11 HUMAN BIOLOGY CELL TRANSPORT & DNA TEST

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /38

**Part one – multiple choice**

*Circle the correct answer*

1. Osmosis is a special type of diffusion that deals with the movement of water molecules through a selectively permeable membrane from:

a) An area of low solute concentration to an area of high solute concentration.

b) An area of high solute concentration to an area of low solute concentration.

c) An area of diffusion to an area of low osmotic pressure.

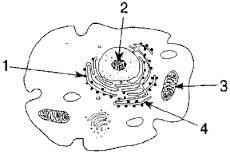
d) An area inside an egg to an area outside an egg.

2. The organelle required for translation of mRNA is:

a) A ribosome.

b) The endoplasmic reticulum.

c) The nucleus.

[](http://www.google.com.au/imgres?um=1&hl=en&biw=1920&bih=931&tbm=isch&tbnid=U89ZmWMusBTYbM:&imgrefurl=http://www.edhsgreensea.net/Biology/taters/cell_parts_quiz_mc.htm&docid=TBrWfSSVlWYqlM&imgurl=http://www.edhsgreensea.net/Biology/taters/taters_images/cell_pic.gif&w=288&h=193&ei=dlE9Ub6OCMjIkQWGxYGYDg&zoom=1&ved=1t:3588,r:78,s:0,i:319&iact=rc&dur=15069&page=3&tbnh=154&tbnw=230&start=76&ndsp=42&tx=101&ty=60) d) Transfer RNA.

**The following three questions refer to the diagram to the right**

3. DNA can be found in which organelle/s:

a) 1

b) 2

c) 3

d) 2 & 3

4. Which of the following contains the correct name and function for #4

a) The cytoskeleton connects the cell membrane transports substances within the cell and provides a surface for chemical reactions

b) The endoplasmic reticulum transports substances within the cell and provides a surface for chemical reactions

c) The cytoskeleton consists of microtubules which give the cells its shape and assist with movement of materials

d) The endoplasmic reticulum consists of microtubules which give the cells its shape and assist with movement of materials

5. Which of the organelles is involved in the release of energy through cellular respiration

a) 1

b) 2

c) 3

d) It is not numbered on this diagram

6. Which of the following explains the correct differences between DNA and RNA

a) DNA is single stranded while RNA is double stranded

b) DNA contains thymine while RNA contains Uracil

c) DNA contains nucleotides while RNA does not

d) DNA is only found in the nucleus while RNA is also found in the mitochondria

7. The following is a list of processes which may occur in a cell.

i) active transport.

ii) catabolism.

iii) respiration.

iv) osmosis.

v) anabolism.

vi) diffusion.

vii) pinocytosis.

Which processes listed above move material into, or out of, the cell?

a) iv and vi only.

b) i ,ii and v only.

c) ii, iii, v and vii only.

d) i ,iv, vi and vii only.

8. Pinocytosis is the:

a) movement of solids through a semi permeable membrane.

b) the engulfing of liquids by the cell membrane.

c) the movement of liquids out of the cell.

d) the production of pinoplasts to remove wastes from a cell.

9. Choose the incorrect statement.

a) Most cells in your body have a nucleus.

b) Inside the nucleus are structures called chromosomes.

c) Chromosomes are tightly coiled RNA strands.

d) DNA is a chemical made up of nucleotides.

10. Select the correct pairing of nitrogenous bases found in DNA.

a) Uracil and cytosine.

b) Thymine and adenine.

c) Cytosine and adenine.

d) Guanine and thymine.

11. Select the correct definition for ‘gene’.

a) A section of DNA.

b) Tightly coiled up strand of DNA.

c) Three pairs of nucleotides attached together.

d) DNA located in the mitochondria.

