SC20PB Exam Review

Dynamics of Ecosystems

1. Explain what is meant by each of the following terms.

   (a) species

   (b) habitat

   (c) population

   (d) community

   (e) ecosystem

2. What is the difference between biotic and abiotic factors?

3.   What is the difference between an autotroph and heterotroph?

4.   Distinguish between consumers, detritivores and saprotrophs.

5.   Consider the following food chain:

Algae → Plankton → Smelt → Perch → Walleye → Northern Pike → Bald Eagle

(a) What is meant by a food chain?

(b) What is meant by the trophic level of an organism?

(c) In what trophic level are the algae?

6. Construct a food web for the Arctic tundra using the following information.
   - Plants (mainly cotton Sedges) eaten by caribou, voles, lemmings, ground squirrels, jaegers, grizzly bears
   - caribou are eaten by wolves, jaegers
   - voles and lemmings are eaten by wolves, wolverines, jaegers, gulls weasels, owls, hawks
   - ground squirrels are eaten by wolves, wolverines, weasels, owls, hawks, and grizzly bears

7. What is the initial energy source for almost all communities?

8. Explain the shape of energy pyramids that are constructed to represent energy flow in an ecosystem.

9. Explain what is meant by the carbon cycle. Use the words photosynthesis and cellular respiration in your answer. You may use a diagram.

10. This question is about the nitrogen cycle.

    (a) How does a plant get the nitrogen that it needs to grow?

   (b) What would be a potential problem of over fertilization?

11. Define biomagnification and give an example of how it works.

12. How is population size affected by each of the following:

    (a) natality

    (b) mortality

    (c) immigration

    (d) emigration

13. State and explain what happens when a population reaches and exceeds the carrying capacity.

14. Consider the following population growth curve.
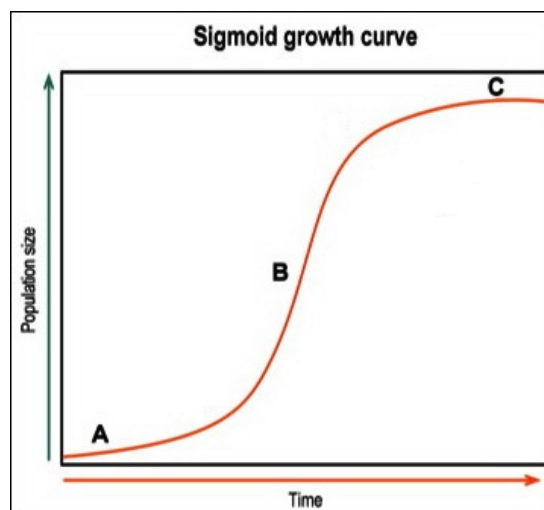
Indicate the letter that represents each of the following:

    (a) exponential growth phase _____

    (b) plateau phase _____

    (c) transitional phase _____

15. Factors that affect population density are either density-dependent or density-independent. Define each of these terms and provide an example of each.

(a) Density Dependent factor

(b) Density Independent factor

Chemistry In Action

16. Draw an electron dot diagram for each of the following:

(a) Sodium	(b) Magnesium	(c) Fluroine	(d) Sulfur
(e) Neon	(f) K^+	(g) P^{3-}	(h) Cl^-

17. Name the following compounds:

(a) $AgNO_3$

(b) PbO

(c) C_3H_6

(d) $CuSO_4$

(e) $Fe(OH)_3$

(f) Na_3PO_4

(g) CaS

(h) SiO_2

(i) MgC_2O_4

(j) $KSCN$

(k) $K_2Cr_2O_7$

(l) $(NH_4)_3PO_4$

18. Write the chemical formula for each of the following compounds.

(a) magnesium sulfide

(b) nitrogen trioxide

(c) Sodium cyanide

(d) Potassium nitrite

(e) Lead(IV) sulfide

(f) Copper(II) hypochlorite

(g) Mercury(II) silicate

(h) Lithium citrate

(i) Ammonium acetate

(j) Tin(II) permanganate

(k) Magnesium nitride

(l) Manganese(IV) perchlorate

19. Write a balanced chemical equation for each of the following reactions and indicate the type of reaction.

(a) Sodium and chlorine combine to form sodium chloride.

(b) Aluminum and copper(II) chloride are mixed and copper and aluminum chloride are formed.

(c) Hydrogen peroxide (H_2O_2) decomposes to form hydrogen gas and oxygen gas.

(d) Propane (C_3H_8) reacts with oxygen to form carbon dioxide and water.

(e) Sodium acetate and copper(II) nitrate are combined to form copper(II) acetate and sodium nitrate.

