Family edition

Crime Scene Lab: Fingerprints, Classify, Compare, Call It

Ages 11-18 · about 45 minutes, in one sitting

Your child compares fingerprints in Crime Scene Lab: two prints lifted from a broken pane, four suspects' ten-print cards, and the call a real examiner makes. One print is clean and one is smudged, and the lesson is that there is no magic number of matching points.

What you need

- A computer or Chromebook with a current browser.
- The lesson link: mytekdev.com/try/crimescenelab?lesson=fingerprints-classify-compare-call&ref=fam-crimescenelab-2. No account, no email and nothing to install.

Before you start: try it once yourself

Open mytekdev.com/try/crimescenelab?lesson=fingerprints-classify-compare-call&ref=fam-crimescenelab-2. A short guide opens over the app. Two prints have already been powdered, taped and sent from the broken pane: lift 1, clean, and lift 2, small and smudged where the brush went twice. The scene is otherwise untouched.

1. **Classify.** `Lab` tab, `Prints` station. Count lift 1's deltas and press a chip: at high school the eight classes, at middle school three. The chips record the choice; nothing says whether it is right until the case is handed in.
2. **Mark and pair.** Press `ridge ending`, then press one on the lift: a mark. Pick a suspect; the ten thumbnails are their card. Press a finger, then press the same feature on the big card: a numbered pair. The station counts the pairs.
3. **Call it.** `identification`, `exclusion` or `inconclusive`. An identification on two pairs is accepted and the chip for the Case says `2 points`, which is the lesson.
4. **The rules.** Under the comparison: three rules, if the deltas count is 0, 1, 2. Run them on a card and the table shows every finger, the rule's call, the card's true class, and where it broke.

> The moment that lands is the wrong finger. The lift is the suspect's actual finger seen through the tape, so on the right finger every feature lines up and on any other finger nothing does.

The ideas, in plain words

Prints are classified by their pattern. A loop has one delta and a core; a whorl has at least two deltas; a plain arch has none. About 65 percent of prints are loops and about 30 percent whorls, the figures in the FBI's own manual; measured populations vary. The eight classes of the standard scheme are the plain arch, tented arch, radial loop, ulnar loop, plain whorl, central pocket loop, double loop and accidental. The tented arch is the one that breaks a rule by deltas: it has a delta and is still an arch.

A comparison is ACE-V: analysis of the lift, comparison with the known print, evaluation to a call, and verification by a second examiner. The three calls are identification (the same source), exclusion (different sources) and inconclusive. There is no fixed number of matching points in the United States; the examiner weighs the quality and the quantity of the features, and a partial or smudged lift may never give enough. The app never counts points as a score, and the chip it hands to the Case says the count so the teacher can see it.

Common mistakes: calling an identification on two or three pairs; pairing a feature on the lift with a different kind of feature on the card; skipping the smudged lift's inconclusive because it feels like failing. The last question on the handout asks the number question straight.

Do it together

1. Open mytekdev.com/try/crimescenelab?lesson=fingerprints-classify-compare-call&ref=fam-crimescenelab-2 together. A short guide opens over the app with two lifts already at the lab. Open the `Lab` tab, then the `Prints` station.

   > **You'll know it worked when:** Lift 1 is on the left, an oval window of ridges.

2. Count the deltas on lift 1: the places where ridges from three directions meet. Press the pattern chip under it: arch, loop or whorl.

   > **If you get stuck:** A loop has one delta, a whorl has two or more, an arch has none.
   >
   > **You'll know it worked when:** Your child can point to the delta and say the pattern.

3. Press a ridge ending or a fork on the lift: a mark. Pick a suspect and a finger on the right, press the same feature on the big card, and the two marks pair up with a number.

   > **If you get stuck:** On the wrong finger nothing lines up. Try another finger of the same hand.
   >
   > **You'll know it worked when:** Three pairs, each on the same feature of the lift and the card.

4. Make the call with the chips: identification, exclusion or inconclusive. Then press `lift 2`, the smudged one, and try again.

   > **You'll know it worked when:** Your child can say why the smudged lift might be inconclusive even on the right finger.