12. What is the correct term for a strand of DNA coiled around histones and condensed.

a) Chromosome

b) Chromatin

c) Centromere

d) DNA does not coil around histones

13. Which of the following is INCORRECT about replication.

a) An identical strand of RNA is formed

b) Occurs while in the form of chromatin

c) Both strands are replicated

d) None of the above, they are all correct

14. Which of the following is most useful in tracing the dispersal of groups of people around the world.

a) RNA

b) Mitochondrial DNA

c) Nuclear DNA

d) All of the above

**Part Two – Short Answer**

1. Describe two **differences** between nuclear DNA and mitochondrial DNA.

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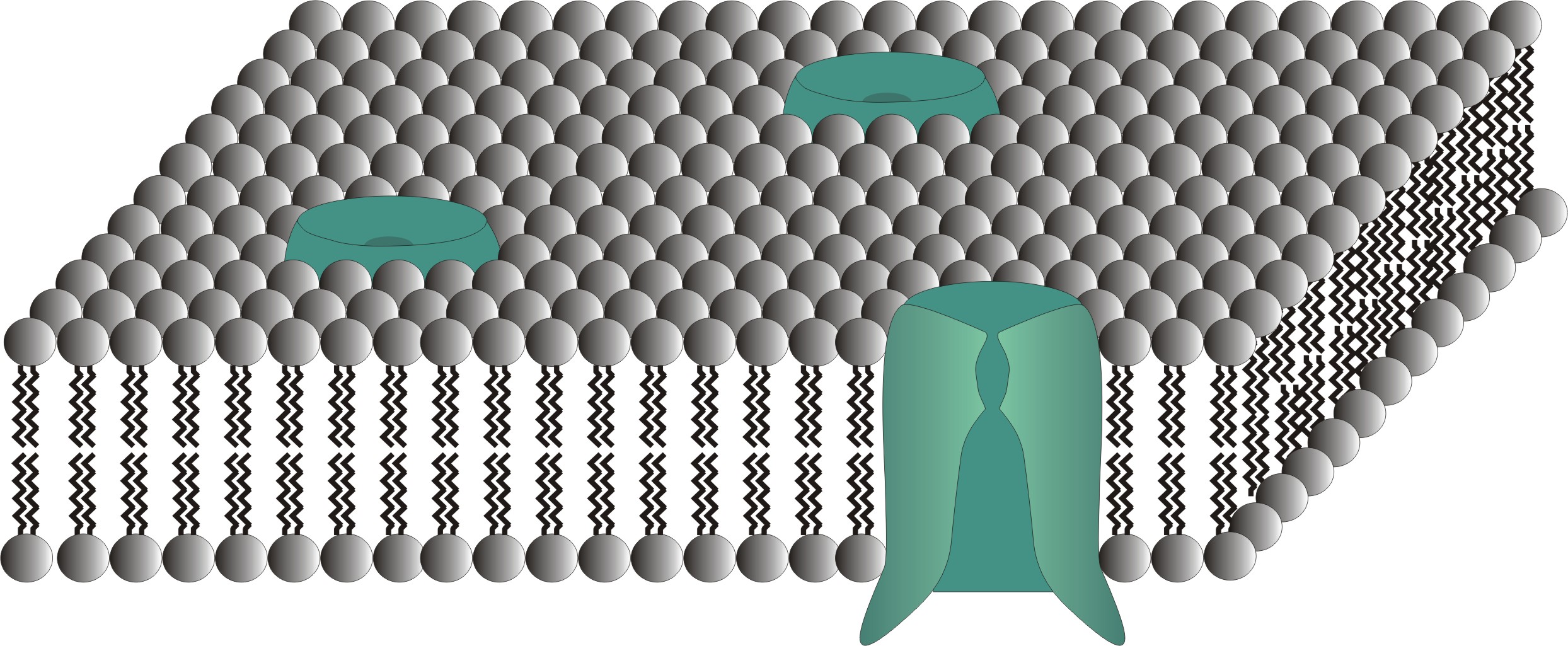
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(2 marks)

2. Below is a diagram of a cell membrane.

a What is the term given to the structure of membranes within the cell? (1 mark)

b What are the structures embedded in the membrane? (1 mark)



c How do these structures enable large molecules such as **glucose** to pass through the membrane? What is this process called? You may use a diagram if you wish. (3 marks)

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3. A microscope has the following lenses:

ocular power = 10x

low power objective = 20x

high power objective = 50x

1. What is the highest magnification you could get using this microscope? (1 mark)
2. If the diameter of the low power field of view is 2 mm, what is the diameter of the high power field of view in millimeters (mm)? Show your working (2 marks)
3. What is the high power field of view in micrometers (μm)? (1 mark)
4. If 10 cells can fit end to end in the low power field of view, how many of those cells would you see under high power? (1 mark)

4. Explain why cells are so small. (2 marks)

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Part three – extended answer

1. With a suitable diagram explain how the synthesis of proteins by ribosomes is controlled by DNA in the nucleus. (10 marks)

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SOLUTIONS

1. Osmosis is a special type of diffusion that deals with the movement of water molecules through a selectively permeable membrane from:

a) An area of low solute concentration to an area of high solute concentration.

b) An area of high solute concentration to an area of low solute concentration.

c) An area of diffusion to an area of low osmotic pressure.

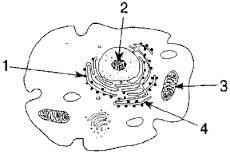
d) An area inside an egg to an area outside an egg.

2. The organelle required for translation of mRNA is:

a) A ribosome.

b) The endoplasmic reticulum.

c) The nucleus.

[](http://www.google.com.au/imgres?um=1&hl=en&biw=1920&bih=931&tbm=isch&tbnid=U89ZmWMusBTYbM:&imgrefurl=http://www.edhsgreensea.net/Biology/taters/cell_parts_quiz_mc.htm&docid=TBrWfSSVlWYqlM&imgurl=http://www.edhsgreensea.net/Biology/taters/taters_images/cell_pic.gif&w=288&h=193&ei=dlE9Ub6OCMjIkQWGxYGYDg&zoom=1&ved=1t:3588,r:78,s:0,i:319&iact=rc&dur=15069&page=3&tbnh=154&tbnw=230&start=76&ndsp=42&tx=101&ty=60) d) Transfer RNA.

