

Name: Answer Key

# Regular General Science Secondary IV

Exam Review Package

December 20<sup>th</sup> 2017

10:55 a.m.—2:25 p.m.

11:25

## Topics

- Ecotoxicology
- Forces
- Energy
- Electricity

## Bring to the Exam:

- Multiple pencils
- Eraser
- Calculator or 2
- Ruler
- Kleenex
- Cough drops
- Water bottle

ST Regular General Review December 2017

1)

In a simple electric circuit, a 24-ohm resistor is connected across a 6.0-volt battery. What is the current in the circuit?

$$\frac{V}{R} = \frac{IR}{R} = \frac{6.0V}{24\Omega} = 0.25A$$

2sf

- (1) 1.0 A                      (3) 140 A  
 (2) 0.25 A                    (4) 4.0 A

2)

The current through a 10.-ohm resistor is 1.2 amperes. What is the potential difference across the resistor?

$$V = IR = (1.2A)(10.\Omega) = 12V$$

2sf

- (1) 8.3 V                      (3) 14 V  
 (2) 12 V                      (4) 120 V

3)

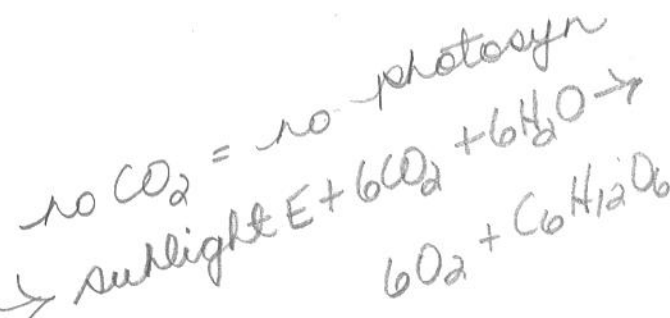
A fruit fly is classified as a consumer rather than as a producer because it is unable to

- (1) reproduce asexually  
 (2) synthesize its own food  
 (3) release energy stored in organic molecules  
 (4) remove wastes from its body
- plant = food maker*  
*consumer = eater*

4)

The most likely result of completely removing carbon dioxide from the environment of a plant is that sugar production will

- (1) continue at the same rate ~~X~~  
 (2) increase and oxygen production will also increase ~~X~~  
 (3) increase and oxygen production will stay the same ~~X~~  
 (4) decrease and eventually stop



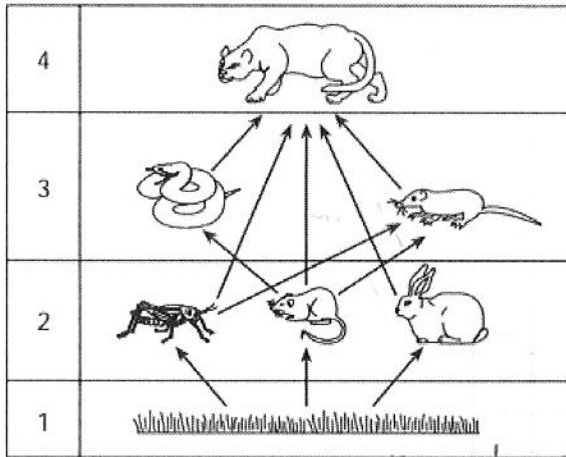
5)

Fungi are decomposers that play an important role in the maintenance of an ecosystem. The role of fungi is important because they

- (1) synthesize energy-rich compounds that are directly used by producers  
 (2) break down materials that can then be used by other organisms  
 (3) limit the number of plants that can perform photosynthesis in an area  
 (4) are competitors of other consumers such as herbivores

6)

22 The diagram below represents a food web.



*producer = "self food makers"*

Which level contains organisms that carry out autotrophic nutrition?

- (1) 1
- (2) 2
- (3) 3
- (4) 4

7)

The concentration of a specific antibody in the blood of an individual was measured at various times over a period of 50 days. The results obtained are shown in the data table below.

**Antibody Concentration in an Individual**

Day	Antibody Concentration in Arbitrary Units (arb. units)
5	0
10	110
16	120
25	10
35	200
45	390
50	200

What is the independent variable?

time in days

What is the dependent variable?

antibody concentration in arb. units

Graph the data:



9)

### Secondhand Smoke and Estrogen

A fertility researcher conducted a study of pregnant women. The researcher's hypothesis was that the estrogen levels of pregnant women who were exposed to daily secondhand cigarette smoke would be higher than estrogen levels of pregnant women not exposed to daily secondhand smoke.

