

AAVSB VTNE® - Quiz Questions with Answers

1. Pharmacy and Pharmacology

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1.

What is a common side effect of corticosteroid administration?

Delayed wound healing

Decreased thirst and urination

Lowered risk of diabetes mellitus

Increased inflammation

Correct answer: Delayed wound healing

While glucocorticoids (corticosteroid medications) can be extremely effective at reducing inflammation, there are risks associated with long-term use and/or high doses. Side effects include delayed wound healing, polyuria (increased urination), and polydipsia (increased thirst). Steroid use is also associated with an increased risk of diabetes mellitus.

2.

"Tablespoon" is commonly used in dosing over-the-counter medications. How many milliliters are in one tablespoon?

15 mL

5 mL

50 mL

500 mL

Correct answer: 15 mL

One tablespoon is equal to 15 milliliters. To convert tablespoons into milliliters, multiply the dose in tablespoons by 15.

There are 3 teaspoons in 1 tablespoon. One teaspoon is equal to 5 milliliters.

3.

A veterinarian prescribes amphotericin B to treat a patient's severe *Histoplasma* fungal infection. Which organ is at the **highest** risk of serious adverse effects?

Kidney (nephrotoxicity)

Liver (hepatotoxicity)

Blood cells (bone marrow failure)

Eye (vision loss)

Correct answer: Kidney (nephrotoxicity)

Amphotericin B carries life threatening risks of nephrotoxicity to the kidneys.

Toxicity to the liver, bone marrow, or eyes is not recognized with this medication.

4.

A client receives a recommendation for her dog to receive Apoquel daily for treatment of atopic dermatitis. She wants to price check what she should expect to spend for three months (90-day supply) of treatment. The 16 mg tablets cost \$1.17 each for the hospital. The business marks up products 2.5 fold for the price charged to the client. The dog's prescription is for 1/2 tablet by mouth once daily.

How much is the financial estimate to the client for this course of therapy?

\$131.62

\$52.65

\$105.30

\$263.24

Correct answer: \$131.62

Calculate number of tablets needed: (1/2 tablet per day) x (90 day supply) = 45 tablets

Calculate cost to practice: 45 tablets x (\$1.17/tablet) = \$52.65 cost to practice

Markup cost to client: \$52.65 x 2.5 mark up = \$131.62

5.

Patients with diabetic ketoacidosis are frequently placed on insulin continuous rate infusions. The veterinarian's orders are for 2.2 U/kg of regular insulin (U-100) to be added to a 250 mL bag of 0.9% NaCl, beginning administration at 10 mL/hr. The patient weighs 25 pounds.

What is the volume of insulin to add to the fluid bag?

0.25 mL

1 mL

0.5 mL

2.5 mL

Correct answer: 0.25 mL

Convert the patient's weight from pounds to kilograms: 25 pounds / (2.2 pounds per kilogram) = 11.4 kg

Calculate the dose in units: 11.4 kg x (2.2 U/kg) = 25 units

Convert units to volume: U-100 insulin is 100 units per ml concentration. 25 units / (100 units/ml) = 0.25 mL

6.

A 40-kg dog needs to receive IV fluids at 66 ml/kg/d. There are no fluid pumps available so the drip rate needs to be calculated using a 10 drops/mL administration set.

How many drops should there be per 15 seconds?

4-5

18-20

2

44

Correct answer: 4-5

Calculate the administration rate in mL/d: $40 \text{ kg} \times (66 \text{ mL/kg/d}) = 2640 \text{ mL/d}$

Convert time downward in steps: $(2640 \text{ mL/d}) / (24 \text{ hr/d}) / (60 \text{ min/hr}) / 4$ (there are 4 periods of 15 seconds per minute) = 0.458 mL per 15 sec

Convert mL to drops: $0.458 \text{ mL} \times (10 \text{ drops/mL}) = 4.6$ drops should be counted per 15 sec

7.

Fipronil is **most** commonly found in which of the following?

Flea and tick preventatives

Heartworm preventatives

Hookworm and roundworm preventatives

Tapeworm preventatives

Correct answer: Flea and tick preventatives

Fipronil is most commonly found in over-the-counter flea and tick preventatives. It is applied topically once monthly. As an environmental treatment, Fipronil is used to control fleas, ticks, ants, cockroaches, beetles, termites, thrips, weevils, rootworms, and mole crickets.

Fipronil is not an active ingredient in heartworm preventatives, hookworm and roundworm preventatives, or tapeworm preventatives.

8.

