# The Traces We Leave: compare records and state the limit

STATIC · Period 1-2 · Supplied classroom records

## One trace comparison sheet

One individual D07 trace comparison sheet, Parts A–E.

Complete your D07 trace comparison sheet during class. Hand the paper sheet to me before leaving, or submit one PDF to this Schoology assignment by Tuesday, September 15, at 11:59 p.m. Submit once. Keep notebook pages in your notebook.

Use the supplied classroom records for your case. This route is available to everyone. These are not observations you made. You do not need to locate a missing image or sample.

Your Case A D07 assignment · Daily directions

### Five steps

1. Read, then answer Part A. Use R1–R4. Copy the first three words of the reading sentence you used for each answer.
2. Work through Part B. Follow the separate model, then use your own case's records. List hair features and the missing reference input. Apply the classroom rule to the four print summaries. Complete B2 and the separate B3 calculation.
3. Write Part C. Use its hypothetical facts only. Include the supported statement, a statement you cannot make and why, and the additional evidence needed. Do not invent its result.
4. Use the vocabulary in Part D. Write one or two sentences using all four terms about today's records.
5. Check and submit. Answer E1–E3 from memory first, then check the reading. Check evidence numbers, case label and limits. Turn in only the completed sheet.

Guided notes and extra help are optional support, not another submission. You may discuss your thinking with a partner, but write your own responses.

Turn in only the completed Parts A–E sheet. No extra CER, tracker, specimen image, microscope drawing or notebook upload is required.

# R1 / R2. Reading

## R1. Why comparisons need two sides

A questioned sample has an unknown source. A known sample, also called a reference or elimination sample, has a stated source and is used for comparison. A person's name by itself is not a reference sample. You need comparable features from both sides before deciding whether they are consistent.

Morphology means visible shape and structure. Hair descriptions may include color, thickness, curl, the medulla or central core, and root condition. List the supplied features first. Keeping the features ahead of a person's name helps reduce bias, which is allowing an expectation to influence a judgment.

## R2. A missing input is a real limit

In this packet, the questioned-hair descriptions are supplied, but the known-hair reference features are not. Record the provided features and the missing comparison input. You cannot name a matching or excluded hair source from these descriptions alone. A missing reference is not a mismatch and is not evidence that someone was absent.

Consistent means the compared features agree. Inconsistent means the compared features disagree. Inconclusive means the available information does not support a clear comparison conclusion. For these supplied hair records, explain the input limit instead of guessing a person's name.

# R3 / R4. Reading

## R3. Class features and source conclusions

Class features may be shared by many sources. Evidence showing only these shared features is class evidence. A blood type, hair color or fingerprint pattern family can be a class feature. A sedan is a useful analogy for a broad class: many cars are sedans. A license plate is the analogy for a particular source, but comparing classroom evidence is not as simple as reading a plate.

Individual evidence is the term used when discussing evidence that can support a particular-source conclusion. For fingerprints, detailed ridge features can support a source-identification conclusion when the analysis is sufficient; it does not automatically prove identity. Similar visible hair features can support a possible-source comparison; they do not identify the donor or establish that the person was at the scene.

## R4. What root information can support

Root shape and attached follicular tissue can provide clues about how a hair was removed. Follicular tissue is tissue from around the growing hair that remains attached. A visible root is not the same as attached tissue. These features do not establish when the hair reached the scene.

Attached follicular tissue may provide DNA for testing. 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. No DNA test result is supplied in this lesson, and no new test is required.

# R5 / R6. Reading

## R5. Our fingerprint practice rule

Minutiae are small fingerprint ridge details, such as endings and splits. Pattern families include loops, whorls and arches. The records state how many details were readable, how many matched a specified card and how many mismatched. Use those supplied counts; do not claim that you counted a missing image.

For this classroom exercise only, use at least 12 matching minutiae and zero mismatching minutiae for the model's “individual” call. This is a practice rule, not a real forensic identification standard. Under this simplified model, a mismatch gives an inconsistent comparison. With fewer than 12 matches and no mismatches, use an inconclusive call. Keep each call limited to this model.

A match in this classroom comparison supports a possible source under the exercise rule; it does not by itself prove who touched the object, when, or why. A missing hair reference does not become an “individual” call because another row contains a fingerprint count.

## R6. Report a proportion, not a probability

Matching count divided by readable count, multiplied by 100, gives the percentage of readable features that match. Show the fraction and calculation before rounding. The percentage describes the matching features counted in this exercise. It is not the probability that a person is the source, touched the object or committed an act.

Keep your evidence number beside every case-record statement. Keep the separate worked model and the Part C hypothetical labeled as practice. Neither supplies a missing result for your case.

