Whose Blood, Whose DNA

STATIC · Period 1-2 · Supplied illustrative case record, available to all students

One serology worksheet

Complete one serology worksheet: Parts A–E plus your case's late-record log. Use your class's supplied illustrative records. Your work explains a classroom comparison and a reported collection plan; it does not claim that you collected or tested a sample.

Complete one serology worksheet, Parts A–E plus your case's late-record log. Hand the paper worksheet to Mr. Mendoza before leaving, or submit one PDF to this section's assignment by September 18 at 11:59 PM. Use your period and investigator code. Do not submit twice; keep notebook pages in your notebook.

Supplied illustrative case record, available to all students. The source supplies reference summaries, not newly inspected original reference cards. A label other than a type does not supply the exact alternative type. Do not invent it.

Your Case A D09 assignment · Daily directions

Five steps

1. Open your own-case handout. Add your period and investigator code. Label it “Supplied illustrative case record.” Read R1–R4, answer A1–A2, and use the separate Sample P model if helpful.
2. Complete B1's typing and comparison grid. Use the supplied anti-A/anti-B observations, then compare each of your two stain calls with the five reference summaries. Keep exact evidence IDs and any “other than” category.
3. Explain the comparison and collection plan. Answer B2 as a hypothetical. Write C1's four-to-six-sentence explanation using your case's reported packaging and custody roles. Mark missing details “not reported”; do not invent a signature.
4. Finish the practice calculation and checks. Complete B3, D1 and E1–E3. The 180 calculation and B/O hypothetical are practice, not new case evidence. Check that all ten task IDs are complete.
5. In the final ten minutes, log your case's late record and submit. Case A records its meter displays and context. Keep these records separate. Hand in the one worksheet on paper or as one PDF in your section assignment.

The model and these checks do not require another upload. Complete Parts A–E and your late-record log in the one serology worksheet.

Before you submit

Your worksheet needs the model calls from the supplied observation rows, comparisons for both stain IDs, B2's two sentences, B3's calculations, C1's plan explanation, D1 and E1–E3, plus the correct late-record log. No unreported exact reference type, time, unit, signature or clinical conclusion should be added.

Hand the paper worksheet to Mr. Mendoza before leaving, or submit one PDF in Wk4 D09 · Whose Blood, Whose DNA (PLTW 1.1.4) by September 18 at 11:59 PM. Use your period and investigator code. Do not submit the same worksheet twice. Keep notebook pages in your notebook.

If you were absent or need help

Use the same supplied-record handout and complete the same product. Its late-record section is included; work on that section after Parts A–E. You do not need to collect a new specimen or invent a missing observation. If your teacher separately assigns actual collection, follow the applicable preparation and approved instructions. This paper worksheet does not complete that practical requirement.

Lost your place? Find the next unanswered task ID and use F1's restart cue. Guided notes and the separate worked model are support, not extra submissions.

If your teacher is absent: Complete the supplied paper-record worksheet using the required briefing and models. Do not begin unassigned physical collection. Use the late-record section after Parts A–E.

R1 / R2. Reading

R1. Your one worksheet

Complete the serology worksheet, Parts A–E and your case's late-record log. Serology is the study of blood and other body fluids. Use the supplied illustrative records for your class's case. You are interpreting these records, not reporting tests or collection work you performed. Yesterday's screening classification does not establish a confirmed material identity. No DNA profile is supplied today.

Keep each evidence ID beside its observations and comparison. The reference summaries are supplied records, not reference cards you independently inspected. A record may give less information than you would like. Preserve that limit instead of filling the gap.

R2. Read the classroom typing rule

An antigen is a marker an antibody can bind. Here, A and B antigens are markers on red blood cells. An antibody is a protein that binds a particular target. Agglutination means visible cell clumping caused by antibody binding. In this classroom model, anti-A serum contains antibodies to A markers; anti-B serum contains antibodies to B markers. These are the model's testing liquids, not the person's blood-type name.