Which of the following medications used in sedation and anesthetic procedures must you maintain a controlled substance log for, properly recording all used and wasted volumes of the drug?

Butorphanol

Propofol

Etomidate

Dexmedetomidine

Correct answer: Butorphanol

Butorphanol is a mixed mu-opioid agonist. The most commonly used mixed opioid agonists in veterinary medicine include butorphanol (a class CIV) and buprenorphine (a class CIII), both of which are controlled. The pure mu agonists are CII (methadone, morphine, fentanyl, hydromorphone).

Etomidate and propofol are both short-acting injectable anesthetic drugs that are not federally controlled substances. However, many states or individual practices treat propofol as a controlled substance due to concerns about misuse and theft. While the drug is abused, it isn't associated with physical dependency, which is the criteria used by the Drug Enforcement Agency (DEA) to determine a medication's need to be controlled.

Dexmedetomidine is an alpha-2 agonist used for pain management, sedation, and other related uses. It is reversible but not a controlled substance.

9.

A farmer wants to treat his cattle herd with ivermectin pour-on. Your hospital stocks 1L bottles in a 5 mg/mL concentration. The dose is 1 mL per 22 pounds body weight. His cattle average 550 pounds each.

How many cattle will one bottle treat?

40

200

25

80

Correct answer: 40

Calculate how much one animal will need: 550 pounds x (1 mL/22 pounds) = 25 mL/animal

Calculate how many 25 mL doses are in a 1 liter bottle (1000 mL): (1000 mL/bottle) / (25 mL/dose) = 40 doses

10.

If a drug is to be administered at 5 mg/kg, what is the correct dose for a 25-pound dog? (Round to the nearest whole number.)

57 mg

65.8 mg

75 mg

5 mg

Correct answer: 57 mg

Convert 25 pounds to kilograms. Since 1 kg equals 2.2 lbs, divide 25 lbs by 2.2 to get 11.36 kg.

At 5 mg per kg, the dose for an 11.36-kg dog is $11.36 \text{ kg} \times 5 \text{ mg/kg} = 56.8 \text{ mg}$. The nearest whole number is 57 mg.

11.

What is a potentially significant side effect of acepromazine?

Hypotension

Hypovolemia

Hypoxia

Hyperventilation

Correct answer: Hypotension

Acepromazine is a tranquilizer that blocks alpha-1 adrenergic receptors, leading to peripheral vasodilation and hypotension. This is normally manageable in otherwise healthy patients.

Acepromazine does not change intravascular volume status to cause hypovolemia, depress respiration to cause hypoxemia, or increase the respiratory rate sufficiently to cause hyperventilation. However, horses may develop tachypnea secondarily to excitement, commonly seen in the species.

12.

Though not currently controlled by the DEA, which of the following medications may likely become controlled soon?

Xylazine

Dexmedetomidine

Gabapentin

Ketamine

Correct answer: Xylazine

Xylazine, an alpha-2 agonist, is used in animal medicine for sedation and analgesia, often in short procedures. It is reversible and commonly combined with additional drugs for multi-modal anesthesia/sedation and pain management. However, recently, it has shown up in the illicit drug market in combination with opioids such as fentanyl. It is not a drug approved for human use and is not currently scheduled under the DEA controlled substances regulations. Various states have passed regulations to control it, recognizing concerns for abuse and illicit use. It has been in the news since early 2023, and discussions are ongoing at the congressional level about controlling it.

Dexmedetomidine, also an alpha-2 agonist, is not controlled and is commonly used in small animal medicine. It hasn't to date been seen in the illicit drug market and remains non-controlled.

Gabapentin, a neuropathic pain management medication originally developed as an anti-seizure drug, is regulated by individual practices and in some states, but is not federally controlled by the DEA.

Ketamine, an NMDA receptor antagonist, is used for pain management, wind-up prevention/treatment, sedation, and as part of a multi-modal pain management/anesthetic protocol. It has been a controlled drug for years because of its use in the illicit drug field and its abuse potential. It is a Schedule III drug that has been regulated since 1999.

13.

A veterinarian asks you to dispense Clavamox®. These tablets are scored, suggesting halving the tablet is okay.

However, you must be sure to advise your client of all of the following, except:

Clavamox is light-sensitive and must be kept in the blister pack until use

Wrap the unused half of the tablet in the blister pack and put in a closed pill container

Make sure to use the remaining half of the tablet for the next dose

Storage of the tablets should be below a maximum of 77°F (25°C)

Correct answer: Clavamox is light-sensitive and must be kept in the blister pack until use

Because the tablets are scored, the drug amount is uniformly contained within each half, permitting splitting. Thus, if giving half of a tablet, we can feel comfortable that the pet is getting the correct mg per dose. However, upon opening the blister pack, the medication can degrade easily, meaning drug stability may be negatively affected by halving the tablet. We want to protect the tablet from the air and moisture to minimize this degradation.