# Plain-English terms

**Questioned sample**
A sample whose source is unknown.

**Known reference**
A sample with a stated source, used for comparison. A name alone is not a reference.

**Morphology**
Visible shape and structure.

**Medulla**
The central core of a hair.

**Bias**
An expectation influencing a judgment.

**Consistent**
The compared features agree.

**Inconsistent**
The compared features disagree.

**Inconclusive**
The available information does not support a clear comparison conclusion.

**Class evidence**
Evidence showing features shared by many sources.

**Individual evidence**
Evidence that can support a particular-source conclusion when the analysis is sufficient.

**Follicular tissue**
Tissue from around the growing hair that remains attached.

**Minutiae**
Small fingerprint ridge details, such as endings and splits.

**Pattern family**
A broad fingerprint pattern, such as a loop, whorl or arch.

**Proportion**
The matching count divided by the readable count in this exercise.

This assignment reviews supplied records. It does not require handling specimens, collecting material or running a test. Practical work needs separate teacher direction and approved preparation.

Your teacher may offer an actual classroom-record route only when complete, approved questioned and reference inputs are available. Follow the preparation requirements for that route. Finishing this record exercise does not give a practical-lab pass or mark an official PLTW activity complete.

# MODEL-1. Separate locker-print practice

This is not Case A or Case B. You are interpreting supplied counts, not conducting or recounting an image comparison.

| | |
|---|---|
| **Pattern family** | Right loop |
| **Readable minutiae** | 16 |
| **Card 1** | 13 matching, 0 mismatching |
| **Card 2** | 5 matching, 3 mismatching |

## Work through the comparison

1. List the features before considering the card's identity: right loop and 16 readable ridge details. A pattern family is a class feature.
2. Compare card 1's supplied count with the classroom rule: 13 is at least 12, and the record reports zero mismatches. Under this exercise model, this supports the model's “individual” call, consistent with card 1. It is not automatic proof of identity or an action.
3. Compare card 2's supplied count with the same model. The record includes three mismatches. Under this simplified classroom rule, the comparison is inconsistent with card 2. This is an exercise conclusion, not a real forensic exclusion based only on counts.

# MODEL-1. Calculation and finished entry

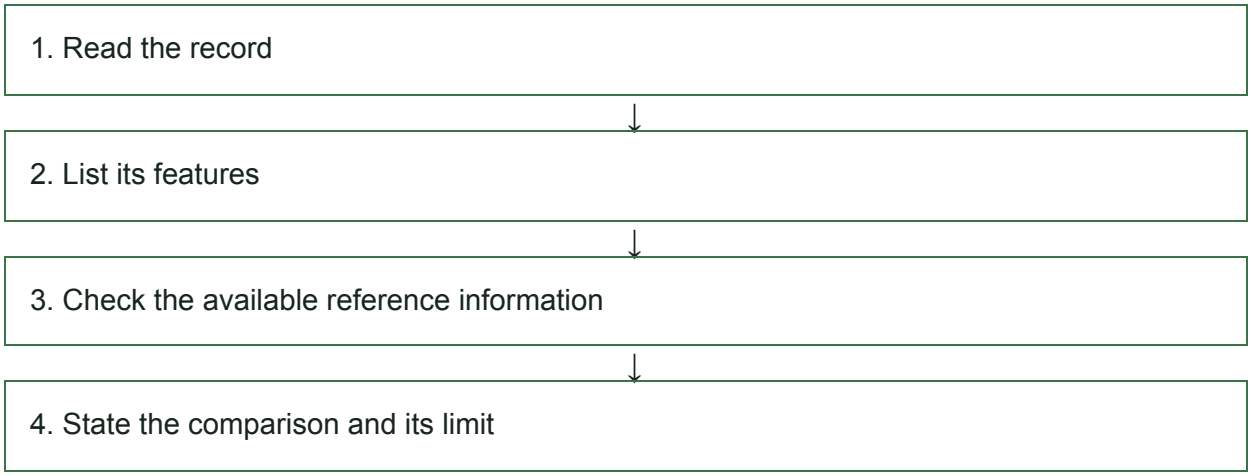
1. Show the card 1 proportion: 13 ÷ 16 × 100 = 81.25%, or about 81% to the nearest whole percent. This percentage describes matching features in the record, not the probability that card 1's source touched the locker.
2. Keep the limit beside the comparison. A match in this classroom comparison supports a possible source under the exercise rule; it does not by itself prove who touched the object, when, or why.

