Chapter 1

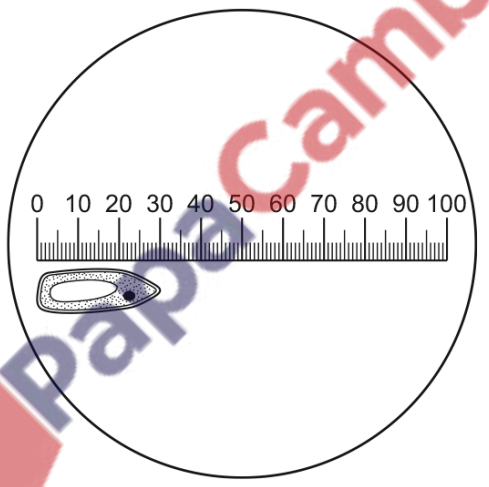
Cell structure

1.1 The microscope in cell studies

1. 9700_m20_qp_12 Q: 1

The diagram shows an eyepiece graticule and cell viewed through a microscope. When the eyepiece graticule was calibrated at this magnification, the whole length of the graticule shown covered 12 divisions of a stage micrometer scale.

There were 100 divisions in 10 mm of the stage micrometer.

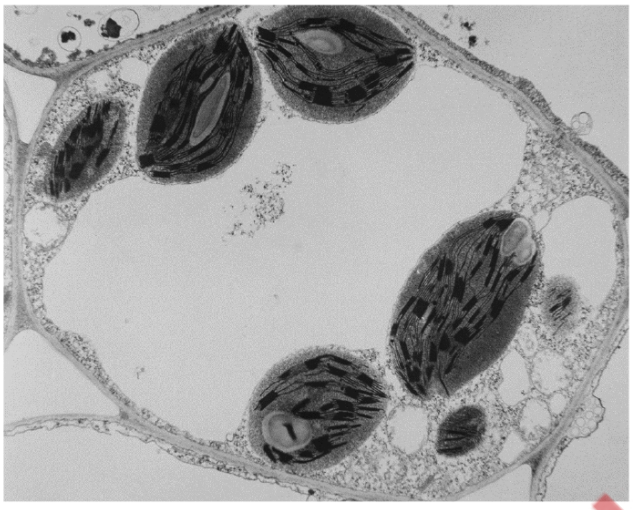


What is the actual length of the cell?

A 2.5 μm **B** 3.6 μm **C** 360 μm **D** 3 mm

2. 9700_s20_qp_11 Q: 1

The photomicrograph shows the ultrastructure of part of a cell.



Which statement about the type of cell shown in the photomicrograph is correct?

A It is a plant cell because it has both chloroplasts and a nucleus.

B It is a plant cell because it has chloroplasts.

C It is an animal cell because it has a cell membrane.

D It is an animal cell because it has mitochondria.

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3. 9700_s20_qp_11 Q: 3

A student examined a slide of human blood with a light microscope and made a careful drawing of the different cell types. The student used an eyepiece graticule so that the relative sizes of the different cell types were drawn accurately.

In the drawing:

- red blood cells were 7 mm in diameter
- lymphocytes were 6 mm in diameter
- neutrophils were 14 mm in diameter.

What is the linear magnification of the drawing?

A ×10 **B** ×40 **C** ×100 **D** ×1000

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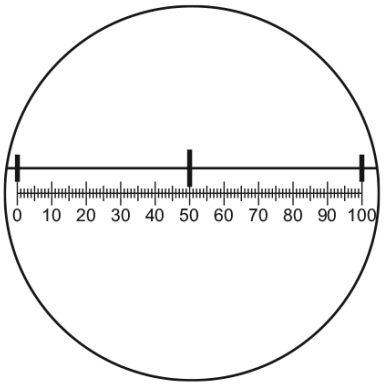
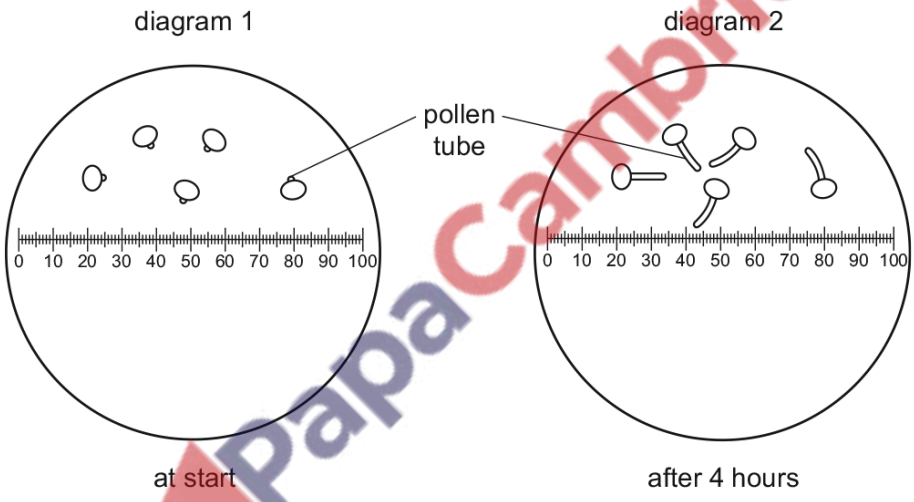
4. 9700_s20_qp_11 Q: 4

The diagram shows a graduated slide, with divisions of 0.1 mm viewed using an eyepiece graticule.



Pollen grains were grown in a sugar solution and viewed using the eyepiece graticule.

Diagram 1 shows the pollen grains at the start. Diagram 2 shows the pollen grains after four hours.



What is the growth rate of the pollen tubes?

A $5\,\mu mh^{-1}$ **B** $10\,\mu mh^{-1}$ **C** $5\,mmh^{-1}$ **D** $10\,mmh^{-1}$

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5. 9700_s20_qp_12 Q: 1

What is the definition of the resolution of a light microscope?

A the degree of sharpness produced by the microscope

B the greatest distance between two objects visible in the same field of view

C the minimum distance that allows two objects to be viewed as separate

D the size of the smallest object visible using the microscope

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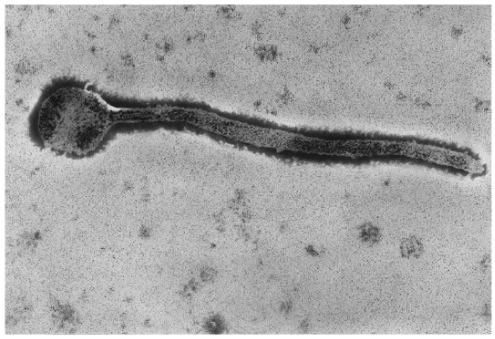
6. 9700_s20_qp_12 Q: 2

The electron micrograph shows a type of virus at a magnification of ×30 000.



What is the length of the virus?

A 2.2×10^3 nm

B 2.2×10^2 nm

C 2.2×10^1 nm

D 2.2×10^0 nm

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7. 9700_s20_qp_13 Q: 1

A student was given a photomicrograph of a cell and told the magnification of the image.

The student was asked to calculate the actual size of the cell.

Which row in the table explains how to do this?

	measure the image in	convert to μm by multiplying by	rearrange the formula to
A	cm	1.0×10^4	$\frac{M}{I}$
B	cm	1.0×10^6	$I \times M$
C	mm	1.0×10^3	$\frac{I}{M}$
D	mm	1.0×10^4	$I \times M$

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8. 9700_w20_qp_11 Q: 1

Which row shows the correct order of size of these cell structures?

1 width of a mitochondrion

2 width of a ribosome

3 width of a cell surface membrane

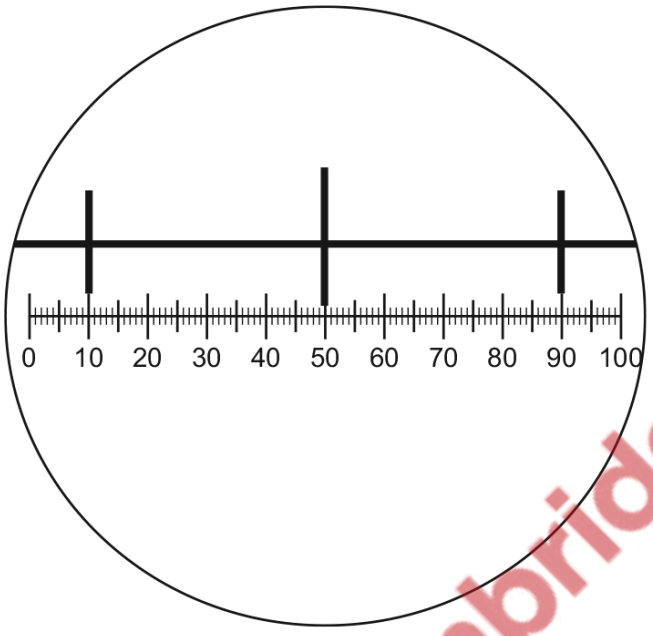
4 width of a chloroplast

	largest		→	smallest
A	1	4	2	3
B	1	4	3	2
C	4	1	2	3
D	4	2	1	3

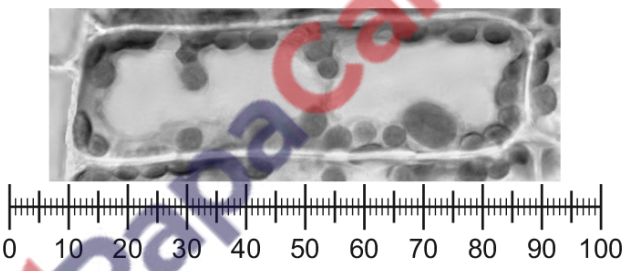
9. 9700_w20_qp_11 Q: 2

The diagram shows a stage micrometer scale viewed through an eyepiece containing a graticule.

The small divisions of the stage micrometer scale are 0.1 mm.



The stage micrometer scale is replaced by a slide of a plant cell.



What is the actual length of the nucleus in the plant cell?

A 8 μm **B** 25 μm **C** 200 μm **D** 0.8 mm

10. 9700_w20_qp_12 Q: 1

The size of the measles virus, *Morbillivirus*, is approximately 150 nm.

The *Mimivirus* is approximately 4.5 times larger than *Morbillivirus*, whilst the *Pandoravirus* is approximately 1.5 times larger than the *Mimivirus*.

Which viruses can be seen using a light microscope with a maximum resolution of 0.25 μm **and** using an electron microscope?

	Morbillivirus	*Mimivirus*	*Pandoravirus*
A	✓	✓	✓
B	✗	✓	✓
C	✗	✗	✓
D	✗	✗	✗

key

✓ = can be seen

✗ = cannot be seen

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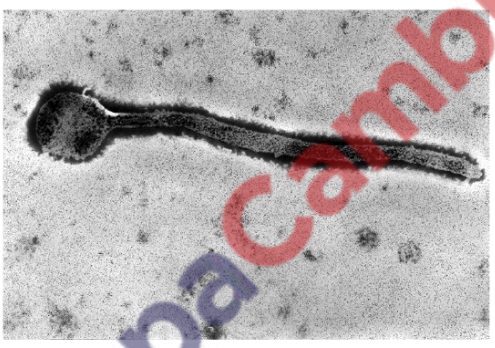
11. 9700_w20_qp_12 Q: 2

The electron micrograph shows a type of virus at a magnification of ×60 000.



What is the actual length of the virus?

A 1.1 nm **B** 11 nm **C** 110 nm **D** 1100 nm

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12. 9700_w20_qp_13 Q: 1

What are the appropriate units for measuring diameters of alveoli, diameters of white blood cells and the width of cell walls?

	diameters of alveoli	diameters of white blood cells	width of cell walls
A	mm	mm	nm
B	mm	μm	μm
C	μm	mm	μm
D	μm	μm	nm

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13. 9700_w20_qp_13 Q: 2

The actual diameter of a prokaryotic cell is 0.5 μm. An electron micrograph of the cell has a magnification of ×50 000.

What is the diameter of the cell in the image?

A 2.5×10^{-1} mm

B 2.5×10^{0} mm

C 2.5×10^{1} mm

D 2.5×10^{2} mm

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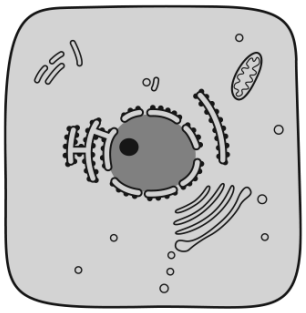
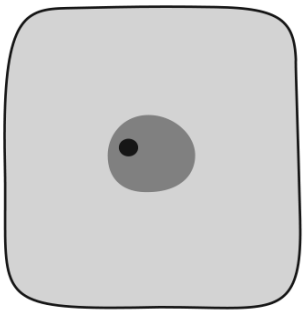
14. 9700_m19_qp_12 Q: 1

The diagram below was drawn from an electron micrograph of an animal cell.

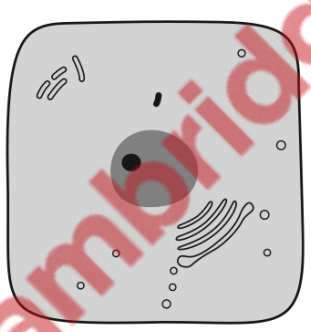


Which diagram would represent the same cell seen under a simple light microscope, using daylight as the only light source?

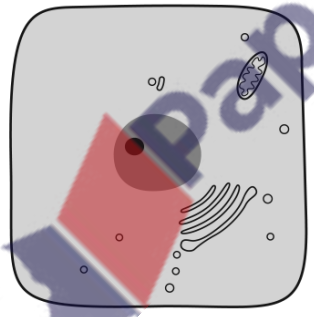
A



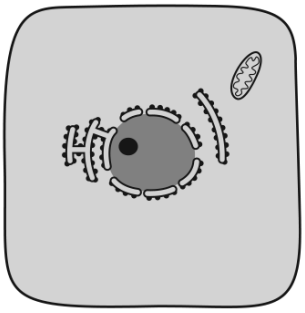
B



C



D



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15. 9700_m19_qp_12 Q: 2

The diameter of a red blood cell in a diagram was measured as 2.5 cm.

The actual diameter of the red blood cell was 7 μm.

Which calculation would give the correct magnification for the red blood cell in the diagram?

A $\frac{7}{25000}$ **B** $\frac{2500}{7}$ **C** $\frac{25000}{7}$ **D** $\frac{25000}{7000}$

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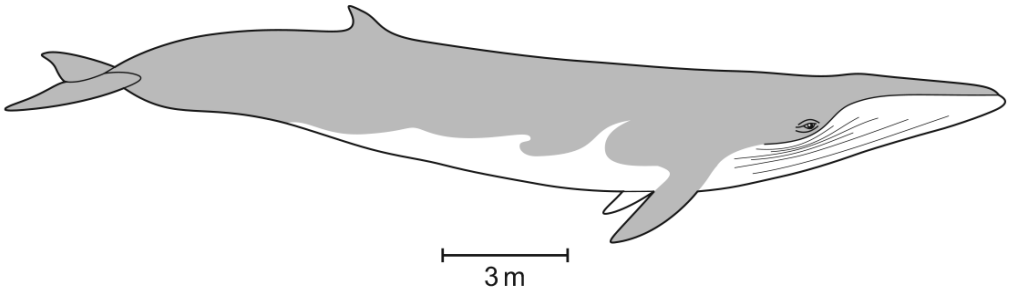
16. 9700_m19_qp_12 Q: 3

The diagram shows a fin whale drawn to scale.



A student made three statements about the diagram.