Supplied anti-A observation	Supplied anti-B observation	Classroom ABO call
Clumping	No clumping	A
No clumping	Clumping	B
Clumping	Clumping	AB
No clumping	No clumping	O

Use this rule only to interpret the supplied model. It does not validate a real blood-typing test. Type O means neither A nor B marker in this simplified rule, not that a red blood cell has no markers at all. NCBI ABO background [S1].

R3 / R4. Reading

R3. Compare one feature and state its limit

ABO types are shared by many people. A matching type does not identify a donor. Compare the stain's classroom call with each supplied reference. The same call means they match on this one feature. A different call means they do not match under this classroom rule. Neither statement establishes where a person was, when material arrived, innocence or guilt.

If a reference says only other than B or other than O, keep those words. The exact alternative type is not supplied. A categorical summary can support a same/different comparison without supplying a more precise type.

DNA results can support a comparison with a reference, but conclusions depend on the actual results and their limits. No DNA profile is supplied for this worksheet, so do not make a DNA identification. NIJ comparison-result background [S2].

R4. Explain the reported collection plan

Moisture and storage conditions can affect how well biological evidence is preserved. Packaging requirements depend on the material and the approved procedure. For this paper exercise, describe the packaging and custody steps reported in your case. Do not say you performed them. Custody means the record of who handled an item. Use the collector and receiver roles, and mark unreported names or times not reported. The reported paper-envelope state is case information, not a universal packaging instruction. NIJ preservation background [S3].

Attached follicular tissue may provide DNA for testing. Follicular tissue is tissue from around a growing hair. Hairs without attached tissue can also contain DNA, but useful results depend on the sample and method. Appearance alone does not provide a DNA result. Record the tissue condition and plan stated in your own case; do not claim you inspected a specimen or established test success. NIJ-supported rootless-hair research [S4].

R5 / R6. Reading

R5. Keep practice arithmetic separate

A reference range is a stated comparison interval. Keep its label and context attached. For the separate practice numbers, compare the given value with the lower and upper limits. To find points above the upper limit, subtract that upper limit from the value. To find percent of the upper limit, divide the value by the upper limit and multiply by 100.

Percent of the upper limit = practice value ÷ upper limit × 100.

This differs from percent above the upper limit. Use the requested label. The practice values have no supplied measurement unit, so do not add mg/dL. Sample P's 150 example and your 180 calculation are separate from the case's late record. The calculation does not diagnose a person.

R6. Record the late information, without a clinical conclusion

A useful log keeps the sample ID, record label, units when supplied and relevant context. Some results are numbers; others are categories. Toxicology is the study of drugs and poisons. A glucose meter memory or a food-test category does not become a complete toxicology or cause-of-death conclusion.

Your case's late record is used in the final ten minutes. Follow only the matching case note below.

PLTW connection and preparation

This John Hay original worksheet practices model comparisons, careful record keeping and evidence limits connected to PLTW Activities 1.1.4 Blood Evidence and 1.1.5 DNA Evidence. It does not certify official activity completion. The complete required explanation is here; background links are support, not extra assignments.

Optional help

F1 shows the paper-record workflow. The separate Sample P example models a comparison, and its 150 example models the arithmetic. Guided notes can support your work but are not another submission. Before any separate teacher-directed physical collection, complete the existing preparation requirement and use the approved instructions. This worksheet does not grant a practical pass. Carry your record to the next assigned case lesson, without assuming that it already has a DNA or clinical result.

Plain-English terms

Serology
The study of blood and other body fluids.

Supplied illustrative case record
You are interpreting these records, not reporting tests or collection work you performed.

Antigen
A marker an antibody can bind. Here, A and B antigens are markers on red blood cells.

Antibody
A protein that binds a particular target.

Agglutination
Visible cell clumping caused by antibody binding.

Anti-A and anti-B serum
In this classroom model, anti-A serum contains antibodies to A markers; anti-B serum contains antibodies to B markers. These are the model's testing liquids, not the person's blood-type name.

Classroom ABO call
Use this rule only to interpret the supplied model. It does not validate a real blood-typing test. Type O means neither A nor B marker in this simplified rule, not that a red blood cell has no markers at all.

