

Pre-Registration Calculations Training

Exercise 1 Answers

Please decide whether each statement is TRUE or FALSE

1. 60 g of Canesten® HC cream (clotrimazole, hydrocortisone) and 30 g of hydrocortisone 2.5% cream are mixed together. The hydrocortisone concentration in the newly prepared cream is 1.5% w/w.

*Only need to consider the hydrocortisone content of the new cream
The two ingredients are Canesten HC and hydrocortisone 2.5% cream*

*Canesten HC cream contains hydrocortisone 10 mg/g
60 g of Canesten HC cream contains $10 \times 60 \text{ mg} = 600 \text{ mg}$*

*Hydrocortisone 2.5% cream contains 2.5 g per 100 g
2500 mg per 100 g
250 mg per 10 g
 $250 \times 3 \text{ mg per } 30 \text{ g} = 750 \text{ mg}$*

The hydrocortisone content in new cream = $600 + 750 \text{ mg} = 1350 \text{ mg}$

The weight of the new cream = $60 + 30 \text{ g} = 90 \text{ g}$

The hydrocortisone strength of new cream:

*1350 mg per 90 g
1350/9 mg per 10 g
 $1350/9 \times 10 \text{ mg per } 100 \text{ g}$
 $1500 \text{ mg per } 100 \text{ g} = 1.5 \text{ g per } 100 \text{ g}$
1.5% w/w*

TRUE

2. A 5 year old child, who weighs 20 kg, is prescribed morphine sulfate for pain at a dose of 200 micrograms/kg every four hours up to a maximum of four times a day. It is correct to administer this child 2 mL of Oramorph® 10 mg/5 mL oral solution (morphine sulfate) for each individual dose.

*Child weighs 20 kg
Individual dose of 200 micrograms/kg
For this child individual dose is $200 \times 20 \text{ mcg} = 4000 \text{ mcg} = 4 \text{ mg}$
Oral solution strength is 10 mg/5 mL
4 mg of morphine sulfate in $(5/10 \times 4) \text{ mL} = 2 \text{ mL}$*

TRUE

3. A neonate, weighing 3.5 kg, is prescribed oral alpha tocopherol at a dose of 17 mg/kg daily. An appropriate volume of Vedrop® oral solution (alpha tocopherol) for the neonatal nurse to administer to the neonate daily is 1.4 mL.

*17 mg/kg/day for 3.5 kg = 59.5 mg/day
Vedrop oral solution strength is 50 mg/mL
1 mg in 1/50 mL
59.5 mg in 59.5/50 mL = 1.19 mL*

FALSE

4. A 70 kg patient requires dobutamine hydrochloride at a dose of 10 mcg/kg/min and dopamine hydrochloride 2 mcg/kg/min. The infusions of each are prepared as follows:

*Dobutamine hydrochloride 250 mg in glucose 5% to a final volume of 250 mL
Dopamine hydrochloride 200 mg in glucose 5% to a final volume of 100 mL*

An appropriate delivery rate for both of these drugs is 4.2 mL/hour

*Dobutamine hydrochloride dose: 10 mcg/kg/min
70 kg patient = 10 × 70 mcg/min
Hourly rate = 10 × 70 × 60 mcg/hour = 42000 mcg/hour = 42 mg/hour
Infusion strength: 250 mg/250 mL = 1 mg/mL
Rate = 42 mg/hour = (42 × 1) mL/hour = 42 mL/hour*

*Dopamine hydrochloride dose: 2 mcg/kg/min
70 kg patient = 2 × 70 mcg/min
Hourly rate = 2 × 70 × 60 mcg/hour = 8400 mcg/hour = 8.4 mg/hour
Infusion strength: 200 mg/100 mL = 2 mg/mL = 1 mg/0.5 mL
Rate = 8.4 mg/hour = (8.4 × 0.5) mL/hour = 4.2 mL/hour*

FALSE

5. Mrs A is prescribed an oxygen cylinder (1360 litres) with instructions to use it at a medium flow rate of 2 L/min. She uses the oxygen for six episodes daily, with each episode lasting ½ hour. This one cylinder will provide enough oxygen for Mrs A for 3 days.