20. List 2 properties of acids and 2 properties of bases.

Acids	Bases

21. Identify 2 common household acids and 2 common household bases.

Acids	Bases

22. What are the reaction products when an acid is combined with a base?

23. Perform the following particle-mole-mass conversions.

    (a) 8.90×10^{25} atoms of oxygen to moles

    (b) 9.62 mol of copper(II) sulphate to grams

    (c) 7.90×10^{22} molecules of butane (C_4H_{10}) to grams

    (d) 24 grams of NaCl to moles

    (e) 0.8 mol of MgO to molecules

24. A chemist has a sample of ammonium dichromate that has a mass of 21.87g.

    (a) Write the chemical formula for ammonium dichromate.

    (b) Calculate the molecular mass of ammonium dichromate.

    (c) Calculate the number of moles of ammonium dichromate the scientist has.

    (d) How many moles of hydrogen atoms are present within the sample?

25. Determine the percent by mass of each element in each of the following compounds.

    (a) $CaCO_3$

    (b) KF

26. A sample of toluene, a toxic organic molecule that can cause brain damage in sufficient quantity, is composed of 84.1 g of carbon and 8.08 g of hydrogen. What is the empirical formula of toluene?

27. Nitro-glycerin is used as both a powerful explosive and as a treatment for heart conditions such as angina (a lack of blood to the heart which causes extreme pain and can be quite dangerous. Nitro-glycerin is composed of 15.86% Carbon, 2.23% Hydrogen, 18.50% Nitrogen and 63.41% Oxygen.

(a) Determine the empirical formula for nitro-glycerin.

(b) The molar mass of nitro-glycerin is 227.09 gmol^{-1}. What is the molecular formula?

Measurement

28. State the number of significant digits in each of the following:

    (a) 350

    (b) 201

    (c) 9845.098

    (d) 870.50

    (e) 0.0045

    (f) 0.000006

    (g) 0.0098300

29. An object has a volume of 50 cm^3 and a mass of 15 g. Calculate the density of the object.
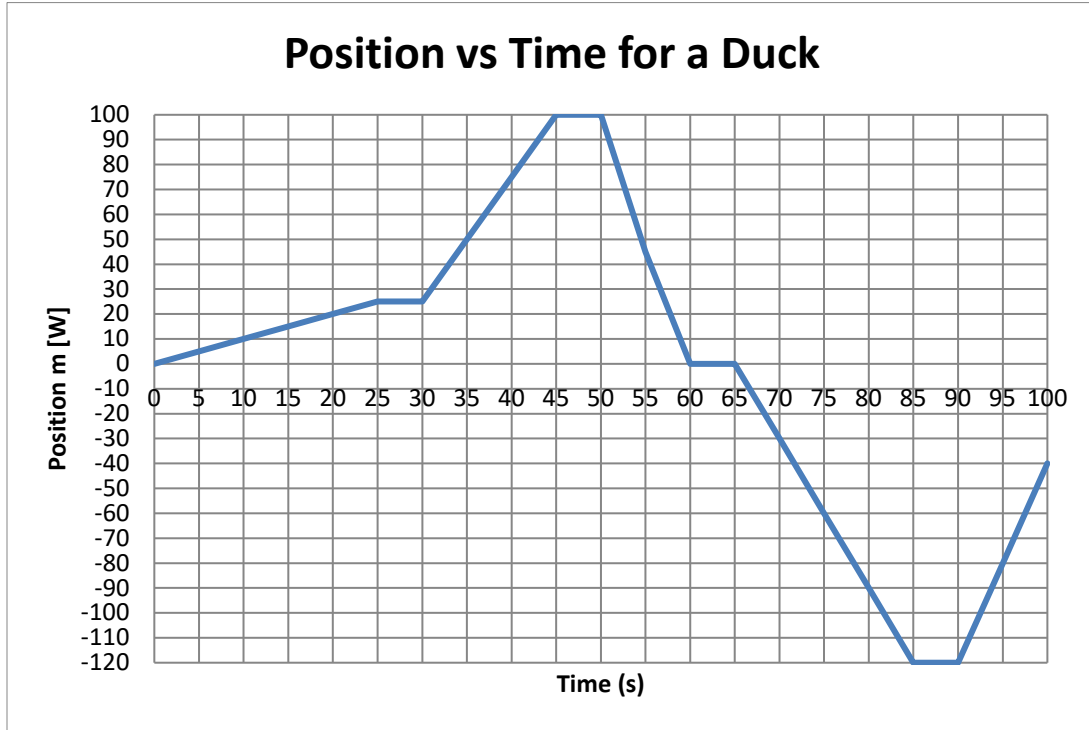

30. Convert the following:

    (a) 80 kmh^{-1} = _____ ms^{-1}

    (b) 35 ms^{-1} = _____ kmh^{-1}

    (c) 2.4 hours = _____ seconds

    (d) 72 seconds = _____ hours

In Motion

31. Frank can run 100 m in 9.58 s.

    (a) What is his average speed in ms^{-1}?