Other than B or other than O
If a reference says only other than B or other than O, keep those words. The exact alternative type is not supplied.

Same call and different call
The same call means they match on this one feature. A different call means they do not match under this classroom rule. Neither statement establishes where a person was, when material arrived, innocence or guilt.

Custody
The record of who handled an item. Use the collector and receiver roles, and mark unreported names or times not reported.

Follicular tissue
Tissue from around a growing hair. Hairs without attached tissue can also contain DNA, but useful results depend on the sample and method.

Reference range
A stated comparison interval. Keep its label and context attached.

Percent of the upper limit
Practice value ÷ upper limit × 100. This differs from percent above the upper limit.

Toxicology
The study of drugs and poisons. A glucose meter memory or a food-test category does not become a complete toxicology or cause-of-death conclusion.

Before any separate teacher-directed actual collection, complete the existing DNA Evidence from the Scene preparation requirement and use the approved instructions. The paper worksheet does not certify that practical work.

Sample P: separate practice, not your case

This worked model uses the existing training-kit Sample P and two practice reference labels. It is not evidence for Case A or Case B. Use the structure, not these labels or answers, in your worksheet.

Read the supplied observations

The Sample P record describes grainy liquid with small dark clumps in the anti-A well, and smooth, even liquid in the anti-B well. In the supplied record that is anti-A yes, anti-B no. This is text describing the practice wells, not an image you personally examined or a test you ran.

Using R2's classroom rule, anti-A clumping only gives the model call A. Practice Person 1's reference card is labeled A; Practice Person 2's card is labeled O.

Model the comparison and its limit

Practice comparison	Supplied information	Model conclusion
Sample P and Person 1	A compared with A	Same on this one classroom ABO feature; donor not identified
Sample P and Person 2	A compared with O	Different under this classroom rule; no conclusion about presence, timing, innocence or guilt

A complete comparison statement keeps both sides visible: “Sample P and Person 1 match on the supplied classroom ABO type A. That shared type does not identify the donor.” For Person 2: “Sample P's model type A differs from Person 2's stated type O. This is a mismatch in this one comparison, not proof about a person's actions.”

Your case may give a reference only as “other than B” or “other than O.” Keep that category in your comparison. Do not invent a specific replacement type.

Sample P. Separate arithmetic model and hypothetical check

The existing made-up practice value is 150, with a supplied comparison range of 70 to 99. No measurement unit is supplied.

1. Compare with the interval: 150 is above its upper limit of 99.
2. Find the difference: 150 − 99 = 51 points above.
3. Find percent of the upper limit: 150 ÷ 99 × 100 = about 152% of the upper limit.

