SC10F Exam Review

Atoms and Elements

1. Match the words on the left with the definitions on the right.

__C__	matter	(A)	Any two or more atoms bonded together.
__J__	mass	(B)	A change in the form or appearance of a substance.
__M__	weight	(C)	Anything that occupies space.
__H__	atom	(D)	A pure substance that can be broken down by chemical changes.
__A__	molecule	(E)	Two or more substances that are together and can be separated by physical changes.
__D__	compound	(F)	A mixture that is the same throughout.
__E__	mixture	(G)	A mixture with visible components.
__F__	homogeneous mixture	(H)	The smallest particle of an element that has the properties of that element.
__G__	heterogeneous mixture	(I)	When two or more substances join to form new substances with new chemical properties.
__L__	physical property	(J)	The amount of matter in an object.
__K__	chemical property	(K)	The ability (or inability) to change from one type of matter into another type.
__B__	physical change	(L)	A characteristic of matter that is not associated with a change in its chemical composition.
__I__	chemical change	(M)	The force of gravity acting on an object.

2. Indicate if each of the following is a homogeneous mixture, heterogeneous mixture, compound, or element.

   (a) Water _____***compound***_____

   (b) Coffee _____***homogeneous mixture***_____

   (c) Sugar _____***compound***_____

   (d) Nitrogen _____***element***_____

   (e) Buttered popcorn _____***homogeneous mixture***_____

3. Indicate if each of these is a physical or chemical property.

   (a) Boiling point _____***physical***_____

   (b) Acidity _____***chemical***_____

   (c) Color _____***physical***_____

   (d) Flammability _____***chemical***_____

   (e) Hardness _____***physical***_____

4. Indicate if each of the following is a chemical change or a physical change.

   (a) Burning wood _____***chemical***_____

   (b) Tearing a piece of paper in half _____***physical***_____

   (c) Adding sugar to a glass of water _____***physical***_____

   (d) Baking a cake _____***chemical***_____

   (e) Boiling water _____***physical***_____

5. Complete the following table.

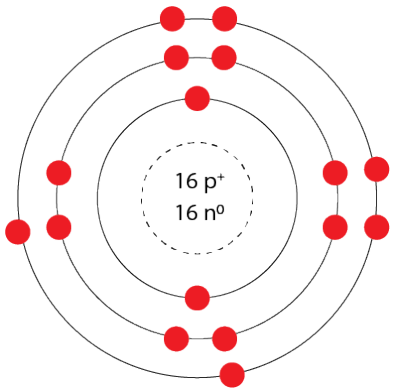
Particle	Symbol	Charge	Location
proton	p^+	*positive*	*nucleus*
neutron	*n0*	neutral	*nucleus*
electron	*e-*	*negative*	clouds surrounding nucleus

6. Complete the following chart.

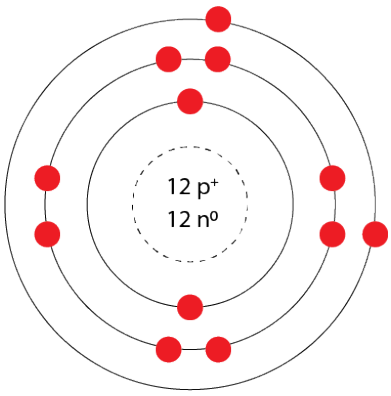
Element name	Element Symbol	Atomic number	Mass number	Number of protons	Number of electrons	Number of neutrons	Family name
Potassium	*K*	*19*	*39*	19	*19*	*20*	*Alkali metals*
Neon	*Ne*	10	*20*	*10*	*10*	*10*	Noble gases
Fluorine	*F*	*9*	*19*	*9*	*9*	*10*	Halogens

7. Draw a Bohr diagram of each of the following elements.

(a) Sulfur



(b) Magnesium



8. List the properties of metals and non-metals.

Metals	Non-metals
shiny	***dull***
malleable	***brittle***
ductile	***poor conductors of heat and electricity***
good conductors of heat and electricity	

9. List the name and quantity of each element in the following compounds.

(a) $NaNO_3$

Na – Sodium = 1
N – Nitrogen = 1
O – Oxygen = 3

(b) $Mg(OH)_2$

Mg – Magnesium = 1
O – Oxygen = 2
H – Hydrogen = 2

Reproduction

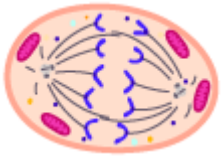
10. Compare and contrast mitosis and meiosis by completing this table. Use the word phrases below.