*Flow rate 2 L/min
½ hour = 30 minutes
Daily Amount used = 6 × 30 × 2 L
Amount Used in 3 days = 6 × 30 × 2 × 3 = 1080 L*

Therefore, one cylinder of 1360 L provides enough for 3 days

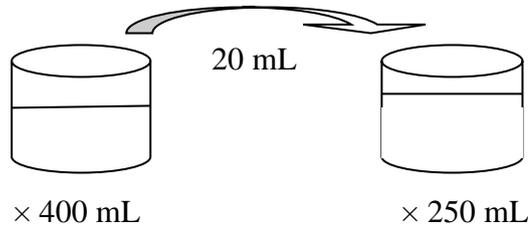
TRUE

6. A patient is prescribed phenytoin 400 mg as a slow intravenous injection. Phenytoin 50 mg/mL solution for injection is available in 5 mL vials. The prescribed dose is contained in 8 mL of the solution for injection.

*Phenytoin solution for injection strength is 50 mg/mL
400 mg in 400/50 mL = 8 mL*

TRUE

7. You are required to produce 400 mL of a concentrated solution of potassium permanganate. A patient is dispensed this concentrated solution which they will dilute to prepare a foot soak. The patient will dilute 20 mL of the concentrated solution to 250 mL to create a 1000 ppm foot soak. The amount of potassium permanganate which should be used to produce 400 mL of the concentrated solution is 4 g.



1000 ppm 1000 g in 1000000 mL
 1 g in 1000 mL
 0.1 g in 100 mL
 0.05 g in 50 mL
 0.25 g in 250 mL

The same 0.25 g in 20 mL taken from concentrated solution
 0.25 g in 20 mL
 2.5 g in 200 mL
 5 g in 400 mL

FALSE

8. While on the neonatal ward you are asked by a F1 Doctor to advise her on the dose of caffeine for a 3-day old baby who was born 3 weeks premature. The F1 Doctor wants to administer 10 mg/kg daily of caffeine base as a maintenance dose by intravenous infusion. The baby being administered this drug weighs 6 lbs. It is appropriate for the baby to be administered 27.2 mg of caffeine citrate daily.

10 mg/kg for 6 lbs baby
 6 lbs = 2.72 kg
 10 mg/kg for 2.72 kg = 27.2 mg caffeine base
 Caffeine base 1 mg \equiv caffeine citrate 2 mg
 Caffeine base 27.2 mg \equiv caffeine citrate 54.4 mg

FALSE

9. You are asked to extemporaneously prepare 450 mL of Magnesium Trisilicate Mixture, BP. You should use 0.0225 kg of light magnesium carbonate in your formulation.

Magnesium Trisilicate Mixture BP
5 % light magnesium carbonate
5 g in 100 mL
5x 4.5 g in 450 mL
22.5 g light magnesium carbonate in 450 mL
Now need to convert 22.5 g into kg
1000 g in 1 kg
1 g = 0.001 kg
22.5 g = 0.0225 kg

TRUE

10. Following a stroke, which has impacted on the swallow of a female patient she requires her medications to be changed to liquid formulations. She is currently prescribed valsartan 80 mg daily and metformin hydrochloride 500 mg three times a day. It is correct to supply 160 mL of Diovan® oral solution (valsartan) and 100 mL of metformin hydrochloride 500 mg/5 mL oral solution for a 7-day prescription. The patient will receive close monitoring following this change. Her medicines are administered using a 5mL oral syringe which can be used to measure volumes in intervals of 1 millilitre.