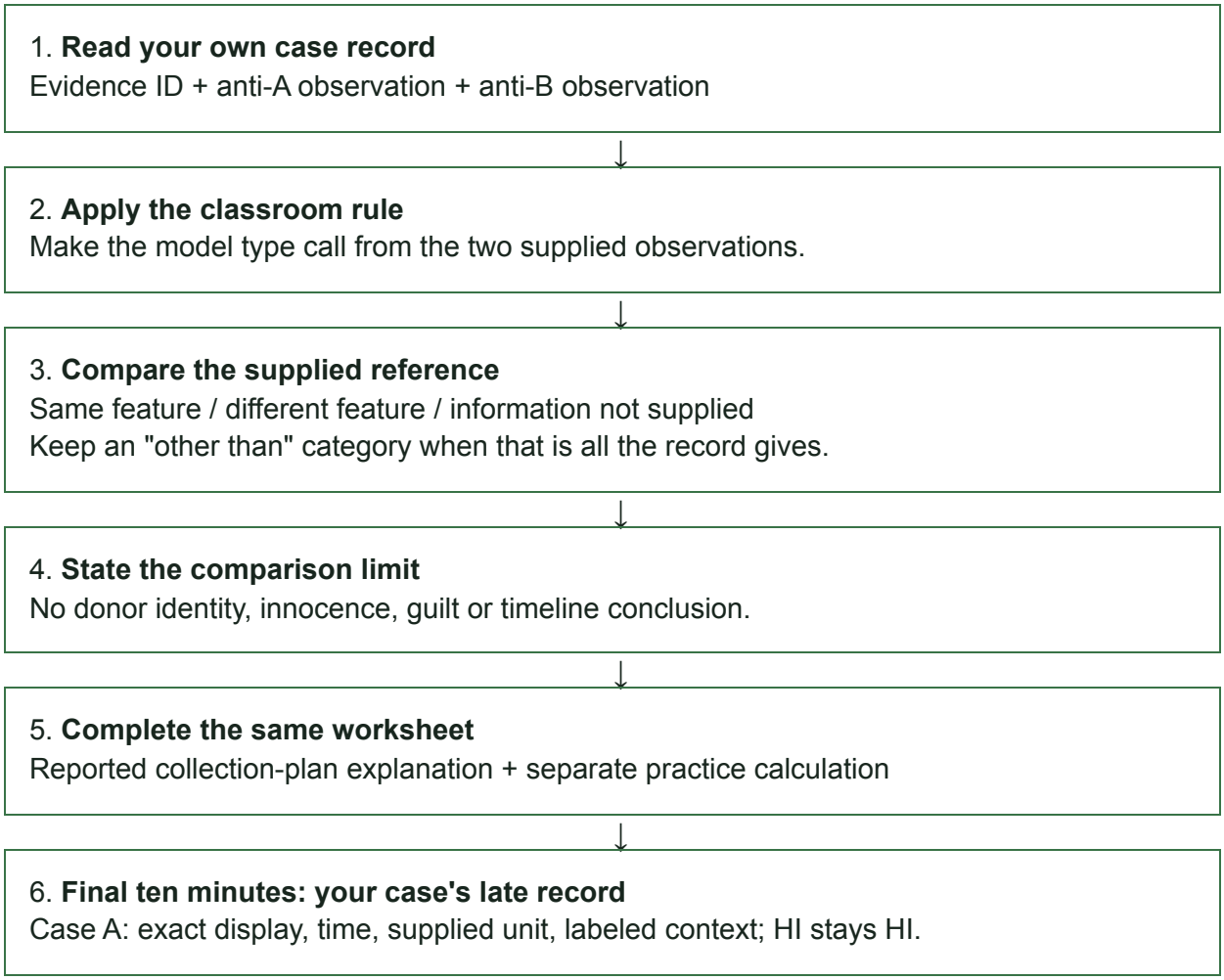
The last label is “percent of,” not “percent above.” Your B3 task uses 180, not 150. Show your own calculation and keep this generic practice separate from any case reading or clinical interpretation.

A separate hypothetical check

B2 imagines a stain and a reference with the same type. It is not another observation in your case. E2 imagines a type-B stain and a type-O reference; this is practice for both sections. Apply R3's one-feature comparison limit rather than using either hypothetical to change your case rows.

The model and these checks do not require another upload. Complete Parts A–E and your late-record log in the one serology worksheet.

F1. Read, compare, record



Paper-record workflow. This is a teaching diagram, not a specimen image, blood-typing procedure or collection protocol.

Find your own-case evidence ID and both supplied clumping observations. Use the classroom rule in R2 to make the model type call. Compare that call with the supplied reference information. State agreement or disagreement only for this one feature. If information is missing, say so; do not fill an “other than” category with a guessed exact type. Add the comparison limit. Then finish the collection-plan explanation and separate arithmetic practice in the same worksheet. In the final ten minutes, log only your own case's late record. Preserve its display or category, source and missing context. The finished worksheet does not claim a test, collection, DNA identity or clinical conclusion.

Optional restart cue

Find the next unanswered task ID. Use R2 for the typing grid, R3 for comparisons, R4 for the collection-plan explanation, R5 for the practice calculation and R6 for the late record. Do not switch to the other case or create a second product.

Case A. Supplied observation rows and reference summaries

Supplied illustrative case record, available to all students. The source supplies reference summaries, not newly inspected original reference cards. A label other than a type does not supply the exact alternative type. Do not invent it.

