

Science 20F Exam Review

Sample Multiple Choice Questions

I: Dynamics of Ecosystems

1. All the living and nonliving factors in an environment comprises a/an

- A) population.
- B) community.
- C) ecosystem.
- D) niche.

2. An ecosystem with very little biodiversity would

- A) be easily sustainable.
- B) be susceptible to failure.
- C) be full of many different types of species.
- D) have no living species whatsoever.

Read the paragraph below to answer questions #3 and #4.

Ted is raising guppies in an aquarium and he monitors the temperature closely, due to the fact that guppies cannot survive when water temperatures become extreme. He feeds 40 guppies in his aquarium daily with 1 teaspoon of fish food. For one week he decreases the food to $\frac{1}{2}$ teaspoon daily and notices that over a period of time his guppy population decreased to 20.

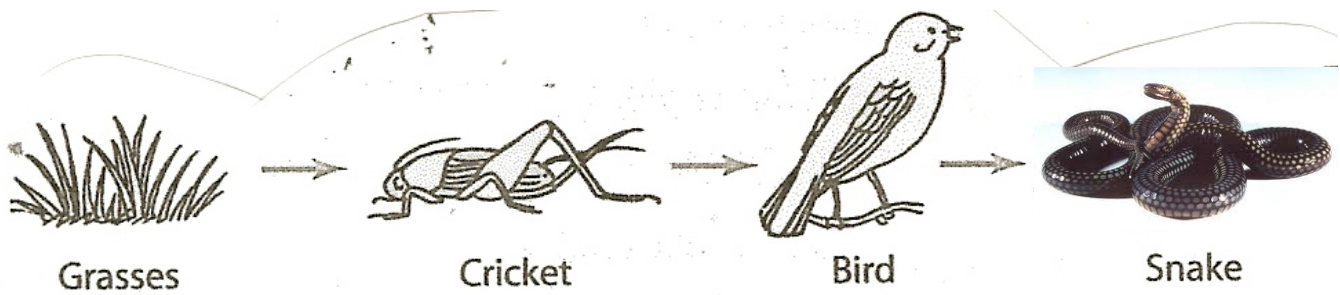
3. Which of the following statements is proven by his observations?

- A) The size of the aquarium is limiting the size of the population.
- B) Food is a limiting factor.
- C) Competition for food decreased.
- D) Disease was beginning to spread through the population.

4. A heat lamp was introduced and the temperature in the aquarium became extreme. The population would most likely

- A) increase.
- B) decrease.
- C) stay the same.
- D) increase initially then decrease rapidly.

5. The diagram below is a picture of a/an



- A) food chain.
- C) biosphere.

- B) food web.
- D) ecosystem.

6. The cricket in the above diagram is also known as a/an

- A) producer.
- C) secondary consumer.

- B) primary consumer.
- D) carnivore.

7. Which of the following would **decrease** the amount of nitrogen available to soils?

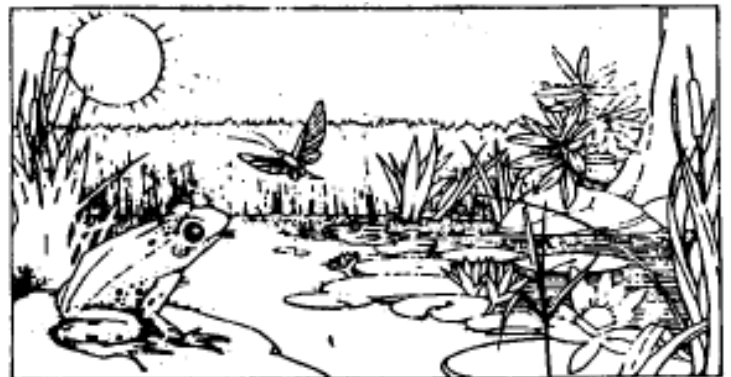
- A) Animals eliminating wastes
- B) Fertilizer run off
- C) Nitrogen-fixing bacteria in the soil
- D) All of the above decrease the amount of nitrogen available to soils

8. The carbon cycle does not involve

- A) water evaporating from oceans that rise and eventually form clouds.
- B) fossil fuel formation.
- C) producers that take CO₂ from the atmosphere.
- D) living organisms performing cellular respiration to make energy.