MODEL-1 reports a right loop with 16 readable minutiae. Card 1 has 13 matches and zero mismatches, meeting the classroom model's rule; 13 of 16 is about 81%. Card 2 has five matches and three mismatches, giving an inconsistent comparison under that same model. These practice counts support bounded comparisons, not proof of who touched the locker or when.

The original model also asks you to imagine nine of 16 matching details with zero mismatches. That gives 56.25%, about 56%, and is below the classroom model's 12-match requirement. This counterfactual is practice only. Do not copy its numbers into B3, which supplies its own values.

B3 supplies its own numbers: 14 readable, 9 matching and 0 mismatching. Do not copy the model result into B3.

# F1. Comparison workflow




F1. A comparison workflow, not a specimen image.

Begin with the evidence number and source label. Copy the reported features. Check whether the necessary comparison information is actually present. Use the supplied counts or approved reference features only. End with a conclusion no stronger than those inputs support.

Known-hair reference features are not supplied. Record the reported features and the missing comparison input. Do not name a matching or excluded source. A missing reference is not a mismatch or evidence of absence.

## Help when you need it

Find your next unanswered task ID. For hair, use R1–R4. For prints and percentages, use R5–R6 and MODEL-1. Check that each conclusion includes its evidence number and limit.

Guided notes and extra help are optional support, not another submission. You may discuss your thinking with a partner, but write your own responses.

# Case A. Hair records

Supplied classroom simulation records, not observations made by the student

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### E7-H1: blanket hair

Dark brown; medium thickness; slight wave; continuous medulla; club-shaped root with no tissue.

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### E7-H2: blanket hair

Dark brown; medium thickness; slight wave; continuous medulla; club root, no tissue.

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### E7-H3: blanket hair

Black; coarse; tight curl; fragmented medulla; club root, NO root tissue.

Known-hair reference features are not supplied. Record the reported features and the missing comparison input. Do not name a matching or excluded source. A missing reference is not a mismatch or evidence of absence.

# Case A. Print records 1–2

Supplied classroom summaries. Apply the stated counts without claiming an independent image count.

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### E8-L1: fader panel lift

right loop; 14 readable minutiae; 12 matching and 0 mismatching with victim's card.

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### E8-L2: fader panel lift

whorl; 8 readable minutiae; 6 matching and 0 mismatching with Cole's card. Reported feature: partial overlay.

Use the classroom-only rule in R5. A call based on this model does not establish a real forensic identification or prove who touched an object, when or why.

# Case A. Print records 3–4

Supplied classroom summaries. Apply the stated counts without claiming an independent image count.

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### E8-L3: fader panel lift

left loop; 15 readable minutiae; 13 matching and 0 mismatching with cleaner's elimination card.

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### E8-L4: can lift

right loop; 13 readable minutiae; 12 matching and 0 mismatching with victim's card.

Use the classroom-only rule in R5. A call based on this model does not establish a real forensic identification or prove who touched an object, when or why.

# Your Parts A–E response sheet

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

Source label: supplied classroom records, or complete teacher-approved actual classroom records.

Date: September 15, 2026

### PBS-U1-D07-A1

In R3, which part of the sedan and license-plate analogy represents class evidence, and which represents a particular source? Copy the first three words of the reading sentence you used.

### PBS-U1-D07-A2

According to R4, what clues can root shape and attached tissue provide, and what can they not establish? Copy the first three words of the reading sentence you used.

# B1. Comparison continuation 1

Complete one comparison row for every supplied questioned item in your case. List its reported features first. For hair, state the missing known-reference input and the comparison you would need; do not name a matching or excluded source. For prints, use the supplied card label and counts to apply the classroom model. Identify class features. Label a model-individual print call only when the classroom rule allows it; otherwise label the inconclusive or inconsistent comparison. State the limit and keep the evidence number on every row.

Same product: include all continuation pages with this sheet. Copy this page if teacher-approved actual records require more rows.

## Row 1 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

## Row 2 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

# B1. Comparison continuation 2

Complete one comparison row for every supplied questioned item in your case. List its reported features first. For hair, state the missing known-reference input and the comparison you would need; do not name a matching or excluded source. For prints, use the supplied card label and counts to apply the classroom model. Identify class features. Label a model-individual print call only when the classroom rule allows it; otherwise label the inconclusive or inconsistent comparison. State the limit and keep the evidence number on every row.

Same product: include all continuation pages with this sheet. Copy this page if teacher-approved actual records require more rows.

