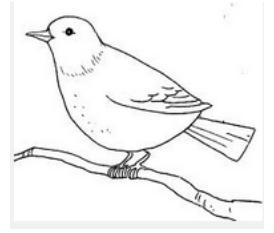1. a)   In the phosphorus cycle, what could add some form of phosphorus to the soil? List two sources.

Industrial fertilizer or manure (animals) or bird waste or green "manure" (dead plants or compost have a lower % of phosphates)

b) What organisms convert organic phosphorus compounds to HPO_4^{2-} and PO_4^{3-}?

bacteria

c) Why could the runoff of phosphates be a problem? List three possible complications.

Because excess algae can develop it could lead to:

(1) Loss of oxygen in water due to decomposition of algae. Recall that most oxygen produced by living algae escapes to atmosphere so is not added to the water.
(2) Production of toxins. Some blue green algae do this.
(3) Dead algae can actually make ponds or small lakes shallower.
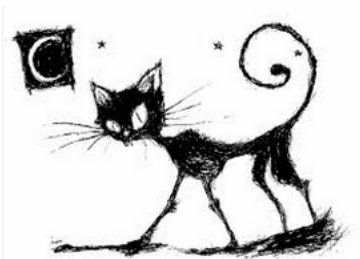
2. In cats, black fur(b) is a recessive trait. You have two black cats whose parents had tabby-coats(dominant).

What is the probability that their mother will have more black kittens? Show a Punnett square.

Their mother must have been Bb to be tabby coated and to have the possibility of producing bb(black kittens). The Tabby-coated father, for the same reason, also had to be Bb.

	B	b
B	BB	Bb
b	Bb	bb

Bb: ¼ = 25%. Notice that it's like the stock-market. Previous records to not change the probability of future outcomes.

3. In peas, seed shape and seed color are Mendelian traits found on separate chromosomes..
R is the allele for the dominant, spherical shape characteristic; r is the allele for the recessive, dented shape characteristic. **L is the allele for the dominant, yellow color characteristic**; l is the allele for the recessive, green color characteristic.
What will be the phenotypic ratio of the offspring, if a rrLl pea plant is crossed with

RrLl? Show a Punnet square (4 marks)

	rL	rl	rL	rl
RL	RrLL	RrLl	RrLL	RrLl
Rl	RrLl	Rrll	RrLl	Rrll
rL	rrLL	rrLl	rrLL	rrLl
rl	rrLl	rrll	rrLl	rrll

Spherical and yellow: 6/16 : 37.5%
Spherical and green: 2/16: 12.5%
Dented and Yellow: 6/16 : 37.5%
Dented and green: 2/16: 12.5%

4. a) If the messenger RNA code is AAAGUGUCA, what was the corresponding DNA code?

TTT-CAC-AGT

b) Give the three transfer RNA codes matching the messenger RNA code of AAAGUGUCA.

UUU-CAC-AGU

c) What amino acids will be picked up by the transfer RNA's from question(b). See mRNA codes in table.

Second letter

| First letter	U	C	A	G	Third letter
U	UUU UUC } Phe / UUA UUG } Leu	UCU UCC UCA UCG } Ser	UAU UAC } Tyr / UAA Stop / UAG Stop	UGU UGC } Cys / UGA Stop / UGG Trp	U C A G
C	CUU CUC CUA CUG } Leu	CCU CCC CCA CCG } Pro	CAU CAC } His / CAA CAG } Gln	CGU CGC CGA CGG } Arg	U C A G
A	AUU AUC AUA } Ile / AUG Met	ACU ACC ACA ACG } Thr	AAU AAC } Asn / AAA AAG } Lys	AGU AGC } Ser / AGA AGG } Arg	U C A G
G	GUU GUC GUA GUG } Val	GCU GCC GCA GCG } Ala	GAU GAC } Asp / GAA GAG } Glu	GGU GGC GGA GGG } Gly	U C A G

AAAGUGUCA corresponds to
Lys-Val-Ser

d) What is the advantage of having different codes for the same amino acid?

