Science 9
Chapter 4: The nucleus controls the functions of life
Section 4.1: The Functions of the Nucleus of the Cell (page 122)

1. Definition of Terms: There are a lot of them, use glossary or text on pages 118 & 122 – 124
   a) nucleus: ________________________________
   
   b) nuclear membrane: _______________________
   
   c) cell membrane: __________________________
   
   d) cell wall: _______________________________
   
   e) cytoplasm: ______________________________
   
   f) organelle: ______________________________
   
   g) mitochondria: ____________________________
   
   h) chloroplasts: ____________________________
   
   i) ribosomes: ______________________________
   
   j) proteins: ________________________________
   
   k) endoplasmic reticulum: __________________
   
   l) vesicles: ________________________________
   
   m) golgi body: ______________________________
   
   n) vacuoles: ________________________________
   
   o) nucleolus: ______________________________
   
   p) nuclear pores: ___________________________
2. Label the animal cell below using Figure 4.1A and Figure 4.2 on pages 122 and 124.

3. Who Am I? - Read 122 – 124 and fill in the blank. Words may be used more than once.
   a) I am a jelly like substance that contains organelles, water, and sugar. ______________
   b) I am a network of membrane covered channels within the cell. ______________
   c) I am the organelle that controls all the activities of the cell. ______________
   d) I am the small organelles that do not have a membrane. ______________
   e) I am found only in plant cells and surround the cell membrane. ______________
   f) I am an organelle that changes a sugar (glucose) into useable energy. ______________
   g) I am small opening in the nuclear membrane. ______________
   h) I am an organelle that sorts and packages proteins for transport. ______________
   i) I am an organelle only in plant cells that use energy from the sun. ______________
   j) I am a thin covering on the outside of the cell. ______________

Total marks this page: 10
1) I am an organelle that transports materials (often proteins) made in the cell.

m) I am only on plant cells and provide support so the cell doesn’t burst.

n) I am an essential material made by ribosomes.

o) I am a membrane covered sac that forms off endoplasmic reticulum.

p) I prepare vesicles filled with proteins for transport out of the cell.

q) I am a membrane free organelle that floats in the interior of the nucleus.

r) I am a large membrane storage covered container in plant cells.

s) I am a membrane which surrounds and protects the nucleus.

t) I allow ribosomes made in the nucleolus to go out of the nucleus.

u) I control the flow of materials into and out of the cell.

v) Chemical reactions occur on the many folds of my inner membranes.

w) I may float in the cytoplasm or be attached to the endoplasmic reticulum.

x) I am like a manufacturing plant making proteins.

y) I am small with starch in plant cells; I am only in some animal cells (no starch).

z) I make ribosomes.

4. The plant cell – Label it using Figure 4.1B on page 123
6. The Nucleus: Control Center of the Cell

(page 125) The nucleus contains the ______________ set of ______________ that determines what each cell will ______________, how it will ______________, when it will ______________ and ______________, and when it will ______________.

(page 126) The instructions in the nucleus are carried in long, _______ stranded molecules called ______________, or _______. The DNA molecules looks like a ______________. The two strands, or sides, of the DNA ladder wrap around each other in a spiral shape called a ______________. The sides of the DNA ladder are made of ______________ and ______________. The steps of the ladder are made of _______ nitrogen bases which are:

A ______________ T ______________
G ______________ C ______________

DNA - Colour each shape the same colour – Use figure 4.5 on page 126 as an example.
Everything that occurs within a cell is the result of how the on the molecule are . This arrangement is known as the .

A always joins with T (always joins with )

G always joins with C (always joins with )

In humans, a single DNA molecule can be several base pairs in length.

7. Read pages 127 to 130. Answer the following questions.

a) DNA is in what form most of the time? Define this word.

b) When does chromatin become a chromosome?

c) Look at figure 4.7. Explain the relationship between DNA, chromatin, and chromosomes.

d) How many individual chromosomes in a human cell? How many pairs?

e) The 23rd chromosome pair are responsible for determining . In males the pair is an combination, in female it is an pair.

f) Define genes and what they do.


g) What are the arrangement of bases (remember those – A/G and C/T) in a gene usually used for?

h) Explain how cells can be made to be so different from each other.


i) What is a genome? (see side bar page 129).


j) What are 2 things the Human Genome Project found?


l) Define enzymes and say what it is that they do.


m) Define hormones


n) Name one hormone

Total marks this page: /18
8. Copy Key to Protein Production Information down on page 131 in the spaces provided.