1 The magnification is ×0.006.

2 The ratio of actual size to diagram size is 1667 : 1.

3 The fin whale has an actual length of 24 m.

Which statements are correct?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 3 only

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17. 9700_s19_qp_11 Q: 1

A student was told that the actual length of a cell structure is 5 μm.

The student was asked to state an equation that can be used to calculate the magnification of an electron micrograph of this cell structure. The student used some of the letters q to u in the equation.

q = the length of the cell structure image on the micrograph in centimetres

r = the length of the cell structure image on the micrograph in millimetres

s = 1000

$t = \frac{1}{5}$

u = 5

Which is the correct equation to calculate the magnification?

A $\frac{q}{s} \times u$ **B** $q \times s \times t$ **C** $\frac{r}{s} \times u$ **D** $r \times s \times t$

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18. 9700_s19_qp_12 Q: 1

The actual length of a cell structure is 8 μm.

Which steps are used to calculate the magnification of an electron micrograph of this cell structure?

step 1 measure the length of the cell structure image on the micrograph in centimetres

step 2 measure the length of the cell structure image on the micrograph in millimetres

step 3 divide the image length by 1000

step 4 multiply the image length by 1000

step 5 divide by 8

step 6 multiply by 8

A steps 1, 3 and 6

B steps 1, 4 and 6

C steps 2, 3 and 5

D steps 2, 4 and 5

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19. 9700_s19_qp_12 Q: 2

What is the typical resolution of a microscope using daylight as a light source with a ×10 eyepiece lens and a ×40 objective lens?

A 0.20 nm **B** 200 nm **C** 100 μm **D** 400 μm

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20. 9700_s19_qp_13 Q: 1

Which combination of lenses for a light microscope will give the greatest magnification?

	eyepiece lens	objective lens
A	×5	×100
B	×10	×40
C	×15	×40
D	×15	×100

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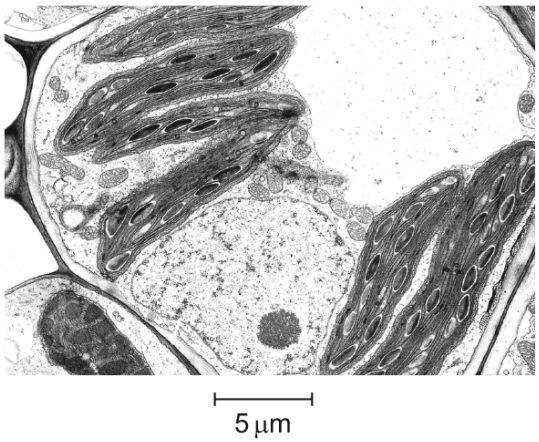
21. 9700_s19_qp_13 Q: 2

The photomicrograph shows some mesophyll tissue from a dicotyledonous leaf.



What is the magnification of the photomicrograph?

A ×280 **B** ×2800 **C** ×3570 **D** ×7000

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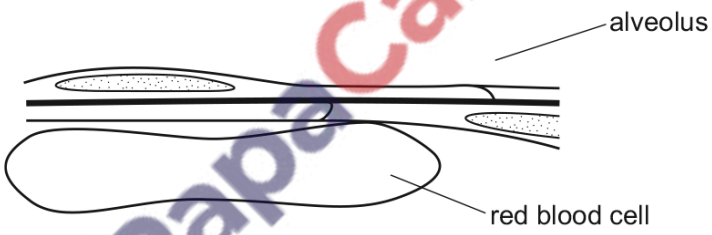
22. 9700_w19_qp_11 Q: 3

The drawing has been made from a section showing part of an alveolus and a red blood cell in a capillary. The magnification of the drawing is ×5000.



What is the minimum distance that oxygen must diffuse from air in an alveolus into the red blood cell?

A 0.1 nm **B** 1.0 nm **C** 0.1 μm **D** 1.0 μm

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23. 9700_w19_qp_12 Q: 1

A student calibrated the scale on an eyepiece graticule in the eyepiece lens of a light microscope. The student was given a stage micrometer scale to use.

The divisions on the stage micrometer scale were 0.1 mm apart.

Which data must the student collect in order to calibrate the eyepiece graticule?

1 magnification of the eyepiece lens of the microscope

2 number of divisions of the stage micrometer scale seen in one field of view of the microscope

3 number of divisions of the eyepiece graticule scale equivalent to each division of the stage micrometer scale

A 1 and 3 **B** 2 and 3 **C** 2 only **D** 3 only

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24. 9700_w19_qp_12 Q: 2

The diameter of living cells varies considerably.

The diameter of a typical eukaryotic cell is 1.5×10^1 μm.
The diameter of a typical prokaryotic cell is 7.5×10^2 nm.

Using these measurements, what is the maximum number of each cell type which could fit along a line 1 cm long?

	number of white blood cells	number of *Streptococcus* cells
A	6.7×10^4	1.3×10^2
B	6.7×10^3	1.3×10^5
C	6.7×10^2	1.3×10^4
D	6.7×10^1	1.3×10^3

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25. 9700_w19_qp_13 Q: 2

How many nanometres are there in one millimetre?

A 1000 **B** 10 000 **C** 100 000 **D** 1 000 000

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26. 9700_m18_qp_12 Q: 1

The eyepiece lens of a microscope can be fitted with an eyepiece graticule.

Which of these statements about eyepiece graticules are correct?

1 They measure the actual length of cells in micrometres.

2 They help biologists to draw cells with correct proportions.

3 They change in size when the objective lens is changed from ×10 to ×40.

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 only

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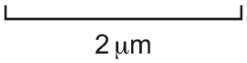
27. 9700_m18_qp_12 Q: 2

A student was asked to use the scale bar shown to calculate the magnification of a cell on a photomicrograph.



Which method could the student use to calculate the magnification of the cell?

A divide the diameter of the cell by the length of the scale bar, both measured in the same units of length

B measure the diameter of the cell in millimetres, multiply by 2000 and divide by the length of the scale bar measured in millimetres

C measure the length of the scale bar in millimetres, convert to micrometres and divide by 2

D measure the length of the scale bar in millimetres, convert to micrometres and multiply by 2

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28. 9700_m18_qp_12 Q: 3

Which eyepiece and objective lens combination of a light microscope allows the greatest number of cells in a field of view to be seen?

	eyepiece lens	objective lens
A	×5	×10
B	×5	×40
C	×10	×10
D	×10	×40

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29. 9700_s18_qp_11 Q: 1

Which statements about resolution and magnification are correct?

	resolution	magnification
A	the ability to distinguish between two separate objects that are very close together	the number of times larger an image is compared with the real size of the object
B	the clarity of the image formed by the microscope	the power of the microscope to focus on very small objects
C	the number of times larger an image is compared with the real size of the object	the ability to distinguish between two separate objects that are very close together
D	the power of the microscope to focus on very small objects	the clarity of the image formed by the microscope

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30. 9700_s18_qp_11 Q: 2

An eyepiece graticule has a scale with 100 divisions. A stage micrometer has a scale with 50 divisions, each of which is 0.040 mm apart.

Using a ×40 objective lens, the whole length of this stage micrometer scale lines up with 15 divisions of the eyepiece graticule.

What is the actual length of the 100 division scale of the eyepiece graticule?

A 1.3 mm **B** 13 mm **C** 75 μm **D** 750 μm

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31. 9700_s18_qp_11 Q: 3

A prokaryotic cell which is 1 μm in diameter, is magnified 50 000 times in an electron micrograph.

What is the diameter of the cell in the electron micrograph?

A 5×10^{-1} mm

B 5×10^{0} mm

C 5×10^{1} mm

D 5×10^{2} mm

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32. 9700_s18_qp_12 Q: 2

Which of these statements about light microscopy are correct?

1 The greater the resolution of a light microscope, the greater the detail that can be seen.

2 The greater the magnification of a light microscope, the greater the detail that can be seen.

3 Increasing the magnification of a light microscope up to its limit of resolution allows more detail to be seen.

4 The shorter the wavelength of light used in a light microscope, the greater the detail that can be seen.

A 1, 2, 3 and 4

B 1, 3 and 4 only

C 1 and 2 only

D 4 only

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33. 9700_s18_qp_13 Q: 1

Which steps are needed to find the actual width of a xylem vessel viewed in transverse section using a ×10 objective lens?

1 Convert from mm to μm by multiplying by 10^{-3}.

2 Calibrate the eyepiece graticule using a stage micrometer on ×4 objective lens.

3 Measure the width of the xylem vessel using an eyepiece graticule.

4 Multiply the number of eyepiece graticule units by the calibration of the eyepiece graticule.

A 1, 2, 3 and 4

B 1 and 2 only

C 2, 3 and 4 only

D 3 and 4 only

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34. 9700_w18_qp_11 Q: 1

A student made notes describing photomicrographs of four cells.

cell 1 Grey cytoplasm at edge of cell contains many black lines and spots. Large white area in centre of cell.

cell 2 Grey cytoplasm contains many black lines and spots which fill the entire cell.

cell 3 Pale blue cytoplasm surrounds a single dark blue spot.

cell 4 Many green structures are enclosed within a rectangular shape with visible boundaries.

Which table identifies the type of cell and the type of microscope used to take each photograph?

A

	animal cell	plant cell
electron microscope	1	2
light microscope	3	4

B

	animal cell	plant cell
electron microscope	1	2
light microscope	4	3

C

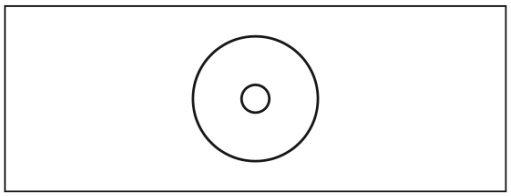
	animal cell	plant cell
electron microscope	2	1
light microscope	3	4

D

	animal cell	plant cell
electron microscope	2	1
light microscope	4	3

35. 9700_w18_qp_11 Q: 2

The diagram shows a slide of a transverse section of a stem. This diagram is the same size as the actual slide.



A student observed this slide using a light microscope at a magnification of ×40. The student made a plan drawing of the stem, which was 20 cm in diameter.

The student labelled the plan 'Transverse section of a stem ×40'.

Which statement explains why this label is **not** correct?

A The actual size of the stem should have been checked using an eyepiece graticule.

B The actual size of the stem was smaller under low power.

C The image size in the drawing was larger than ×40.

D The image size in the drawing was smaller than ×40.

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36. 9700_w18_qp_12 Q: 2

A specimen of plant tissue is first observed under a microscope using red light with a wavelength of 650 nm.

The same specimen is then observed under the same conditions, but using green light with a wavelength of 510 nm.

What happens to the magnification and resolution when using green light compared to red light?

	magnification	resolution
A	decreases	decreases
B	increases	increases
C	remains the same	decreases
D	remains the same	increases

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37. 9700_w18_qp_13 Q: 1

Which statement explains why it is necessary to use an electron microscope to see the cristae of a mitochondrion?

A The magnification of the electron microscope is greater than that of the light microscope.

B The membranes of the cristae are separated by a distance greater than 200 nm.

C The resolution of a student microscope using daylight is too low.

D The wavelength of an electron beam is longer than the wavelength of light.

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38. 9700_w18_qp_13 Q: 2

A prokaryotic cell which is 0.25 μm in diameter, is magnified 50 000 times on an electron micrograph.

How big will its diameter be in the electron micrograph?

A 1.25×10^{-1} mm

B 1.25×10^{0} mm

C 1.25×10^{1} mm

D 1.25×10^{2} mm

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39. 9700_w18_qp_13 Q: 3

When making measurements in experiments, which methods could have parallax errors?

1 using a calibrated eyepiece graticule to measure length

2 using a measuring cylinder to measure volume

3 using a ruler to measure length of a shoot

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

40. 9700_m17_qp_12 Q: 2

A light microscope is used to observe two structures that are 200 nm apart.

How far apart are the structures when the magnification is changed from ×40 to ×400?

A 2 μm **B** 20 μm **C** 200 nm **D** 2000 nm

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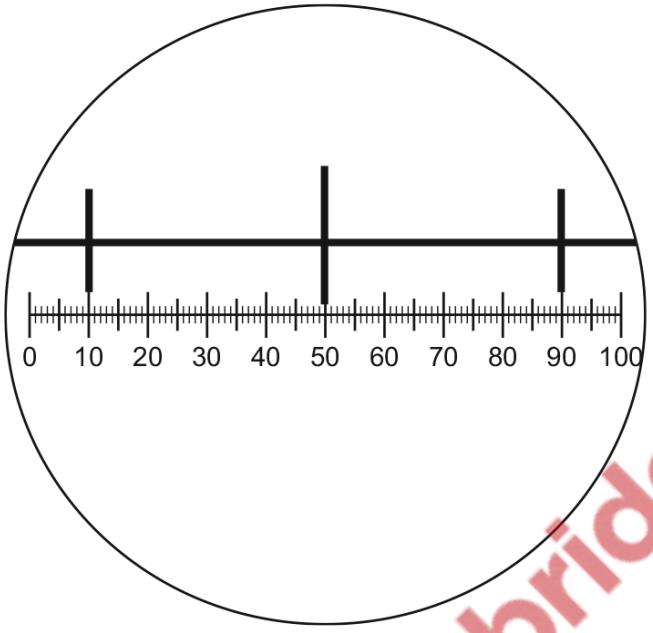
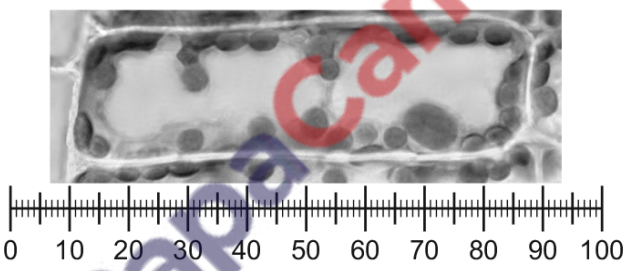
41. 9700_m17_qp_12 Q: 3

The diagram shows a stage micrometer scale viewed through an eyepiece containing a graticule. The small divisions of the stage micrometer scale are 0.1 mm.



The stage micrometer scale is replaced by a slide of a plant cell.



What is the length of the nucleus in the plant cell?

A 0.8 mm **B** 8 μm **C** 25 μm **D** 200 μm

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42. 9700_s17_qp_11 Q: 1

Which definition of the magnification of a drawing of a leaf is correct?

A the actual size of an object multiplied by the magnification of the microscope

B the difference in size between an actual object and a drawing of the object

C the increase in size of an object when observed using a microscope

D the size of the drawing of a specimen in comparison to the actual size

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43. 9700_s17_qp_11 Q: 4

Which lengths are equivalent to 1 μm?

1 1000 mm
2 0.001 nm
3 0.001 mm
4 1 000 000 nm
5 0.01 mm
6 1000 nm

A 1 and 4 **B** 2 and 5 **C** 3 and 4 **D** 3 and 6

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44. 9700_s17_qp_12 Q: 3

The recently discovered *Pandoravirus* measures 1000 nm in diameter.

The *Mimivirus* has a diameter of 400 nm.

What can be detected using a light microscope with a maximum resolution of 0.25 μm?

A both the *Mimivirus* and the *Pandoravirus*

B neither the *Mimivirus* nor the *Pandoravirus*

C the *Mimivirus,* but not the *Pandoravirus*

D the *Pandoravirus*, but not the *Mimivirus*

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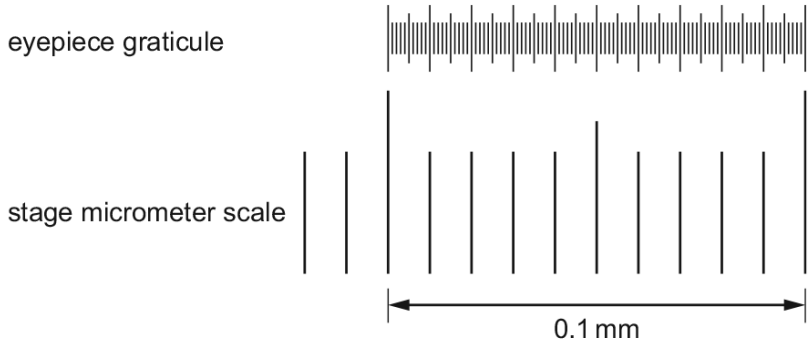
45. 9700_s17_qp_13 Q: 2

The diagram shows an eyepiece graticule and part of a stage micrometer scale as seen using ×100 magnification.



