EDVOTEK® INQUIRY GUIDE:

ELISA

TEACHERS:
For the answer key, please contact us at **info@edvotek.com**

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Key Terms

DEFINE the following terms before you begin the guide then refer to them as needed. Use any resources you want!

ELISA:

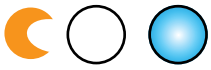
Antigen ():

Antibody:

Primary Antibody ():

Secondary Antibody ():

Enzyme ():

Detection System ():

Substrate ():

Product ():

Epitope:

Product:

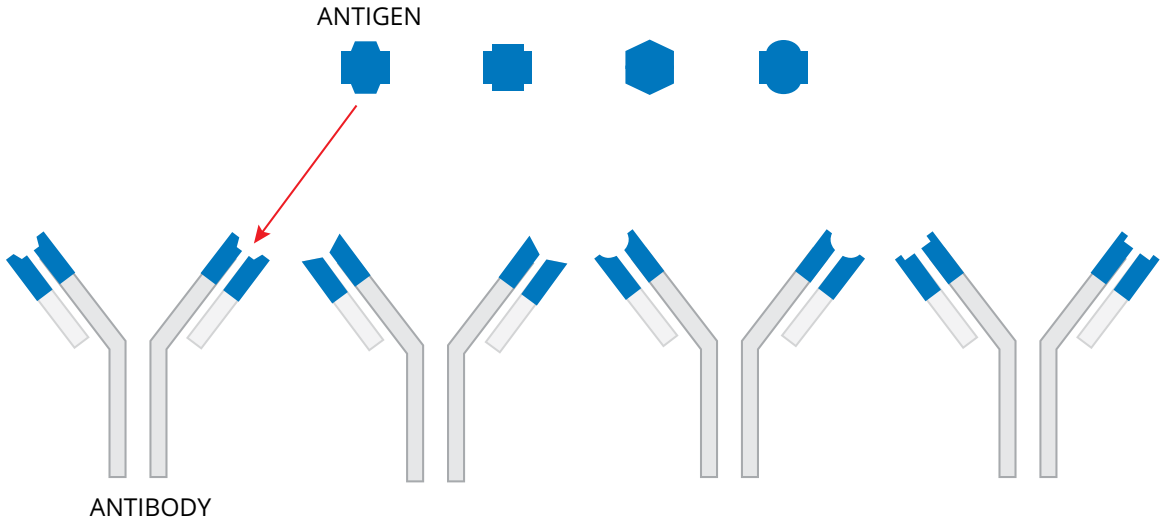
Catalytic Activity:

Microtiter Plate:

Qualitative:

Quantitative:

1. An ELISA harnesses the highly specific interaction between antigens and antibodies. Refamiliarize yourself with lock and key recognition and **DRAW** lines to match the four antigens with their corresponding antibodies below. (One match is already done for you.)

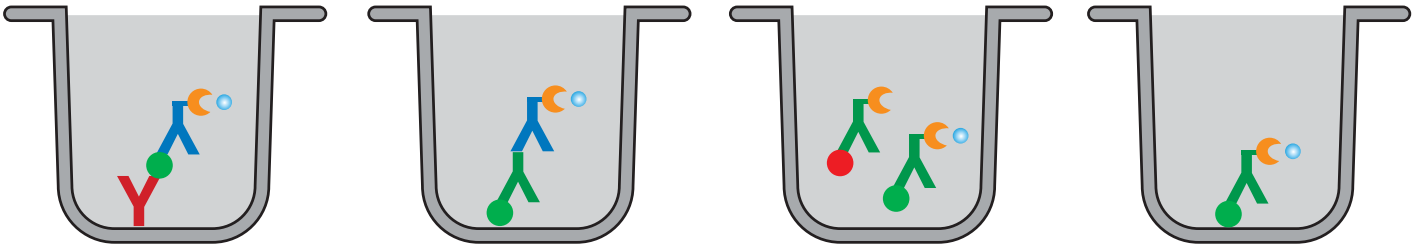


2. Antibodies can be used to detect a variety of biomolecules including antigens, other antibodies, hormones, peptides, and proteins. Scientists use this versatility to create diverse and powerful ELISAs. **CIRCLE** tests that would be good candidates for ELISA assays.

HIV Screening	Lyme Disease Screening
Early-stage Breast Cancer Screening	Drug Test (for illicit drugs)
Drug Test (for rheumatoid arthritis prescription drug)	Carbon Dating
Isotope Ratio Determination	Pregnancy Test
COVID Screening	Food Allergen Screening (nuts, eggs, and milk)
Paternity Determination	Early detection of Huntington Diseases

3. There are four types of ELISAs – Direct, Indirect, Sandwich, and Competitive. Use the definitions below to **GUESS** a title for each of the four illustrations.