Therefore, the best practice recommendation is to have the client put the unused portion back into the blister wrapping and put it in a sealed pill container. This will protect it from the air. Further, ensure clients are storing the tablets appropriately. They should not be refrigerated but should also not be kept in conditions at temperatures exceeding 77°F (25°C), such as outside, in a warm car, in a warm house, etc.

14.

What class of medication does bupivacaine fall into?

Local anesthetic

Opioid analgesic

Anesthetic induction agent

Calcium channel blocker

Correct answer: Local anesthetic

Bupivacaine provides local anesthesia by blocking sodium channels needed for nerve signal transmission. It is not effective topically.

Bupivacaine is not an opioid analgesic (butorphanol and buprenorphine, for example), anesthetic induction agent (such as propofol), or calcium channel blocker (such as amlodipine).

15.

A 20-pound puppy accidentally ingests an unknown amount of another pet's carprofen 25 mg tablets. Possible renal side effects begin at > 8 mg/kg.

How many tablets would the puppy have to have eaten to risk renal toxicity?

Just under 3 tablets

Approximately 6 tablets

Anything over 1.5 tablets

4.5 tablets

Correct answer: Just under 3 tablets

Convert the weight from pounds to kilograms: $20 \text{ pounds} / (2.2 \text{ pounds/kg}) = 9.1 \text{ kg}$

Calculate the toxic dose: $9.1 \text{ kg} \times (8 \text{ mg/kg}) = 72.8 \text{ mg}$

Calculate number of tablets: $72.8 \text{ mg} / (25 \text{ mg/tablet}) = 2.9 \text{ tablets}$

16.

Loop diuretics exert their effects through the increased excretion of all **except** which of the following electrolytes?

All listed choices have increased excretion with loop diuretics.

Calcium

Potassium

Sodium

Correct answer: All listed choices have increased excretion with loop diuretics

Loop diuretics inhibit renal tubular resorption of certain electrolytes, including sodium, potassium, and calcium.

Extracellular fluid follows sodium, so these medications are effective at removing the excessive fluid in congestive heart failure patients.

17.

A veterinarian prescribes meds for a dog to go home after laparoscopic surgery for liver and GI biopsies. She wants you to get the medications ready to go home. She would like to send the dog home after administering an injection of pantoprazole intravenously, as the dog still has her catheter in place to lessen reflux and nausea and because the patient is due for her oral dose of omeprazole (but not yet eating) before traveling home. The dog received a dose of cefazolin perioperatively, and her last dose was about 30 minutes ago.

When giving this medication IV, all of the following are true, except:

The drug is compatible with midazolam

The dose is 0.7-1 mg/kg IV slow, over 15 minutes q 12 hours

The concentration of the drug is often diluted to 4 mg/ml

The drug is compatible with cefazolin

Correct answer: The drug is compatible with midazolam

Pantoprazole is a proton-pump inhibitor (PPI). It is used for its antacid benefits and is commonly used in patients with IBD, reflux-related conditions, esophagitis, and generalized GI upset. It is the injectable version of the oral drug omeprazole. It was initially prescribed once daily, but studies suggest that it should now be twice daily, and that has been reflected in the most recently published PDRs.

Pantoprazole is a human drug used off-label in animals. It is compatible with:

- Ampicillin
- Cefazolin
- Ceftriaxone
- Dopamine
- Epinephrine
- Furosemide
- Opioids
- Potassium chloride

However, it is incompatible with the following (i.e., it shouldn't be given IV in a line used to administer these drugs): dobutamine, esmolol, mannitol, midazolam, and various multivitamins. Solutions with zinc may also be incompatible, so watch which fluids you administer it with.

It is generally diluted to a 4 mg/ml solution when reconstituted. It should be given no faster than over two minutes, but is most commonly given over 15 minutes. It is dosed at 0.7-1 mg/kg IV q 12 hours, though most vets usually start at the higher dose.

18.

Which choice correctly describes a therapeutic use for albuterol?

Bronchodilation

Increase in gastrointestinal absorption

Antiemetic

Antimicrobial

Correct answer: Bronchodilation

Albuterol is a bronchodilator (dilates the airways), used most commonly to treat cough, asthma, and bronchospasm. It is typically administered by inhalation, but oral formulations are available.