    (b) Assuming he can run at this average speed for 30 minutes, how far will he travel?

    (c) Assuming he can run at this average speed for an extended period of time, how long would it take him to run a distance of 200 km?

32. Fred Flintstone can accelerate his car from 2.5 m/s to 15 m/s in a time of 10 seconds.

    (a) What is the acceleration of the car?

    (b) What is his speed after 7 seconds?

33. Consider the following position-time graph.

Position vs Time for a Duck

(a) How far does the duck travel in the trip?

(b) What is the displacement of the duck over the entire trip?

(c) Describe the motion (speed and direction) of the duck during the following time intervals:

  (i) 0-25 s

  (ii) 45-50 s

  (iii) 60-65 s

(d) What is the velocity of the duck from 50 – 60 s?

34. Consider the following velocity-time graph to answer the following questions.

Velocity vs Time for a Badger
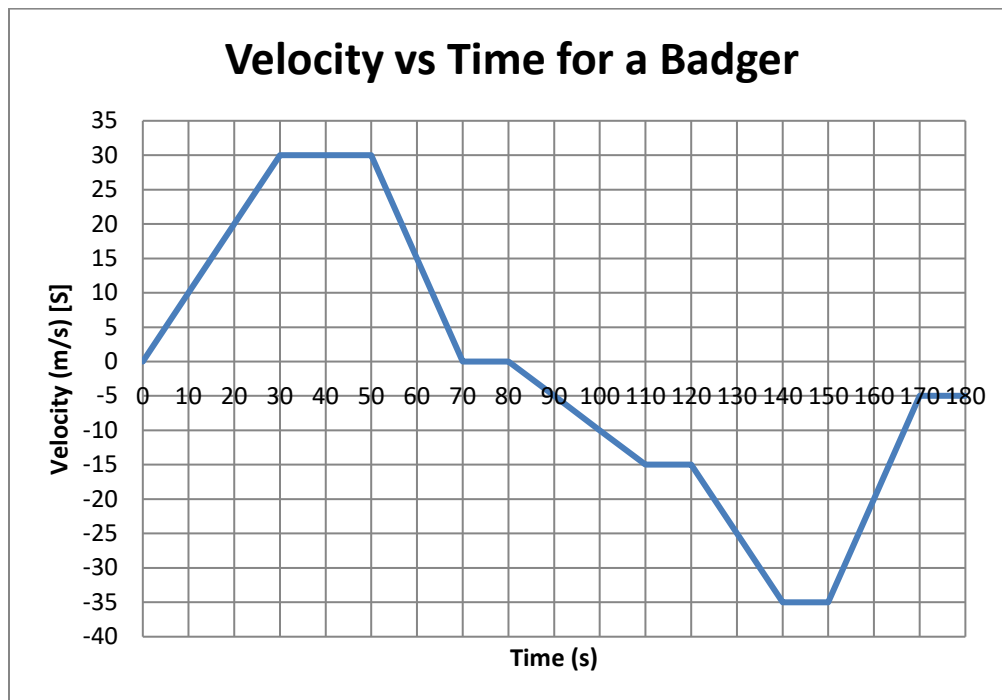
35. Describe the motion of Billy the Badger (speed, direction) during the following time intervals:

(a) 0 – 30 s

(b) 70 – 80 s

(c) 140 – 150 s

(d) 150 – 170 s

(e) Calculate the badger's acceleration from 120 – 140 seconds.

36. In your own words, describe Newton's three laws of motion.

First Law
Second Law
Third Law

37. Define momentum and give an example.

38. A deer runs out in front of a car traveling 100 km/h on an icy road (k=0.25). If the deer is 250 m away, will the car stop in time?

39. Explain how reaction time changes the amount of time required to stop a vehicle.

40. Choose one safety feature on a car and explain how it works to reduce injury to the passengers.

Weather Dynamics

41. What is the most abundant gas in the atmosphere?

42. Which layer of the atmosphere is closest to the earth?

43. Explain what is meant by the hydrosphere.

44. Explain each of the following:

   (a) ozone layer

   (b) high pressure system

   (c) low pressure system

   (d) Coriolis effect

   (e) albedo

   (f) jet stream

(g) prevailing winds

(h) Fujita scale

45. What happens during the weather pattern known as El Niño?

46. List three "greenhouse" gases.

47. The following question is about extreme weather events.

(a) Explain how a thunderstorm forms.

(b) How could you stay safe in a thunderstorm?

(c) Explain how a tornado forms.

(d) What should you do in the event of a tornado?

(e) What conditions are required for Environment Canada to label a snow storm a blizzard?