How is the value, in μm, of one eyepiece graticule unit calculated?

A divide 100 by 0.1 and multiply by 1000

B divide 100 by 0.1 and multiply by 1000 divided by 100

C multiply 0.1 by 1000 and divide by 100

D multiply 0.1 by 1000 and divide by 100 then divide again by 100

---

46. 9700_w17_qp_11 Q: 4

Which set of measurements is correct?

	diameter of capillary	diameter of red blood cell	thickness of cell surface membrane of red blood cell
A	7 μm	7 μm	7 nm
B	7 μm	7 nm	7 nm
C	0.7 mm	7 μm	7 nm
D	0.7 mm	0.7 mm	7 μm

---

47. 9700_w17_qp_11 Q: 5

The size of the measles virus is approximately 150 nm.

The *Mimivirus* is approximately 4.5 times larger than the measles virus, whilst the *Pandoravirus* is approximately 1.5 times larger than the *Mimivirus*.

Which viruses can be seen using **both** a light microscope with a maximum resolution of 0.25 μm **and** an electron microscope?

	measles virus	*Mimivirus*	*Pandoravirus*
A	✓	✓	✓
B	✗	✓	✓
C	✗	✗	✓
D	✗	✗	✗

key

✓ = can be seen

✗ = cannot be seen

---

48. 9700_w17_qp_12 Q: 1

Which equation for calculating the actual size of a specimen, A, or image size, I, or magnification, M, is correct?

A A = M ÷ I **B** A = I × M **C** I = M ÷ A **D** M = I ÷ A

---

49. 9700_w17_qp_13 Q: 1

Which statement about the light microscope is correct?

A As the smallest distance to see two points as distinct separate points decreases, the resolution also decreases.

B If the resolution is 220 nm, then a bacterium 0.2 μm in diameter will not be visible.

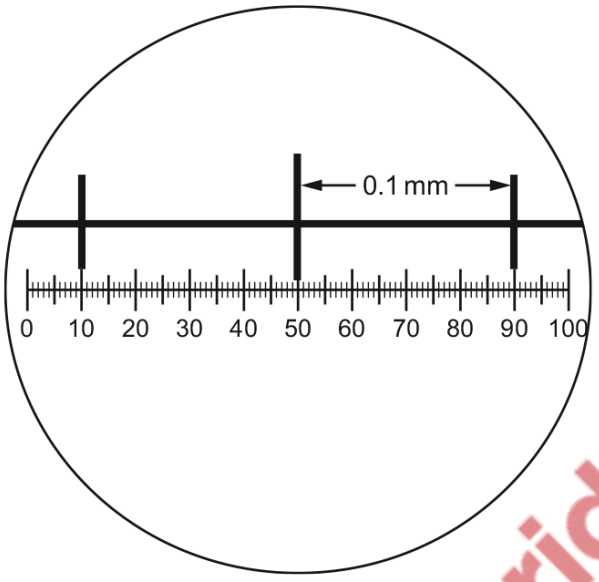
C If the wavelength of light is 600 nm, then two membranes 300 nm apart will be visible as two distinct membranes.

D Using visible light of a longer wavelength, such as red light, will improve the resolution.

---

50. 9700_w17_qp_13 Q: 2

The diagram shows a stage micrometer scale viewed with an eyepiece graticule, using a magnification of ×200.



Using the same magnification, a chloroplast is measured as 4 eyepiece graticule divisions long.

How long is the chloroplast?

A $1.0 \times 10^{1}\,\mu m$

B $4.0 \times 10^{2}\,\mu m$

C $2.5 \times 10^{-1}\,\mu m$

D $2.5 \times 10^{-2}\,\mu m$

---

51. 9700_m16_qp_12 Q: 1

A student has drawn a cell structure as seen using a light microscope.

The magnification of the drawing is ×600.

The length of the structure on the drawing is 6 mm.

What is the actual length of the cell structure?

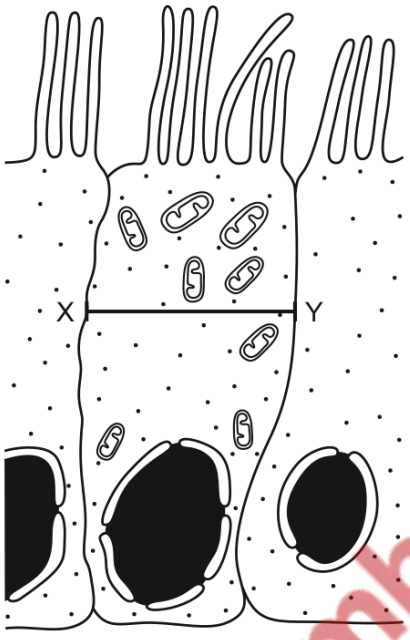
A $1 \times 10^{-1}\,\mu m$ **B** $1 \times 10^{0}\,\mu m$ **C** $1 \times 10^{1}\,\mu m$ **D** $1 \times 10^{2}\,\mu m$

---

52. 9700_s16_qp_11 Q: 2

The drawing from an electron micrograph shows a ciliated epithelial cell, magnified ×1500, which is found in the trachea.

Line X-Y shows the widest dimension of the cell.



What is the number of these cells that could be found along a 1 cm length of the trachea?

A 5 **B** 50 **C** 500 **D** 5000

---

53. 9700_s16_qp_12 Q: 1

A student was presented with a photomicrograph of a cell organelle. The magnification of the photomicrograph is known.

Which calculation of the actual length of the organelle in μm is correct?

A actual size in cm × 100 divided by the magnification

B actual size in mm × 100 divided by the magnification

C image size in cm × 1000 divided by the magnification

D image size in mm × 1000 divided by the magnification

---

54. 9700_s16_qp_13 Q: 1

An eyepiece graticule can be calibrated using a stage micrometer.

What is the correct reason why an eyepiece graticule is calibrated?

A An eyepiece graticule can be used to make measurements.

B An eyepiece graticule is magnified by the objective lens.

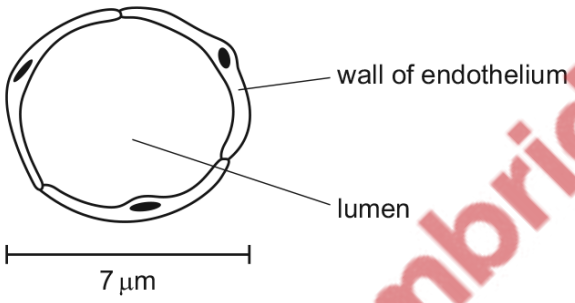
C An eyepiece graticule magnifies the specimen.

D An eyepiece graticule makes comparisons.

---

55. 9700_w16_qp_11 Q: 1

The diagram shows a transverse section through a blood capillary.



What is the magnification of the drawing?

A ×200 **B** ×245 **C** ×500 **D** ×5000

---

56. 9700_w16_qp_12 Q: 1

Until recently, the typical viruses known to science were 20 – 150 nm in size.

In 2003, the Mimivirus was discovered with a size of approximately 680 nm.

In 2013, the Pandoravirus was discovered which has a size of over 1000 nm.

Which viruses can be seen using **both** a light microscope with a maximum resolution of 0.25 μm and an electron microscope?

	typical virus	Mimivirus	Pandoravirus
A	✓	✓	✓
B	✗	✓	✓
C	✗	✗	✓
D	✗	✗	✗

key

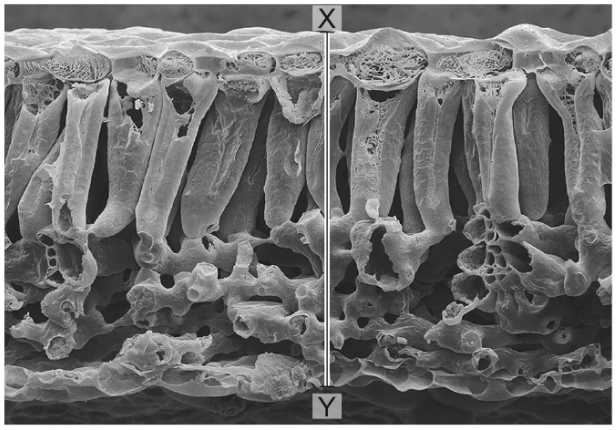
✓ = can be seen

✗ = cannot be seen

---

57. 9700_w16_qp_12 Q: 2

This electron micrograph of a section of a leaf has a magnification of ×210.



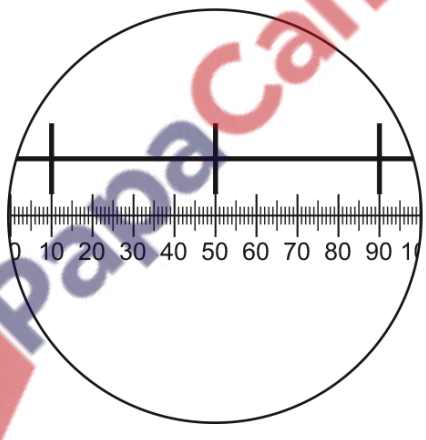
What is the actual length along the line X–Y?

A 2.43 μm **B** 24.3 μm **C** 243.0 μm **D** 2430 μm

---

58. 9700_w16_qp_12 Q: 4

The diagram shows a stage micrometer scale, with divisions 0.1 mm apart, viewed through an eyepiece containing a graticule.



What is the area of the field of view of the microscope at this magnification? (π = 3.14)

A $\pi \times 12.5 \times 12.5 = 4.9 \times 10^2\,\mu m^2$

B $\pi \times 50 \times 50 = 7.9 \times 10^3\,\mu m^2$

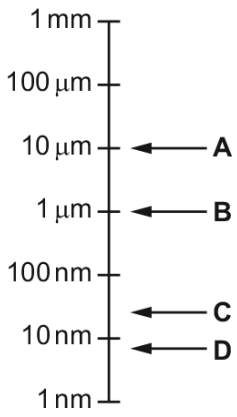
C $\pi \times 125 \times 125 = 4.9 \times 10^4\,\mu m^2$

D $\pi \times 250 \times 250 = 2.0 \times 10^5\,\mu m^2$

---

59. 9700_w16_qp_13 Q: 2

Which letter on the logarithmic scale corresponds to the size of a typical prokaryote?



---

60. 9700_w16_qp_13 Q: 3

Which calculation is used to find the actual length of an organelle from an image?

A image size ÷ magnification

B image size × magnification

C image size × resolution

D magnification ÷ image size

---

61. 9700_s15_qp_11 Q: 1

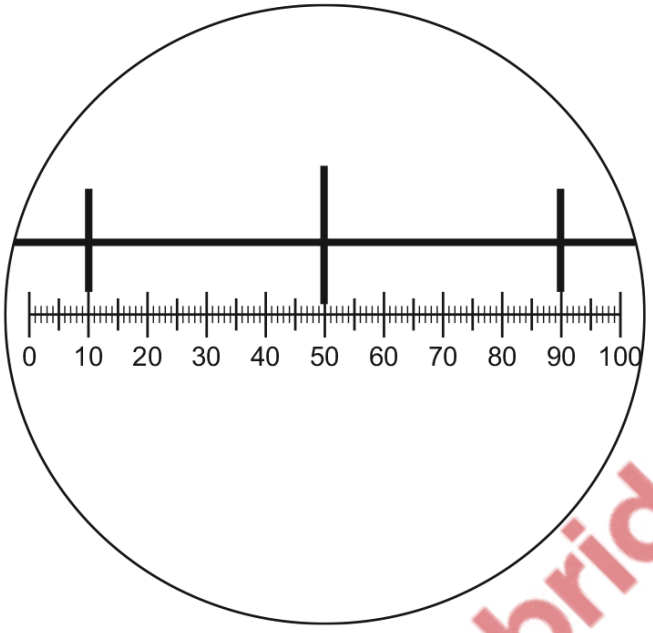
What are the appropriate units for measuring diameters of alveoli, diameters of white blood cells and the width of cell walls?

	diameters of alveoli	diameters of white blood cells	width of cell walls
A	mm	µm	µm
B	µm	mm	µm
C	µm	µm	nm
D	mm	mm	nm

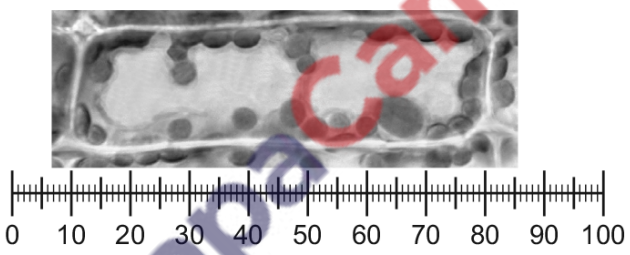
---

62. 9700_s15_qp_11 Q: 3

The diagram shows a stage micrometer scale on which the small divisions are 0.1 mm. It is viewed through an eyepiece containing a graticule.



The stage micrometer scale is replaced by a slide of a plant cell.

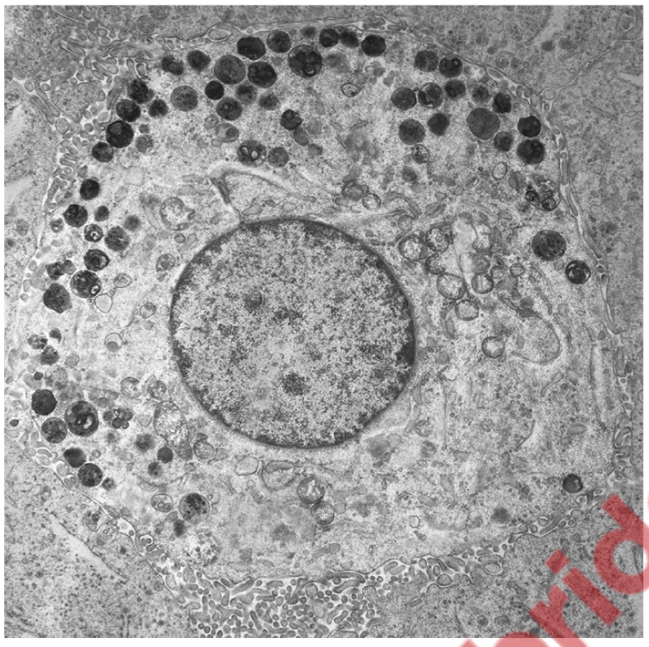


What is the width of a chloroplast?

A 0.5 mm **B** 10 μm **C** 50 μm **D** 100 μm

63. 9700_s15_qp_11 Q: 6

The electronmicrograph shows a cell.



×5700

What is the actual diameter of the nucleus?

A 0.6 μm **B** 6 μm **C** 35 μm **D** 350 μm

---

64. 9700_s15_qp_12 Q: 1

What is the diameter of a typical plant cell?

A 4.0×10^{1} μm

B 1.0×10^{0} μm

C 4.0×10^{2} nm

D 1.0×10^{2} nm

---

65. 9700_s15_qp_12 Q: 2

A specimen is viewed under a microscope using green light with a wavelength of 510 nm.