Setting: Statik Sound, a neighborhood recording studio. Case number JH-26-0831-A.

Observation grid: 4 supplied rows, model type call left blank

Row label	Supplied anti-A	Supplied anti-B	Model type call
E2-console: Console-corner stain	No (smooth well)	Yes (grainy clumps)	
E2-floor: Floor stain	No (smooth well)	Yes (grainy clumps)	
Victim, medical record (reference)	No	Yes	
Terrence Cole, donor record (reference)	Yes (grainy clumps)	No (smooth well)	

All five reference summaries, used for each stain

- Victim, medical record (reference): anti-A No, anti-B Yes; type B reported in the case record.
- Terrence Cole, donor record (reference): anti-A Yes (grainy clumps), anti-B No (smooth well); exact type: not supplied.
- Vasquez: OTHER than B; exact type: not supplied.
- Okoye: OTHER than B; exact type: not supplied.
- Tran: OTHER than B; exact type: not supplied.

Same-type stain/reference comparison is a hypothetical prompt, not an additional match in either supplied case.

Case A. Reported collection plan and custody state

- Console stain swab; evidence ID E2-console.
- Floor stain swab; evidence ID E2-floor.
- three can-rim swabs (one per energy-drink can); grouped under E4, count 3; individual new IDs: not supplied.
- blanket hair H3 root check; existing label H3; root tissue reported available: no; recorded plan: no DNA swab from it.

References reported on file: reference swabs already on file for the victim and all four persons of interest.

This is the source's reported root check, not an independently inspected specimen. No general rootless-hair rule is inferred.

Reported custody state: Swab air-dried, sealed in a paper envelope (not plastic), labeled with the E-number, first custody row signed by the collector and the receiver.

Reported roles: collector and receiver. Collector identity: not reported. Receiver identity: not reported. Collection time: not reported. Transfer time: not reported. Actual signatures: not reported.

Reported illustrative packaging/custody state, not proof the student performed it or a complete approved collection protocol.

Practice numbers, not from the case

Value 180, supplied range 70 to 99, measurement unit: not supplied. Requested: inside the supplied range?; points above the upper limit; percent of the upper limit: 180 / 99 × 100.

Your Parts A–E serology worksheet

Case A, STATIC, Period 1-2. Investigator code, not name:

Record route label: Supplied illustrative case record, available to all students.

Date: September 18, 2026

Complete the serology worksheet, Parts A–E and your case's late-record log. Serology is the study of blood and other body fluids. Use the supplied illustrative records for your class's case. You are interpreting these records, not reporting tests or collection work you performed. Yesterday's screening classification does not establish a confirmed material identity. No DNA profile is supplied today.

PBS-U1-D09-A1

In one sentence, explain why clumping can occur with anti-A serum in this classroom model. Use the terms antibody and A marker. Copy the first three words of a supporting sentence in R2.

Explanation

Supporting sentence starts

PBS-U1-D09-A2

Explain one limit of a same-type comparison and why today's worksheet cannot make a DNA identification.

Same-type limit

DNA-input limit

B1. Observation grid

PBS-U1-D09-B1

Use the supplied anti-A and anti-B observations to fill the model type call for each observation row. Then compare each of your two stain calls with all five supplied reference summaries. Keep the stain ID, reference label, reported pattern or category, same/different result and limit together. Do not invent an exact type for an other-than category.

Four observation rows are supplied in A and three in B, including references with well observations. All five reference summaries are still used for each stain. Missing exact types remain categorical.

Observation grid: row label, supplied anti-A, supplied anti-B, blank model type call

Row label	Supplied anti-A	Supplied anti-B	Model type call (blank for your call)
E2-console: Console-corner stain	No (smooth well)	Yes (grainy clumps)	
E2-floor: Floor stain	No (smooth well)	Yes (grainy clumps)	
Victim, medical record (reference)	No	Yes	
Terrence Cole, donor record (reference)	Yes (grainy clumps)	No (smooth well)	

B1. Comparison grid for E2-console

PBS-U1-D09-B1

E2-console: Console-corner stain. Supplied anti-A No (smooth well); supplied anti-B Yes (grainy clumps). Your model type call from the observation grid:

