a. $\frac{30\%}{C_2} = \frac{100\ mL}{50\ mL}$ b. $C_2 = \frac{50\ \cancel{mL} \times 30\ \%}{100\ \cancel{mL}} = 15\%$

Questions:

Calculate and **show** all work.

1. What is the final concentration of a 300 mL solution that was made from 100 mL of a 45g/L concentrated solution?

$C_1 V_1 = C_2 V_2$

$C_1 = 45\ g/L$
$V_1 = 100\ mL$
$C_2 = X\ g/L$
$V_2 = 300\ mL$

$(45\ g/L)(100\ mL) = (X\ g/L)(300\ mL)$

$\frac{(45\ g/L)(100\ mL)}{(300\ mL)} = X\ g/L$

$C_2 = 15\ g/L$

2. If 200 mL of water is added to a 100 mL solution that has a concentration of 75g/L, what will the final concentration be?

$C_1 V_1 = C_2 V_2$

$C_1 = 75 g/L$
$V_1 = 100\ mL$
$C_2 = X\ g/L$
$V_2 = 300 mL$

$(75\ g/L)(100\ mL) = (X\ g/L)(300\ mL)$

$\frac{(75\ g/L)(100\ mL)}{(300\ mL)} = X\ g/L$

$C_2 = 25\ g/L$

3. When 10 mL of water is added to 30 mL of vinegar with a concentration of the vinegar of 14% V/V. What is the final concentration?

$C_1 V_1 = C_2 V_2$

$C_1 = 14\%$
$V_1 = 30\ mL$
$C_2 = X\%$
$V_2 = 40\ mL$

$(14\%)(30\ mL) = (X\%)(40\ mL)$

$\frac{(14\%)(30\ mL)}{(40\ mL)} = X\%$

$C_2 = 10.5\%$

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Sample problem #3:

Calculate the initial volume of a 10g/L solution needed to make 200 mL of a 5 g/L solution.

Step 1: **Decide** what type of information the problem gives us.

$C_1 = 10$ g/L

$C_2 = 5$ g/L

$V_1 = ?$

$V_2 = 200$ mL

Step 2:

Plug in all the known values into the dilution formula and **cross multiply**: $\frac{C_1}{C_2} = \frac{V_2}{V_1}$

a. $\frac{10\text{g/L}}{5\text{ g/L}} = \frac{200\text{ mL}}{V_1}$ b. $V_1 = \frac{200\text{ mL} \times 5\ \cancel{\text{g/L}}}{10\ \cancel{\text{g/L}}} = 100$ mL

Questions:

Calculate and **show** all work.

1. What is the initial volume of a 30g/L solution needed to make 150 mL of a 12 g/L solution?

$C_1 = 30$ g/L

$V_1 = X$ mL

$C_2 = 12$ g/L

$V_2 = 150$ mL

$C_1 V_1 = C_2 V_2$

$(30\text{ g/L})(X\text{ mL}) = (12\text{ g/L})(150\text{ mL})$

$X\text{ mL} = \frac{(12\text{ g/L})(150\text{ mL})}{(30\text{ g/L})}$

$V_1 = 60$ mL

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2. A solution started out with a concentration of 8g/L. Water was added and a 50 mL solution with a concentration of 3 g/L is made. What is the initial volume of the solution needed to make the new solution?

$C_1 = 8\ g/L$
$V_1 = X\ mL$
$C_2 = 3\ g/L$
$V_2 = 50\ mL$

$C_1V_1 = C_2V_2$
$(8\ g/L)(X\ mL) = (3\ g/L)(50\ mL)$
$X\ mL = \frac{(3\ g/L)(50\ mL)}{(8\ g/L)}$
$V_1 = 18.75\ mL$

3. A cleaning product is needed. You must make 70 mL of a 18% V/V from a 25% V/V cleaning solution.

a. What is the volume needed from the volume of original solution needed to make the new cleaning solution?

$C_1 = 25\%$
$V_1 = X\ mL$
$C_2 = 18\%$
$V_2 = 70\ mL$

$C_1V_1 = C_2V_2$
$(25\%)(X\ mL) = (18\%)(70\ mL)$
$X\ mL = \frac{(18\%)(70\ mL)}{(25\%)}$
$V_1 = 50.4\ mL$

b. How much water needs to be added to this volume?

$V_1 = 50.4\ mL$ $V_2 = 70\ mL$

$70\ mL - 50.4\ mL = 19.6\ mL$

Sample problem #4:

Calculate the final volume of a 75g/L solution when 500 mL of a 125 g/L solution was used to create the new solution.

Step 1: **Decide** what type of information the problem gives us.

$C_1 = 125\ g/L$
$C_2 = 75\ g/L$
$V_1 = 500\ mL$
$V_2 = ?$

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Step 2:

Plug in all the known values into the dilution formula and **cross multiply**: $\frac{C_1}{C_2} = \frac{V_2}{V_1}$

a. $\frac{125 g/L}{75 g/L} = \frac{V_2}{500 mL}$

b. $V_2 = \frac{500 mL \times 125 \cancel{g/L}}{75 \cancel{g/L}} = 833 mL$

Questions:

Calculate and **show** all work.

1. What is the final volume of a 50g/L solution when 100 mL of a 75 g/L solution was used to create the new solution?

$C_1 V_1 = C_2 V_2$

$C_1 = 75 g/L$
$V_1 = 100 mL$
$C_2 = 50 g/L$
$V_2 = X mL$

$(75 g/L)(100 mL) = (50 g/L)(x mL)$

$\frac{(75 g/L)(100 mL)}{(50 g/L)} = x mL$

$V_2 = 150 mL$

2. Some water is added to 45 ml of a solution that started out with a concentration of 8 g/L. The concentration then drops to 5 g/L.

a)What is the volume of the final solution?

$C_1 = 8 g/L$
$V_1 = 45 mL$
$C_2 = 5 g/L$
$V_2 = x mL$

$C_1 V_1 = C_2 V_2$

$(8 g/L)(45 mL) = (5 g/L)(x mL)$

$\frac{(8 g/L)(45 mL)}{(5 g/L)} = x mL$

$V_2 = 72 mL$

b) What volume of water was added to the initial solution?

$V_1 = 45 mL \quad V_2 = 72 mL$

$72 mL - 45 mL = 27 mL$

3. Bleach was prepared from a solute called sodium hypochlorite (NaClO). What volume of bleach at 2.5% m/V could be made from 60 mL of bleach at 6 % m/V?

$C_1 = 6\%$
$V_1 = 60 mL$
$C_2 = 2.5\%$
$V_2 = X mL$

$C_1 V_1 = C_2 V_2$

$(6\%)(60 mL) = (2.5\%)(x mL)$

$\frac{(6\%)(60 mL)}{(2.5\%)} = x mL$

$V_2 = 144 mL$