If the same specimen is viewed under the same conditions, but using red light with a wavelength of 650 nm instead, what effect will this have on the magnification and on the resolution of the microscope?

	magnification	resolution
A	decreased	remains the same
B	increased	increased
C	remains the same	decreased
D	remains the same	increased

---

66. 9700_s15_qp_13 Q: 2

Which statements about light microscopes are correct?

1 To calculate the magnification of a light microscope the eyepiece lens and objective lens magnifications are added together.

2 As the magnification increases the resolution decreases.

3 The resolution of a light microscope is limited by the wavelength of light.

4 The scale on a stage micrometer is resolved more clearly than an eyepiece graticule.

A 1, 2, 3 and 4

B 1, 3 and 4 only

C 2 and 3 only

D 2 and 4 only

---

67. 9700_w15_qp_11 Q: 2

Pancreatic cells have a diameter of 35 μm.

Red blood cells have a diameter of 7000 nm.

Which statement is correct?

A Pancreatic cells are 5 times larger than red blood cells.

B Pancreatic cells are 50 times larger than red blood cells.

C Pancreatic cells are 5 times smaller than red blood cells.

D Pancreatic cells are 50 times smaller than red blood cells.

---

68. 9700_w15_qp_12 Q: 2

Different units are used when measuring biological specimens.

Which measurement in mm has **not** been correctly converted into **both** μm and nm?

	mm	μm	nm
A	1.0	1.0×10^3	1.0×10^6
B	2.5	2.5×10^3	2.5×10^6
C	5.0	5.0×10^4	5.0×10^7
D	25.0	2.5×10^4	2.5×10^7

---

69. 9700_w15_qp_13 Q: 2

Different units are used when measuring biological specimens.

In which rows are the same measurements correctly expressed in each of the units shown in the column headings?

	mm	μm	nm
1	1.0	1.0×10^3	1.0×10^6
2	2.5	2.5×10^3	2.5×10^6
3	5.0	5.0×10^4	5.0×10^7
4	25.0	2.5×10^4	2.5×10^7

A 1, 2, 3 and 4

B 1, 2 and 4 only

C 1 and 2 only

D 3 and 4 only

1.2 Cells as the basic units of living organisms

70. 9700_m20_qp_12 Q: 2

Which cell structures can form vesicles?

	cell structure		
	cell surface membrane	endoplasmic reticulum	Golgi body
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

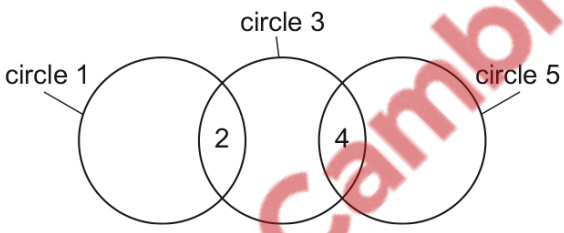
✓ = can form vesicles

✗ = cannot form vesicles

---

71. 9700_m20_qp_12 Q: 3

The diagram shows three circles, 1, 3 and 5, representing chloroplasts, mitochondria and typical prokaryotes.



Which row correctly identifies the three circles and some of the structures that are shared between them?

	circle 1	2	circle 3	4	circle 5
A	chloroplasts	circular DNA	mitochondria	80S ribosomes	prokaryotes
B	chloroplasts	80S ribosomes	mitochondria	circular DNA	prokaryotes
C	prokaryotes	circular DNA	mitochondria	circular DNA	chloroplasts
D	prokaryotes	70S ribosomes	chloroplasts	80S ribosomes	mitochondria

---

72. 9700_m20_qp_12 Q: 4

Which cell structures contain RNA?

1 centrioles
2 mitochondria
3 nucleus
4 ribosomes

A 1, 2, 3 and 4
B 1 and 2 only
C 2, 3 and 4 only
D 3 and 4 only

---

73. 9700_m20_qp_12 Q: 5

It is possible for a bacterium to synthesise a eukaryotic protein.

This involves introducing a eukaryotic gene into the bacterial DNA. The eukaryotic gene is then translated by the bacterium.

What explains why a bacterial cell can produce a eukaryotic protein but cannot produce a eukaryotic glycoprotein?

A Bacteria do not have rough endoplasmic reticulum.
B Bacteria do not have a nuclear envelope.
C Bacteria do not have mitochondria.
D Bacteria do not have Golgi bodies.

---

74. 9700_m20_qp_12 Q: 6

Which structures are found in typical prokaryotic cells and also in typical plant cells?

A cell walls
B histones
C telomeres
D tonoplasts

---

75. 9700_s20_qp_11 Q: 2

Which structures are found in typical eukaryotic cells?

1 70S ribosomes

2 80S ribosomes

3 linear DNA (chromosomes)

4 circular DNA

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1 and 4 only

D 2 and 3 only

---

76. 9700_s20_qp_11 Q: 5

The table shows a comparison between two features of a typical eukaryotic cell and a typical prokaryotic cell.

Which row shows the correct comparison between these cells?

	presence of centromeres		presence of telomeres	
	eukaryotic cell	prokaryotic cell	eukaryotic cell	prokaryotic cell
A	✓	✓	✗	✗
B	✓	✗	✓	✗
C	✗	✓	✗	✓
D	✗	✗	✓	✓

key

✓ = present

✗ = not present

---

77. 9700_s20_qp_12 Q: 3

Which row correctly shows a feature of a cell structure?

	site of protein synthesis	makes lysosomes
A	smooth endoplasmic reticulum	rough endoplasmic reticulum
B	ribosomes	Golgi body
C	rough endoplasmic reticulum	ribosomes
D	Golgi body	smooth endoplasmic reticulum

---

78. 9700_s20_qp_12 Q: 4

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by a number.

1 organises microtubules to produce the spindle during cell division

2 synthesis of polypeptides

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by a letter.

V membranes which surround an enclosed inner cavity

W non-membrane bound, spherical structures

X a double membrane with many pores

Y non-membrane bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered function with the appearance of the cell structure?

	1	2	3
A	W	X	Y
B	W	Z	W
C	Y	W	Z
D	Y	Z	Z

---

79. 9700_s20_qp_12 Q: 5

The features of some cells and cell structures that make ATP are listed.

1 has outer boundary membrane and folded inner membrane

2 has peptidoglycan cell wall outside an outer boundary membrane

3 has a double boundary membrane and stacks of inner membranes

Which row identifies these components?

	1	2	3
A	bacterium	chloroplast	mitochondrion
B	chloroplast	bacterium	mitochondrion
C	chloroplast	mitochondrion	bacterium
D	mitochondrion	bacterium	chloroplast

---

80. 9700_s20_qp_12 Q: 6

Mitochondria are thought to have evolved from prokaryotic cells that were ingested by an ancestral cell.

Which feature have these prokaryotes lost during their evolution into mitochondria?

A cell wall

B circular chromosome

C internal membranes

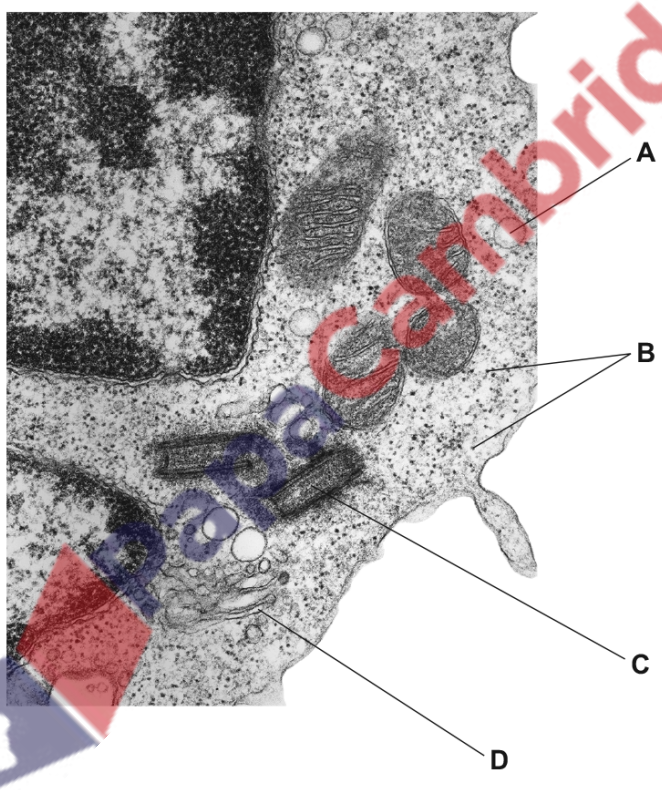
D ribosomes

---

81. 9700_s20_qp_13 Q: 2

The electron micrograph shows part of a eukaryotic cell.

Which cell structure is a site of protein synthesis?



---

82. 9700_s20_qp_13 Q: 3

Some stains can be used to identify cell structures in living cells.

A dilute solution of one stain causes the whole cell to appear blue.

The blue colour rapidly disappears in most cell structures. Those cell structures that release energy stay blue.

Which type of cell structure is likely to stay blue?

A endoplasmic reticulum

B Golgi body

C lysosome

D mitochondrion

---

83. 9700_s20_qp_13 Q: 4

A molecule of carbon dioxide is in the centre of a mitochondrion.

Assuming there are no other cell structures in its path, how many phospholipid layers will the carbon dioxide molecule have to pass through in order to leave the cell?

A 2 **B** 3 **C** 6 **D** 8

---

84. 9700_s20_qp_13 Q: 5

Which row identifies the type of ribosome found in each of the different structures?

	chloroplast	cytoplasm of eukaryotic cell	prokaryotic cell	mitochondrion
A	70S	70S	80S	70S
B	70S	80S	70S	70S
C	80S	70S	80S	80S
D	80S	80S	70S	80S

---

85. 9700_w20_qp_11 Q: 3

Insulin is a hormone synthesised from two polypeptide chains inside cells of the pancreas.

Which row shows the cell structures that are used in producing insulin and releasing it from the cells?

	Golgi body	lysosome	rough endoplasmic reticulum
A	✓	✓	✗
B	✓	✓	✓
C	✓	✗	✓
D	✗	✓	✓

key

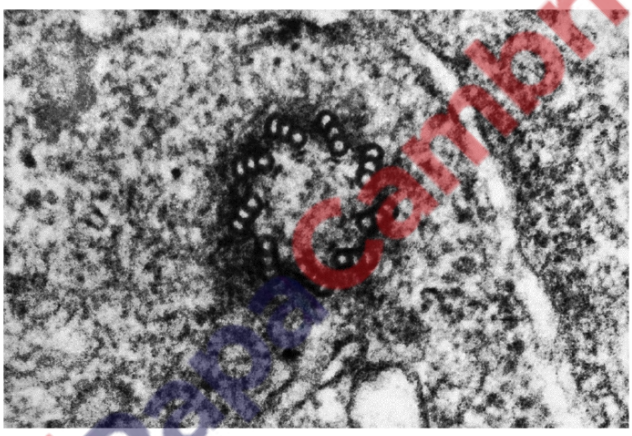
✓ = used

✗ = not used

---

86. 9700_w20_qp_11 Q: 4

The electron micrograph shows a cell structure in a eukaryotic cell.



Which statements about this cell structure are correct?

1 ATP is synthesised in this cell structure.

2 The cell structure is made of protein molecules.

3 The cell structure replicates during interphase of the cell cycle.

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

---

87. 9700_w20_qp_11 Q: 5

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by number.

1 synthesis of polypeptides

2 synthesis of lipids

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by letter.

V membranes which surround an enclosed inner cavity

W non-membrane-bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane-bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered function with the appearance of the cell structure?

	1	2	3
A	W	V	Z
B	W	Z	Y
C	Z	W	Z
D	Z	V	W

---

88. 9700_w20_qp_11 Q: 6

The DNA of typical prokaryotes is naked and circular.

Which statement describes how the DNA of eukaryotes differs from the DNA of typical prokaryotes?

A Only DNA of eukaryotes has a nuclear envelope around it and is a double helix.

B Only DNA of eukaryotes has a nuclear envelope around it and is circular.

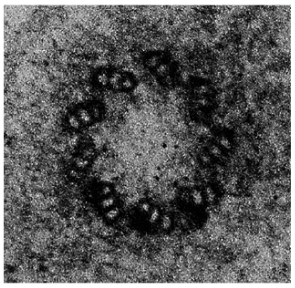
C Only DNA of eukaryotes has proteins attached to it and is a double helix.

D Only DNA of eukaryotes has proteins attached to it and is linear.

---

89. 9700_w20_qp_12 Q: 3

The electron micrograph shows a structure found in the cytoplasm of an animal cell.



Which biological molecules are found in this structure?

1 nucleic acid

2 protein

3 phospholipid

A 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

90. 9700_w20_qp_12 Q: 4

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by number.

1 mRNA passes through to the ribosome

2 synthesis of lipids

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by letter.

V membranes which surround an enclosed inner cavity

W non-membrane-bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane-bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered function with the appearance of the cell structure?

	1	2	3
A	V	W	Z
B	V	Z	Y
C	X	V	W
D	X	V	Z

---

91. 9700_w20_qp_12 Q: 5

Which are found in typical prokaryotic cells **and** in typical plant cells?

1 cell wall

2 circular DNA

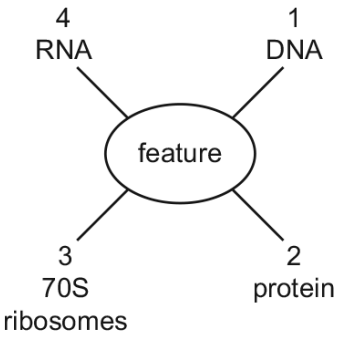
3 cytoplasm

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

92. 9700_w20_qp_12 Q: 6

The diagram shows some features that occur in organisms.



Which features can be present in viruses?

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

93. 9700_w20_qp_13 Q: 3

The electron micrograph shows some cell structures.

Some cell structures are listed.

1 nucleolus
2 chloroplast
3 microtubules
4 ribosomes
5 mitochondria
6 plasmodesmata

Which cell structures can be seen in the electron micrograph?

A 1, 2, 3 and 4 **B** 1, 4, 5 and 6 **C** 2, 3, 5 and 6 **D** 2, 4, 5 and 6

---

94. 9700_w20_qp_13 Q: 4

Which part of the cell is often continuous with the rough endoplasmic reticulum?

A cell surface membrane
B Golgi body
C mitochondrion
D nuclear envelope

---

95. 9700_w20_qp_13 Q: 5

Which statements about ATP are correct?

1 It is produced in chloroplasts.

2 It is used during protein synthesis.

3 It contains deoxyribose.

4 It is used in facilitated diffusion.

5 It is used to load sucrose into companion cells.

A 1, 2 and 5 **B** 1, 3 and 5 **C** 2, 3, 4 and 5 **D** 2 and 4 only

---

96. 9700_w20_qp_13 Q: 6

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by number.

1 mRNA passes through to the ribosome

2 organises microtubules to produce the spindle during cell division

3 synthesis of lipids

The appearances were listed by letter.

V membranes which surround an enclosed inner cavity

W non-membrane-bound, spherical structures

X a double membrane with pores

Y non-membrane-bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered functions with the appearance of the cell structure?

	1	2	3
A	V	W	Z
B	V	Y	W
C	X	W	V
D	X	Y	V

---

97. 9700_m19_qp_12 Q: 4

Which structures are found in both chloroplasts and mitochondria?

