Cell Biology

GCSE Science • **Combined and Triple** • Grades 3–6

WORKED SOLUTIONS

Name: worked example Class: _____ Total: 48 / 48

Show all your working. Marks are given for correct method as well as the final answer.

1. Name two structures found in a plant cell but not an animal cell. **[2 marks]**

any two of: cell wall, chloroplasts, permanent vacuole

Answer: cell wall, chloroplasts (or permanent vacuole)

2. State the function of the nucleus. **[1 mark]**

it holds the DNA

Answer: contains the genetic material / controls the cell

3. State the function of the mitochondria. **[1 mark]**

releases energy for the cell

Answer: where aerobic respiration happens

4. State the function of the ribosomes. **[1 mark]**

where proteins are made

Answer: protein synthesis

5. Give two differences between a prokaryotic and a eukaryotic cell. **[2 marks]**

prokaryote: DNA is a loop, free in the cytoplasm
plus plasmids, and no membrane-bound organelles

Answer: prokaryotes have no nucleus and are much smaller

6. Name the type of cell that bacteria are. **[1 mark]**

no nucleus

Answer: prokaryotic

7. Explain how a sperm cell is adapted to its function. **[3 marks]**

tail: moves it to the egg
mitochondria: energy for swimming
enzymes: digest through the egg membrane
always link the feature TO the job

Answer: tail to swim, many mitochondria, enzymes in the head

8. Explain how a root hair cell is adapted to its function. **[3 marks]**

large surface area: faster absorption
thin wall: short diffusion distance
many mitochondria: energy for active transport

Answer: long projection for a large surface area

9. Explain how a red blood cell is adapted to its function. **[3 marks]**

biconcave disc: large surface area
no nucleus: more room for haemoglobin
haemoglobin: binds the oxygen

Answer: biconcave, no nucleus, full of haemoglobin

10. Write down the equation linking magnification, image size and real size. **[1 mark]**

both sizes in the SAME units

Answer: magnification = image size ÷ real size

11. An image is 50 mm across and the real object is 0.1 mm. Work out the magnification. **[2 marks]**

50 ÷ 0.1
= 500

Answer: × 500

12. A cell is 0.05 mm wide. Convert this into micrometres. **[2 marks]**

1 mm = 1000 μm
0.05 × 1000 = 50

Answer: 50 **µm**

13. An image of a cell is 60 mm wide at a magnification of ×1 500. Work out the real width in micrometres. **[4 marks]**

real = image ÷ magnification
60 ÷ 1500 = 0.04 mm
0.04 × 1000 = 40 μm

Answer: 40 **µm**

14. Give one advantage of an electron microscope over a light microscope. **[2 marks]**

it can show sub-cellular structures
resolution is the detail, not just the size

Answer: much higher resolution and magnification

15. Name the type of cell division that produces two identical cells. **[1 mark]**

used for growth and repair

Answer: mitosis

16. Describe what happens to the DNA before mitosis begins. **[2 marks]**

each chromosome makes an identical copy

Answer: it is copied / replicated

17. Define a stem cell. **[2 marks]**

it has not yet specialised

Answer: an undifferentiated cell that can become other types

18. Give one advantage and one risk of using stem cells in medicine. **[2 marks]**

advantage: treat conditions like paralysis or diabetes
risk: the cells may be rejected, or carry a virus

Answer: can replace damaged cells; risk of rejection or infection

19. Compare diffusion and active transport.

(a) State the direction each moves substances in. **[2 marks]**

diffusion: high to low concentration
active transport: low to high

(b) State which one requires energy, and why. **[2 marks]**

active transport
it works AGAINST the concentration gradient
energy comes from respiration

Answer: ____ *high→low vs low→high ; active transport needs energy* ____

20. Potato cylinders are placed in sugar solutions of different concentrations.

(a) Name the process that changes their mass. **[1 mark]**

osmosis

(b) Explain why a cylinder gains mass in pure water. **[3 marks]**

pure water is a more dilute solution
water moves in by osmosis
through the partially permeable membrane
osmosis is water ONLY

Answer: ____ *osmosis ; water moves in, so the cylinder gains mass* ____

21. A cell has a surface area of 24 mm^2 and a volume of 8 mm^3.

(a) Work out the surface area to volume ratio. **[2 marks]**

24 : 8
= 3 : 1

(b) Explain why large organisms need an exchange surface. **[3 marks]**

as an organism gets bigger
its surface area to volume ratio FALLS
diffusion alone is then too slow
so they need lungs, gills or villi

Answer: ____ *3 : 1 ; the ratio falls, so diffusion alone is too slow* ____

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