Mitosis	Same for Both	Meiosis
Creates 2 diploid cells	*A type of cell division*	*Creates 4 haploid cells*
One stage of division	*Creates new cells*	*Two stages of division*
Body cells divide	*Replicates DNA*	*Sex cells divide*
No genetic diversity		*Creates genetic diversity*
Identical to parent cell		*Different than parent cell*

Creates 4 haploid cells	Creates genetic diversity
Creates 2 diploid cells	No genetic diversity
A type of cell division	Identical to parent cell
One stage of division	Different than parent cell
Two stages of division	Replicates DNA
Creates new cells	
Body cells divide	
Sex cells divide	

11. The following pictures represents cells in the various stages of mitosis.

Anaphase

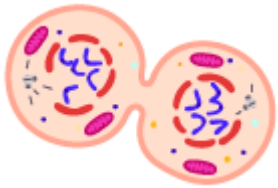


(A)

Prophase

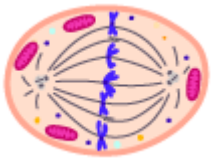
(B)

Telophase



(C)

Metaphase



(D)

Images: CK-12 (CC BY-NC 3.0)

Put the stages in the correct order. ___***B, D, A, T***_____

12. Indicate if each statement describes sexual or asexual reproduction.

(a) Only one parent required _____***asexual***_____

(b) Two parents required _____***sexual***_____

(c) Offspring are genetically identical to the parent _____***asexual***_____

(d) Offspring are never genetically identical to the parent ____***sexual***_____

(e) Rapid population growth ____***asexual***_____

(f) Minimal pest resistance _____***asexual***_____

(g) Easier for a species to adapt to new environmental conditions ____***sexual***_____

13. Indicate the type of asexual reproduction being described. A list is provided following the descriptions.

(a) ____***Fragmentation***____ A parent organism is split into multiple parts, each of which grows to become a complete, independent, offspring organism.

(b) ____***Budding***_____ Offspring grows out of the body of the parent, then breaks off into a new individual.

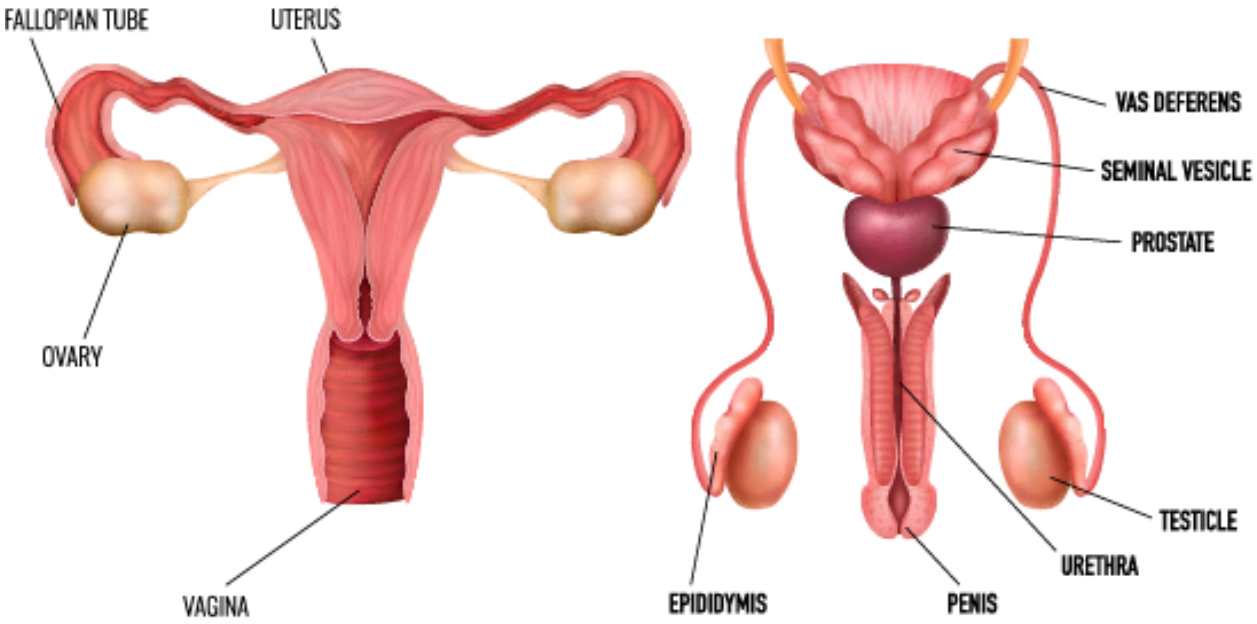
(c) ____***Layering***_____ A stem attached to the plant is bent and covered with soil.