1 70S ribosomes

2 80S ribosomes

3 circular DNA

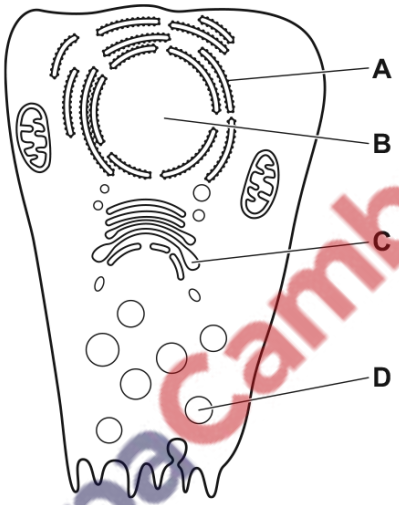
A 1 and 3 **B** 2 and 3 **C** 1 only **D** 3 only

---

98. 9700_m19_qp_12 Q: 5

Radioactively labelled amino acids are introduced into a cell that is actively secreting an enzyme.

In which cell structure will the radioactivity first become concentrated?



---

99. 9700_m19_qp_12 Q: 6

Ribosomes exist as separate subunits that are bound together during protein synthesis.

What do these subunits consist of?

A mRNA and protein

B mRNA and tRNA

C rRNA and protein

D rRNA and tRNA

---

100. 9700_s19_qp_11 Q: 2

Which features of cilia and root hairs are correct?

	increase cell surface area	cannot be resolved with the light microscope	contain vacuoles	more than one present on a cell
A	cilia	cilia	root hairs	root hairs
B	cilia	root hairs	cilia	cilia
C	root hairs	cilia	root hairs	cilia
D	root hairs	root hairs	cilia	root hairs

---

101. 9700_s19_qp_11 Q: 3

Which are functions of microtubules?

1 allowing movement of cilia in a bronchus

2 attachment of centromeres during metaphase

3 moving secretory vesicles around a cell

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

102. 9700_s19_qp_11 Q: 4

Some cell structures are listed.

1 mitochondria

2 nucleus

3 chloroplasts

4 ribosomes

What is the correct order of these cell structures when listed from largest to smallest?

A 1, 2, 3, 4 **B** 2, 3, 1, 4 **C** 2, 4, 1, 3 **D** 3, 4, 2, 1

---

103. 9700_s19_qp_11 Q: 5

Which cell structures have ribosomal RNA (rRNA)?

1 chloroplast

2 mitochondrion

3 nucleus

4 rough endoplasmic reticulum

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 2 and 4 only

D 2, 3 and 4 only

---

104. 9700_s19_qp_11 Q: 6

A cell structure in the macrophage destroys bacteria. Some bacteria stop this cell structure from functioning.

Which cell structure in the macrophage is stopped from functioning by the bacteria?

A Golgi body

B lysosome

C ribosome

D vesicle

---

105. 9700_s19_qp_12 Q: 3

Two different types of cell, P and Q, were broken up using ultrasound and their contents analysed. Both types of cell contained small circular DNA. The circular DNA from P all carried the same base sequence, but those from Q were of two types, with different base sequences.

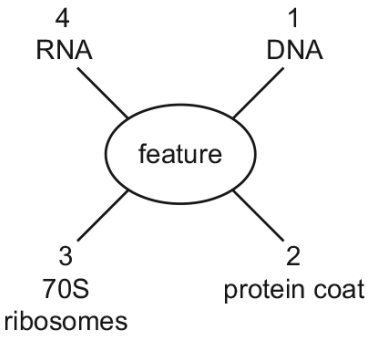
What may be concluded about the identity of cell types P and Q?

	P	Q
A	heart muscle fibres	root cortical cells
B	lymphocytes	mature red blood cells contaminated by bacteria
C	mature red blood cells	phloem sieve tube element
D	root cortical cells	leaf mesophyll cells

---

106. 9700_s19_qp_12 Q: 4

Which features shown in the diagram can be present in viruses?

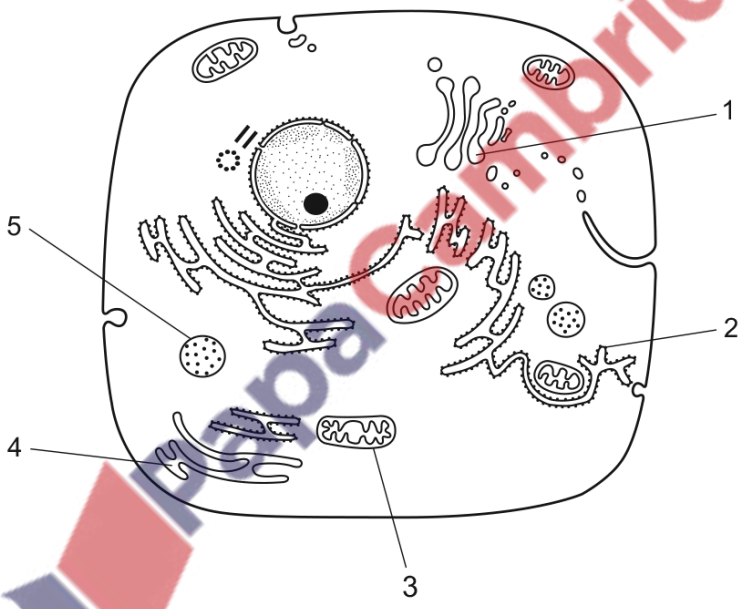


A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

---

107. 9700_s19_qp_13 Q: 3

The diagram shows a typical animal cell as seen using an electron microscope.



Which of the numbered structures are needed for proteins to be secreted at the cell surface membrane?

A 2, 3, 4 and 5 **B** 1, 2 and 4 **C** 1 and 3 **D** 5 only

---

108. 9700_s19_qp_13 Q: 4

Lysosomes vary in shape and size, making them difficult to identify.

What describes a lysosome?

A a vesicle containing enzymes, enclosed by a double membrane, that is budded off the endoplasmic reticulum

B a vesicle containing hydrolytic enzymes and surrounded by a single membrane, found only in phagocytes

C a vesicle enclosed by a single membrane, containing several different hydrolytic enzymes that may act inside or outside the cell

D a vesicle surrounded by a double membrane, containing enzymes which can hydrolyse damaged organelles in a cell

---

109. 9700_s19_qp_13 Q: 5

Which statements about ATP are correct?

1 It is produced in mitochondria only.

2 It can be hydrolysed to form ADP.

3 It contains deoxyribose.

A 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

---

110. 9700_s19_qp_13 Q: 6

A single-celled organism lives inside the body of a fish. This single-celled organism is rod-shaped, 700 μm long, enclosed in a cell wall and has cytoplasm containing thousands of copies of small, circular DNA.

Which statement about this single-celled organism is correct?

A It is a eukaryote, because it can be seen without using a microscope.

B It is a eukaryote, because it is too large to be a prokaryote.

C It is a plant, because it is enclosed in a cell wall.

D It is a prokaryote, because it has small, circular DNA in its cytoplasm.

---

111. 9700_w19_qp_11 Q: 1

Which cell structure contains cytoplasm?

A chloroplasts

B mitochondria

C plasmodesmata

D smooth endoplasmic reticulum

---

112. 9700_w19_qp_11 Q: 2

Some cell structures are listed in a particular order.

1 nucleus

2 ribosome

3 Golgi body

4 vesicle

What determines the order in which these cell structures are listed?

A sequence used in synthesis of a lipid

B sequence used in synthesis of an antibody

C size from largest to smallest

D size from smallest to largest

---

113. 9700_w19_qp_11 Q: 4

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by a number.

1 mRNA passes through to the ribosome

2 synthesis of polypeptides

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by a letter.

V membranes which surround an enclosed inner cavity

W non-membrane bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered functions with the appearance of the cell structure?

	1	2	3
A	V	X	Y
B	V	Z	Z
C	X	W	Z
D	X	Z	W

---

114. 9700_w19_qp_11 Q: 5

The antibiotic chloramphenicol inhibits protein synthesis in mitochondria and in some prokaryotes. Chloramphenicol does **not** inhibit protein synthesis in the cytoplasm of eukaryotic cells.

What would be the effect on the cells of a person being treated with chloramphenicol?

	rate of ATP production	transcription of nuclear DNA
A	decreases	decreases
B	decreases	no effect
C	increases	decreases
D	no effect	no effect

---

115. 9700_w19_qp_12 Q: 3

Which structures are found in animal cells and in plant cells?

1 centriole

2 lysosome

3 nucleolus

4 vacuole

A 1 and 3 only

B 2 and 4 only

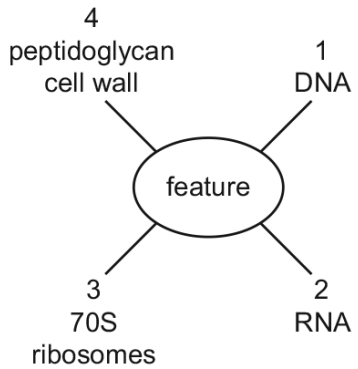
C 2, 3 and 4 only

D 1, 2, 3 and 4

---

116. 9700_w19_qp_12 Q: 4

Which features shown in the diagram can be present in eukaryotes?



A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

---

117. 9700_w19_qp_12 Q: 5

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by a number.

1 organises microtubules to produce the spindle during cell division

2 synthesis of polypeptides

3 synthesis of lipids

The appearances were listed by a letter.

V membranes which surround an enclosed inner cavity

W non-membrane bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered functions with the appearance of the cell structure?

	1	2	3
A	W	X	Z
B	W	Z	V
C	Y	W	V
D	Y	Z	W

---

118. 9700_w19_qp_12 Q: 6

Which types of RNA are present in prokaryotic cells and in eukaryotic cells?

	mRNA	rRNA	tRNA
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✓	✗

key

✓ = present

✗ = not present

---

119. 9700_w19_qp_13 Q: 1

Plant cells are stained and then seen with a simple light microscope using daylight as the only light source.

Which cell structures are clearly visible at a magnification of ×400?

A chloroplast grana

B lysosomes

C nucleoli

D ribosomes

---

120. 9700_w19_qp_13 Q: 3

Which cell structures contain 70S ribosomes?

1 chloroplasts

2 mitochondria

3 nucleus

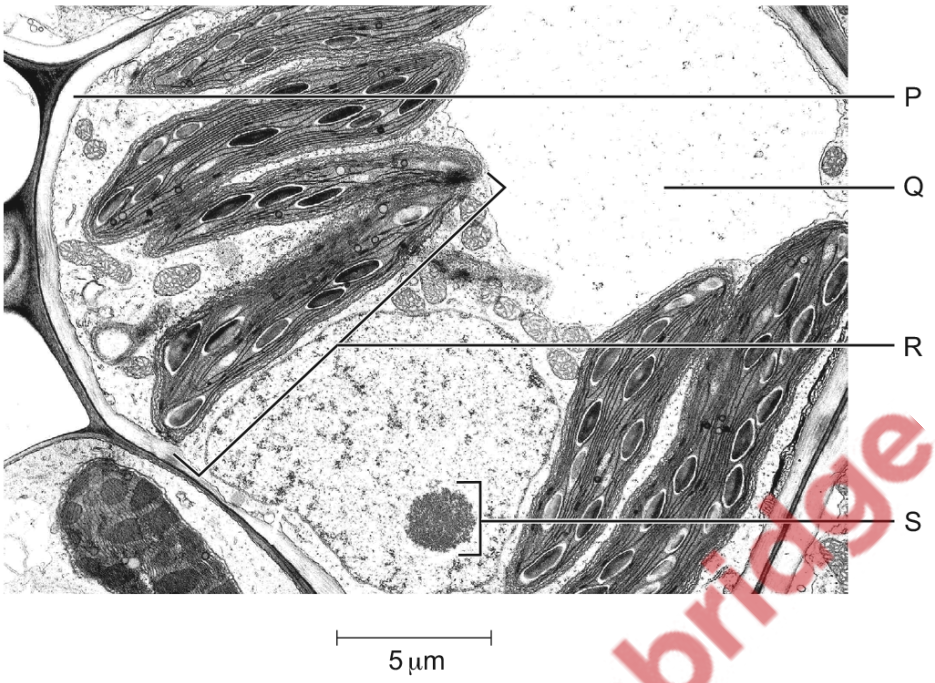
4 cytoplasm

A 1 and 2 only **B** 1 only **C** 2, 3 and 4 **D** 2 and 4 only

---

121. 9700_w19_qp_13 Q: 4

The electron micrograph shows part of a plant cell.



Which combination correctly identifies the labelled cell structures?

	P	Q	R	S
A	cell surface membrane	cytoplasm	mitochondrion	nucleus
B	cell surface membrane	vacuole	chloroplast	nucleus
C	cell wall	cytoplasm	mitochondrion	nucleolus
D	cell wall	vacuole	chloroplast	nucleolus

122. 9700_w19_qp_13 Q: 5

Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by a number.

1 mRNA passes through to the ribosome

2 organises microtubules to produce the spindle during cell division

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by a letter.

V membranes which surround an enclosed inner cavity

W non-membrane bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered function with the appearance of the cell structure?

	1	2	3
A	V	W	Y
B	V	Y	Z
C	X	W	Y
D	X	Y	Z

---

123. 9700_m18_qp_12 Q: 4

Which row correctly matches each cell structure with its function?

	microtubules	rough endoplasmic reticulum
A	allow vesicles to move within the cell	synthesises amino acids
B	form cilia and centrioles	produces ribosomes
C	form the spindle during prophase	transports proteins
D	move chromosomes during anaphase	makes triglycerides and phospholipids

---

124. 9700_m18_qp_12 Q: 5

Which animal cells would have the most extensive Golgi bodies?

A ciliated epithelial cells

B goblet cells

C red blood cells

D smooth muscle cells

---

125. 9700_m18_qp_12 Q: 6

Which of these processes will require ATP?

1 transport of water in the xylem

2 semi-conservative replication of DNA

3 facilitated diffusion of amino acids into the cell

A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 2 only

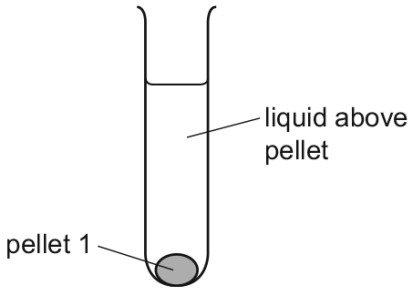
---

126. 9700_s18_qp_11 Q: 4

A scientist carried out an experiment to separate cell structures in animal cells.

The cells were broken open to release the cell structures.

This extract was filtered into a centrifuge tube and then spun in a centrifuge. The heaviest cell structure sank to the bottom forming pellet 1, as shown in the diagram.



The liquid above pellet 1 was poured into a clean centrifuge tube and spun in the centrifuge at a higher speed to separate the next heaviest cell structure. This cell structure sank to the bottom, forming pellet 2.

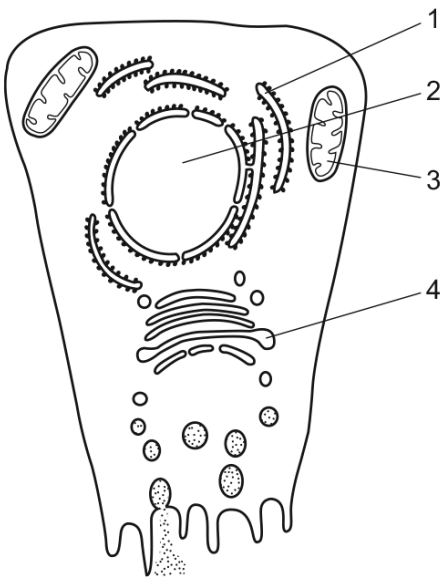
This procedure was repeated twice more to obtain pellet 3 and pellet 4, each containing a single type of cell structure.

