UNIT: FIRST AID

ACT-Based Math: Dosage Calculation for Pain Management

### Here are ACT-aligned math activities for First Aid Kits that help students apply real-world skills in measurement, dosage calculations, and data interpretation relevant to emergency care.

### Objective:

Students will calculate appropriate medication dosages based on patient weight.

MATERIALS NEEDED:

* Calculator
* Dosage chart
* Patient scenarios

STUDENT DIRECTIONS:

**Goals:**
You will practice calculating medication dosages based on a patient’s weight, using math skills like multiplication, ratios, and rounding. These calculations are critical in emergency care to ensure a patient receives the **right amount of medication**—not too little, and not too much.

**Step 1: Understand the Dosage Chart**

Take a few minutes to study the **Dosage Chart**. It tells you:

* How many milligrams (mg) of medication to give **per kilogram (kg)** of a patient’s weight.
* The **maximum dose** allowed for each weight range.

 *Example: A 15 kg child falls into the 10–20 kg range. They should receive 2 mg per kg, but no more than 40 mg total.*

**Step 2: Read Each Scenario**

Turn to the **Patient Scenarios Worksheet**. Each situation describes a patient’s:

* **Weight**
* **Injury type**
* Need for pain relief

You’ll use the dosage chart to calculate the correct dosage for each patient.

**Step 3: Solve Using the Dosage Formula**

Use this formula for each scenario:

**Dosage = Weight (kg) × Dosage per kg**

**Then:**

* Compare your answer to the **maximum dosage** in the chart.
* If the dosage you calculated is higher than the max, **give only the max allowed**.

**Step 4: Answer Tablet Questions**

Some questions will ask you how many tablets to give. To solve these:

1. **Divide the dosage** you calculated by the **tablet strength** (like 50 mg or 100 mg).
2. **Round down** to avoid going over the max dose.

 *Example: If a patient needs 225 mg and each tablet is 100 mg, they can only safely take* ***2 tablets*** *(200 mg total).*

**Step 5: Reflect and Discuss**

After calculating each dosage, answer the reflection questions:

* What could happen if a patient gets **too little** medication?
* What risks come with giving **too much**?
* How can math help protect patients in real-life emergencies?

**Dosage Chart & Patient Scenarios Worksheet**

**Instructions:**

1. Review the **dosage chart** below, which provides medication dosages based on patient weight.
2. Read each patient scenario carefully.
3. Calculate the correct medication dosage based on the patient’s weight and the dosage guidelines.
4. Discuss the consequences of incorrect dosages.

**Dosage Chart for Pain Relief Medication**

|  |  |  |
| --- | --- | --- |
| Patient Weight (kg)  | Dosage (mg per kg)  | Maximum Dosage (mg)  |
| 10-20 kg  | 2 mg/kg  | 40 mg  |
| 21-40 kg  | 3 mg/kg  | 100 mg  |
| 41-60 kg  | 5 mg/kg  | 250 mg  |
| 61-80 kg  | 7 mg/kg  | 400 mg  |

**Patient Scenarios**

**Scenario 1: Child with a Mild Injury**

A **15 kg** child falls and suffers a minor injury requiring pain relief.

* Using the dosage chart, calculate the correct dosage for this child.
* Does the calculated dosage exceed the maximum allowed?

**Scenario 2: Teenager with a Sprained Ankle**

A **50 kg** teenager needs pain relief for a sprained ankle.

* How much medication should they receive based on the chart?
* If the pharmacy only provides 100 mg tablets, how many tablets should be given?

**Scenario 3: Adult with Severe Pain**

A **72 kg** adult is prescribed pain medication after an accident.

* What is their recommended dosage?
* What is the closest whole number of 50 mg tablets that should be given without exceeding the max dose?

## ACT-Style QuestionS:

## A **patient weighs 38 kg** and needs **3 mg per kg** of pain relief medication. What is their total required dosage?

## 76 mg

## 100 mg

## 114 mg

## 120 mg

* A patient weighing **50 kg** requires **5 mg per kg** of pain relief medication. What is the total dosage?
1. 100 mg
2. 200 mg
3. 250 mg
4. 300 mg

## **⚡ Why These Activities and Questions Matter**

By using the ACT Math First Aid Kit, students:

✅ Review essential ACT topics like algebra, geometry, trigonometry, and data analysis.
✅ Practice solving equations, interpreting functions, and analyzing graphs—just like on the test.
✅ Learn time-saving strategies for word problems, coordinate geometry, and number operations.

These activities directly support ACT Math success—helping students master key concepts, reduce careless mistakes, and boost confidence for college and STEM pathways.