

**PRACTICE PROBLEMS**  
**TRANSLATING WORD PROBLEMS INTO EQUATIONS**

**i. When 6 is added to four times a number, the result is 50.  
Find the number.**

Step 1: What are we trying to find?

A number.

Step 2: Assign a **variable** for the number.

Let's call it  $n$ .

Step 3: Write down what the **variable** represents.

Let  $n =$  a number

Step 4: Write an equation.

We are told 6 is added to 4 times a number. Since  $n$  represents the number, four times the number would be  $4n$ . If 6 is added to that, we get  $6 + 4n$ . We know that answer is 50, so now we have an **equation**  $6 + 4n = 50$

Step 5: Solve the equation.

$$6 + 4n = 50$$

$$4n = 44$$

$$n = 11$$

Step 6: Answer the question in the problem

The problem asks us to find a number. We decided that  $n$  would be the number, so we have  $n = 11$ . The number we are looking for is 11.

Step 7: Check the answer.

The answer makes sense and checks in our **equation** from Step 4.

$$6 + 4(11) = 6 + 44 = 50$$

**ii. The sum of a number and 9 is multiplied by -2 and the answer is -8. Find the number.**

Step 1: What are we trying to find?

A number.

Step 2: Assign a **variable** for the number.

Let's call it  $n$ .

Step 3: Write down what the **variable** represents.

Let  $n =$  a number

Step 4: Write an equation.

We know that we have the sum of a number and 9 which will give us  $n + 9$ . We are then told to multiply that by  $-2$ , so we have  $-2(n + 9)$ . Be very careful with your parentheses here. The way this is worded indicates that we find the sum first and then multiply. We also know the answer is  $-8$ . So we will solve

$$-2(n + 9) = -8$$

Step 5: Solve the equation.

$$-2(n + 9) = -8$$

$$-2n - 18 = -8$$

$$-2n = 10$$

$$n = -5$$

Step 6: Answer the question in the problem

The problem asks us to find a number. We decided that  $n$  would be the number, so we have  $n = -5$ . The number we are looking for is  $-5$ .

Step 7: Check the answer.

The answer makes sense and checks in our **equation** from Step 4.

$$-2(n + 9) = -2(-5 + 9) = -2(4) = -8$$

**iii. On an algebra test, the highest grade was 42 points higher than the lowest grade. The sum of the two grades was 138. Find the lowest grade.**

Step 1: What are we trying to find?

The lowest grade on an algebra test.

Step 2: Assign a **variable** for the lowest test grade.

Let's call it  $l$ .

Step 3: Write down what the **variable** represents.

Let  $l =$  the lowest grade

Step 4: Write an equation.

Whatever the lowest grade is, we are told that the highest grade is 42 points higher than that. That means we need to add 42 to the lowest grade. This tells us the highest grade is  $l + 42$ . We also know that the highest grade added to the lowest grade is

138. So, (highest grade) + (lowest grade) = 142. In terms of our variable,  $(l + 42) + (l) = 138$

Step 5: Solve the equation.

$$(l + 42) + (l) = 138$$

$$2l + 42 = 138$$

$$2l = 96$$

$$l = 48$$

Step 6: Answer the question in the problem

The problem asks us to find the lowest grade. We decided that  $l$  would be the number, so we have  $l = 48$ . The lowest grade on the algebra test was 48.

Step 7: Check the answer.

The answer makes sense and checks in our **equation** from Step 4.

$$(48 + 42) + (48) = 90 + 48 = 138$$

**iv. At the end of the day, a pharmacist counted and found she has  $\frac{4}{3}$  as many prescriptions for antibiotics as she did for tranquilizers. She had 84 prescriptions for the two types of drugs. How many prescriptions did she have for tranquilizers?**

Step 1: What are we trying to find?

The number of prescriptions for tranquilizers.

Step 2: Assign a **variable** for the number of tranquilizer prescriptions.

Let's call it  $t$ .

Step 3: Write down what the **variable** represents.

Let  $t$  = number of tranquilizer prescriptions

Step 4: Write an equation.