## Row 3 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

## Row 4 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

# B1. Comparison continuation 3

Complete one comparison row for every supplied questioned item in your case. List its reported features first. For hair, state the missing known-reference input and the comparison you would need; do not name a matching or excluded source. For prints, use the supplied card label and counts to apply the classroom model. Identify class features. Label a model-individual print call only when the classroom rule allows it; otherwise label the inconclusive or inconsistent comparison. State the limit and keep the evidence number on every row.

Same product: include all continuation pages with this sheet. Copy this page if teacher-approved actual records require more rows.

## Row 5 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

## Row 6 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

# B1. Comparison continuation 4

Complete one comparison row for every supplied questioned item in your case. List its reported features first. For hair, state the missing known-reference input and the comparison you would need; do not name a matching or excluded source. For prints, use the supplied card label and counts to apply the classroom model. Identify class features. Label a model-individual print call only when the classroom rule allows it; otherwise label the inconclusive or inconsistent comparison. State the limit and keep the evidence number on every row.

Same product: include all continuation pages with this sheet. Copy this page if teacher-approved actual records require more rows.

## Row 7 of 7

Evidence number and item

Reported features or counts

Available reference information or missing input

Bounded call or input-limited conclusion

Evidence level and limit

# B2/B3. Limit and separate calculation

## PBS-U1-D07-B2

Choose your weakest supported comparison or a documented input limit. Give its evidence number and explain exactly what prevents a stronger conclusion. Why is reporting that limit useful?

## PBS-U1-D07-B3

Separate practice: a questioned print has 14 readable minutiae, 9 matching and 0 mismatching. Show the fraction matching and calculate the percentage. What call does our classroom model allow, and what could you honestly say instead of identifying a person?

Fraction and calculation:

Classroom call and qualified explanation:

# C1. Separate hypothetical

### PBS-U1-D07-C1

Separate hypothetical: suppose a hair is consistent with one known reference and has attached root tissue. Write a three-part practice matrix note: the strongest statement those facts support; a stronger statement you are not allowed to make and why; and one additional type of evidence that could support a more specific source comparison. State what that additional evidence would need to show. No additional test result is supplied or required.

### 1. Strongest supported statement

### 2. Stronger statement not allowed, and why

### 3. Additional evidence and what it would need to show

# D/E. Finish the same sheet

### PBS-U1-D07-D1

Use class evidence, individual evidence, morphology and minutiae correctly in one or two sentences about today's records. A list of definitions alone does not count.

### PBS-U1-D07-E1

Blood type B at a scene: class or individual evidence? Answer in one line from memory, then check R3.

### PBS-U1-D07-E2

What clues can root features provide, and what can they not establish? Answer in one line from memory, then check R4.

### PBS-U1-D07-E3

Why list features before considering a person's name? Answer in one line from memory, then check R1.

The reading remains available for checking. This self-check is part of the same sheet, not another exit-ticket submission.

# Optional notebook support

Keep notebook pages in your notebook. They are not an additional submission.

Use this template only if helpful. It does not replace a required response or add another product.

## One matrix row

Evidence number

Supplied record statement

What this supports

Limit or missing input

## Cornell cues

1. What information is supplied?
2. What reference is available or missing?
3. What can the comparison support?
4. What can it not support?

Write a brief reminder of how to keep a comparison within its evidence.

# Handoff, PLTW and sources

Complete your D07 trace comparison sheet during class. Hand the paper sheet to me before leaving, or submit one PDF to this Schoology assignment by Tuesday, September 15, at 11:59 p.m. Submit once. Keep notebook pages in your notebook.

Keep your source-labeled comparison and its limits for the next class on Thursday, September 17. Your notebook pages stay in your notebook.

Related PLTW reference: Activity 1.1.3, The Traces We Leave Behind, in Lesson 1.1, Investigating the Scene. This John Hay classroom adaptation practices describing evidence, comparing available information and explaining limits.

This sheet does not replace or certify completion of the official activity. If assigned, open the matching activity through your existing myPLTW account or section hub.

Case A D07 assignment · Official PLTW section hub

## Sources and optional background

Everything needed is in the reading, records, model and task prompts. Opening these sources is optional background, not another assignment.

- S1. FBI Handbook of Forensic Services

  limits of hair comparison.
- S2. NIST: follicular tag

  attached follicular tissue.
- S3. NIJ-supported research on rootless hair DNA

  why appearance alone cannot decide DNA-test usefulness.
- S4. Department of Justice: latent print testimony and reporting

  limits on source conclusions.
- S5. NIJ Fingerprint Sourcebook

  fingerprint comparison background. The numerical classroom rule above is a teaching model.

These supplied records cannot establish a hair source without known-reference features, or prove who touched an object, when or why. The 12-match rule is a classroom model, not a real forensic identification standard. No DNA result is supplied.