Diovan solution contains valsartan 3 mg/mL
80 mg daily dose in $1/3 \times 80 \text{ mL} = 26.67 \text{ mL}$
In practical terms the daily dose would be 27 mL
For 7 day prescription will need to supply $27 \times 7 \text{ mL} = 189 \text{ mL}$

Metformin hydrochloride daily dose: 500 mg tds
Metformin hydrochloride oral solution strength: 500 mg/5 mL
Daily dose = 5 mL tds
Daily volume used = 15 mL
For 7 day prescription will need to supply $15 \times 7 \text{ mL} = 105 \text{ mL}$

FALSE

11. During a consultation with a patient you discuss their weekly alcohol intake. The patient tells you they drink 2 glasses of a gin cocktail each Monday, Wednesday & Friday nights and a 750 mL bottle of red wine (13% ABV) on a Saturday. The gin they drink has a 37.5% ABV and each cocktail contains a 25 mL measure of gin. This drinking pattern represents 20 units of alcohol being consumed per week.

$$\text{Units} = \frac{\text{Alcohol by Volume (ABV)} \times \text{Alcohol volume}}{1000}$$

$$\begin{aligned} \text{Gin volume per week} &= 25 \text{ mL per cocktail with 2 cocktails on 3 nights} \\ &= 25 \times 6 \text{ mL} = 150 \text{ mL} \end{aligned}$$

$$\text{Gin units per week} = \frac{37.5 \times 150}{1000} = 5.625 \text{ units}$$

$$\text{Wine units per week} = \frac{13 \times 750}{1000} = 9.75 \text{ units}$$

$$\text{Total weekly units} = 15.375$$

FALSE

12. A 4 week old baby, 6.5 kg, is prescribed trimethoprim 50 mg/5 mL sugar-free oral suspension for prophylaxis of urinary-tract infection. The prescribed dose is 2 mg/kg at night. This baby should be given 1.3 mL for each dose.

$$\text{Dose is } 2 \text{ mg/kg for } 6.5 \text{ kg} = 13 \text{ mg}$$

$$\begin{aligned} &\text{Trimethoprim 50 mg/5 mL sugar-free oral suspension} \\ &10 \text{ mg/mL} \\ &13 \text{ mg/1.3 mL} \end{aligned}$$

TRUE

13. When 25 g of sodium chloride is dissolved in 50 mL of water and made up to a final volume of 400 mL with water, a 1 in 15 solution of sodium chloride is formed.

$$\begin{aligned} &25 \text{ g sodium chloride in 400 mL final volume} \\ &1 \text{ g sodium chloride in } 400/25 \text{ mL solution} \\ &1 \text{ in 16 solution} \end{aligned}$$

FALSE

14. A patient has been prescribed Tobradex[®] eye drops (dexamethasone, tobramycin) for the short-term treatment of ocular inflammation.

An excerpt from their prescription is:

Tobradex ear/eye drops

Put 1 drop into right eye four times a day for five days, then put 1 drop into right eye three times a day for 48 hours, then put 1 drop into right eye four twice daily for 48 hours, then return to clinic for review

A supply of one 5 mL bottle of Tobradex[®] eye drops will be adequate for the patient to cover this treatment.

[15 drops = 1 mL]

$$1 \text{ drop qds} \times 5 \text{ days} = 1 \times 4 \times 5 \text{ drops} = 20 \text{ drops}$$

$$1 \text{ drop tds} \times 48 \text{ hours} = 1 \times 3 \times 2 = 6 \text{ drops}$$

$$1 \text{ drop bd} \times 48 \text{ hours} = 1 \times 2 \times 2 = 4 \text{ drops}$$

$$\text{Total number of drops required} = 20 + 6 + 4 = 30 \text{ drops}$$

$$15 \text{ drops} = 1 \text{ mL}$$

$$30 \text{ drops} = 2 \text{ mL}$$

One 5 mL bottle is therefore enough

TRUE

15. A 6 year old child has been prescribed 2.5 mL four times a day of Gaviscon Advance[™] suspension (potassium bicarbonate, sodium alginate).

Gaviscon Advance[™] suspension contains 4.6 mmol Na⁺/10 mL. The recommended daily allowance (RDA) of salt for a 6-year-old child is 3 g (equivalent to 1.2 g sodium) per day. The atomic mass of sodium is 23.