9. The picture is **best** described as a/an

- A) population.
- B) food web.
- C) community.
- D) food chain.



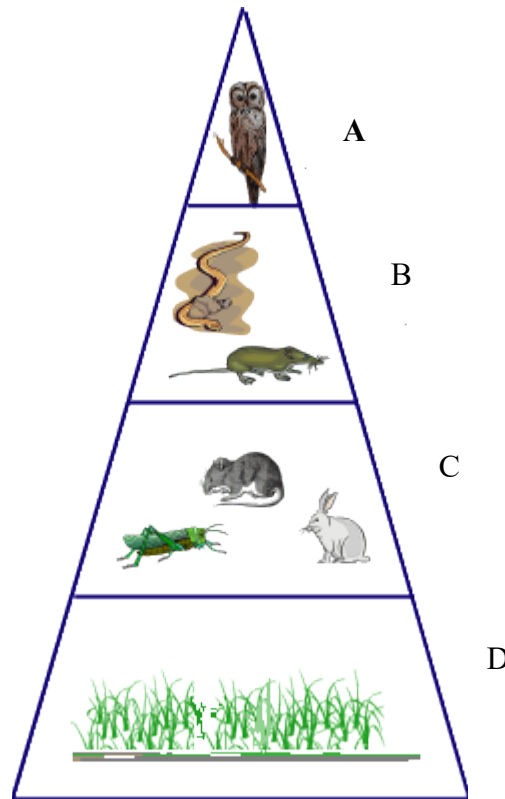
10. Density dependent factors can reduce the size of a population. An example of such a factor is

- A) flooding.
- B) extreme weather.
- C) disease.
- D) fire.

11. A specialized role in an ecosystem, such as a predator, refers to the organism's

- A) ecosystem function.
- B) niche.
- C) cycle.
- D) endangerment.

Examine the diagram below and answer questions #12, #13, and #14.



12. Which level in the pyramid contains the **most** energy?

- A) A
- B) B
- C) C
- D) D

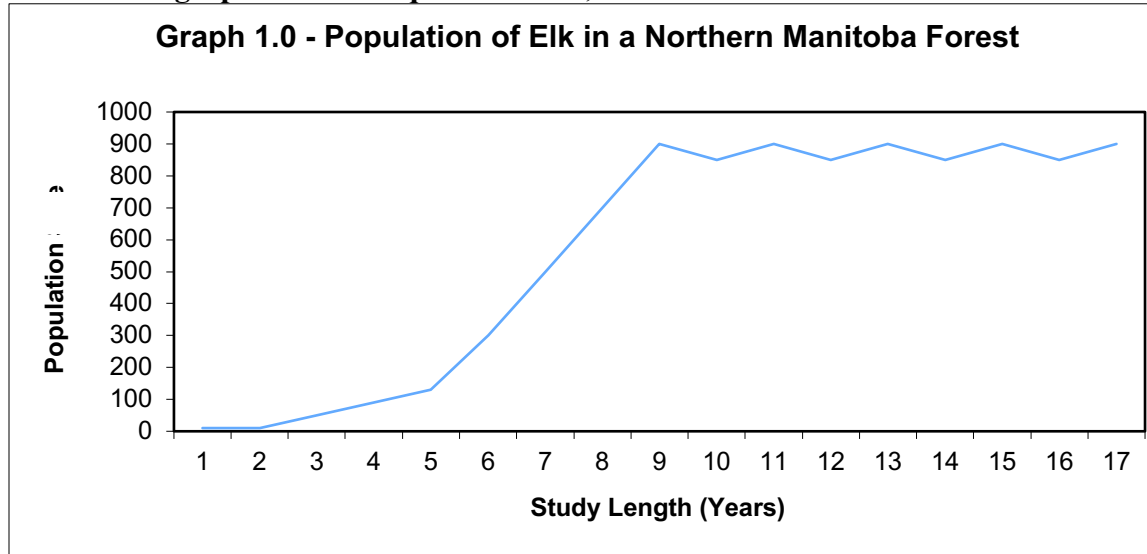
13. Which level(s) contains prey?