5. Scroll down to the rules pane. Write the three rules, 0 deltas, 1 delta, 2 deltas, and run them on a card. Find the finger where the rule breaks.

   > **You'll know it worked when:** Your child can name the tented arch as the one with a delta that is still an arch.

Talk about it

Ask these while you work together. A child who has understood the lesson can answer them without help:

- Point to the delta on lift 1. What class does that make it?
- You paired a ridge ending with a bifurcation. Are those the same feature?
- How many pairs did you find on lift 2, and is that enough?
- What are the three calls, and which one is the honest one for a smudged lift?
- Your rule says one delta is a loop. On which finger did it break, and why?

> The last question is the real test: anyone who says the tented arch has a delta and is still an arch, so counting deltas sorts most prints and not all, has understood what a rule is.

For younger and older kids

Younger: For a younger child, open `Setup` and pick middle school: three classes only, and do lift 1 together.

Older: For a teenager, compare lift 2 against two fingers and write a sentence for each call, the way an examiner's report reads.

Keep going

- Compare lift 2 with all ten fingers of the right suspect and write which ones can be excluded outright and why.
- Run the rules on all four cards and name every finger where they break, with its true class.
- Open the ten-print card of the custodian and say why a print on the pane can be theirs and still mean nothing.

Bring it into other subjects

- Math: the FBI's figures are 65 percent loops and 30 percent whorls. On the four cards, count the loops and whorls across forty fingers and compare the share.
- History: find when fingerprints were first used in a criminal case in your country, and what classification system was used.
- English: write lift 2's comparison as an examiner's report: the lift, the features, the finger, the call, and the reason.
- Computer science: the rules pane is a classifier. Write a fourth rule that catches the tented arch, and say what it needs that counting deltas does not give.

For your records

Ready to copy into an hour log, a portfolio or a transcript.

LESSON	Crime Scene Lab: Fingerprints, Classify, Compare, Call It
SUBJECTS	Forensic science

TIME	45 minutes
WHAT WE DID	Classified two lifted fingerprints by their deltas, marked ridge endings and bifurcations, paired them with the same features on a suspect's ten-print card, and made the examiner's call with a reason.
SKILLS PRACTICED	Fingerprint classification; Ridge characteristics; Comparison and the three calls

Activity sheet (optional)

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/crimescenelab?lesson=fingerprints-classify-compare-call

Essential question: How many matching features make a fingerprint match?

Warm-up: Is there a number of points that makes a match? My answer: _____. Because: _____.

1. **Vocabulary.** Delta, core, ridge ending, bifurcation, the three calls: write each in your own words.

2. **The comparison table.** For each lift: deltas counted ____; class _____; suspect and finger compared _____; pairs found ____; the call _____; the reason _____. Lift 1 on the first line, lift 2 on the second.

3. **The rules.** 0 deltas → _____. 1 delta → _____. 2 deltas → _____. The card I ran them on: _____. The finger where a rule broke, and its true class: _____.

1. Lift 2 is smudged. Which call did you make, and what would an examiner say about the number of pairs you found?

2. Counting deltas sorts most prints. Which class breaks the rule, and why?

Quick check

Name: _____

1. A print with one delta and a core is: (A) an arch (B) a loop (C) a whorl

2. In the United States, the number of matching points an examiner needs for an identification is: (A) 8 (B) 12 (C) there is no fixed number

3. Name the three calls an examiner can make, and say which one fits a smudged partial lift with two pairs.

Answers

QUESTION	ANSWER	WHY
1	B	A loop has one delta and a core; a whorl has at least two deltas; a plain arch has none.
2	C	There is no fixed number of points. The examiner weighs the quality and the number of corresponding features.
3	Identification, exclusion, inconclusive; inconclusive	Two pairs on a smudged partial is not enough to say the same source or a different one. Three calls named with the right one chosen is a full answer; three named alone is half.

If your state or umbrella school asks, this lesson covers Common Core ELA W.9-10.1b.

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The app this lesson uses is free and runs in the browser, with nothing to install and no account needed. It is at mytekdev.com.

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