==The redundancy protects against mutations. If one base turns into another, there's a chance that it will still lead to the same amino-acid pick up.==
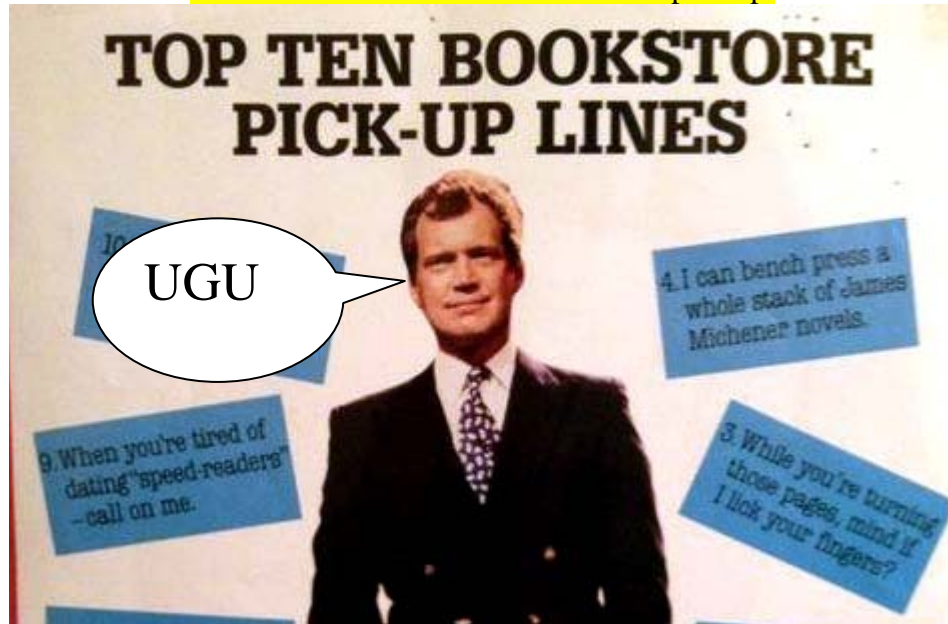
e)   Which nitrogen base in the DNA probably changed if valine(val) was replaced by aspartic acid (asp) in the protein being made?
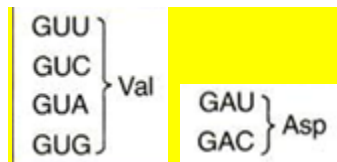
==The RNA codes that resemble each other are GUU and GAU in Val and Asp, respectively, and GUC and GAC in Val and Asp, respectively.
The corresponding DNA codes are==
CAA and CTA in Val and Asp, respectively: a switch from A to T; and
CAG and CTG: in Val and Asp, respectively: again, a switch from A to T.

5.   TRUE? Or FALSE?

a)   A gene is part of a chromosome that has the genetic code required to make 1 protein.____==Vero, Vrai, true, αληθής , verdadero , đúng , 真==

b)   A gene is made up of DNA.____==true==_____-

c)   Lipids and carbohydrates consist of amino acids : ==falso, faux,false, ψευδής , falso, sai, 假==

d)   The order in which amino acids are combined influences the type of protein being made.
==true==

e) Human sex cells have 23 unpaired chromosomes ==true $23 \times 1 = 23$; body cells have 23 pairs, for a total of 46==

6. Show the locations of ==transcription== and ==translation== in the cell.
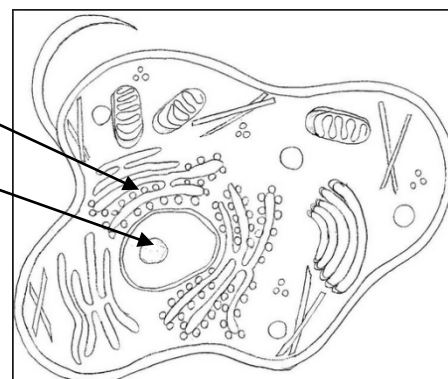
7. Use $c = 4.19$ J/(g $^\circ$C) to figure out the final temperature of 2300 g of water initially at 12.0 $^\circ$C, if it absorbed 35 kJ of energy (3 marks)
==$Q = mc\Delta T$==
==35000 J $= 2300$ g $(4.19$ J/g/$^\circ$C$)(T-12)$==
==$T = 15.6\ ^\circ$C==

8. **Beta$^-$ decay occurs for isotopes with an excess of neutrons. What occurs is that the neutron is converted into a proton (thereby changing the element) and another elementary particle. Start with a neutron as the "reactant" and show a balanced equation to reveal what that particle is. (2 marks)**

==$${}^{1}_{0}n \rightarrow {}^{1}_{1}p + {}^{0}_{-1}e$$==

==**The last particle is a beta particle**==

9. **Given:** 2 LiOH + H_2SO_4 → Li_2SO_4 + 2 H_2O

What will the concentration of Li^+ be in a total of 250 ml if 0.4 moles of H_2SO_4 react?

==0.4 molesH_2SO_4 $\left(\frac{Li2SO4}{H2SO4}\right)$ = 0.4 moles Li_2SO_4==
==0.4 moles $Li_2SO_4\left(\frac{2Li+}{1\ Li2SO4}\right)$= 0.8 moles Li^+==
==Concentration = n/V = 0.8 moles Li^+ / 0.250 L = 3.2 M==