- A) A & B
- B) B & C
- C) A & C
- D) C & D

14. Which level is the top carnivore?

- A) A
- B) B
- C) C
- D) D

Consult the graph below for questions #15, and #16.



15. One reason that the elk population could have risen so quickly from year 1 to year 9 could be due to

- A) the introduction of disease.
- B) an increase in the death rate of the elk.
- C) a drought during those same years.
- D) an abundance of food available.

16. The reason for the fluctuation in the deer population past year 9 is **most** likely due to

- A) the carrying capacity being reached.
- B) resources are abundant.
- C) disease being introduced, then removed, then re-introduced, then removed etc.
- D) a decrease in competition for resources.

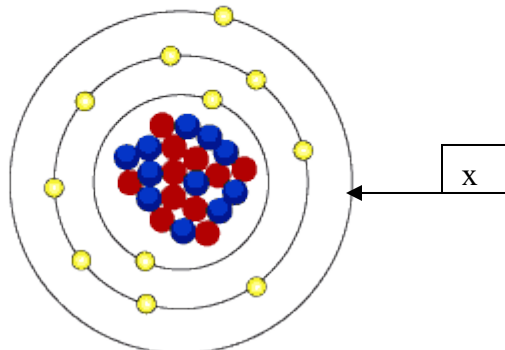
II: Chemistry in Action

17. The arrangement of electrons in an atom determines

- A) the name of atom.
- B) the type of chemical bond formed.
- C) if it is an acid or a base.
- D) the number of electrons that element will gain or lose when forming an ionic bond.

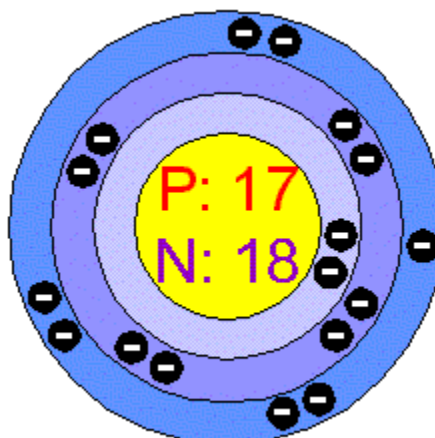
18. In the diagram below, “x” is pointing to the energy level that contains

- A) protons.
- B) protons & neutrons.
- C) total number of electrons.
- D) valence electrons.



19. Analyze the diagram below. In order to bond with another element, it will most likely

- A) gain one electron.
- B) lose one electron.
- C) gain seven electrons.
- D) lose seven electrons.



Examine the diagram below and answer questions #20, #21, and #22.

Periodic Table of Elements

The diagram shows a periodic table with the following groups labeled at the top: IA, IIA, IIIA, IVA, VA, VIA, VIIA, 0. The elements are color-coded by group: IA (yellow), IIA (cyan), IIIA (purple), IVA (green), VA (blue), VIA (orange), VIIA (red), 0 (pink), and transition metals (blue). Arrows point from boxes A, B, C, and D to specific elements: A points to Li, B points to F, C points to Ca, and D points to Kr.

1	2											3	4	5	6	7	8	9	10										
H	He											B	C	N	O	F	Ne												
3	4											13	14	15	16	17	18												
Li	Be											Al	Si	P	S	Cl	Ar												
11	12	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36												
Na	Mg	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr												
19	20											37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
K	Ca	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe												
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54												
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe												
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86												
Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn												
87	88	89	104	105	106	107	108	109	110																				
Fr	Ra	+Ac	Rf	Ha	106	107	108	109	110																				

* Lanthanide Series

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu

+ Actinide Series

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

20. The chemical family/group that contains the most reactive elements is

- A) A
B) B
C) C
D) They are all equally reactive.