Comparison grid: stain ID, reference label, supplied reference pattern/category, blank same/different call, reason and limit

Reference label and supplied pattern or category	Same or different (blank for your call)
Victim, medical record (reference): anti-A No, anti-B Yes; type B reported in the case record.	
Reason and limit	
Terrence Cole, donor record (reference): anti-A Yes (grainy clumps), anti-B No (smooth well); exact type: not supplied.	
Reason and limit	
Vasquez: OTHER than B; exact type: not supplied.	
Reason and limit	
Okoye: OTHER than B; exact type: not supplied.	
Reason and limit	
Tran: OTHER than B; exact type: not supplied.	
Reason and limit	

B1. Comparison grid for E2-floor

PBS-U1-D09-B1

E2-floor: Floor stain. Supplied anti-A No (smooth well); supplied anti-B Yes (grainy clumps). Your model type call from the observation grid:

Comparison grid: stain ID, reference label, supplied reference pattern/category, blank same/different call, reason and limit

Reference label and supplied pattern or category	Same or different (blank for your call)
Victim, medical record (reference): anti-A No, anti-B Yes; type B reported in the case record.	
Reason and limit	
Terrence Cole, donor record (reference): anti-A Yes (grainy clumps), anti-B No (smooth well); exact type: not supplied.	
Reason and limit	
Vasquez: OTHER than B; exact type: not supplied.	
Reason and limit	
Okoye: OTHER than B; exact type: not supplied.	
Reason and limit	
Tran: OTHER than B; exact type: not supplied.	
Reason and limit	

B2/B3. Hypothetical and practice numbers

PBS-U1-D09-B2

Hypothetical practice, not a new case result: a stain and a person-of-interest reference have the same classroom ABO type. In two sentences, state what agrees and what that agreement does not establish.

Do not add this hypothetical match to your case matrix.

Two-sentence comparison and limit

PBS-U1-D09-B3

Practice numbers, not from the case: a value is 180 and the supplied range is 70 to 99. Is it inside that interval? How many points above the upper limit is it? What percent of the upper limit is 180? Show the subtraction and 180 ÷ 99 × 100. Label percent of the upper limit, not percent above. No measurement unit is supplied.

Use 99 as the upper limit for this practice. Do not use the case reference card or add mg/dL.

Inside/outside

Difference calculation

Percent-of-upper-limit calculation and label

C1. Reported collection-plan explanation

PBS-U1-D09-C1

Choose one swab entry from your case's supplied collection-plan record. In four to six sentences, explain the reported item and location; its reported packaging and the preservation reason from R4; the collector/receiver roles and any unreported names or times; and the reference samples reported on file. This is a paper-record explanation, not instructions for performing collection or a claim that you packaged the sample.

Do not invent an evidence ID for a lid or hair entry whose ID is not supplied, and do not write an actual signature. Use a listed swab entry for this response.

Chosen source label and existing evidence ID if supplied

Four-to-six-sentence explanation covering the four components

D/E. Finish the same worksheet

PBS-U1-D09-D1

Use agglutination and toxicology in one or two sentences about this worksheet. Explain their roles without treating the late record as a diagnosis or a complete toxicology conclusion.

The typing model and the study of drugs/poisons are different concepts. Do not invent a toxicology result.

One or two applied sentences

PBS-U1-D09-E1

Practice check: the supplied observation says clumping with anti-A only. What is the classroom model call?

This is a rule check, not another assigned stain.

Model type call

PBS-U1-D09-E2

Hypothetical practice for both cases: a stain has classroom type B and a reference has type O. Write the same/different comparison and one limit. Do not change your case records.

Limit the statement to this feature comparison, not a person's actions.

Comparison and limit

PBS-U1-D09-E3

Why can moisture matter when preserving biological evidence? State the reason from R4 and keep real packaging decisions tied to the material and approved procedure.

Do not claim that one package is suitable for every specimen or that you performed the reported steps.