(d) _***Vegetative propagation***_ A plant grows a new shoot which can become a whole new organism.

(e) ____***Cuttings***_____ A portion of the stem containing nodes and internodes is placed in moist soil and allowed to root.

Budding	Fragmentation	Spores	Vegetative propagation
Cuttings	Grafting	Layering	

14. Label the following diagrams of the human reproductive system.



Credit: macrovector (Adobe Stock Photo)

epididymis	penis	testicle	vagina
fallopian tube	prostate	urethra	vas deferens
ovary	seminal vesicle	uterus	

15. Match the parts of the female and male reproductive systems with the appropriate function.

A.	epidiymus	___B___	connect ovaries to the uterus
B.	fallopian tubes	___C___	produce eggs and secrete estrogen
C.	ovaries	___F___	produce sperm and secrete testosterone
D.	penis	___H___	passageway for a baby to leave the mother's body
E.	prostate gland	___E___	secrete substances that become part of semen
F.	testes	___D___	path for sperm to leave body through the urethra
G.	uterus	___A___	store sperm until they leave the body
H.	vagina	___I___	transport sperm from the epididymis to the urethra
I.	vas defrens	___G___	where a fetus grows and develops until birth

16. Indicate the hormone(s) that is responsible for the activity.

Hormone(s)	Activity
FSH ***LH***	released from the anterior pituitary
FSH ***LH***	stimulate sperm production and testosterone secretion by the testes
Estrogen ***Progesterone***	regulate a female's ovarian and menstrual cycle
Testosterone	responsible for the secondary sexual characteristics that develop in the male during adolescence
Estrogen	responsible for the secondary sexual characteristics of females
Testosterone	stimulates sperm production and operates as a feedback control to the hypothalamus

FSH	LH	Testosterone	Estrogen	Progesterone

17. Fill in the blanks with words from the word bank.

The male ___*sperm*___ cell and the female _____*egg*_____ fuse together to produce a ____*zygote*_____ that travels down the fallopian tube to the _____*uterus*_____. It grows as it travels and becomes a blastocyst. The blastocyst embeds in the lining of the uterus forming an _____*embryo*_____. The embryo begins to grow and become more complex. After about eight weeks, it has developed specialized cells and most organs. At this stage it is now referred to as a _____*fetus*_____.

egg	embryo	fetus	sperm	uterus	zygote

The Nature of Electricity

18. Fill in the blanks with words from the word bank below. (Some words will be used more than once and other words will not be used at all).

(a) There are two types of charges: ___*positive*___ and ___*negative*___. Objects with the same charge __*repel*__ each other and objects with opposite charges __*attract*__ each other. An object becomes positively charged when __*electrons*__ are __*removed*__. An object becomes negatively charged when __*electrons*__ are __*added*__.

(b) When a positively charged rod is brought near a neutral plastic ball. The charges inside the ball separate. This is called __*polarization*__. If the charged rod touches the ball, __*electrons*__ will move from the ___*ball*___ to the __*rod*__ and the ball will have a __*positive*__ charge. This process is known as charging by ___*conduction*___.

(c)

(A) (B)

A negatively charged balloon is brough near a soda can as shown in picture (A). The __*electrons*__ move away from the balloon to the far end of the can. The can is then touched by a hand as shown in picture (B). Some __*electrons*__ move from the ___*can*___ to the ____*hand*____. If the hand is removed while the balloon is still present, the can will have a ____*positive*____ charge.

added	can	hand	polarization	removed
attract	conduction	induction	positive	repel
ball	electrons	negative	protons	rod

19. Label each of the following as a conductor or an insulator.

(a) copper _____***conductor***_____

(b) plastic _____***insulator***_____

(c) rubber _____***insulator***_____

(d) aluminum ___***conductor***_____

20. Match the words on the left with the definitions on the right.

_***D***___ conductor	(A) The rate at which charge flows through a circuit.
_***E***___ insulator	(B) Energy per unit charge.
_***A***___ current	(C) Rate at which energy is transformed.
_***B***___ voltage	(D) A material in which electrons can move freely.
_***C***___ power	(E) A material in which electrons cannot move freely.

21. 100 C of charge flows past a point in a circuit in 2 s. Calculate the current in the wire?

$$I = \frac{Q}{t}$$
$$I = \frac{100}{2} = 50 \text{ A}$$

22. 2.5 A of current flow through a wire each second. How much charge flows in the same amount of time?

$$I = \frac{Q}{t}$$
$$2.5 = \frac{Q}{1}$$
$$Q = 2.5 \text{ C}$$

23. 6 C of electric charge flows through a resistor which uses 12 J of energy. What is the potential difference across the resistor?

