Mini-Test 2: Pharmacy Calculations

1. Infusion rate

A dopamine infusion contains **200 mg in 50 mL**.
A patient requires **5 micrograms/kg/min**, weighing **82 kg**.
What infusion rate (mL/hour) is required?

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2. Creatinine Clearance

A 71-year-old male weighs **74 kg**, serum creatinine **118 µmol/L**.
Use Cockcroft–Gault to estimate CrCl (mL/min).

$$\text{Estimated Creatinine Clearance in mL/minute} = \frac{(140 - \text{Age}) \times \text{Weight} \times \text{Constant}}{\text{Serum creatinine}}$$

- Age in years

- Weight in kilograms (use ideal body weight where fat is likely to be the major contributor to body mass)

- Serum creatinine in micromol/litre

- Constant = 1.23 for men; 1.04 for women

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3. Syringe Driver

A syringe driver must deliver **48 mg of morphine** over **24 hours** using **10 mg/mL** solution.
What rate (mL/hour) is required?
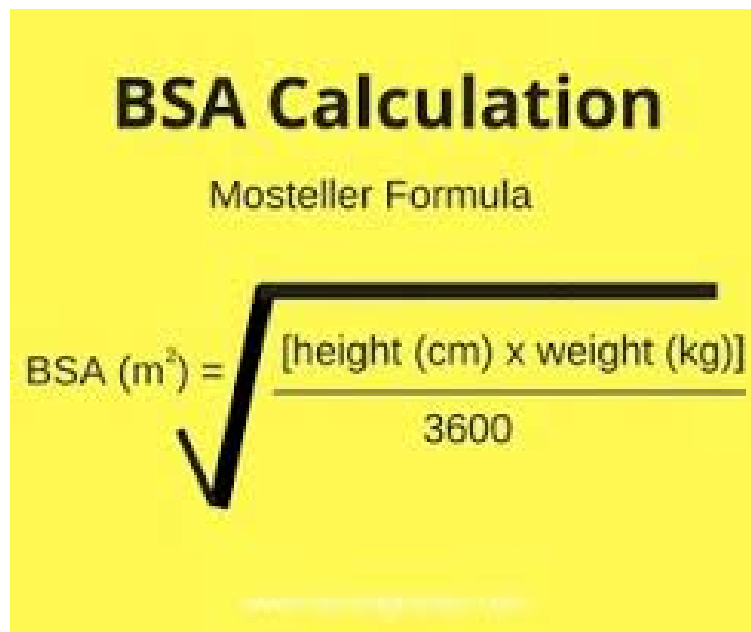
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4. Stock Dilution

How much **20% w/v** stock solution is needed to prepare **400 mL of 1% w/v**?

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5. BSA Calculation

A patient weighs **55 kg** and is **1.49 m** tall.
Calculate **body surface area (BSA)** using the Mosteller formula:

$$BSA\ (m^2) = \sqrt{\dfrac{[\text{height (cm)} \times \text{weight (kg)}]}{3600}}$$

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6. Dose Rounding

A patient requires **carbamazepine 15 mg/kg/day**, weight **43 kg**.
Tablets are **200 mg**.
How many tablets per day?

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7. Unit Conversion

Convert **0.15% w/v** to **mg/mL**.

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8. Alcohol Units

A patient drinks **3 × 330 mL bottles** of **5.2% beer** every evening.
How many units per week?
(Units = % × volume(mL) ÷ 1000)

9. Displacement Calculation

A 120-mL bottle requires **80 mL water** to reconstitute.
What is the **displacement volume**?

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10. Suspension Quantity

Metronidazole 200 mg/5 mL is prescribed: **5 mL three times daily for 7 days**.
How many bottles of **100 mL** must be supplied?

1. **Dopamine infusion rate**

- Dose = 5 µg/kg/min × 82 kg = 410 µg/min = 0.41 mg/min

- Conc = 200 mg / 50 mL = 4 mg/mL

- Rate = 0.41 / 4 = 0.1025 mL/min

- × 60 = **6.2 mL/hour** (to 1 d.p.)

2. **Creatinine clearance (male, Cockcroft–Gault)**
   53 mL/min (approx.)

3. **Syringe driver morphine rate**

- 48 mg over 24 h with 10 mg/mL

- Volume = 48/10 = 4.8 mL

- Rate = 4.8 / 24 = **0.2 mL/hour**

4. **Volume of 20% stock for 400 mL of 1%**

- Required drug = 1 g/100 mL → 4 g

- 20% = 20 g/100 mL = 0.2 g/mL

- Volume = 4 / 0.2 = **20 mL**
5. **BSA (Mosteller)**

- Height = 1.49 m = 149 cm
  → 1.51 m²

6. **Carbamazepine tablets/day**

- Daily dose = 15 mg/kg × 43 kg = 645 mg

- Tabs = 200 mg → 645/200 ≈ 3.2

- Round to nearest whole tablet → **3 tablets per day** (≈600 mg)

7. **0.15% w/v to mg/mL**

- 0.15 g/100 mL = 150 mg/100 mL → **1.5 mg/mL**

8. **Alcohol units per week**

- Per bottle: 5.2 × 330 / 1000 = 1.716 units

- 3 bottles/day → 5.148 units/day

- × 7 = **≈36 units/week**

9. **Displacement volume**

- Final volume 120 mL; water added 80 mL

- Displacement = 120 − 80 = **40 mL**

10. **Metronidazole suspension quantity**

- 5 mL TDS for 7 days → 5 × 3 × 7 = 105 mL

- Using 100-mL bottles → **2 bottles**