21. The family/group located at D is known as the

- A) alkaline earth metals.
B) noble gases.
C) halogens.
D) chalcogens.

22. An element that contains exactly 1 valence electron while in its neutral state would be in group

- A) A
B) B
C) C
D) D

23. A covalent bond may form between

- A) beryllium and sodium.
B) sodium and nitrogen.
C) beryllium and fluorine.
D) fluorine and nitrogen.

24. Transfer of electrons occurs in

- A) the formation of molecules.
- B) ionic bonding.
- C) covalent bonding.
- D) metallic bonding.

25. Atoms with less than 4 electrons tend to

- A) lend electrons.
- B) gain electrons.
- C) share electrons.
- D) destroy electrons.

26. The Law of Conservation of Mass states that

- A) the total mass of the reactants is always greater than the total mass of the products.
- B) the total mass of the reactants is always less than the total mass of the products.
- C) the total mass of the reactants is always equal to the total mass of the products.

27. Which of the following **best** represents a synthesis reaction?

- A) $AB + CD \rightarrow AD + CB$
- B) $A + B \rightarrow AB$
- C) $AB \rightarrow A + B$
- D) $A + BC \rightarrow AC + B$

28. According to the following reaction: $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$, the reactant(s) is/are

- A) 2HgO
- B) 2Hg
- C) O_2
- D) $2\text{Hg} + \text{O}_2$

29. Consider the chemical compound Na_2O . The proper name for this compound is

- A) sodium oxide.
- B) disodium oxide.
- C) disodium monoxide.
- D) sodium monoxide.

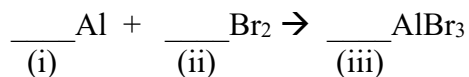
30. All strong bases contain

- A) oxygen.
- B) hydrogen.
- C) nitrogen.
- D) hydroxide.

31. Which pH would most likely belong to a weak acid?

- A) 1
- B) 5
- C) 7
- D) 10

32. Balance the following chemical equation by identifying which coefficients belong in the spaces provided.



- | | | |
|---------|-------|--------|
| A) i) 2 | ii) 2 | iii) 3 |
| B) i) 2 | ii) 3 | iii) 2 |
| C) i) 3 | ii) 2 | iii) 3 |
| D) i) 3 | ii) 3 | iii) 2 |

33. A neutralization reaction can also be classified as a _____ reaction.

- | | |
|-----------------------|-----------------------|
| A) synthesis | B) decomposition |
| C) single replacement | D) double replacement |

34. Sodium atoms

- | | |
|------------------------------|------------------------------|
| A) form ionic bonds. | B) form covalent bonds. |
| C) are present in all acids. | D) are present in all bases. |

35. Acid rain may be caused by

- | | |
|--------------------|--------------------------|
| A) nitrous oxides. | B) burning fossil fuels. |
| C) sulfur oxides. | D) all of the above |

III: In Motion

36. A car travels 5.1 km east, then turns and travels 1.7 km west. What is the displacement of the car?

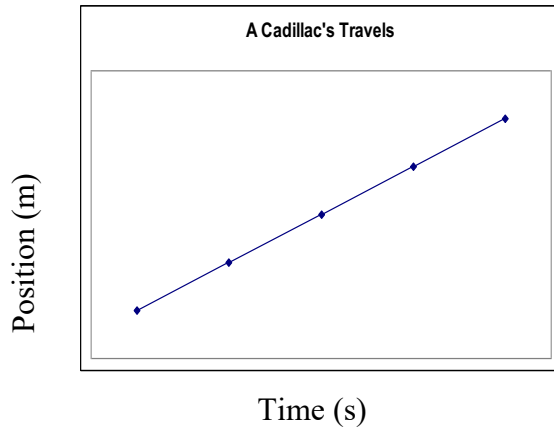
- | | |
|-----------|----------------|
| A) 6.8 km | B) 6.8 km east |
| C) 3.4 km | D) 3.4 km east |