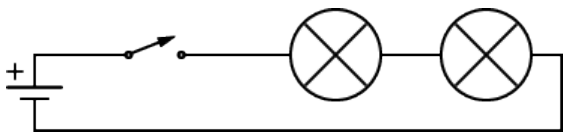
$$V = \frac{E}{Q}$$
$$V = \frac{12}{6} = 2 \text{ V}$$

24. How much energy does each electron (Q = 1.6×10^{-19} C) have in a 9 V battery?

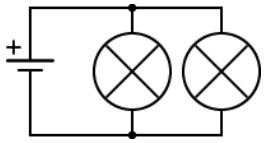
$$V = \frac{E}{Q}$$
$$9 = \frac{E}{1.6 \times 10^{-19}}$$
$$E = 1.44 \times 10^{-18} \text{ J}$$

25. Draw a circuit diagram of an electric circuit with

(a) 1 battery, 2 light bulbs and a switch in series.



(b) 1 battery and two light bulbs in parallel.



26. An electric lamp uses a current of 2.5 A when connected to 120 V. Calculate the power the lamp uses?

$P = IV$
$P = 2.5 \times 120 = 300 \text{ W}$

27. Why would it be dangerous to use an extension cord rated for 10 A with a toaster oven that uses 13 A?

When current flows through a wire heat is produced due to the resistance. The cord is only rated for 10 A. If the current is greater than 10 A too much heat could be produced and the cord could catch on fire.

28. A TV uses 120 W of power.

(a) How much energy in kWh does the TV use if you watch it for 4 hours?

$Energy = \frac{120}{1000} \times 4 = 0.48 \text{ kWh}$

(b) Electricity costs \$0.10 per kWh. How much would it cost to watch TV 4 hours a day, every day, for the whole year?

$0.48 \times 365 \times \$0.10 = \$17.52$

Genetics

29. Indicate if the following genotypes are homozygous dominant, homozygous recessive or heterozygous.

    (a) Dd ___*heterozygous*_____

    (b) DD ___*homozygous dominant*_____

    (c) dd ____*homozygous recessive*_____

30. In pea plants, purple flowers (P) are dominant to white flowers (p). State the phenotypes for each of the following genotypes.

    (a) PP ____*purple*_____

    (b) Pp ____*purple*_____

    (c) pp ____*white*_____

31. In horses, black coat color (B) is dominant to chestnut coat color (b). A heterozygous black coat male is mated with a chestnut coat female.

    (a) Indicate the genotype of the male and the female horses.

    Male: _____*Bb*_____ Female: _____*bb*_____

    (b) Complete a Punnett square showing the cross between these two horses.

	B	b
b	Bb	bb
b	Bb	bb

    (c) What percentage of the offspring will have black coats?

    50%

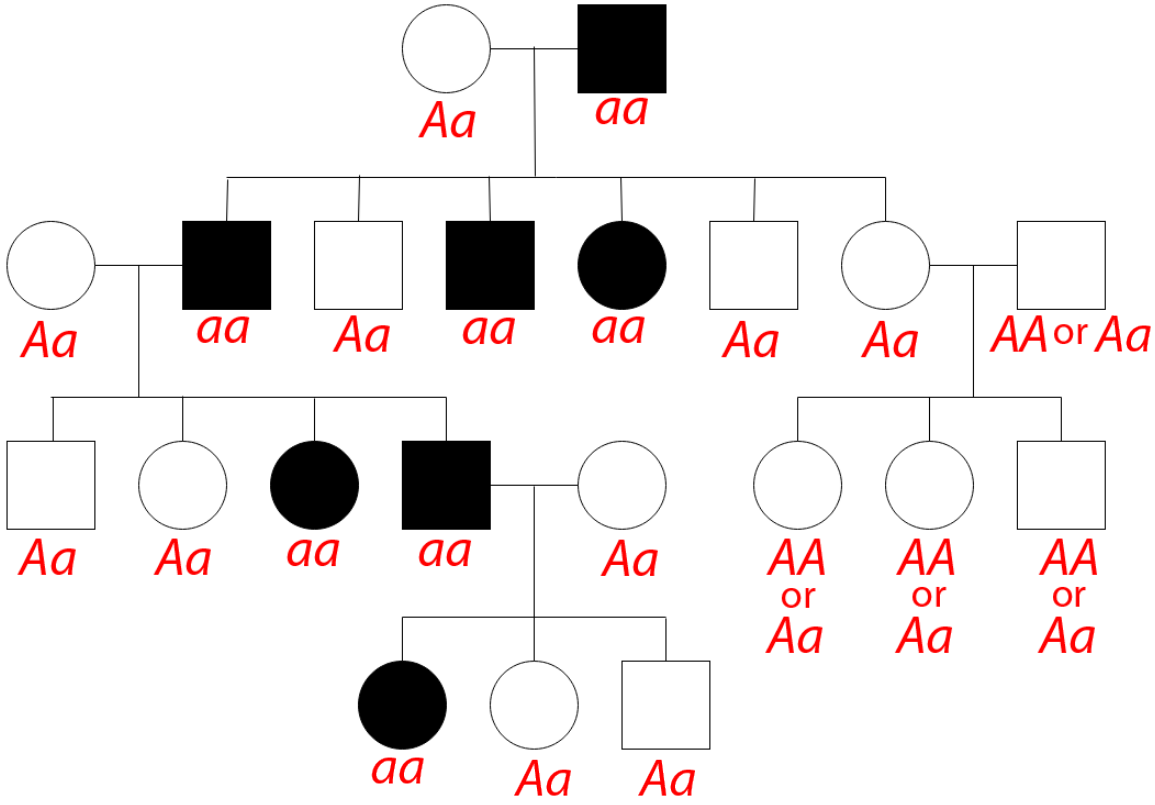
32. Traits controlled by genes located on sex chromosomes are called __*sex-linked*_____ traits.