Which row shows the order in which the cell structures were collected?

	pellet 1	pellet 2	pellet 3	pellet 4
A	nucleus	lysosomes	mitochondria	ribosomes
B	nucleus	mitochondria	lysosomes	ribosomes
C	ribosomes	lysosomes	mitochondria	nucleus
D	ribosomes	mitochondria	lysosomes	nucleus

127. 9700_s18_qp_11 Q: 5

Radioactively-labelled nucleotides are introduced into a cell.



In which cell structures will the radioactivity first become concentrated?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

---

128. 9700_s18_qp_12 Q: 1

Some features of cells are listed.

1 cell wall
2 cell surface membrane
3 ribosomes

Which features can be found in plant cells and in prokaryotic cells?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

129. 9700_s18_qp_12 Q: 3

Which type of cell contains the highest proportion of cell structures bound by a single membrane?

A ciliated epithelial cell

B goblet cell

C red blood cell

D smooth muscle cell

---

130. 9700_s18_qp_12 Q: 4

The table shows a variety of structures which may be found in cells.

Which row shows structures that could be found in the root cells of a plant?

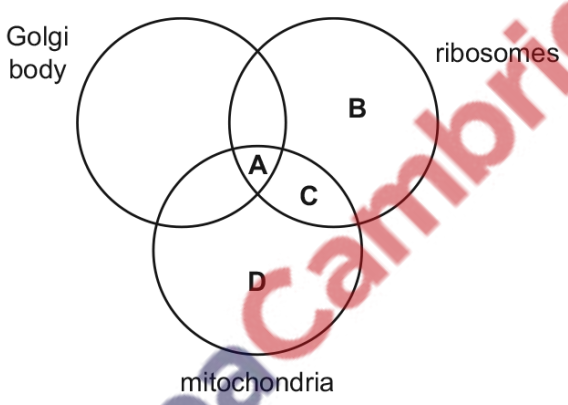
	plasmodesmata	glycogen granules	Golgi body	mitochondria
A	✓	✓	✗	✗
B	✓	✗	✓	✓
C	✗	✓	✓	✓
D	✗	✗	✓	✓

key
✓ = present
✗ = absent

---

131. 9700_s18_qp_12 Q: 5

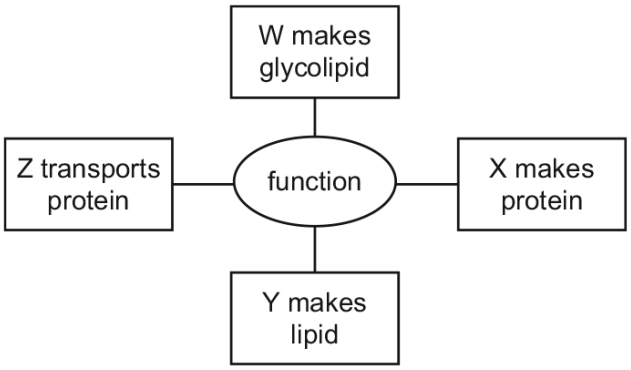
Which of these cell structures are present in *Plasmodium*?



---

132. 9700_s18_qp_13 Q: 2

The diagram shows functions of four cell structures, W, X, Y and Z.



Which row correctly matches the cell structure with the letter representing a function?

	Golgi body	ribosome	rough endoplasmic reticulum	smooth endoplasmic reticulum
A	W	X	Z	Y
B	X	Z	Y	W
C	Y	W	X	Z
D	Z	Y	W	X

---

133. 9700_s18_qp_13 Q: 3

Which cell structures produce ATP?

1 chloroplasts

2 mitochondria

3 nucleus

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

134. 9700_s18_qp_13 Q: 5

Which row could be correct for a virus?

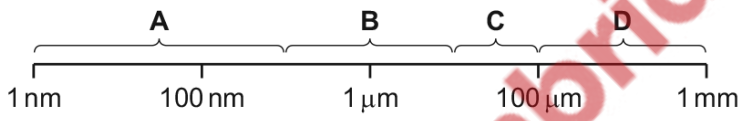
	carbohydrate	DNA	phospholipid	lipid	protein	RNA
A	✓	✓	✓	✓	✓	✓
B	✓	✗	✓	✗	✗	✓
C	✗	✓	✗	✗	✗	✓
D	✗	✓	✗	✗	✓	✗

key
✓ = present
✗ = not present

---

135. 9700_s18_qp_13 Q: 6

Which size range would include most prokaryotic cells?



---

136. 9700_w18_qp_11 Q: 3

Which cell structures may contain cisternae?

	chloroplast	endoplasmic reticulum	Golgi body	mitochondrion
A	✓	✓	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

key
✓ = may contain cisternae
✗ = does not contain cisternae

---

137. 9700_w18_qp_11 Q: 4

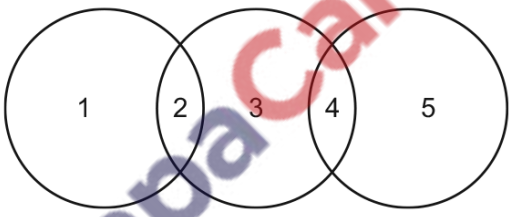
Which row correctly describes the function of the cell structures?

	lysosomes	mitochondria	smooth endoplasmic reticulum	Golgi body
A	digestion of unwanted structures	abundant in sites of active transport	processing of proteins	a stack of flattened sacs
B	digestion of unwanted structures	ATP synthesis	lipid production	glycoprotein production
C	spherical sacs containing hydrolytic enzymes	abundant in sites of active transport	lipid production	glycoprotein production
D	spherical sacs containing hydrolytic enzymes	ATP synthesis	glycoprotein production	lipid production

---

138. 9700_w18_qp_11 Q: 5

The diagram shows the relationship between various cells and their components.



Which row is correct?

	1	2	3	4	5
A	80S ribosome	eukaryotic cell	mitochondrion	70S ribosome	prokaryotic cell
B	chloroplast	plant cell	cell wall	prokaryotic cell	80S ribosome
C	circular DNA	nucleus	eukaryotic cell	mitochondrion	70S ribosome
D	prokaryotic cell	circular DNA	chloroplast	membrane bound	70S ribosome

---

139. 9700_w18_qp_12 Q: 1

What is the diameter of a typical prokaryote, such as *Streptococcus*?

A 7.5×10^{1} nm

B 7.5×10^{2} nm

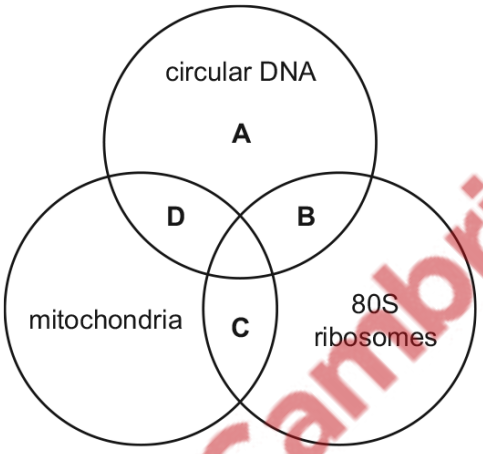
C 7.5×10^{0} μm

D 7.5×10^{1} μm

---

140. 9700_w18_qp_12 Q: 3

Which structures are present in a *Vibrio cholerae* cell?



---

141. 9700_w18_qp_12 Q: 4

The removal of a plant cell wall by enzyme digestion leaves an intact membrane-bound structure called a protoplast.

Which statement explains why protoplasts are easily damaged?

A Mitochondria stop producing ATP to maintain membrane integrity.

B Net movement of water is no longer limited by turgor.

C Secretory vesicles are unable to fuse with the cell surface membrane.

D The shape of the cell structures is changed by the loss of cell shape.

---

142. 9700_w18_qp_12 Q: 5

Which statements are correct for a green plant?

1 ATP is produced by mitochondria.

2 ATP is produced by chloroplasts.

3 ATP forms part of the DNA.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

143. 9700_w18_qp_12 Q: 6

Which processes occur in eukaryotes and prokaryotes?

1 hydrolysis

2 mitosis

3 transcription

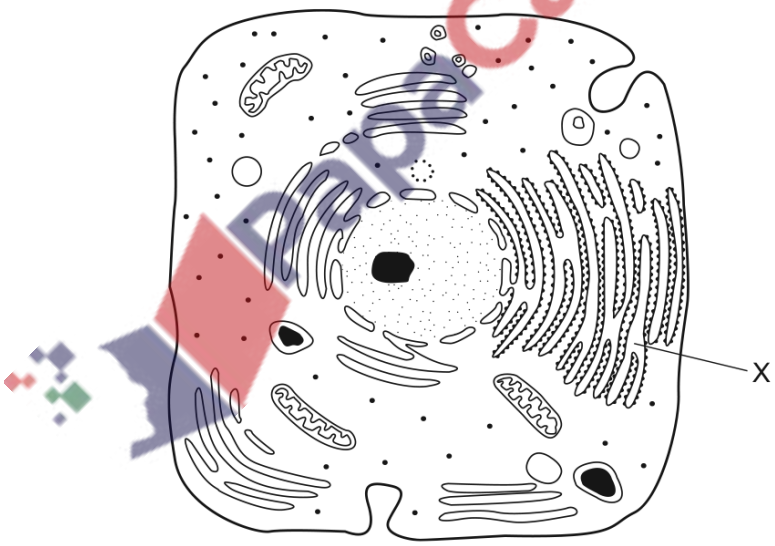
4 translation

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

---

144. 9700_w18_qp_13 Q: 4

The diagram is a drawing from an electron micrograph of a typical animal cell.



What is the function of the membrane system labelled X?

A lipid synthesis only

B protein synthesis and transport

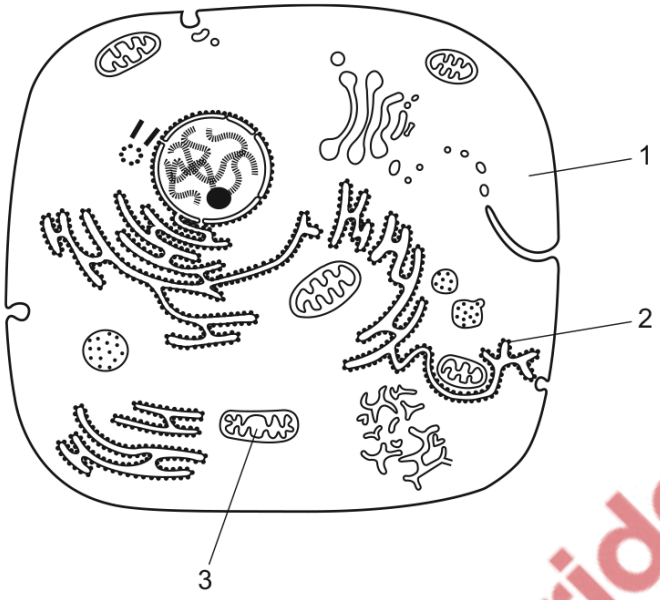
C protein synthesis only

D protein transport only

---

145. 9700_w18_qp_13 Q: 5

The diagram is a drawing from an electron micrograph of a typical animal cell.



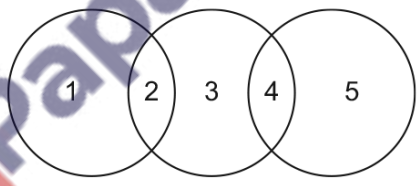
Where would nucleic acid be found?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

146. 9700_w18_qp_13 Q: 6

The diagram shows some similarities between chloroplasts, mitochondria and typical prokaryotes.



Which row is correct?

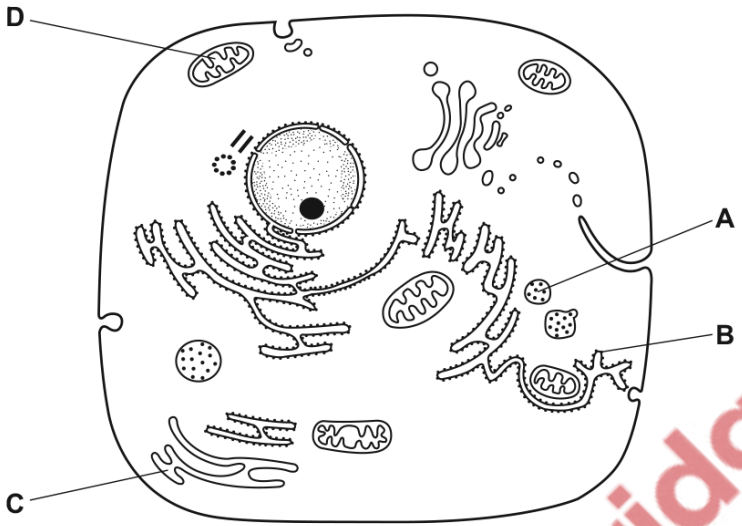
	1	2	3	4	5
A	chloroplasts	circular DNA	mitochondria	linear DNA	prokaryotes
B	mitochondria	70S ribosomes	chloroplasts	linear DNA	prokaryotes
C	mitochondria	linear DNA	chloroplasts	70S ribosomes	prokaryotes
D	prokaryotes	70S ribosomes	mitochondria	70S ribosomes	chloroplasts

---

147. 9700_m17_qp_12 Q: 1

The diagram shows the ultrastructure of a typical animal cell.

Which structure synthesises and transports lipids?



---

148. 9700_m17_qp_12 Q: 4

Some features of cells are listed.

1 cytoplasm

2 cell surface membrane

3 ribosomes

Which features are found in **both** animal and prokaryotic cells?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

149. 9700_m17_qp_12 Q: 5

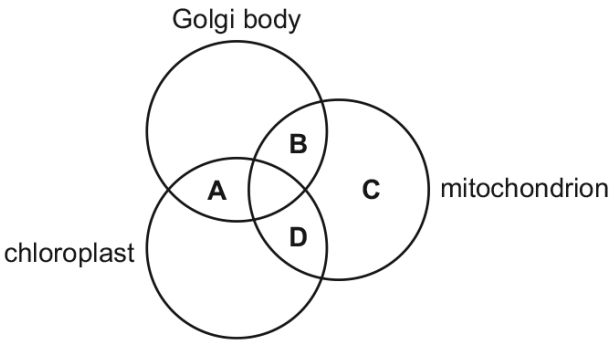
Which size of ribosomes is found in chloroplasts?

A 60S **B** 70S **C** 80S **D** 90S

---

150. 9700_m17_qp_12 Q: 6

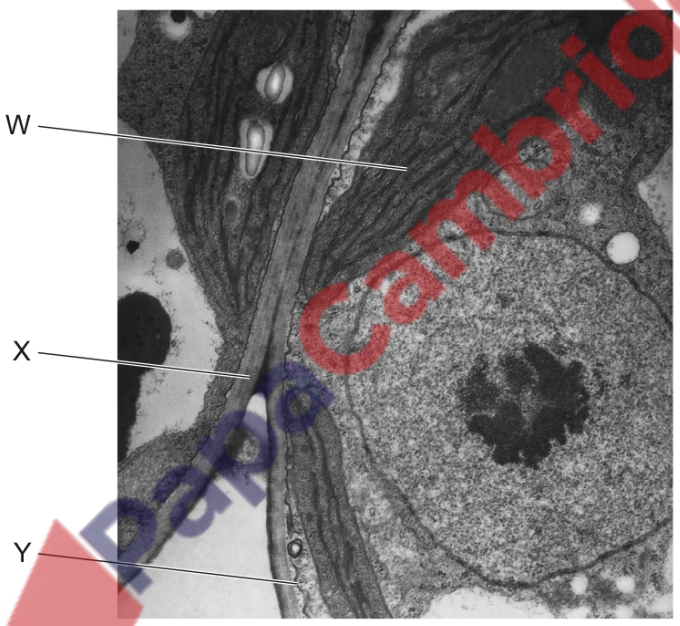
In which of these organelles is ATP synthesised?