37. The motion of the car in the above question took 0.25 hours. What was the **average velocity** of the car?

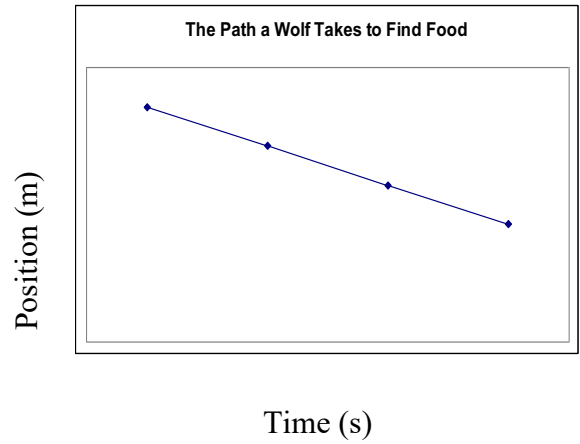
- | | |
|--------------|-------------------|
| A) 27.2 km/h | B) 27.2 km/h east |
| C) 13.6 km/h | D) 13.6 km/h east |

Use the graphs below to answer questions #38, #39, and #40.

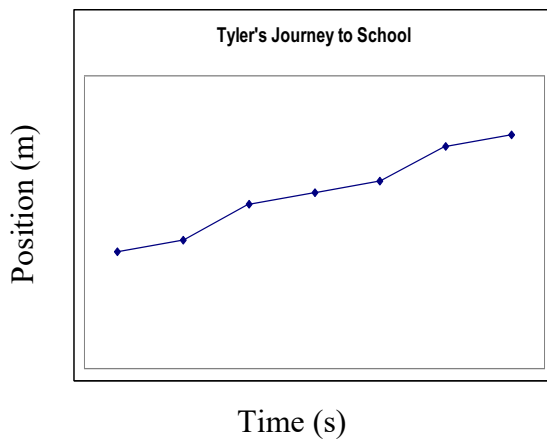
Graph 1



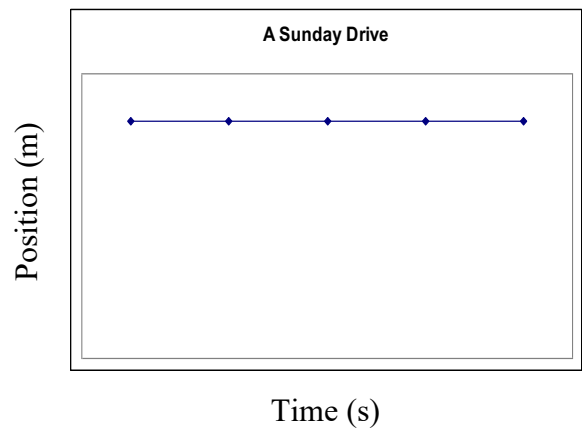
Graph 2



Graph 3



Graph 4



38. Which graph shows non-uniform motion?

- A) Graph 1
- C) Graph 3

- B) Graph 2
- D) Graph 4

39. Which graph shows an object that is **not** moving?

- A) Graph 1
- C) Graph 3

- B) Graph 2
- D) Graph 4

40. Which graph(s) shows motion shows an object moving backwards?

- A) Graph 2 & Graph 3
- B) Graph 3 & Graph 4
- C) Graph 2 only
- D) Graph 4 only

41. Which of the following is a **correct** measurement of distance?

- A) 300 km
- B) 5.5 km/h
- C) 66.7 km/h [E]
- D) 98 km [W]