The researcher measured the estrogen levels of eight pregnant women each week throughout their pregnancy. Four of the women lived in houses with heavy smokers, the other four did not. The women's ages varied from 19 to 42 years old. Six of the women were pregnant with girls, one was pregnant with a boy, and one was pregnant with twin boys. The research was submitted for peer review.

Analyze this experiment. In your answer, be sure to:

*too big an age diff, not enough subjects, the 4 in non-smoking houses may have been exposed elsewhere*

- identify *one* error in the researcher's experimental design [1]
- identify *one* way, other than affecting estrogen levels, that secondhand smoke could affect a developing embryo [1]. *less O<sub>2</sub> = less growth*
- explain why the process of peer review is an important step in this research [1]

10)

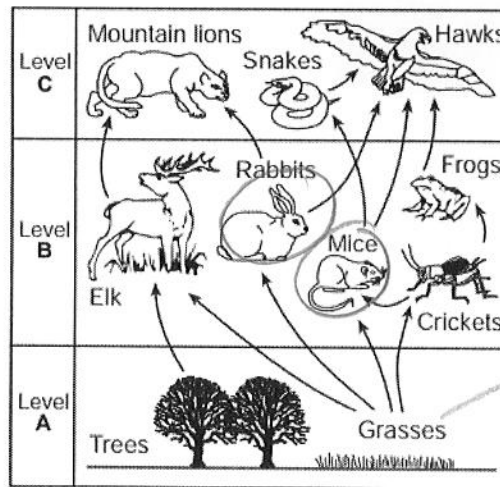
*scientific equals = determine whether the research is valid*

### Snowy Owls Move to the South

Snowy owls are large white birds that normally inhabit the cold northern regions of Canada. Recently, scientists and birdwatchers have sighted the snowy owls much farther south than usual.

When snowy owls are in northern areas, they feed on lemmings (small rodents). When lemmings are not available, as in the areas further south, the owls will seek out mice or rabbits as their food source.

Several snowy owls migrated into an area represented by the food web below.



*more grass because fewer mice*

Identify *one* population of organisms shown in the food web, other than rabbits or mice, that would likely be affected by the introduction of the snowy owls and explain why their population would be affected. [1]

- *less food for mountain lions = ↓ lions*  
*rabbits → lions*
- *same for Hawks but more so bec*  
*rabbits → Hawks*  
*mice →*

11)

What is the primary source of energy for Earth's weather systems?

- (1) incoming solar radiation
- (2) subtropical jet streams
- (3) precipitation from clouds
- (4) heat from Earth's interior

*no sun = no E on Earth*

12)

Most scientists infer that a major factor in the increased rate of melting of Earth's glaciers is

- (1) a decrease in the output of energy from the Sun ~~X~~
- (2) a decrease in Earth's atmospheric transparency ~~X~~
- (3) an increase in Earth's orbital distance from the Sun ~~X~~
- (4) an increase in carbon dioxide in Earth's atmosphere

13)

A black rock burned to make electricity is

A. Obsidian

B. Petroleum

C. Natural gas

D. Coal

*coal = FF → burn → heat E → water*  
*↓*  
*stea*  
*↓*  
*turbine*  
*↓*  
*generato*  
*↓*  
*electricity*

14)

Energy from heat inside the earth is

A. Natural gas

B. Geothermal

C. Terrathermal

D. Petroleum

15)

Energy from flowing water is

A. Hydropower

B. Flowpower

C. Geoflow power

D. Wind power

*= should be Hydroenergy!*

16)

Energy from wood, waste, and garbage is called

A. Trash power

B. Biothermal

C. Biomass

D. Human power

↓  
rots → gives of methane → burn

17)

A mixture of gases, that was formed from ancient sea plants and animals is

A. Coal

B. Natural gas

C. Petroleum

D. Geothermal

18)

Which is a list of fossil fuels?

A. Natural gas, petroleum, coal

B. Petroleum, geothermal, wind

C. Biomass, natural gas, petroleum

D. Coal, obsidian, petroleum

19)

What does renewable mean?

Discuss

A. It is a resource that is produced by the earth

B. It is a resource that is replaced at the same rate that it is being used.

C. It is a resource that is formed at a rate that is much slower than the rate at which it is being used

D. It is a resource that is made by humans

= non-renewable

20)

What does nonrenewable mean?