---

151. 9700_s17_qp_11 Q: 2

The electron micrograph shows part of two cells.



Which labelled features identify these cells as eukaryotic?

A W, X and Y **B** W and X only **C** W only **D** X only

---

152. 9700_s17_qp_11 Q: 3

Plant cells are fixed, stained and viewed using a student microscope. The light source was natural light.

What would be clearly visible at ×400 magnification?

A cristae of mitochondria

B grana of chloroplasts

C nucleoli

D ribosomes

---

153. 9700_s17_qp_11 Q: 5

Some secretory cells synthesise and release glycoproteins.

What is the correct order of the sequence of events as they occur in the secretory cell?

1 exocytosis

2 product accumulates in secretory vesicle

3 mRNA binds to ribosomes

4 synthesis of glycoprotein

A 3, 4, 1, 2 **B** 3, 4, 2, 1 **C** 4, 3, 1, 2 **D** 4, 3, 2, 1

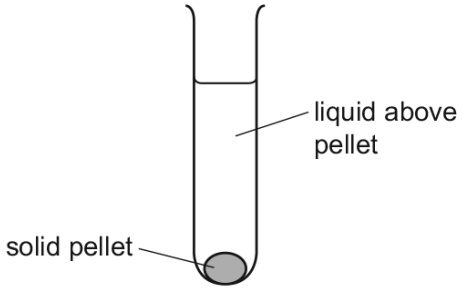
---

154. 9700_s17_qp_11 Q: 6

A scientist carried out an experiment to separate the organelles in an animal cell by mass.

The scientist mixed the cells with a buffer solution which had the same water potential as the cells. He then broke the cells open with a blender to release the organelles.

The extracted mixture was filtered and then spun in a centrifuge at a speed to separate the heaviest organelle. This sank to the bottom, forming a solid pellet, 1.



The liquid above pellet 1 was poured into a clean centrifuge tube and spun in the centrifuge at a higher speed to separate the next heaviest organelle. This organelle sank to the bottom, to form a solid pellet, 2.

He repeated this procedure twice more to obtain pellet 3 and pellet 4, each containing a single organelle.

What is the function of the organelle extracted in pellet 3?

A digestion of old organelles

B production of ATP

C synthesis of mRNA

D synthesis of protein

---

155. 9700_s17_qp_12 Q: 1

Which organelles are enclosed in a single phospholipid bilayer and contain hydrolytic enzymes?

A endocytotic vesicles

B Golgi body

C lysosomes

D mitochondria

---

156. 9700_s17_qp_12 Q: 2

The DNA of prokaryotes is naked and circular.

Which statement describes how the DNA of eukaryotes differs from that of prokaryotes?

A It has a nuclear envelope around it and is a double helix.

B It has a nuclear envelope around it and is circular.

C It has proteins attached to it and is a double helix.

D It has proteins attached to it and is linear.

---

157. 9700_s17_qp_12 Q: 4

What are found in chloroplasts **and** mitochondria?

1 DNA

2 70S ribosomes

3 mRNA

A 1, 2 and 3 **B** 1 and 2 only **C** 1 only **D** 2 and 3 only

---

158. 9700_s17_qp_13 Q: 1

Where are cisternae found in a cell?

1 endoplasmic reticulum

2 Golgi body

3 mitochondrion

A 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 and 3

---

159. 9700_s17_qp_13 Q: 3

It is possible for a bacterium to synthesise a eukaryotic protein.

This involves introducing a eukaryotic gene into the bacterial DNA, which can be translated.

What explains why a bacterial cell can produce a eukaryotic protein but cannot produce a eukaryotic glycoprotein?

A Bacteria do not have 70S ribosomes.

B Bacteria do not have a nuclear envelope.

C Bacteria do not have Golgi bodies.

D Bacteria do not have mitochondria.

---

160. 9700_s17_qp_13 Q: 4

Which structures are found in **both** typical eukaryotic cells **and** typical prokaryotic cells?

1 70S ribosomes

2 80S ribosomes

3 circular DNA

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 only

---

161. 9700_w17_qp_11 Q: 2

An electron micrograph of a cell shows large quantities of rough endoplasmic reticulum and many Golgi bodies.

What type of cell is being viewed?

A bacterium

B guard cell

C lymphocyte

D mesophyll

---

162. 9700_w17_qp_11 Q: 3

Which cell structures can form vesicles?

	cell structure		
	cell surface membrane	endoplasmic reticulum	Golgi body
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = can form vesicles

✗ = cannot form vesicles

---

163. 9700_w17_qp_12 Q: 2

One of the smallest viruses is the polio virus, which has a diameter of approximately 30 nm.

In 2003, the *Mimivirus* was discovered which has a diameter of approximately 680 nm.

In 2013, the *Pandoravirus* was discovered which has a diameter of approximately 1000 nm.

Which row correctly matches a cell structure with a virus that has a similar approximate size?

	polio virus	*Mimivirus*	*Pandoravirus*
A	lysosome	nucleolus	nucleus
B	nucleolus	lysosome	mitochondrion
C	nucleolus	mitochondrion	lysosome
D	ribosome	lysosome	mitochondrion

---

164. 9700_w17_qp_12 Q: 3

Which cell components are present in **all** prokaryotic cells?

	cell surface membrane	cell wall	endoplasmic reticulum	flagellum
A	✓	✓	✗	✓
B	✓	✓	✗	✗
C	✓	✗	✓	✗
D	✗	✓	✓	✓

key

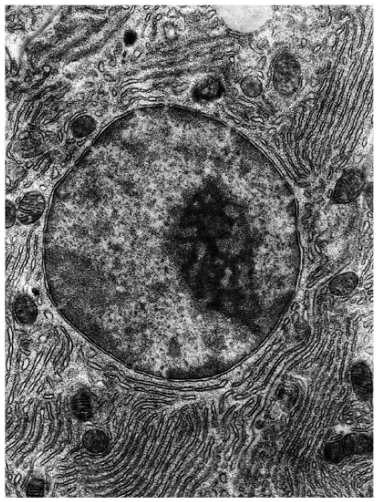
✓ = present

✗ = not present

---

165. 9700_w17_qp_12 Q: 4

The electron micrograph shows part of an animal cell.



What will be synthesised in large quantities in this cell?

1 ATP

2 glucose

3 RNA

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 only

---

166. 9700_w17_qp_12 Q: 5

Mitochondria are thought to have evolved from prokaryotic cells that were ingested by an ancestral cell.

Which feature have the prokaryotes lost during their evolution into mitochondria?

A cell wall

B circular chromosome

C endoplasmic reticulum

D ribosomes

---

167. 9700_w17_qp_12 Q: 6

Which statement is correct?

A A virus is composed of a protein coat which may surround RNA or DNA.

B Eukaryotic plant cell walls contain peptidoglycans in addition to cellulose.

C Plasmodesmata and centrioles are found in all plant cells.

D Prokaryotic cells contain 80S ribosomes which they use to manufacture proteins.

---

168. 9700_w17_qp_13 Q: 3

A cell was supplied with cytosine labelled with radioactive carbon.

In which cell structure would radioactivity be detected first?

A endoplasmic reticulum

B Golgi body

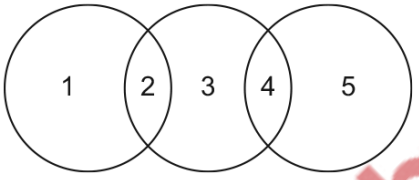
C nucleus

D ribosome

---

169. 9700_w17_qp_13 Q: 4

The diagram shows some similarities between chloroplasts, mitochondria and typical prokaryotes.



Which row is correct?

	1	2	3	4	5
A	chloroplasts	circular DNA	mitochondria	80S ribosomes	prokaryotes
B	chloroplasts	80S ribosomes	mitochondria	circular DNA	prokaryotes
C	prokaryotes	circular DNA	mitochondria	circular DNA	chloroplasts
D	prokaryotes	70S ribosomes	chloroplasts	80S ribosomes	mitochondria

---

170. 9700_w17_qp_13 Q: 5

Which statement supports the fact that mature plant cells can carry out the same role as lysosomes?

A A range of hydrolytic enzymes can be found within mature plant vacuoles.

B Glycogen, found within vesicles, can be hydrolysed to glucose molecules.

C Single membrane-bound vesicles are formed from plant Golgi bodies.

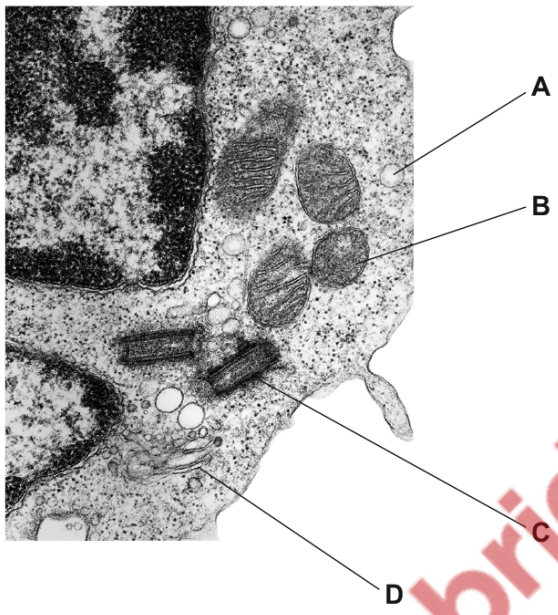
D Vesicles, formed from smooth endoplasmic reticulum, contain enzymes.

---

171. 9700_m16_qp_12 Q: 2

The electron micrograph shows part of a eukaryotic cell.

Which of the labelled organelles is a site of protein synthesis?



---

172. 9700_m16_qp_12 Q: 3

Inside a cell, a damaged mitochondrion can be surrounded and enclosed by a membrane to form a vesicle.

What happens after the fusion of a lysosome with the vesicle?

A ATP production by the mitochondrion increases.

B Enzymes from the lysosome repair the mitochondrion.

C Hydrolytic enzymes catalyse the breakdown of the mitochondrion.

D The mitochondrion is released from the cell by exocytosis.

---

173. 9700_m16_qp_12 Q: 4

Which units are the most appropriate to record the diameter of a lymphocyte and a red blood cell?

	lymphocyte	red blood cell
A	mm	mm
B	mm	μm
C	μm	mm
D	μm	μm

---

174. 9700_m16_qp_12 Q: 5

Which structures will be present in a cell that causes cholera?

1 circular DNA

2 naked DNA

3 70S ribosomes

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

175. 9700_s16_qp_11 Q: 1

Which of the cell organelles will be clearly visible under the high power (×400) of the light microscope?

	lysosomes	endoplasmic reticulum	mitochondria	chloroplasts
A	✓	✓	✗	✗
B	✓	✗	✓	✗
C	✗	✓	✓	✓
D	✗	✗	✗	✓

key

✓ = clearly visible

✗ = not clearly visible

---

176. 9700_s16_qp_11 Q: 3

What are correct locations of ribosomes in the typical eukaryotic cell?

1 free in the cytoplasm

2 attached to the outside of the endoplasmic reticulum

3 attached to the inside of the endoplasmic reticulum

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

177. 9700_s16_qp_11 Q: 4

Visking tubing is an artificial partially permeable membrane used to demonstrate diffusion. Glucose molecules can pass through the pores in the membrane which are approximately 2.4 nm in diameter.

Which of the following could pass through the pores?

1 bacteria

2 haemoglobin

3 ribosomes

4 glycogen

A 1 and 3 **B** 2 and 4 **C** 2 only **D** none of the above

---

178. 9700_s16_qp_11 Q: 5

What are found in both chloroplasts and typical prokaryotic cells?

A 70S ribosomes and circular DNA

B 70S ribosomes only

C 80S ribosomes and circular DNA

D circular DNA only

---

179. 9700_s16_qp_12 Q: 2

Which statements about **both** mitochondria and chloroplasts are correct?

1 They contain 80S ribosomes.

2 They contain circular DNA molecules.

3 They produce ATP.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

180. 9700_s16_qp_12 Q: 3

Which range of sizes would include most eukaryotic cells?

A 1×10^2 nm to 1 μm

B 1 μm to 1×10^1 μm

C 1×10^1 μm to 1×10^2 μm

D 1×10^2 μm to 1×10^3 μm

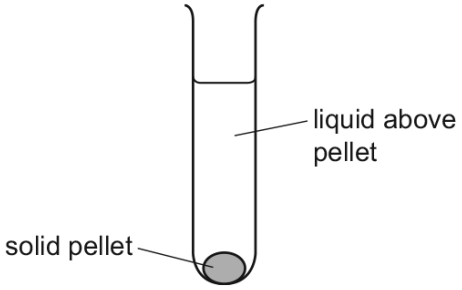
---

181. 9700_s16_qp_12 Q: 4

A scientist carried out an experiment to separate the organelles in an animal cell by mass.

The scientist mixed the cells with a buffer solution which had the same water potential as the cells. He then broke the cells open with a blender to release the organelles.

The extracted mixture was filtered and then spun in a centrifuge at a speed that separates the heaviest organelle. This organelle sank to the bottom, forming a solid pellet, 1.



The liquid above pellet 1 was poured into a clean centrifuge tube and spun in the centrifuge at a higher speed to separate the next heaviest organelle. This organelle sank to the bottom, forming a solid pellet, 2.

He repeated this procedure twice more to obtain pellet 3 and pellet 4, each containing a single organelle.

What is the function of the organelle extracted in pellet 4?

A digestion of old organelles

B production of ATP

C production of mRNA

D synthesis of protein

---

182. 9700_s16_qp_13 Q: 2

For which cell component would nanometres be the most appropriate unit of measurement?

A a cell surface membrane

B a chloroplast

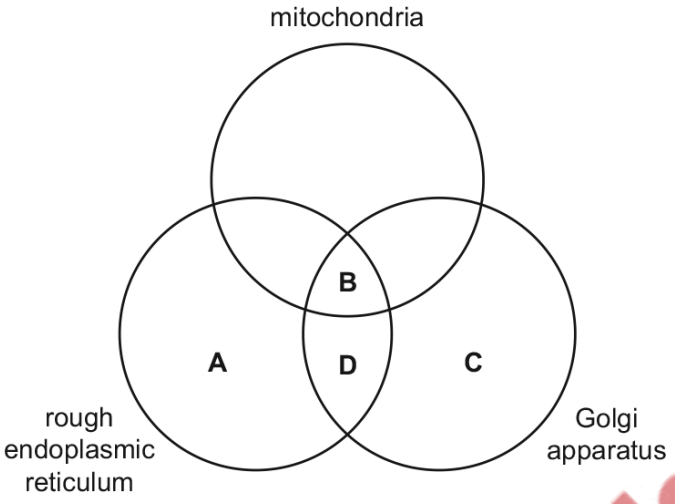
C a mitochondrion

D a nucleolus

---

183. 9700_s16_qp_13 Q: 3

Which organelles are required for the formation of lysosomes containing hydrolytic enzymes?



---

184. 9700_s16_qp_13 Q: 4

What are found in **both** chloroplasts and mitochondria?

A 70S ribosomes only

B 70S ribosomes and circular DNA

C 80S ribosomes and circular DNA

D circular DNA only

---

185. 9700_s16_qp_13 Q: 5

Which types of RNA are found in **both** prokaryotic and eukaryotic cells?

	mRNA	rRNA	tRNA
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✓	✗

key

✓ = present

✗ = absent

---

186. 9700_w16_qp_11 Q: 2

A culture of human cells had its cell surface membranes removed, releasing the cell contents.

This material became contaminated by bacteria.