*Copy Exactly as Shown*

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Total marks this page: / 9.
9. Do Checking Concepts (page 135). Do numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 13 Note: this page and the next are blank to allow you to draw diagrams. Please write neatly in full sentences.

1. a) __________  b) __________  c) __________

2. __________

3. __________________________

4. __________________________

5. __________________________

6. __________________________

7. a) __________  b) __________  c) __________

8. __________________________

9. __________________________

13. A C C T G C T A T __________________________

Total marks this page: 125
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Section 4.2: Mutation (page 136)
1. A _______________ _______________ is a change in the order of the _______________ bases in a gene. Gene mutations can be _______________, _______________, or _______________. _______________ are substances or factors that can cause mutations in _______________.
2. Define gene mutation: ________________________________

3. Read page 136. Complete the “Find Out Activity” on page 137.
   1) Study the table on page 137. Which kind of mutation is more destructive, a substitution of a base or an addition of a base? Explain. ________________________________
   2) Copy the DNA sequence in the space below. Leave a space between each group of 3 ________________________________
   3) Do the same with the 3 DNA sequences given. State if each is a substitution, a deletion, or an addition.
      a) ________________________________
      b) ________________________________
      c) ________________________________

   Do questions 1 and 2 on page 137 in the space below.
   ________________________________
   ________________________________
   ________________________________

4. The Effects of Mutations (page 138)

There are 3 different kinds of mutations. Name them and describe what it means.
   ________________________________
   ________________________________
   ________________________________

Define positive mutation and give two examples:
   ________________________________
   ________________________________

Total marks this page: 15
Define negative mutation and give two examples:

____________________________________________________________________

____________________________________________________________________

Define neutral mutation and give two examples:

____________________________________________________________________

____________________________________________________________________

5. Mutagens (page 141)
What is a mutagen? _____________________________________________

Explain how a virus can disrupt the instructions stored in genes.  ________________________________

____________________________________________________________________

There are 5 additional sources of mutagens listed. Name them.
____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

6. Correcting Mutations  Read pages 141 to 143. Answer the following questions:
What is gene therapy?  _____________________________________________

Explain why gene therapy is not in common use. There are 4 reasons.
____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Activity 4-2B – Considering Gene Therapy – Read the section, choose a response on the scale (of 1 to 5 – see book), and give a reason for your choice

a) 1 2 3 4 5 - Everyone should have equal access to gene therapy treatment no matter what the cost if gene therapy is known to cure a disease. Reason behind choice: ________________________________

b) 1 2 3 4 5 - Because of the risks, gene therapy testing should not be conducted on humans until gene therapy is proven 100 percent safe and effective. Reason behind choice: ________________________________
c) 1 2 3 4 5 - If gene therapy is proven safe, then it is acceptable to use gene therapy to enhance a person’s genetically inherited characteristics, provided the individual pays for all expenses for the treatment. Reason behind choice:


d) 1 2 3 4 5 - Gene therapy should be used only as a last resort to treat critically ill patients. Reason behind choice: _____________________________


Summarize your thoughts on gene therapy: _____________________________


7. Do Checking Concepts, page 145 Do 1 to 10, 12, 13, and 16. (Write in full sentences.)

1. _____________________________

2. a) _____________________________
   b) _____________________________
   c) _____________________________

3. The three different effects that a mutation can have on an individual are: a) _____________________________ b) _____________________________ c) _____________________________

4. _____________________________

5. _____________________________

6. _____________________________

7. _____________________________

8. _____________________________

9. Write the full sentence out – correct the order  _____________________________
* Full Sentences!!

10.

12. a) 
b) 
c) 
d) 

13. 

16. 

Total marks this page: 6