Discuss

- A. A resource that is replaced ~~at the same rate~~ that it is being used
- B. It is a resource that pollutes
- C. It is a resource that is formed at a rate that is much slower than the rate at which it is being used
- D. It is a resource that is made by humans

21)

Which of the following are renewable resources?

- ~~Oil and coal~~
- Solar rays and wind
- Water and biomass
- ~~Biomass and geothermy~~

Renewable =

- sunlight
- wind
- rain
- tides
- waves
- geothermal

22)

Which of the following is NOT an inexhaustible resource?

- Solar rays *renew*
- Wind *renew*
- Biomass
- Geothermy *renew*

23)

What is energy produced from natural resources used for?

- Produce heat
- Decrease dependence on fossil fuels
- Change the weather
- Produce air pollutants



24)

Why are non-renewable resources used most throughout the world as an energy source?

- Because they are expensive
- Because they help the environment
- Because people enjoy using non-renewable resources
- Because they cost less

25)

Which of the following is a benefit of wind power?

- It produces no air or water pollution.
- It is a no-emissions energy source.
- It has low operational costs.
- All the answers are correct.

26)

Which of the following is a renewable energy source?

Geothermal

All the answers are correct.

Wind

Biofuels

*technically yes if the plants used are grown in a sustainable fashion*

27)

What are energy resources that are not easily replenished by the environment known as?

Eolic

Chemical

Non-renewable

Renewable



32)

Energy is released from fossil fuels when they are

- A. cooled
- B. burned
- C. pressurized
- D. sterilized

33)

Petroleum and natural gas are generally formed from remains of

- A. birds
- B. sea organisms
- C. mammals
- D. plants → seas → fossils

34)

Certain gases in the atmosphere – water vapor, carbon dioxide, methane and nitrous oxide – help maintain the Earth's temperatures and climate. These are called: \_\_\_\_\_.

- A ozone gases
- B solar gases
- C greenhouse gases
- D stomach gases

GHGs = good if kept to normal levels

35)

Too many greenhouse gasses in the atmosphere may block heat from escaping into space and trap too much heat next to the Earth's surface causing: \_\_\_\_\_.

- A another ice age
- B global warming
- C earthquakes
- D volcanic eruptions

GHGs → GHE

if GHE ↑ → global warming + climate change

40)

If 90J of energy goes into a torch and 50J is given out as light, how much is given out as heat - the only other product?

- 40J
- 90J
- 50J

flashlight if you're British

$$90J_{in} - 50J_{out} = 40J_{other\ out}$$

41)

How much of the energy in an average fossil fuel-burning power plant is lost as waste heat?

- About 15 percent
- About 25 percent
- About 45 percent
- About 65 percent

wow!!

42)

Which type of light bulb is the most efficient at converting energy into light?

- Incandescent
- CFL
- LED

$$\% \text{ eff} = \frac{\text{work out}}{\text{work in}} \times 100 = \frac{230J}{420J} \times 100 = 55\%$$

43)

A mechanical device requires 420 J of work to do 230 J of work in lifting a crate. What is the efficiency of the device?

- a. 55%
- b. 183%
- c. 190%
- d. 0.5%

44)

What does Ohm's Law state?  $= \uparrow V = \uparrow I = \text{direct variation}$

What is wrong with this graph even though the independent and dependent are correct?

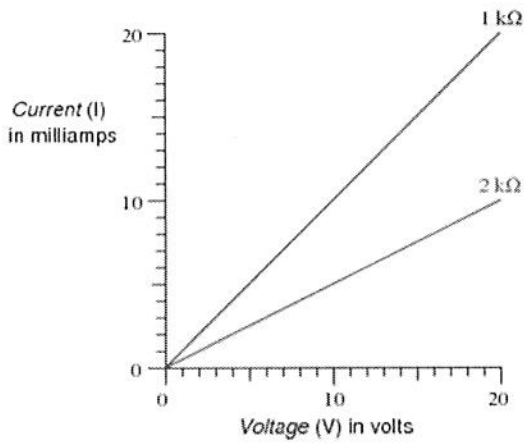
Explain. *Cannot calculate R from this graph.*

Can you calculate resistance  $\otimes$  from this graph? Explain. What would you have to do?