This child will consume 5% of their recommended daily salt allowance from the total daily dose of Gaviscon Advance[™] suspension.

$$\text{Daily dose} = 2.5 \text{ mL QDS} = 10 \text{ mL}$$

$$\text{Product contains } 4.6 \text{ mmol Na}^+ / 10 \text{ mL}$$

$$1 \text{ mole of sodium} = 23 \text{ g}$$

$$1 \text{ mmol of sodium} = 23 / 1000 \text{ g} = 0.023 \text{ g}$$

$$4.6 \text{ mmol Na}^+ = 0.023 \times 4.6 \text{ g} = 0.1058 \text{ g}$$

$$\text{The RDA} = 1.2 \text{ g}$$

$$\% \text{ daily intake} = 0.1058 / 1.2 \times 100 = 8.8\%$$

FALSE

16. As a pharmacist prescriber in a pain clinic you are converting a patient from dihydrocodeine tartrate 30 mg tablets to dihydrocodeine tartrate 10 mg/5 mL oral

solution due to a change in his swallow. The patient was previously taking 1 tablet four times a day. A prescribed quantity of 300 mL would last him for 14 days of treatment.

You can assume there is no difference in bioavailability between these two formulations.

Tablet dose: 30 mg QDS
Solution strength: 10 mg/5 mL
30 mg/15 mL
Solution dose: 15 mL QDS
For 14 days of treatment require $15 \times 4 \times 14 = 840$ mL

FALSE

17. 50 g of sodium bicarbonate is needed to prepare 1 L of a sodium bicarbonate solution, such that 20 mL diluted to 400 mL gives a 0.25% w/v sodium bicarbonate solution.

Final solution strength = 0.25% w/v
0.25 g in 100 mL
1 g in 400 mL

This 1 g is the drug content of the 20 mL of original solution used
Strength of this solution is 1 g in 20 mL
Therefore, 10 g in 200 mL and 50 g in 1000 mL

TRUE

18. A 63 year old man has a percutaneous endoscopic gastrostomy (PEG) tube in situ. He requires 1800 kcal per 24 hours from his enteral feed, and has been prescribed Osmolite® 1.5 kcal. It is agreed that he will feed for 10 hours overnight. It is appropriate for his feed to be delivered at a rate of 120 mL/hour.

1800 kcal per 24 hours which is delivered over 10 hours
Rate: 1800 kcal/10 hours
180 kcal/hour

Osmolite® 1.5 kcal: 150 kcal/100 mL
1 kcal/100/150 mL
 $180 \text{ kcal}/(100 \times 180)/150 \text{ mL}$
180 kcal/120 mL

Rate: 120 mL/hour

TRUE

19. A child is prescribed an oral dose of 4000 micrograms of furosemide. The only strength of furosemide oral solution stocked within your hospital dispensary is 20 mg/5 mL. Following your hospital's policy you dilute 5 mL of the oral solution to 20 mL with water. It is appropriate for this child to be administered 4 mL of the resulting liquid.

The child is prescribed 4000 mcg of furosemide which is 4 mg

The original solution strength is 20 mg/5 mL

5 mL of this solution is then diluted to 20 mL with water

The strength of this solution will be 20 mg/20 mL i.e. 1 mg/mL

Child to be administered 4 mg which will be contained in 4 mL

TRUE

20. Following receipt of a prescription 250 g of coal tar 10% w/w in white soft paraffin has been made up in the dispensary. On checking the prescription, you realise that 250 g of 20% w/w was prescribed. By adding 15 g of coal tar to 250 g of the 10% w/w product the new product will have a coal tar strength of 20% w/w.

Need to decide if the addition of the extra coal tar will produce the correct strength of ointment.

The original strength is 10% w/w which means:

10 g of coal tar in 100 g of ointment

25 g of coal tar in 250 g of ointment

If add an extra 15 g of coal tar the ointment composition changes to:

(25 + 15) g in (250 + 15) g of ointment

40 g of coal tar in 265 g of ointment

% strength of this solution = $40/265 \times 100\% = 15.09\%$ w/w

FALSE

21. A 59-year-old woman, who weighs 60 kg, attends a pre-admission clinic at your hospital 4 weeks prior to having orthopaedic surgery. She is found to have moderate anaemia and is prescribed a course of subcutaneous Eprex[®] (epoetin alfa). The epoetin alfa is given at a dose of 600 units/kg once weekly for 3 weeks before surgery and on day of surgery. Over the treatment course the patient will be given 270000 units.

