LESSON

- **Lesson I on Division**

A. | Give each pair of students 15 cubes (or other convenient objects). |

| Tell the students: |

Separate your set of cubes into groups with <u>5 cubes in each group</u>.

Notice what you actually <u>did</u> to form the groups: you simply counted out sets of 5 cubes until all the cubes were used.

Now you can see that there are 3 groups.

Notice that we can describe the result by writing a simple multiplication equation:

$$5 \text{ cubes per group } \times \underbrace{3 \text{ groups}}_{\text{answer to question}} = 15 \text{ cubes}$$

B. | Show the class a piece of string, and demonstrate, using a yardstick, that the string is 24 inches long.
Ask: How many 6-inch sections can be made from the whole piece of string?
Let a student measure and cut 6-inch sections to find the answer. |

You have seen that when a 24-inch piece of string is cut into 6-inch sections, there will be 4 sections.

Again, there is a multiplication equation that shows this result:

$$6 \text{ inches per section } \times 4 \text{ sections } = 24 \text{ inches}$$

C. | Pose this problem. |

Davon ran laps around the school track for 20 minutes. Each lap took 4 minutes. How many laps did he run?

| Tell the students: |

You can see that we don't have to count out laps of 4 minutes each to find the answer. There is a simple multiplication sentence to describe the story:

$$20 \text{ minutes } = 4 \text{ minutes per lap } \times \underline{\ ?\ } \text{ laps}$$

We can think of this as:

<u>What number</u> must be multiplied by 4 to get 20?

or

4 times <u>what number</u> equals 20?

And you know that the answer is 5.

D. | Recap all of this for the class. |

Recap:

   If we have a total number of things, and we want to separate them into a certain kind of <u>equal groups</u>, we can find out how many equal groups there will be by:

<div align="center">

<u>counting</u> out the groups (one at a time)

or

using a multiplication fact (such as 3 times <u>what</u> equals 21?).

</div>

E. | Lead a discussion about how to find answers to these questions. (Include concrete models and equations.) |

   a. Jane needs 30 ounces of pecans to make pecan pies. Pecans are sold in 6-ounce bags. How many bags does she need?

   <u>Think</u>:

   i. | 6 ounces | | 6 ounces | | 6 ounces | · · · ?

      How many bags are needed to make 30 ounces?
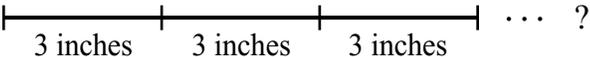
<div align="center">and</div>

   ii. 6 ounces per bag × __?__ bags = 30 ounces

      (What number must we <u>multiply</u> by 6 to get 30?)

   b. Glue sticks are 3 inches long. How many of them have to be placed end-to-end to make a row that is 18 inches long?

   <u>Think</u>:

   i. |——— 3 inches ———|——— 3 inches ———|——— 3 inches ———| · · · ?

      How many 3-inch sticks will make 18 inches?

<div align="center">and</div>

   ii. 3 inches per stick × __?__ sticks = 18 inches
      (What number must be <u>multiplied</u> by 3 to get 18?)

F. | Pose this problem. |

Suppose you have $42, and circus tickets cost $14 each. How many tickets can you buy?

Since we don't know a fact that tells us "14 times <u>what</u> is 42", we will separate 42 play dollars into groups of 14 dollars each.

| Provide 42 play dollars for each pair of students. |

Complete this equation:

$$^{\$}42 \ = \ ^{\$}14 \text{ per ticket } \times \ \underline{\qquad} \text{ tickets}$$

G. Separating the $42, into groups of $14 in each, is a lot of trouble. So, instead of doing all that work, we just <u>think</u> <u>about</u> doing it. Look:

$$
\begin{array}{r}
^{\$}42 \quad \text{(total money)} \\
- \quad 14 \quad \text{(cost of } \underline{1 \text{ ticket}}\text{)} \\
\hline
^{\$}28 \quad \text{(money left)} \\
- \quad 14 \quad \text{(cost of } \underline{1 \text{ ticket}}\text{)} \\
\hline
^{\$}14 \quad \text{(money left)} \\
- \quad 14 \quad \text{(cost of } \underline{1 \text{ ticket}}\text{)} \\
\hline
\end{array}
$$

money left ⟶ 0 | 3 tickets |

Complete: $^{\$}42 \ = \ \underline{\qquad} \text{ tickets } \times \ ^{\$}14 \text{ per ticket}$

H. Let's try another one:

Miss Tyler gives 18 bonus points for each challenge problem that students solve. Howard earned 72 bonus points. How many problems did he solve?

$$
\begin{array}{r}
72 \quad \text{(total points)} \\
- \quad 18 \quad \text{(1 problem)} \\
\hline
54 \quad \text{(points left)} \\
- \quad 18 \quad \text{(1 problem)} \\
\hline
36 \quad \text{(points left)} \\
- \quad 18 \quad \text{(1 problem)} \\
\hline
18 \quad \text{(points left)} \\
- \quad 18 \quad \text{(1 problem)} \\
\hline
\end{array}
$$

points left ⟶ 0 | 4 problems solved |

Complete this equation: 18 points per problem × _____ problems = 72 points

I. | Tell the students: | The process (or operation), of <u>separating a quantity into equal parts</u>, is called <u>division</u>. It has a symbol, ÷ , which is called the <u>division sign</u>, and which is read aloud as 'divided by'.

For example, in part A when you separated 15 cubes into groups with 5 cubes per group, there were 3 groups.

We say: 15 cubes <u>divided by</u> 5 cubes per group makes 3 groups.

Or we write: | 15 cubes ÷ 5 cubes per group = 3 groups |

It is important for you to notice that we expressed this same information as a <u>multiplication</u> equation:

| 5 cubes per group × 3 groups = 15 cubes |

The two equations <u>tell us the same thing</u>—they are simply two different ways to <u>think about</u> the cubes.

When we <u>divide</u>, we begin with a total amount, and separate it into equal groups of some kind.

When we <u>multiply</u>, we combine equal groups of some kind to find a total amount.

J. | Lead a discussion of the various ways to express answers to questions posed in parts B and E. |

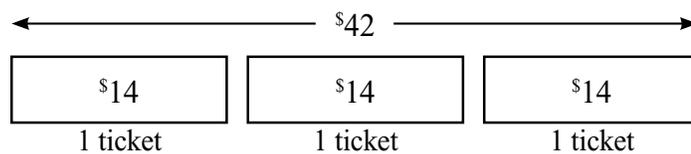   i.   24 inches <u>cut into</u> 6 inches per section makes 4 sections.
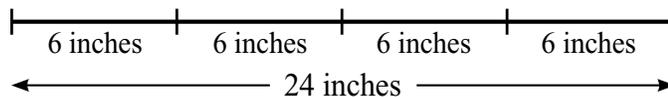
24 inches <u>divided by</u> 6 inches per section equals 4 sections.
24 inches ÷ 6 inches per section = 4 sections
6 inches per section × 4 sections = 24 inches

  ii. $42 paid for tickets, at $14 for each ticket, buys 3 tickets.

$42 <u>divided by</u> $14 per ticket equals 3 tickets.
$42 ÷ $14 per ticket = 3 tickets
$14 per ticket × 3 tickets = $42