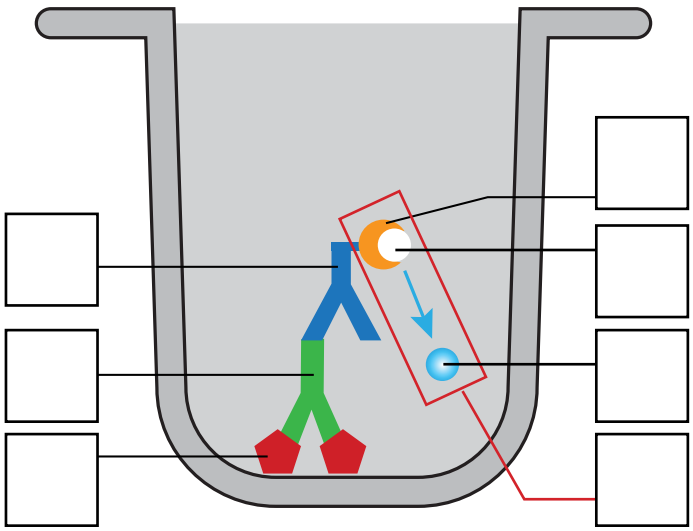
   - **DIRECT**: ELISA where the antigen is immobilized to the surface of a well and then detected with a specific antibody that is conjugated with a detection system – typically an enzyme that can turn a substrate into a differently colored product.
   - **INDIRECT**: ELISA where an antigen is immobilized to the surface of a well and then binds to a primary antibody which then binds to a secondary antibody that is conjugated with a detection system.
   - **SANDWICH**: ELISA where an antibody is coated on a well and then used to capture the antigen. A second detection molecule conjugated antibody is then added.
   - **COMPETITIVE**: ELISA used to measure the concentration of an antigen by having both a sample antigen and a reference antigen.



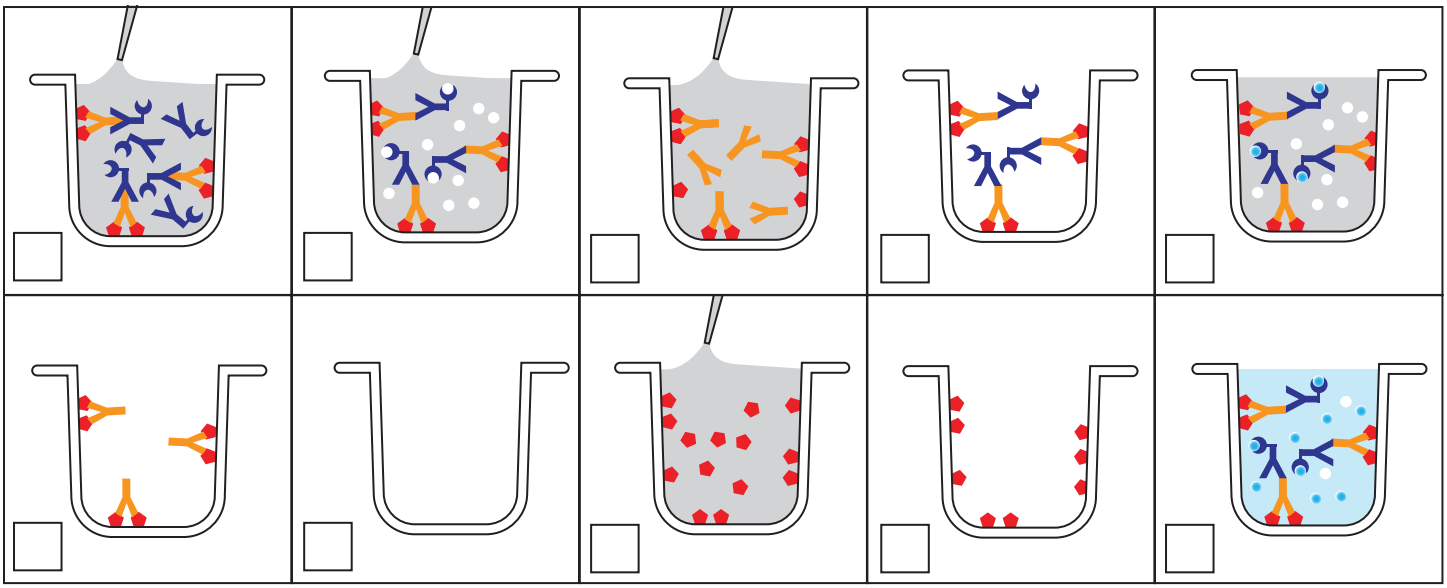
_____ _____ _____ _____

4. **LABEL** the major components in an indirect ELISA by **WRITING** each component's corresponding letter in the appropriate box.