Albuterol does not increase gastrointestinal absorption, work as an antiemetic (decrease nausea), or have antimicrobial (treats infections) properties.

19.

Under what circumstances would a technician be asked to reach for atipamezole?

Anesthetic/sedative reversal

To induce vomiting

Airway dilation

Local anesthesia

Correct answer: Anesthetic/sedative reversal

Atipamezole is an adrenergic receptor antagonist used to reverse the effects of the alpha-2 adrenergic agonist dexmedetomidine.

Apomorphine is an emetic. Terbutaline, Albuterol, or Aminophylline are examples of bronchodilators. Lidocaine is a local anesthetic.

20.

Which of the following anesthetic agents causes cardiovascular stimulation, rather than depression?

Ketamine

Xylazine

Morphine

Isoflurane

Correct answer: Ketamine

Animals anesthetized with ketamine may have stronger pulses or a rapid heart rate, even when under anesthesia. Adverse effects include respiratory depression, cardiac arrhythmias, and increased intracranial pressure.

Xylazine, morphine, and isoflurane cause cardiovascular depression, not stimulation.

21.

Which of the following correctly identifies the target and actions of luteinizing hormone (LH)?

Stimulates female ovulation and male testosterone production

Stimulates female ovarian follicular growth and male spermatogenesis

Stimulates thyroid production of T_3/T_4

Stimulates corticosteroid production by the adrenal cortex

Correct answer: Stimulates female ovulation and male testosterone production

Luteinizing hormone (LH) is a pituitary hormone of the anterior lobe that stimulates female ovulation and male testosterone production. LH is also responsible for the secretion of progesterone and the conversion of follicles to the corpus luteum.

Follicle-stimulating hormone (FSH) is a pituitary hormone of the anterior lobe that stimulates female ovarian follicle growth (oogenesis) and male spermatogenesis. It also stimulates the follicular cells to produce and secrete estrogens.

Thyroid-stimulating hormone (TSH) is a pituitary hormone of the anterior lobe that stimulates thyroid production of T_3/T_4 . Thyroid hormone homeostasis occurs via the interactions among the hypothalamus, the thyroid and the anterior pituitary glands.

Adrenocorticotrophic hormone (ACTH) is a pituitary hormone of the anterior lobe that stimulates corticosteroid production by the adrenal cortex.

22.

Which of the following drug classes does **not** have use in the treatment of heart failure?

Expectorant

Positive inotrope

Vasodilator

ACE inhibitor

Correct answer: Expectorant

Expectorant medications help clear viscous respiratory secretions by thinning the consistency. They have limited use in respiratory conditions.

The other three options are routinely used when treating heart failure:

- *ACE (angiotensin-converting enzyme) inhibitors modulate the renin-angiotensin-aldosterone system (RAAS) and promote vasodilation.*
 - *Positive inotropes increase heart contraction strength. Examples include digoxin, epinephrine, or dobutamine.*
 - *Vasodilators allow smooth muscle vascular relaxation which can decrease preload and afterload or help treat systemic high blood pressure. Examples include nitroprusside or nitroglycerin.*
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23.

Bexagliflozin is the new oral diabetic agent recently approved for use in cats in the U.S. What is the mechanism of action for this drug?

SGLT2 inhibitor

Sulfonylurea

Incretin mimetic

DPP4 Inhibitor

Correct answer: SGLT2 inhibitor

Bexacat™ or Bexagliflozin is a new oral diabetic drug recently approved by the FDA in the U.S. It is an SGLT2 inhibitor (sodium-glucose cotransporter-2). SGLT2 is present in the kidneys and is responsible for 97% of glucose resorption that would otherwise be excreted via micturition. SGLT1 works by reabsorbing glucose from the intestinal tract.

Inhibiting this transporter causes a dumping of sugar in the urine and prevents (hopefully) hyperglycemia, thereby preventing the secondary negative effects of diabetes.

However, the drug can only be used in cats who are not yet on insulin (and have never been on insulin). It will only work in cats who still produce their own insulin (type 2 diabetics). Usually, cats who are recently diagnosed as diabetic and are not ketotic are considered most likely to respond.

All other options are possible diabetic medications currently available in people but have either not been shown effective in cats or not yet been utilized/studied in cats. These other options include sulfonylureas, e.g., glipizide, incretin mimetics (glucagon-like peptide 1 or GLP-1 receptor agonist), e.g., Byetta® and Victoza®, or a DPP4 (dipeptidyl peptidase 4) inhibitor, e.g., Ozempic®. While sulfonylureas are oral, the other options are currently injectable. Thus, even if cats responded, it isn't as beneficial as an oral option. However, the frequency of administration may be less than with insulin.