*V was the independent variable & is correctly graphed on the x-axis but  $R = \frac{V}{I} \therefore$  need to find  $y = mx$*

$$V = RI$$

$$\therefore \frac{\Delta V}{\Delta x} = \frac{V_2 - V_1}{x_2 - x_1} = R (\Omega)$$



$$V = \frac{J}{C}$$

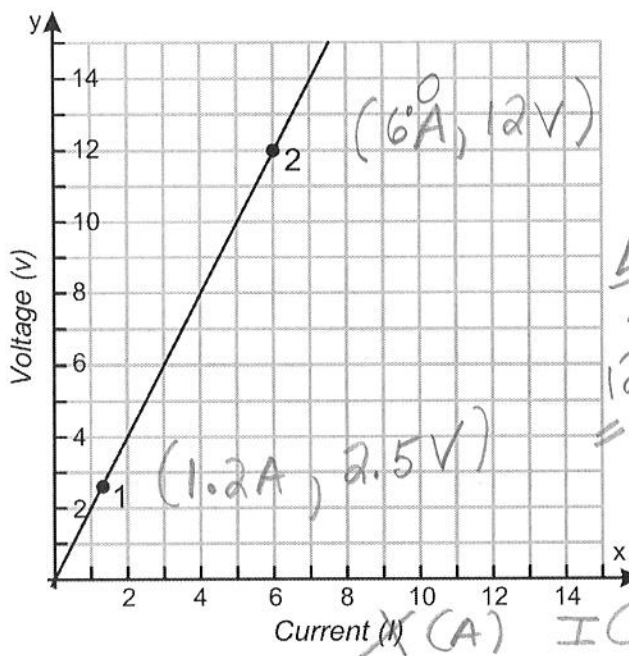
$$A = \frac{C}{s}$$

many many units

What units do you have to use when doing electricity problems?

- V (V)
- I (A)
- R ( $\Omega$ )
- P (W)
- P ( $\frac{J}{s}$ )
- P (kW)
- E (J)
- E (kWh)
- E (Ws)
- E (Wmin)
- E (Wh)

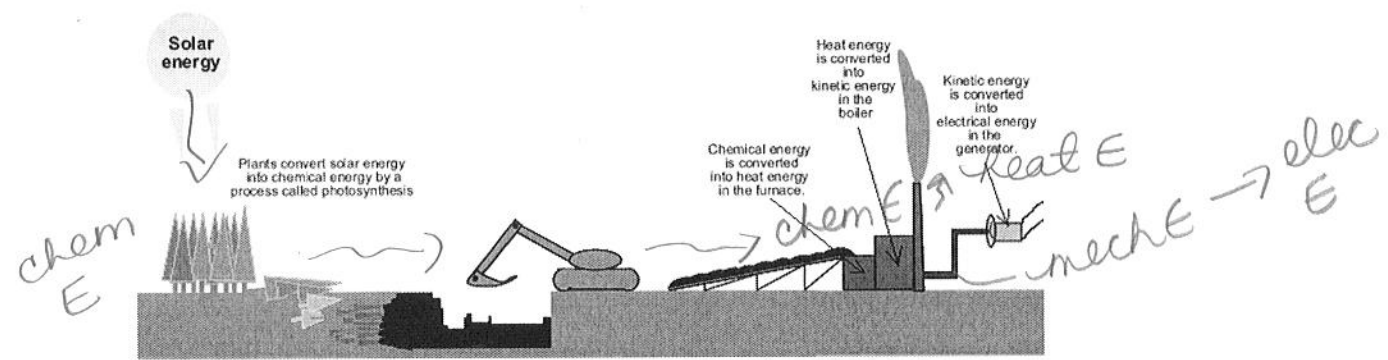
45) Graph of Voltage vs Current for an Unknown Resistor



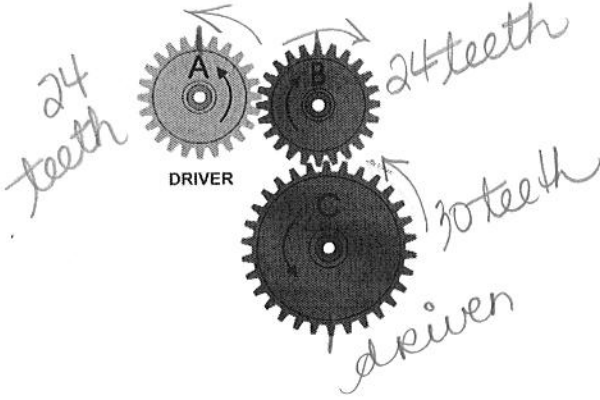
$$\frac{\Delta V}{\Delta I} = \frac{12V - 2.5V}{6A - 1.2A} = 2.0 \Omega$$