**The following three questions refer to the diagram to the right**

3. DNA can be found in which organelle/s:

a) 1

b) 2

c) 3

d) 2 & 3

4. Which of the following contains the correct name and function for #4

a) The cytoskeleton connects the cell membrane transports substances within the cell and provides a surface for chemical reactions

b) The endoplasmic reticulum transports substances within the cell and provides a surface for chemical reactions

c) The cytoskeleton consists of microtubules which give the cells its shape and assist with movement of materials

d) The endoplasmic reticulum consists of microtubules which give the cells its shape and assist with movement of materials

5. Which of the organelles is involved in the release of energy through cellular respiration

a) 1

b) 2

c) 3

d) It is not numbered on this diagram

6. Which of the following explains the correct differences between DNA and RNA

a) DNA is single stranded while RNA is double stranded

b) DNA contains thymine while RNA contains Uracil

c) DNA contains nucleotides while RNA does not

d) DNA is only found in the nucleus while RNA is also found in the mitochondria

7. The following is a list of processes which may occur in a cell.

i) active transport.

ii) catabolism.

iii) respiration.

iv) osmosis.

v) anabolism.

vi) diffusion.

vii) pinocytosis.

Which processes listed above move material into, or out of, the cell?

a) iv and vi only.

b) i ,ii and v only.

c) ii, iii, v and vii only.

d) i ,iv, vi and vii only.

8. Pinocytosis is the:

a) movement of solids through a semi permeable membrane.

b) the engulfing of liquids by the cell membrane.

c) the movement of liquids out of the cell.

d) the production of pinoplasts to remove wastes from a cell.

9. Choose the incorrect statement.

a) Most cells in your body have a nucleus.

b) Inside the nucleus are structures called chromosomes.

c) Chromosomes are tightly coiled RNA strands.

d) DNA is a chemical made up of nucleotides.

10. Select the correct pairing of nitrogenous bases found in DNA.

a) Uracil and cytosine.

b) Thymine and adenine.

c) Cytosine and adenine.

d) Guanine and thymine.

11. Select the correct definition for ‘gene’.

a) A section of DNA.

b) Tightly coiled up strand of DNA.

c) Three pairs of nucleotides attached together.

d) DNA located in the mitochondria.

12. What is the correct term for a strand of DNA coiled around histones.

a) Chromosome

b) Chromatin

c) Centromere

d) DNA does not coil around histones

13. Which of the following is INCORRECT about replication.

a) An identical strand of RNA is formed

b) Occurs while in the form of chromatin

c) Both strands are replicated

d) None of the above, they are all correct

14. Which of the following is most useful in tracing the dispersal of groups of people around the world.

a) RNA

b) Mitochondrial DNA

c) Nuclear DNA

d) All of the above

**Part two – short answer**

1. Describe two **differences** between nuclear DNA and mitochondrial DNA.

 (2 marks)

2. Below is a diagram of a cell membrane.

a What is the term given to the structure of membranes within the cell? (1 mark)

Phospholipid bilayer

b What are the structures embedded in the membrane? (1 mark)

Proteins

c How do these structures enable large molecules such as **glucose** to pass through the membrane? What is this process called? You may use a diagram if you wish. (3 marks)

Facilitated Diffusion/Carrier-mediated transport 1 mark

Binds to carrier protein, which changes shape any 2, 1 mark each

Moving from area of high conc to low conc

Move from extra cellular to cytoplasm

3. A microscope has the following lenses:

ocular power = 10x

low power objective = 20x

high power objective = 50x

1. What is the highest magnification you could get using this microscope? (1 mark)

500x

1. If the diameter of the low power field of view is 2 mm, what is the diameter of the high power field of view in millimeters (mm)? Show your working (2 marks)

Low = 200x

200 x 2.5 = 500 1 mark for answer 1 mark for working

2mm/2.5 = 0.8mm

1. in micrometers (μm)? 0.8 x 1000 = 800um (1 mark)
2. If 10 cells can fit end to end in the low power field of view, how many of those cells would you see under high power? (1 mark)

10/2.5 = 4

4. Explain why cells are so small. (2 marks)

An explanation that includes both:

* Surface area to volume ratio
* Diffusion

Part three – extended answer

1. With a suitable diagram explain how the synthesis of proteins by ribosomes is controlled by DNA in the nucleus. (10 marks)

DNA Unzips

Complementary nucleotides

U for T

mRNA formed

Leave through nuclear pore

Through ER

To ribosome

tRNA brings amino acid

comp bases lines amino acids in order

peptide bond joins amino acids

tRNA disconnects

twists to form protein

minus 1 for each point not mentioned or not drawn on diagram