33. Red-green color blindness is a recessive x-linked disorder. Show how it is possible for a normal father to have children that are color blind.

A normal father (X^BY) can have children that are color blind if the mother has at least one recessive allele (X^b). She can either be a carrier or be color blind.

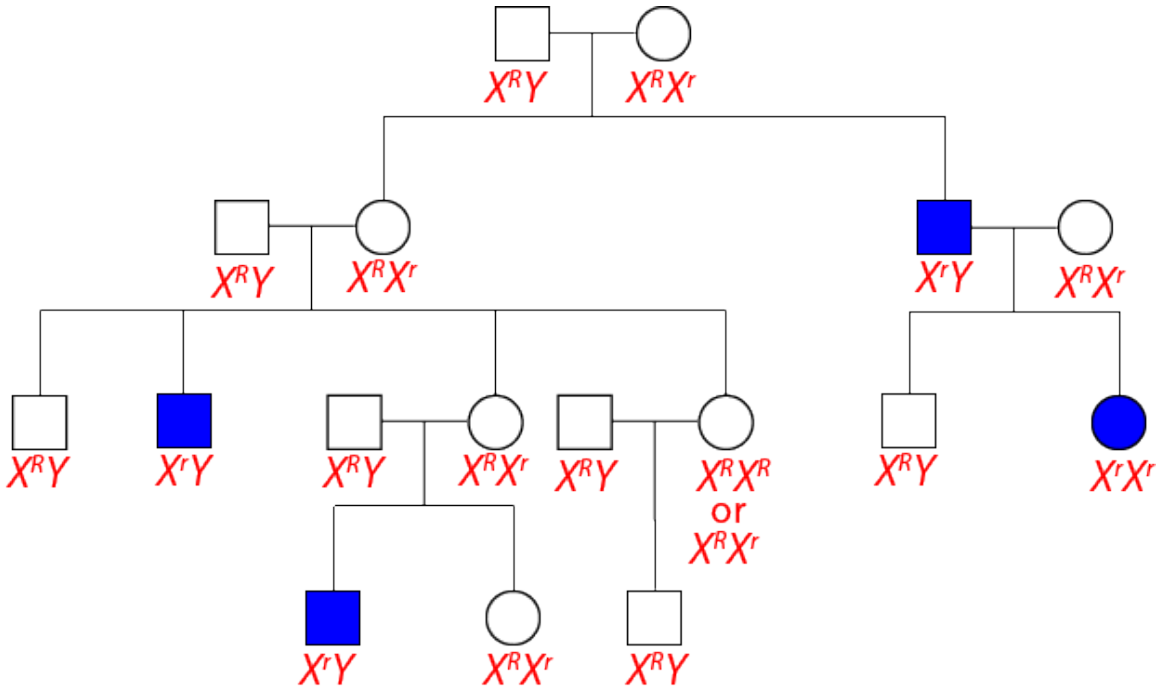
	X^B	Y
X^b	X^BX^b	X^bY

34. The following pedigree tracks an autosomal recessive disorder.



Indicate the genotype of each person in the pedigree. Use "A" for dominant and "a" for recessive.

35. The following pedigree tracks an x-linked recessive disorder.



Indicate the genotype of each person in the pedigree. Use "R" for dominant and "r" for recessive.