Calculate the resistance of the unknown resistor:  $R = 2.0 \Omega$

46) Indicate the Energy Transformations that take place from start to finish:



What would be the gear ratio for the following set of gears?



$$\frac{\text{driver}}{\text{driven}} = \frac{24 \text{ teeth}}{24 \text{ teeth}} = \frac{1}{1} \therefore \text{same speed}$$

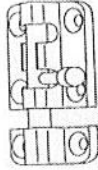
$$= \frac{24 \text{ teeth}}{30 \text{ teeth}} = 0.8 \times = \text{slower}$$

48. Football is a sport that requires a lot of equipment, including a helmet. Inside the helmet is a layer of flexible padding to protect the player's head. It is held in place with glue. What are the characteristics of the link between the padding and the helmet? Explain each characteristic.

*link*

- a. Direct or indirect?
- b. Rigid or flexible?
- c. Removable or non-removable?
- d. Complete or partial?

49. Safety bolts like the one illustrated below are used to lock doors. What are the characteristics of the link between the bolt and the housing? Explain each characteristic.



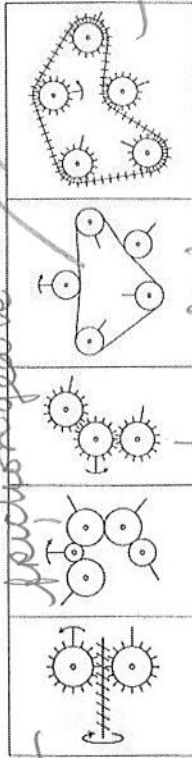
- a. Direct or indirect?
- b. Rigid or flexible?
- c. Removable or non-removable? = *cannot really tell*
- d. Complete or partial?

50. During a family breakfast, you explain that there are three main types of guiding. You use the jar of peanut butter with its screw-on lid, the cutlery drawer, the refrigerator door and the kitchen scissors as examples. Which type of guiding does each of these objects demonstrate?

- a. jar of peanut butter = *helical translation*
- b. cutlery drawer = *rotational y axis*
- c. refrigerator door = *rotational*
- d. kitchen scissors = *rotational*

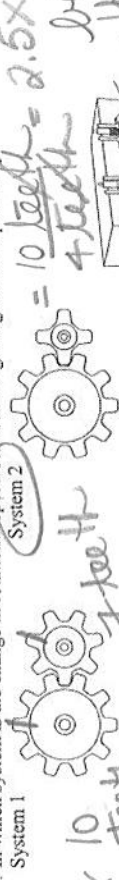
51. For a study on motion transmission, you have been asked to provide information on the main systems that perform this mechanical function. For each diagram below:

- a. Name the motion transmission system.
- b. Write "yes" or "no" regarding the possibility of reversibility.
- c. Complete the diagram by indicating the direction of rotation of each of the driver and driven components in the system.



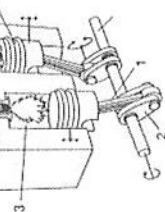
*worm gear*  
*worm gear*  
*gear train*  
*belt + pulley*  
*chain sprocket*

52. In which system is the change in rotational speed between the gears greater? Explain why.



$$\frac{\text{driver}}{\text{driven}} = \frac{10 \text{ teeth}}{7 \text{ teeth}} = 1.4 \times$$

*because the fewer the teeth on the smaller the diameter the faster it turns*



53. Does this drawing represent a motion transmission or a motion transformation system? Explain your answer.  
*slider - crank*

54. What is the name of this type of system?

*converts translational motion to rotational motion => Crank system*

36)

Heat is defined as....

---

- None of these choices.
- The temperature of matter.
- The energy of a molecule.
- The energy that is transferred between matter at different temperatures.

37)

What does temperature measure?

---

- The potential energy of molecules.
- The heat of matter.
- The energy of an atom.
- The kinetic energy of the molecules.

38)

If a torch takes in 50J of energy and transfers 20J to light. What is its efficiency?

- 20%
- 50%
- 40%

39)

A fan takes in electrical energy and gives out movement, heat and sound. Which type of energy is useful?

- Heat
- Movement
- Sound