24.

A veterinarian's protocol is to administer Euthasol at 2 mL per 10 pounds for the first 10 pounds, then 1 mL per 10 pounds of body weight thereafter.

How much Euthasol should be drawn for a 25-pound patient?

3.5 mL

2.5 mL

5 mL

3 mL

Correct answer: 3.5 mL

The veterinarian wants 2 mL for the first 10 pounds of body weight.

The veterinarian wants 1 mL per 10 pounds for the remaining body weight (25 pounds - 10 pounds = 15 pounds). 1 mL per 10 pounds, extrapolated to 15 pounds = 1.5 mL

To cover the 25 pounds of patient weight, 3.5 mL of Euthasol should be drawn.

25.

A 20-kg patient received 3 mL of hydromorphone. The stock vial label indicates the concentration is 2 mg/mL. There is concern that this was an overdose, so you are asked to calculate what dosage this patient received.

Which of the following doses administered is correct?

0.3 mg/kg

0.1 mg/kg

2 mg/kg

3 mg/kg

Correct answer: 0.3 mg/kg

Dosage is the quantity (either mL or mg) per body weight (kg).

3 mL of hydromorphone at 2 mg/mL concentration = 3 mL x 2 mg/mL = 6 mg

The patient weighs 20 kg, so the dosage would be: 6 mg/20 kg = 0.3 mg/kg

26.

Which of the following is considered a psychotropic medication?

Alprazolam

Digoxin

Chlorpheniramine

Furosemide

Correct answer: Alprazolam

Psychotropic medications affect the mental state of patients and potentially treat behavior problems. Alprazolam is a benzodiazepine. Benzodiazepines are fast-acting medications with a short duration. They are best used for predictable, anxiety-provoking situations.

Digoxin is a cardiac glycoside medication. Chlorpheniramine is a histamine antagonist medication, more commonly known as an antihistamine. Furosemide is a loop diuretic.

27.

Which of the following topical medications causes the patient's pupils to dilate in order to facilitate a more thorough ocular exam?

Atropine

Tobramycin

Proparacaine

Ketotifen fumerate

Correct answer: Atropine

Atropine causes dilation of the pupils by relaxing the pupillary sphincter muscle, which helps facilitate a more thorough ocular exam and control ciliary spasms of the eye, providing pain relief. When administered intravenously, atropine is also used to counteract organophosphate poisoning, prevent bradycardia, and slow a hypermotile gut. Finally, it provides pain relief. Other commonly used topical ophthalmic drops used for mydriasis (pupil dilation) include tropicamide and phenylephrine.

Tobramycin is an antibiotic used to treat bacterial eye infections. Proparacaine is a topical anesthetic used to numb the eye for procedures to facilitate examination of painful eyes. Ketotifen is an antihistamine used for allergic conjunctivitis.

28.

A 60-lb dog needs a 22 mg/kg dose of cefazolin. The technician has a 1g vial to reconstitute with 9.8 mL of sterile water to produce 10 mL of total volume.

What volume of reconstituted cefazolin will be administered for one dose?

6 mL

13.2 mL

2.7 mL

27 mL

Correct answer: 6 mL

Convert patient weight from pounds to kilograms: $60 \text{ lbs} / (2.2 \text{ lbs/kg}) = 27.27 \text{ kg}$

Calculate the patient dose in mg: $27.27 \text{ kg} \times (22 \text{ mg/kg}) = 600 \text{ mg}$

Calculate the concentration of drug: 1 g (or 1000 mg) in 10 mL volume = 100 mg/mL

Convert mg of drug to ml: $600 \text{ mg} / (100 \text{ mg/mL}) = 6 \text{ mL}$

29.

Leuprolide acetate is a reproductive drug used to treat adrenal endocrinopathy in which of the following patients?

Ferrets

Cockatiels

Iguanas

Goats

Correct answer: Ferrets

Leuprolide acetate is a reproductive drug used in ferrets for the treatment of hyperadrenocorticism. Leuprolide is a synthetic analog of GnRH, which stops the production of sex hormones and symptoms associated with hyperadrenocorticism, such as pruritus and hair loss.

Leuprolide can be used to treat inappropriate egg-laying in cockatiels. Leuprolide may also be helpful in treating aggression in male iguanas. Leuprolide is not used in goats.