   A Antigen
   B Primary Antibody
   C Secondary Antibody
   D Detection System
   - D1 Enzyme
   - D2 Substrate
   - D3 Product



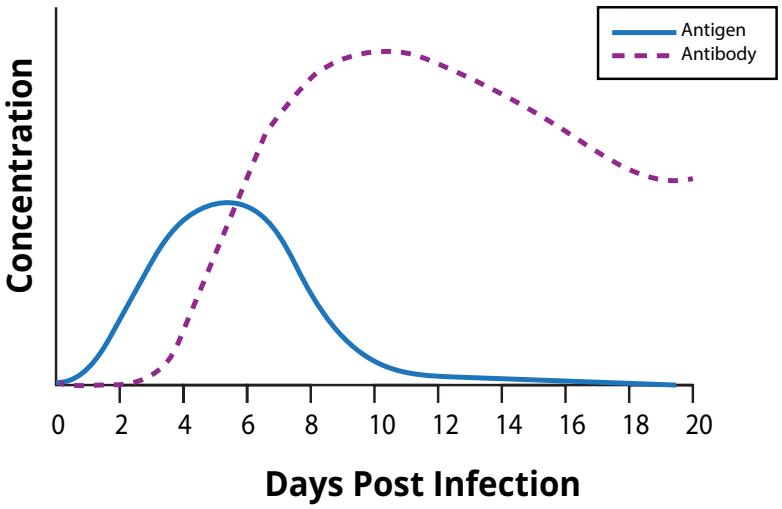
5. Below are 10 tiles depicting the steps in a typical indirect ELISA. **NUMBER** each box to reflect the correct sequence of events.



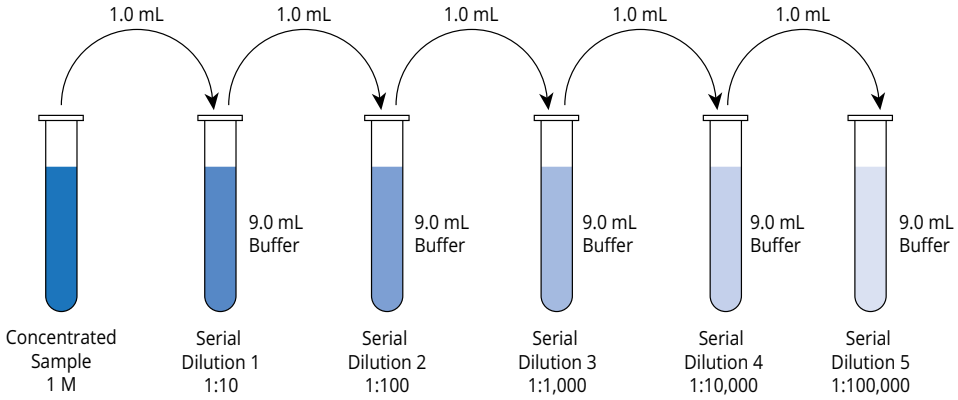
If you are struggling it can help to physically rearrange the tiles. For a printable version, ask your teacher or visit **https://edvotek.com/storytiles/elisa**.

6. Using the symbols from questions 3, 4, and 5, **DRAW** the molecular sequence in a NEGATIVE sample of an indirect ELISA (assume the negative sample contains no antigen.)

7. Below is a generalized infection timeline showing the concentration of antigens and antibodies on each day of an infection. On the X-axis, **HIGHLIGHT** when you think ELISA tests would be most helpful diagnosing an infection then explain your answer on the side.



8. Some ELISA tests are quantitative. Quantitative ELISAs use a standard curve to determine the concentration of a sample. To make a standard curve, scientists repeatedly dilute a sample with a known concentration. The image below illustrates a common way to make a standard curve from a 1M concentrated sample. Using this image, **FILL IN** the table.



Sample	Amount of Buffer	Amount of Sample	Sample Source	Concentration
Concentrate Sample	---	---	---	1 M
Serial Dilution 1	9 mL	1 mL	Concentrate Sample	0.1 M
Serial Dilution 2				
Serial Dilution 3				
Serial Dilution 4				
Serial Dilution 5				

9. Imagine you're part of a lab specializing in Lyme disease diagnosis. You've been sent samples from three patients and are setting up a preliminary ELISA. In front of you are the patient samples, a positive control, a negative control, and a 96 well microtiter plate. **DESIGN** and **LABEL** your plate to include all these samples. Keep in mind the importance of replicates and the role of blank wells in preventing contamination.