We have to be careful here. The pharmacist had  $\frac{4}{3}$  as many prescriptions for antibiotics as she did for tranquilizers. Let's think about this in terms of numbers first. Suppose there were 3 tranquilizer prescriptions,  $\frac{4}{3}$  as many would **mean** there were 4 prescriptions for antibiotics. Or if there were 30 tranquilizer prescriptions, then  $\frac{4}{3}$  as many for antibiotics, would **mean** there were 40 antibiotic prescriptions. In each case, we are taking the number of tranquilizers and multiplying by  $\frac{4}{3}$  to get the number

of antibiotic prescriptions. So if  $t$  is the number of tranquilizer

prescriptions, then  $\frac{4}{3}t$  is the number of antibiotic prescriptions. We are told that together the two types of prescriptions add up

to 84. So we end up with the equation  $t + \frac{4}{3}t = 84$ .

Step 5: Solve the equation.

$$t + \frac{4}{3}t = 84$$

$$\frac{7}{3}t = 84$$

$$t = 36$$

Step 6: Answer the question in the problem

The problem asks us to find the number of prescriptions for tranquilizers. We decided that  $t$  would be the number of prescriptions for tranquilizers, so we have  $t = 36$ . There were 36 prescriptions for tranquilizers.

Step 7: Check the answer.

The answer makes sense and checks in our equation from Step 4.

$$(36) + \frac{4}{3}(36) = 36 + 48 = 84$$

**v. In a given amount of time, Jamie drove twice as far as Rhonda. Altogether they drove 90 miles. Find the number of miles driven by each.**

Step 1: What are we trying to find?

The number of miles driven by Jamie and by Rhonda.

Step 2: Assign a variable.

Since we are looking for two numbers here, we need to choose which one we will assign a variable to. The number of miles driven by either Jamie or Rhonda will work. We need to just choose one and move to Step 3. Let's assign a variable to represent the number of miles driving by Rhonda

Let's call it  $R$ .

Step 3: Write down what the variable represents.

Let  $R$  = the number of miles driven by Rhonda

Step 4: Write an equation.

We know that Jamie drove twice as far as Rhonda. As with Example 4, let's think about this in terms of numbers before jumping into an equation. If Rhonda drives 10 miles, then Jamie will drive twice as far which would be 20. So whatever amount Rhonda drives, Jamie's amount will be two times that number.

We have already decided that the number of miles driven by Rhonda is  $R$ , so the number of miles driven by Jamie is  $2R$ .

Together they drove a total of 90 miles. So we have (Rhonda) + (Jamie) = 90, or  $R + 2R = 90$

Step 5: Solve the equation.

$$R + 2R = 90$$

$$3R = 90$$

$$R = 30$$

Step 6: Answer the question in the problem

The problem asks us to find out how far Rhonda and Jamie drove. The **solution** to the **equation** tells us  $R = 30$ , which means Rhonda drove 30 miles. Now we have to find out how far Jamie drove. She drove twice as far as Rhonda, so the distance would be 20 miles.

Step 7: Check the answer.

The answer makes sense and checks in our **equation** from Step 4.

$$(30) + 2(30) = 30 + 60 = 90$$

**vii. The length of a rectangular map is 15 inches and the perimeter is 50 inches. Find the width.**

Step 1: What are we trying to find?

The width of a rectangle.

Step 2: Assign a **variable** for the width.

Let's call it  $w$ .

Step 3: Write down what the **variable** represents.

Let  $w$  = the width of a **rectangle**

Step 4: Write an equation.

We know the **length** is 15 inches. We also know the **perimeter** is 50 inches. **Perimeter** is the distance all the way around a figure.

So to go all the way around a rectangle, you have

**Perimeter** = width + **length** + width + length.

Since **length** is 15 inches, width is  $w$ , and **perimeter** is 50, we get

$$P = w + l + w + l \quad \text{or} \quad P = 2w + 2l$$

Step 5: Solve the equation.

$$P = w + l + w + l$$

$$50 = w + 15 + w + 15$$

$$50 = 2w + 30$$

$$20 = 2w$$

$$10 = w$$

Step 6: Answer the question in the problem.

The problem asks us to find the width of a rectangle. We decided that  $w$  would represent width, so we have  $w = 10$ . The width of the **rectangle** is 10 inches. Don't forget your units.

Step 7: Check the answer.

The answer makes sense and checks in our **equation** from Step 4.

$$10 + 15 + 10 + 15 = 50 \text{ inches}$$