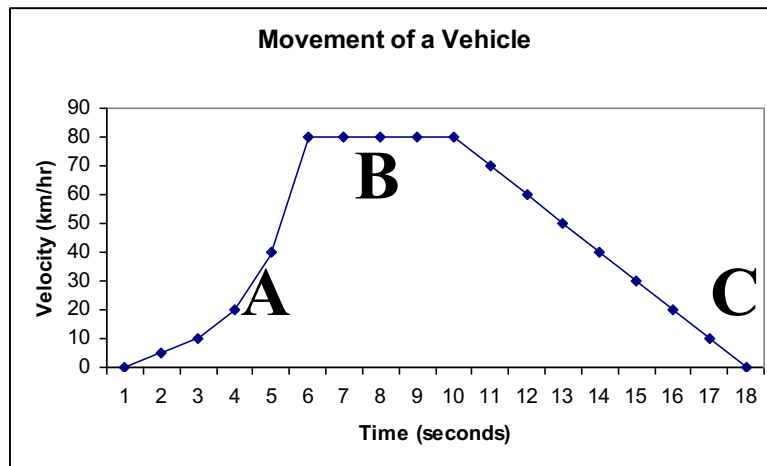
42. A grocery shopper is pushing a shopping cart down an aisle at a speed of 0.8 m/s. How long will it take to push the cart down an aisle with a length of 16 m?

- A) 20 s
- B) 20 m/s²
- C) 16 s
- D) 16 m/s²

43. While travelling down a different aisle, the shopper in the above question removed all items from the cart. What will happen when the shopper begins pushing the cart again?

- A) The shopper will have to use more force to push the cart.
- B) The shopper will have to use less force to push the cart.
- C) The amount of force needed to push the cart will not change.
- D) The cart will begin to move backward unless the shopper continues to push it forward.

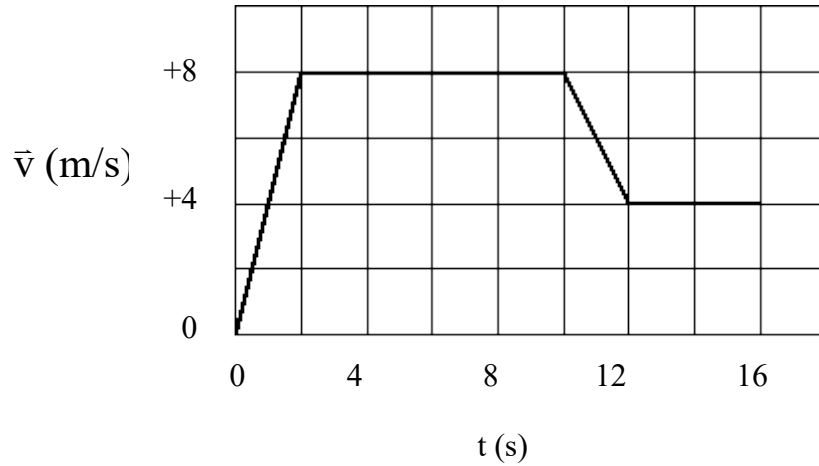
44. Examine the following velocity – time graph:



What is happening during segment A?

- A) The car is stopped.
- B) The car is moving at a constant velocity.
- C) The car is accelerating.
- D) The car is slowing down.

45. Examine the following velocity – time graph:



What is the acceleration between $t = 4$ and $t = 8$?

- A) 0 m/s
- B) 0 m/s^2
- C) +4 m/s
- D) $+4 \text{ m/s}^2$

46. Does knowing the distance a car travels in one hour give you enough information to find the general location of the car?

- A) Yes, because the distance will tell you how far away the car is.
- B) Yes, because a single distance provides information about the relative position of the car.
- C) No because distance and time do not tell you how far the car travelled.
- D) No, because the distance and time does not tell you what direction the car travelled.

47. In a class experiment, you collect data regarding a student's change in velocity over time. What property of motion can you calculate?

- A) Acceleration
- B) Displacement
- C) Average velocity
- D) Instantaneous speed

48. A student is walking through the mall. The table below gives the position of the student at various times. The position is measured from the main doors of the mall (0m).

Time (seconds)	Position (m)
0	0
10	20
20	50
30	60
40	75
50	100

When comparing the time intervals between 20-30 seconds and 40-50 seconds, it shows that

- A) The student is walking slower between 20-30 seconds than they are between 40-50 seconds.
- B) The student is accelerating in the positive direction between 40-50 seconds.
- C) The student is accelerating in the negative direction between 40-50 seconds.
- D) The student is not moving between 40-50 seconds.

