GCE Biology

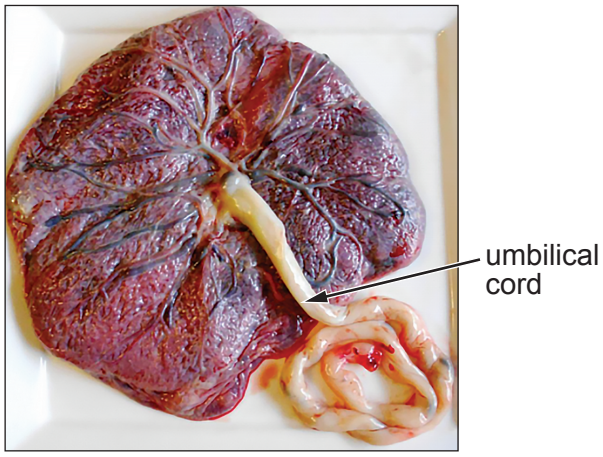
S21-A400U20-1

Assessment Resource 15

Continuity of Life Resource F

1. Figure 1.1 shows a placenta at full term and a transverse section through the umbilical cord.

Figure 1.1



Placenta

T.S. umbilical cord

(a) Name structures **A** and **B** in Figure 1.1 and give details of the features that allowed you to identify each one. [4]

Structure	Name	Features
A		
B		

Figure 1.2 shows the maternal and fetal blood supplies to the placenta.

Figure 1.2

(b) Using appropriate labels from Figure 1.2 describe how the maternal blood flows through the placenta. [2]

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(c) Using Figure 1.2 compare the arrangement of blood vessels in the fetal circulation within the placenta with the arrangement of blood vessels in the maternal circulation within the placenta. Explain how this increases the efficiency of exchange. [2]

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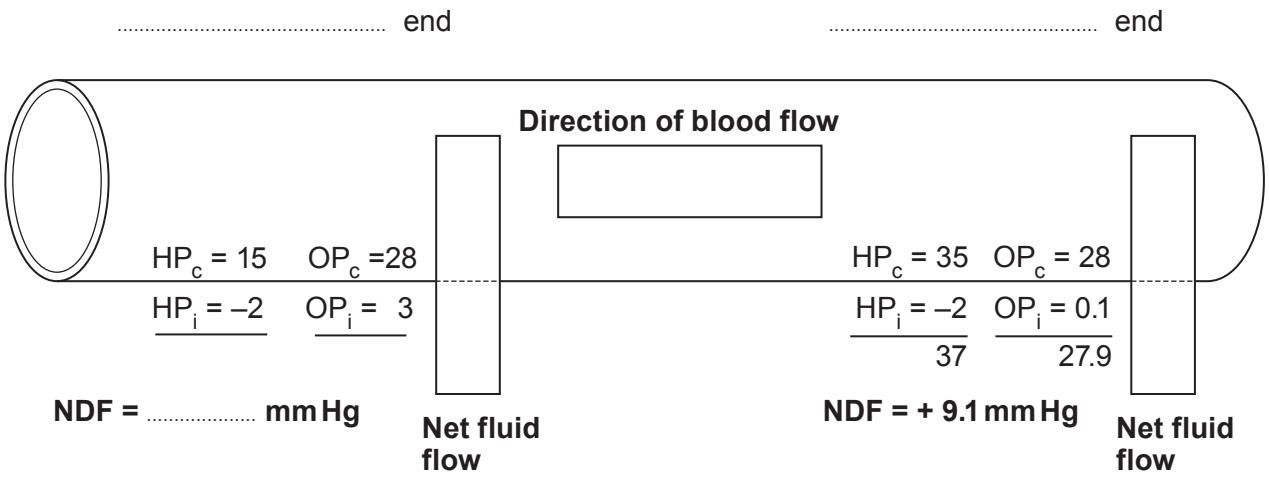
Tissue fluid is the name given to fluid that passes across capillary membranes and leaves the blood at the arterial ends of capillaries. Some of the fluid returns to the blood at the venous ends of capillaries, the rest is drained away by lymph vessels. Figure 1.3 shows the forces affecting the movement of fluid **across** capillary membranes at both ends of a capillary. The forces are hydrostatic pressure (HP) and osmotic pressure (OP), all values are in mmHg.

Figure 1.3



The Net Driving Force (NDF) can be calculated from the formula:

$$NDF = (HP_c - HP_i) - (OP_c - OP_i)$$

- HP_c is the capillary hydrostatic pressure
- HP_i is the interstitial hydrostatic pressure
- OP_c is the capillary osmotic pressure
- OP_i is the interstitial osmotic pressure

(d) (i) The NDF for the right-hand end of the capillary has been calculated using this formula. Use the formula to calculate the missing NDF and **enter your value on Figure 1.3**. [2]

Space for working.

