

## 2017 AP<sup>®</sup> BIOLOGY FREE-RESPONSE QUESTIONS

8. Estrogens are small hydrophobic lipid hormones that promote cell division and the development of reproductive structures in mammals. Estrogens passively diffuse across the plasma membrane and bind to their receptor proteins in the cytoplasm of target cells.
- (a) **Describe** ONE characteristic of the plasma membrane that allows estrogens to passively cross the membrane.
  - (b) In a laboratory experiment, a researcher generates antibodies that bind to purified estrogen receptors extracted from cells. The researcher uses the antibodies in an attempt to treat estrogen-dependent cancers but finds that the treatment is ineffective. **Explain** the ineffectiveness of the antibodies for treating estrogen-dependent cancers.

**STOP**

**END OF EXAM**

**AP<sup>®</sup> BIOLOGY**  
**2017 SCORING GUIDELINES**

**Question 8**

Estrogens are small hydrophobic lipid hormones that promote cell division and the development of reproductive structures in mammals. Estrogens passively diffuse across the plasma membrane and bind to their receptor proteins in the cytoplasm of target cells.

- (a) **Describe** ONE characteristic of the plasma membrane that allows estrogens to passively cross the membrane. **(1 point)**

**Description (1 point)**

- Hydrophobic/nonpolar
- Space between phospholipids

- (b) In a laboratory experiment, a researcher generates antibodies that bind to purified estrogen receptors extracted from cells. The researcher uses the antibodies in an attempt to treat estrogen-dependent cancers but finds that the treatment is ineffective. **Explain** the ineffectiveness of the antibodies for treating estrogen-dependent cancers. **(2 points)**

**Explanation (2 points)**

- Antibodies are unable to enter the cell.
- (Extracellular) antibodies will not bind to (intracellular) estrogen receptors.