49. Which of the following situations describes acceleration?

- A) A speed skater gliding at a constant speed in a straight line.
- B) A plane increasing its speed as it takes off from an airport.
- C) A boulder being pushed uphill at a constant speed.
- D) A car traveling at 60 km/h on a city street.

50. The tendency of a body to keep its present state of motion is called

- A) inertia.
- B) velocity.
- C) force.
- D) direction.

51. The famous “magic” trick shown below is actually an example of



- A) Newton’s first law.
- B) Newton’s second law.
- C) Newton’s third law.

52. An air bag is helpful in a car accident because it can

- A) increase the impulse.
- B) increase the time that a force acts on the accident victim.
- C) reduce the time that a force acts on the accident victim.
- D) reduce impulse.

53. When friction on a road increases the distance required to stop will

- A) be reduced.
- B) double.
- C) not change.
- D) quadruple.

IV: Weather Dynamics

54. Most weather phenomenon will occur in which layer of the atmosphere?

- A) troposphere
- B) stratosphere
- C) mesosphere
- D) thermosphere

55. Which of the following gases is present in the **highest** amount in the Earth’s atmosphere?

- A) Oxygen
- B) Nitrogen
- C) Hydrogen
- D) Carbon Dioxide

56. Hurricanes would not form in Winnipeg because

- A) Winnipeg is located far from a warm, large body of water.
- B) Winnipeg is located far from a cold, large body of water.
- C) hurricanes only form in the southern hemisphere.
- D) hurricanes only affect countries in Asia.

57. El Nino occurs in the

- A) Tropical Pacific Ocean.
- B) Tropical Atlantic Ocean.
- C) Polar Pacific Ocean.
- D) Polar Atlantic Ocean.

58. The jet stream is

- A) an ocean current that affects the North American climate.
- B) a weather phenomenon produced by the introduction of fresh water into the ocean.
- C) a weather phenomenon created by an increase in the amount of carbon dioxide in the atmosphere.
- D) a high altitude ribbon of fast moving air that moves from west to east over North America.

59. What type of surface would probably reflect the **most** incoming solar radiation?

- A) soil
- B) ice
- C) sand
- D) water

60. Land will gain or lose heat _____ water.

- A) faster than
- B) slower than
- C) at the same rate as
- D) unlike

61. What do scientists think would be **most** likely to happen if there were to be a two degree Celsius rise in the average temperature of the oceans?

- A) There would be less rainfall in rain forests.
- B) Tropical climates would be cooler.
- C) The polar icecaps would melt, causing flooding.
- D) There would be no deserts.

62. The type of weather found at the center of a high pressure system is usually

- A) cloudy.
- B) rainy and windy.
- C) snowy and windy.
- D) sunny.

63. Compared to the climate conditions of dry, inland locations, the climate conditions of locations influenced by an ocean generally result in

- A) hotter summers and colder winters; a larger annual range of temperatures.
- B) hotter summers and colder winters; a smaller annual range of temperatures.
- C) cooler summers and warmer winters; a larger annual range of temperatures.
- D) cooler summers and warmer winters; a smaller annual range of temperatures.

64. Read the following description of a severe weather event:

Typically it first appears as a rotation in a huge thunder cloud, behind a shroud of heavy rain or hail. The sky usually turns green, yellow or black. Soon, a violently rotating cloud appears and sounds like the rumble of a freight train or a jet and can be quite deafening. This severe storm typically snakes erratically from southwest to northeast, toppling buildings, scattering debris and tossing cars as though they were toys. It can last just a few minutes or a few hours and usually leaves a wake of destruction. The Fujita scale measures the intensity of this storm.

What severe weather event is this passage describing?

- A) a hurricane
- B) a tornado
- C) a blizzard
- D) a thunderstorm

65. Approximately _____ of the hydrosphere is fresh water.

- A) 98%.
- B) 87%.
- C) 15%.
- D) 3%