600 units/kg once weekly for 3 weeks nad on day of surgery therefore, will be administered a total of four times.

60 kg patient therefore $600 \times 60 \times 4$ units administered in total = 144000 units

FALSE

22. This is an excerpt from a legally written prescription

*Prednisolone 5 mg Tablets
 50 mg daily for 2 weeks
 Then reduce daily dose by 5 mg once
 weekly until at zero*

You only have 4 x 28 tablet packs of prednisolone 5 mg in stock which you dispense in full to the patient. It is correct to give this patient an owing slip for 12 x 28 tablet packs of prednisolone 5 mg tablets.

50 mg daily x 2 weeks	10 x 7 x 2 tablets =	140
45 mg daily x 1 week	9 x 7 =	63
40 mg daily x 1 week	8 x 7 =	56
35 mg daily x 1 week	7 x 7 =	49
30 mg daily x 1 week	6 x 7 =	42
25 mg daily x 1 week	5 x 7 =	35
20 mg daily x 1 week	4 x 7 =	28
15 mg daily x 1 week	3 x 7 =	21
10 mg daily x 1 week	2 x 7 =	14
5 mg daily x 1 week	1 x 7 =	<u>7</u>
		455 tablets

*Initially supplying 112 tablets
 Therefore, owe 455 – 112 tablets = 343 tablets
 12 x 28 tablets = 336 tablets which is not enough tablets*

FALSE

23. A 53-year-old woman who weighs 78 kg presents to hospital after ingesting ethylene glycol (anti-freeze) 1 hour ago. In accordance with hospital guidance, the consultant requests to use oral ethanol for the management of the overdose. The oral loading dose of ethanol (in the form of whisky, gin, vodka at 40% by volume ethanol is 2.5 mL/kg. The pharmacy department supply gin at 35% by volume ethanol. 223 mL of 35% gin is required to provide a loading dose of ethanol for this patient. (You can assume only whole mL doses of ethanol will be administered in cases of overdose).

*78 kg patient to be administered 2.5 mL/kg of 40% v/v
 2.5 x 78 mL of 40% v/v
 195 mL of 40%
 40% 40 mL ethanol per 100 mL volume
 195 mL contains (40/100) x 195 mL ethanol = 78 mL ethanol*

*35% v/v = 35 mL ethanol per 100 mL
 1 mL ethanol per 100/35 mL
 78 mL ethanol per 78 x (100/35) mL = 222.86 mL
 Have to administer whole mL therefore, 223 mL*

TRUE

24. 60 g of Synalar 1 in 4 Dilution[®] ointment contains 375 mg of fluocinolone acetonide.

*Synalar 1 in 4 Dilution ointment contains 0.00625 % fluocinolone acetonide
62.5 microgram fluocinolone acetonide per 1 g Synalar 1 in 4 Dilution ointment
62.5 x 60 mcg fluocinolone acetonide in 60 g Synalar 1 in 4 Dilution ointment
3750 mcg fluocinolone acetonide in 60 g Synalar 1 in 4 Dilution ointment
3750 microgram = 3.75 mg*

FALSE

25. You have to extemporaneously prepare an ointment for a patient with pressure sores. The prescriber has requested for 125 g of Hydromol[®] ointment (emulsifying wax & yellow soft paraffin) to be mixed with 50 g of yellow soft paraffin BP and 10 g of zinc oxide. The concentration of zinc oxide in the new ointment is 8% w/w.

Hydromol[®] ointment contains emulsifying wax 300 mg/g & yellow soft paraffin 300 mg/g (no zinc oxide)

*The weight of the new ointment is 125 g + 50 g + 10 g = 185 g
This 185 g of ointment contains 10 g of zinc oxide
The % zinc oxide concentration = $(10/185)100\% = 5.41\%$ w/w*

FALSE