The material was then centrifuged, separating out the various cell structures according to size and mass.

Which cell structure would be separated out along with the bacteria?

A endoplasmic reticulum

B mitochondria

C nuclei

D ribosomes

---

187. 9700_w16_qp_11 Q: 3

Which parts of a cell contain ribosomes?

1 chloroplast

2 mitochondrion

3 nucleus

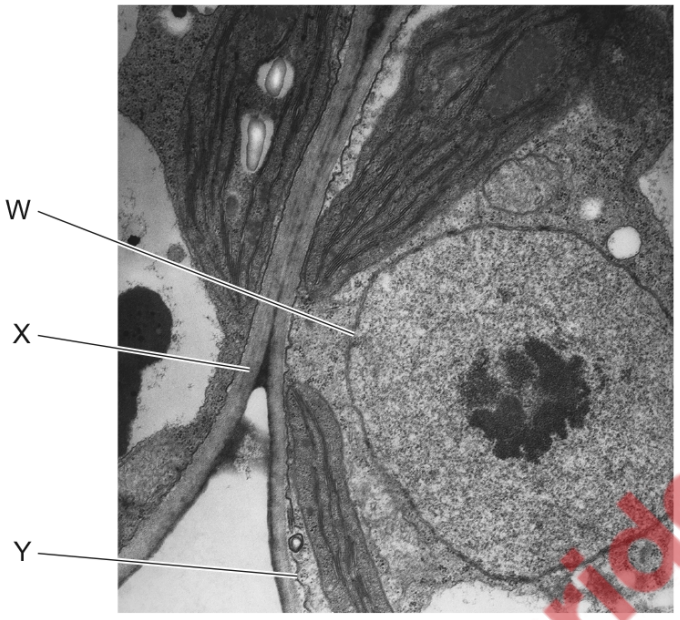
4 cytoplasm

A 1, 2, 3 and 4 **B** 1, 2 and 3 only **C** 1, 2 and 4 only **D** 3 and 4 only

---

188. 9700_w16_qp_11 Q: 4

The electron micrograph shows part of two eukaryotic cells.



Which features are also found in prokaryotes?

A W only **B** X only **C** X and Y only **D** W, X and Y

---

189. 9700_w16_qp_11 Q: 5

Which of the structures are found in photosynthetic prokaryotes?

1 cell surface membrane
2 cellulose wall
3 ribosomes
4 chloroplasts

A 1, 2, 3 and 4 **B** 1, 2 and 3 only **C** 1 and 3 only **D** 2 and 4 only

---

190. 9700_w16_qp_12 Q: 3

What is the correct order in which organelles function to make and secrete an enzyme?

A nucleolus → ribosome → Golgi body → vesicle

B nucleolus → smooth endoplasmic reticulum → lysosome → vesicle

C nucleus → rough endoplasmic reticulum → Golgi body → vesicle

D nucleus → smooth endoplasmic reticulum → lysosome → vesicle

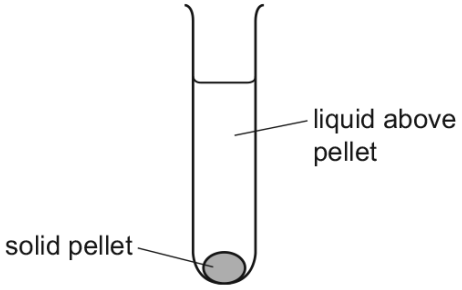
---

191. 9700_w16_qp_12 Q: 5

A scientist carried out an experiment to separate the organelles in an animal cell by mass.

The scientist mixed the cells with a buffer solution which had the same water potential as the cells. He then broke the cells open with a blender to release the organelles.

The extracted mixture was filtered and then spun in a centrifuge at a high speed to separate the heaviest organelle. This sank to the bottom, forming a solid pellet, 1.



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He repeated this procedure twice more to obtain pellet 3 and pellet 4, each containing a single organelle.

What is the function of the organelle extracted in pellet 2?

A digestion of old organelles

B production of ATP

C production of mRNA

D synthesis of protein

---

192. 9700_w16_qp_12 Q: 6

Which is a correct comparison between a typical prokaryotic cell and a typical eukaryotic cell?

	prokaryote	eukaryote
A	circular DNA only	linear DNA only
B	naked DNA	DNA associated with protein
C	rough endoplasmic reticulum present	smooth endoplasmic reticulum and rough endoplasmic reticulum present
D	ribosomes approximately 22 nm diameter	ribosomes approximately 18 nm in diameter

---

193. 9700_w16_qp_13 Q: 1

Which structure is **only** found in typical eukaryotic animal cells?

A cell surface membrane

B centriole

C Golgi body

D ribosome

---

194. 9700_w16_qp_13 Q: 4

Which statement is correct?

A Prokaryotes and chloroplasts have circular DNA where genes carrying the code for cell walls are located.

B Prokaryotes and chloroplasts have 70S ribosomes that are the sites for translation and polypeptide synthesis.

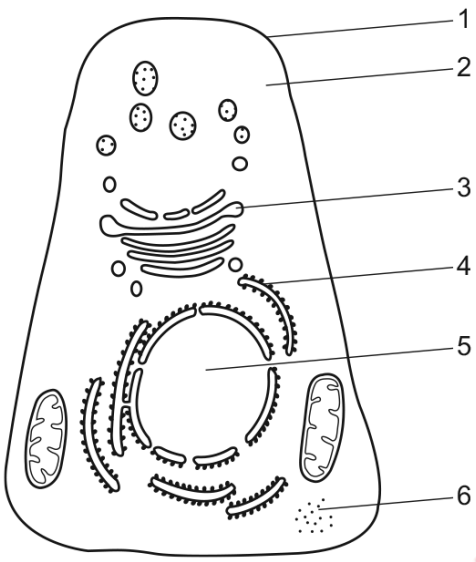
C Prokaryotes and mitochondria have an outer membrane and a separate inner, folded membrane where ATP synthesis occurs.

D Prokaryotes and mitochondria have double-stranded linear DNA where genes carrying coded information are located.

---

195. 9700_w16_qp_13 Q: 5

The diagram shows a typical animal cell.



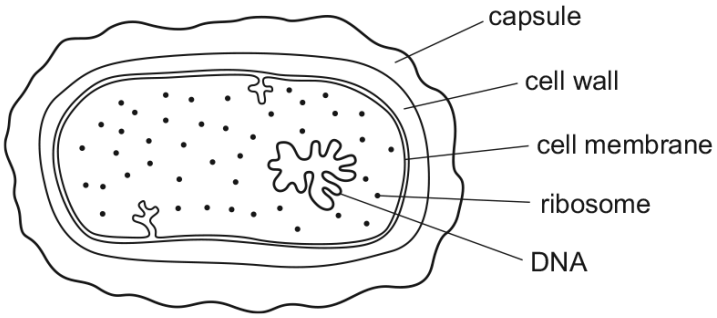
Which features are also found in **both** plant cells and prokaryotic cells?

	1	2	3	4	5	6
A	✓	✓	✓	✓	✓	✓
B	✓	✓	✗	✗	✗	✓
C	✓	✗	✗	✓	✗	✗
D	✗	✓	✓	✓	✓	✗

key
✓ = present
✗ = absent

196. 9700_s15_qp_11 Q: 2

The diagram shows a high-power drawing of a bacterium.



Which three components are found in **both** this bacterium and an animal cell?

A capsule, cell membrane and cell wall

B capsule, DNA and ribosome

C cell membrane, cell wall and DNA

D cell membrane, DNA and ribosome

---

197. 9700_s15_qp_11 Q: 4

Which structures are found in typical eukaryotic cells?

1 70S ribosomes

2 80S ribosomes

3 linear DNA (chromosomes)

4 circular DNA

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1 and 4 only

D 2 and 3 only

---

198. 9700_s15_qp_11 Q: 5

What is the function of the nucleolus?

A The formation and breakdown of the nuclear envelope.

B The formation of rough endoplasmic reticulum.

C The synthesis of ribosomal proteins.

D The synthesis of rRNA.

---

199. 9700_s15_qp_12 Q: 3

What is the function of plasmodesmata in plant cells?

A to act as a barrier to water soluble substances

B to allow active transport of ions and sucrose between cells

C to allow the symplastic movement of substances between cells

D to enable cells to recognise each other

---

200. 9700_s15_qp_12 Q: 4

Which size of ribosome is found in both chloroplasts and mitochondria?

A 60S **B** 70S **C** 80S **D** 90S

---

201. 9700_s15_qp_12 Q: 5

Which function is correct for the description of the cell structure?

	function	cell structure
A	organises microtubules to produce the spindle	membrane-bound sacs, arranged as a flattened sac
B	packages hydrolytic enzymes used in cell	non-membrane bound cylindrical structures
C	synthesises lipids	membranes which surround an enclosed inner cavity
D	synthesises polypeptides	membrane bound spherical structure

---

202. 9700_s15_qp_12 Q: 6

Ribosomes consist of two subunits, each containing rRNA. An analysis of **all** the 70S ribosomes from a single cell of the bacterium, *Escherichia coli*, showed that there were:

- 38 000 rRNA molecules
- 2 main types of rRNA molecule
- 19 000 copies of each type of rRNA molecule

How many 70S ribosomes were there in the *E. coli* cell?

A 9500 **B** 19 000 **C** 38 000 **D** 76 000

---

203. 9700_s15_qp_13 Q: 1

What are found in both mitochondria and typical prokaryotic cells?

A 70S ribosomes and circular DNA

B 70S ribosomes only

C 80S ribosomes and circular DNA

D circular DNA only

---

204. 9700_s15_qp_13 Q: 6

What is the diameter of a typical prokaryote, such as *Streptococcus*?

A 7.5×10^{1} nm

B 7.5×10^{2} nm

C 7.5×10^{0} μm

D 7.5×10^{1} μm

---

205. 9700_w15_qp_11 Q: 1

Which size of ribosome is found in chloroplasts and typical prokaryotic cells?

A 60S **B** 70S **C** 80S **D** 90S

---

206. 9700_w15_qp_11 Q: 6

Which order of organelles is correct when a protein is synthesised and secreted?

A Golgi body → lysosome → ribosome → nucleus

B nucleus → ribosome → Golgi body → vesicle

C ribosome → nucleus → lysosome → Golgi body

D vesicle → Golgi body → nucleus → ribosome

---

207. 9700_w15_qp_12 Q: 1

Which size of ribosome is found in mitochondria?

A 60S **B** 70S **C** 80S **D** 90S

---

208. 9700_w15_qp_12 Q: 3

Which features of microvilli and root hairs are correct?

	increase cell surface area	cannot be resolved with the light microscope	contain vacuoles	more than one present on a cell
A	microvilli	microvilli	root hairs	root hairs
B	microvilli	root hairs	microvilli	microvilli
C	root hairs	microvilli	root hairs	microvilli
D	root hairs	root hairs	microvilli	root hairs

---

209. 9700_w15_qp_12 Q: 4

Lysosomes have a variety of different shapes and sizes, making them difficult to identify.

What describes a lysosome?

A a vesicle containing enzymes, enclosed by a double membrane, that is budded off the endoplasmic reticulum

B a vesicle containing hydrolytic enzymes and surrounded by a single membrane, found only in phagocytes

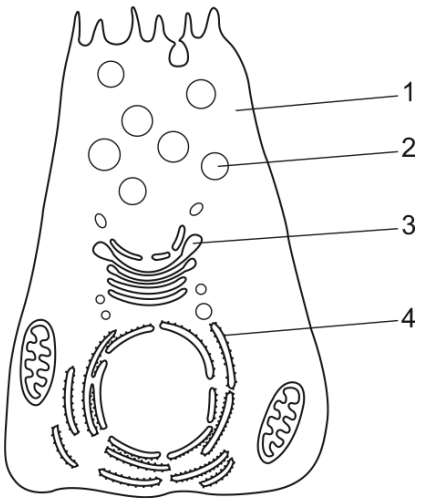
C a vesicle enclosed by a single membrane, containing several different hydrolytic enzymes that may act inside or outside the cell

D a vesicle surrounded by a double membrane, containing enzymes which can hydrolyse damaged organelles in a cell

---

210. 9700_w15_qp_12 Q: 5

Radioactively-labelled amino acids were introduced into a tracheal cell that uses them to make mucus (a glycoprotein).



What route will the amino acids take?

	first → last			
A	1	2	3	4
B	1	4	3	2
C	4	1	2	3
D	4	3	2	1

---

211. 9700_w15_qp_13 Q: 1

Which size of ribosome is found in chloroplasts?

A 60S **B** 70S **C** 80S **D** 90S

---

212. 9700_w15_qp_13 Q: 3

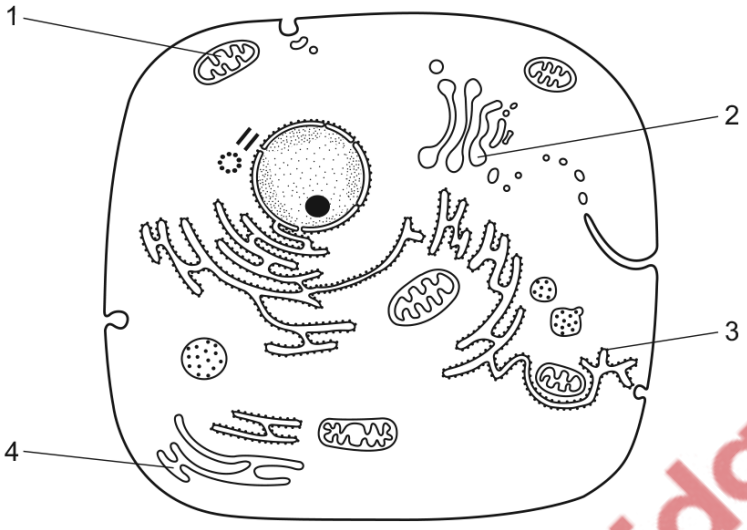
Which features of cilia and root hairs are correct?

	increase cell surface area	cannot be resolved with the light microscope	contain vacuoles	more than one present on a cell
A	cilia	cilia	root hairs	root hairs
B	cilia	root hairs	cilia	cilia
C	root hairs	cilia	root hairs	cilia
D	root hairs	root hairs	cilia	root hairs

---

213. 9700_w15_qp_13 Q: 4

The diagram shows a typical animal cell. Each labelled structure is involved with the synthesis of biological molecules.



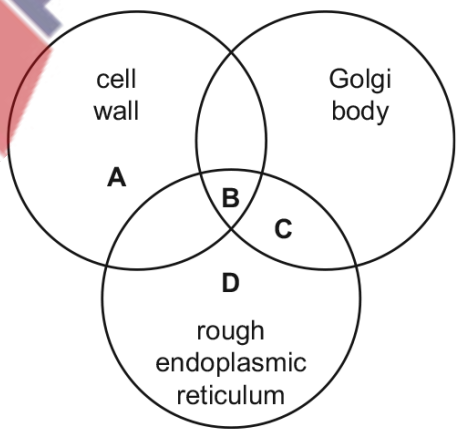
Within which structures are glycoproteins, proteins and steroids synthesised?

	glycoproteins	proteins	steroids
A	2	3	1
B	2	3	4
C	4	2	3
D	4	1	2

---

214. 9700_w15_qp_13 Q: 5

What is present in a *Vibrio cholerae* cell?



---

215. 9700_w15_qp_13 Q: 6

What is correct for a typical prokaryotic cell?

	cell wall	cell diameter	ribosomes
A	cellulose	1-5 μm	70S
B	cellulose	5-40 μm	70S and 80S
C	peptidoglycan	1-5 μm	70S
D	peptidoglycan	5-40 μm	70S and 80S