Applicable CSPI Exam Objectives:

1. Given a patient exposed to an amount of a gel, liquid or cream in specific concentrations, calculate the ingested dose on an amount per weight dosage.

2. Given an exposure including a patient who has taken an unknown amount of a substance, determine the amount of substance that would need to be ingested to reach a defined toxic dose.

3. Given an exposure including a patient who has taken a known amount of a solid substance, calculate the amount ingested on an amount per weight dosage.

4. Convert units of measurement for common exposures.

There is no ‘right’ way to do these questions as long as you get the right answer.

*Example:* 25 lb child ingests 5 g tube of 1% diphenhydramine cream. How many mg/kg diphenhydramine was ingested? I would use the following method.

\[
\frac{25 \text{ lb} \times 1 \text{ kg}}{2.2 \text{ lb}} = 11.4 \text{ kg} \\
1 \text{ mg} = 1000 \text{ mg/mL} \\
1 \text{ g} = 1000 \text{ mg} \\
5 \text{ g tube} = 5 \text{ mL} \\
5 \text{ mL cream} \times \frac{10 \text{ mg}}{1 \text{ mL}} = 50 \text{ mg} \\
\frac{50 \text{ mg}}{11.4 \text{ kg}} = 4.4 \text{ mg diphenhydramine/kg}
\]

Useful conversions:
- 1 swallow = 5 mL (child) = 15 mL (adult)
- 1 mL liquid/cream = 1 gram
- 1000 g = 1 kg = 2.2 pounds (lbs)
- 1000 mg = 1 g
- 1 mg = 1000 mcg (mcg = microgram)
- 1 pint = 16 fluid ounces
- 1 fluid ounce = 30 mL = 30 g
- 1 tablespoon = 15 mL
- 1 teaspoon = 5 mL
- 10 mg/mL = 1%
- 1 mg/mL = 0.1%
- %w/v is 1 g ingredient/100 mL product
- %v/v is 1 mL ingredient/100 mL product
- % w/w is 1 g ingredient/100 g product
- Desiccated thyroid 1 grain = 65 mg = 0.6 mg levothyroxine
- Sodium fluoride 2.2 mg = 1 mg fluoride
- Ferrous fumarate: 33% iron (divide by 3)
- Ferrous sulfate: 20% iron (divide by 5)
- Ferrous gluconate: 12% iron (divide by 8)

Aspirin conversion factors (ACFs):
- Bismuth salicylate = 0.5
- Methyl salicylate = 1.4
- Salicylic acid = 1.3
- Calculate mg compound ingested, multiply by ACF, divide by kg = mg/kg aspirin equiv.

Practice on your own:

1. A two-year-old, 28 pound female drank Acetaminophen Elixir (160 mg/5ml). How many mL would she need to drink to get 200 mg/kg of acetaminophen?

2. A 38 pound four-year-old child ingested some Maximum Strength Pepto-Bismol (525 mg/15 ml bismuth subsalicylate). Bottle was 12 oz brand new; it was approximately half full and there is now 90 ml left. How many mg/kg aspirin equivalent is this?
3. A 31 pound two-year-old drank two ounces of Scope® mouthwash (49% (v/v) SD alcohol). How much pure ethanol did she ingest in ml/kg?

5. A 2-year-old child weighing 27 pounds got into 3 bottles of iron and ingested the following: ferrous sulfate 325mg: 3 tabs, ferrous gluconate 300mg: 5 tabs, and ferrous fumarate 75mg: 3 tabs. How much elemental iron in mg/kg was ingested?

4. An 18-month-old 30 pound child ingested approximately 2 oz. of toothpaste. This brand contains 0.248% sodium fluoride. How much elemental fluoride was ingested in mg/kg?