(ii) By convention, **outward** force is defined as **positive**, and **inward** force is defined as **negative**. Use the given value of NDF and the result of your calculation, to conclude whether the net fluid movement would be outward or inward at each end of the capillary. **Draw arrows in the two rectangles labelled 'net fluid flow'** to show your conclusions. [1]

(iii) Use all the information provided and calculated to identify

I. the arterial and venous ends of the capillary. **Write your answers on the dotted lines above Figure 1.3.** [1]

II. which direction blood is moving inside the capillary. **Draw an arrow in the rectangle labelled 'direction of blood flow'.** [1]

(e) Predict what might happen to a patient's leg if lymph vessels were damaged during a hip replacement operation. [1]

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Following birth, babies must adapt to exchanging gases using lungs. Premature babies often have lungs which are not completely developed and they must be treated with surfactants.

(f) Explain the purpose of treating premature babies with surfactants. [2]

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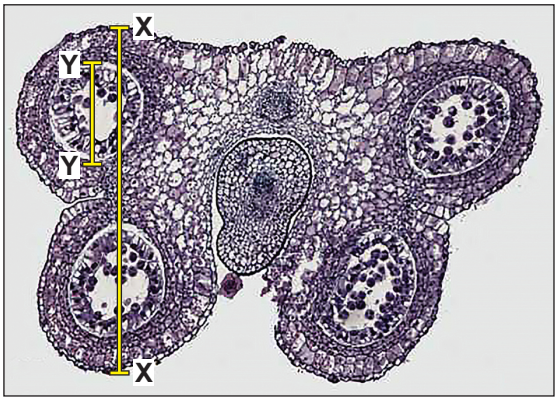
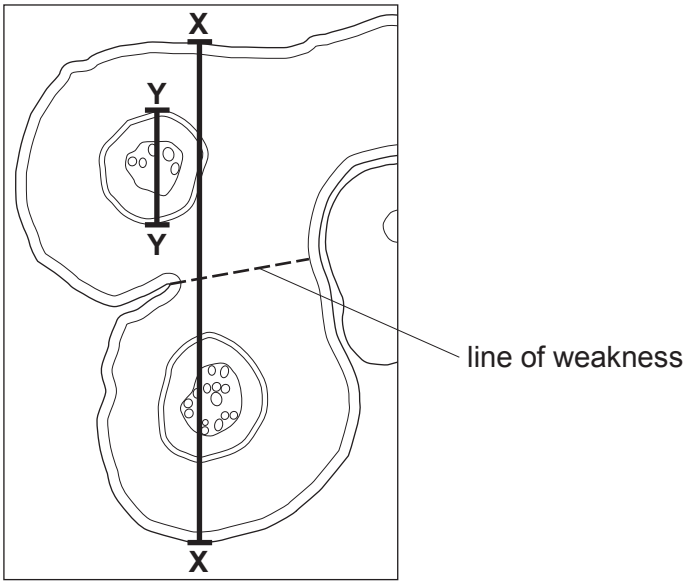
2. A student examined the TS Anther shown in the photomicrograph in Figure 1 through a microscope and measured the dimensions indicated by lines X-X and Y-Y using a calibrated eyepiece graticule.
Figure 2.1
X- X measured 1080 µm; Y-Y measured 360 µm.



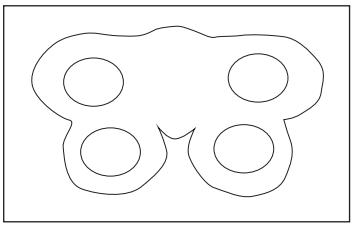
The low power plan drawing of a **representative portion** of the specimen is shown in Figure 2.2.

Figure 2.2



(a) (i) One structure is shown in the micrograph in Figure 2.1 but missing from the low power plan in Figure 2.2.
Draw this structure on the low power plan. Label it with its name and its function.
[3]

(ii) **In the rectangle provided** below, which contains a sketch of the whole section, indicate which part is shown in the tissue plan in Figure 2.2. [1]



(b) Use the measurement lines on Figure 2.2 and the measurements given for the photomicrograph in Figure 2.1 to deduce whether the low power plan in Figure 2.2 is in proportion. Show all workings. [4]

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(c) (i) Describe the part played by **mitosis** and **meiosis** in the formation of the male gametes in flowering plants, explaining the biological significance of each type of cell division. [5]

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(ii) State the function of the tapetum. [1]

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Figure 2.3 shows an anther undergoing dehiscence.

Figure 2.3

(d) Use the photomicrograph in Figure 2.3 and the low power plan in Figure 2.2 to suggest the significance of a line of weakness in the position shown on the drawing. [3]

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