Preservation reason and limit

Your worksheet needs the model calls from the supplied observation rows, comparisons for both stain IDs, B2's two sentences, B3's calculations, C1's plan explanation, D1 and E1–E3, plus the correct late-record log. No unreported exact reference type, time, unit, signature or clinical conclusion should be added.

Optional single comparison check, not alternate work plans

A reference is labeled only other than B. What should the worksheet preserve?

1. Choose a likely exact alternative type.
2. Keep other than B and make only the supported classroom comparison.
3. Use Sample P's reference type in its place.

The model and these checks do not require another upload. Complete Parts A–E and your late-record log in the one serology worksheet.

Notebook support, not another submission

Keep notebook pages in your notebook.

Optional support

- Optional Guided Notes
- Separate Sample P and 150 worked models
- Existing voluntary vocabulary extra credit, kept separate from required D1

Handoff, PLTW and sources

Complete one serology worksheet, Parts A–E plus your case's late-record log. Hand the paper worksheet to Mr. Mendoza before leaving, or submit one PDF to this section's assignment by September 18 at 11:59 PM. Use your period and investigator code. Do not submit twice; keep notebook pages in your notebook.

Keep today's worksheet for the next assigned case lesson. Later evidence must be supplied before you use it; do not assume a DNA or clinical result already exists.

This John Hay original worksheet practices model comparisons, careful record keeping and evidence limits connected to PLTW Activities 1.1.4 Blood Evidence and 1.1.5 DNA Evidence. It does not certify official activity completion.

John Hay original local work connected by title; no official completion claim. The complete required explanation is here; background links are support, not extra assignments.

Case A D09 assignment · Official PLTW section hub · Activity 1.1.4 Blood Evidence · Activity 1.1.5 DNA Evidence

Sources and optional background

- S1. NCBI ABO background

  cited in R2.
- S2. NIJ comparison-result background

  cited in R3.
- S3. NIJ preservation background

  cited in R4.
- S4. NIJ-supported rootless-hair research

  cited in R4.
- S5. FDA display explanation

  cited in R6.
- S6. FDA fasting-context explanation

  cited in R6.
- S7. Antibody-binding background

  cited in R6.

A matching type does not identify a donor. No DNA profile is supplied for this worksheet, so do not make a DNA identification. The finished worksheet does not claim a test, collection, DNA identity or clinical conclusion.

Late record: use in the final ten minutes

Use only your case's released record and support card. Copy exact displays or line observations and reported categories, then state the limit.

Log E5 / Exhibit 011 exactly as supplied. Make one row for each Saturday time. Copy 412 mg/dL in its row and HI, not a guessed number, in the other. Record the supplied fasting-card label/range and the separate stated meter ceiling. State that fasting status and meter accuracy are not established. Do not diagnose or infer a cause of death.

Case A support: a meter memory

Copy each stored display with its stated day, time and unit. Keep HI as a nonnumeric flag. Do not replace it with 600 or another guessed reading. The supplied record explains HI using its stated meter ceiling. Copy the supplied reference card with its fasting label, meaning a reference context without recent food intake. Fasting status and meter accuracy are not established by this worksheet. The log does not establish a diagnosis or cause of death. FDA display explanation [S5], FDA fasting-context explanation [S6].

Glucose meter memory readout (SIMULATED)

E5 / Exhibit 011. Record type: numerical reading and nonnumeric instrument flag.

Reported day	Reported time	Exact display	Calendar date
Saturday	11:02 AM	412 mg/dL	not reported
Saturday	9:47 PM	HI	not reported

Separate stated meter ceiling: 600 mg/dL. HI, meaning the reading was above the meter's 600 mg/dL ceiling, so the screen shows HI instead of a number (reported instrument explanation, not independently validated meter behavior).

Supplied reference card: fasting glucose about 70 to 100 mg/dL.

Fasting status of the record subject: not reported. Clinical interpretation: none supplied. Cause or event inference: none supplied.

Your Case A late-record log (left blank for your log)

Evidence/exhibit	Reported day/time	Exact display	Unit where supplied	Fasting reference-card label/range	Separate meter ceiling	Missing context and limit

Continue your late-record log here