

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 1 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

## 5.1 Introduction

Handwriting identification is based on the following three premises – (1) No two writers share the same combination of handwriting characteristics, given sufficient quantity and quality of writing (Individuality), (2) No writer can exactly duplicate his or her writing when repeating (Variation), and (3) No writer can immediately exceed his or her skill level of writing (Writing Skill). Handwriting examinations can never determine such traits as age, sex, personality, or intent.

A number of factors, including the size of the fingers, hands, wrists, arms, toes, legs and the persons muscular control and coordination, his or her schooling and mental image of how he or she thinks letters should appear, all combine to make each person's writing individual or unique to him or her.

Individuals may write with their toes, feet, mouth, or other means. The possibility of this type of writing must be considered.

## 5.2 Theory

The theory of writing identification is that, in two sets of writing, when they both contain the same combination of significant individual identifiable writing characteristics to the extent that it would be beyond reason to think that this combination could show up by mere chance or coincidence in the writings of two different persons.

Writing may be eliminated from having been written by a particular individual when the questioned writing contain individualizing characteristics that are structurally divergent from the known writing, outside the range of variation of the known writer, and cannot otherwise be reasonably explained, or when the skill level of the writing in question exceeds the writing ability of the known writer.

## 5.3 Terminology

In this manual, the general term "writing" will be used to refer to both cursive (connected) writing and printing. The term "writing" will include all forms of written visual correspondence, e.g., handwriting, hand printing, mouth writing, foot writing, writing with prostheses, etc. The term "signature" may be used in its broadest sense and could refer to more extended bodies of writing than just one's name. The term "writing identification" refers to the identification or elimination of writing by an unknown writer by comparison of that writing with samples of writing from a known author. The term "writing identification" is not to be confused or associated with the concept of graphology, graphoanalysis, writing analysis, or any type of personality evaluation utilizing the study of handwriting.

## 5.4 Types of Writing Characteristics

### General appearance or pictorial effect:

- 1) Plain or fancy.
- 2) Skillful or clumsy.
- 3) General consistency and balance.

### General writing style:

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 2 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- 1) Large or small.
- 2) Straight or curved strokes.
- 3) Angular or rounded.
- 4) General position on the page.

**Slant:**

- 1) Backhand, vertical or forehand.
- 2) Of upward strokes and downward strokes.

**Line quality:**

- 1) Fluency and speed.
- 2) Uniformity and consistency.
- 3) Direction (particularly when it could be optional, as in an "O").
- 4) Tremor - presence or absence.

**Line shading or pen pressure:**

- 1) Heavy up and light down, or vice versa.
- 2) Around curves or corners, when strokes change direction.
- 3) On beginning and ending strokes.

**Relations and proportions:**

- 1) Position of letters and words in relation to a real or imaginary baseline.
- 2) Position of letters and words in relation to each other.
- 3) Position of capitals in relation to lower case letters.
- 4) Proportion of width to height to length:
  - a) Of each word.
  - b) Of each letter.
  - c) Of low parts of letters in relation to the high parts.
  - d) Of capitals in relation to lower case letters.

**Spacing:**

- 1) Between letters.
- 2) Between lower case letters and capitals.
- 3) Between words.
- 4) Between words and margins.
- 5) Between writing and top/bottom of writing surface.
- 6) Between lines - particularly on unruled or blank paper.

**Beginning and ending strokes:**

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 3 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- 1) Present Or absent.
- 2) Hooked or straight.
- 3) Tapered or blunt.

**Connecting strokes:**

- 1) Connected or disconnected.
- 2) Straight or curved.
- 3) Long or short.

**T-crossings and I-dots:**

- 1) General formation.
- 2) Vertical position.
- 3) Lateral (horizontal) position.

**Pen lifts:**

- 1) Presence or absence.
- 2) Location.
- 3) Frequency (habitual or occasional).

**Special features:**

- 1) Rare forms (habitual or occasional).
- 2) Flourishes.
- 3) Punctuation:
  - a) Use and type.
  - b) Location and formation.
- 4) Drag marks.
- 5) Characteristic "gooping".
- 6) Retouching.
- 7) Indentions or impressions.
- 8) Loops and retracing.

## 5.5 Overview of Specialized Problems

### 5.5.1 Disguised or deliberately distorted writing:

- Usually need to compare a large number of different samples of a person's writing, both collected samples and requested samples (taken at different times).
- Indications of disguise:

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 4 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- (a) Changes in slant.
- (b) Changes in size.
- (c) Changes in speed:
  1. Extremely fast or slow.
  2. Inconsistent speeds.
  3. Hesitation.

- Changes in letter forms, especially capitals, to:
  - a) Box letter or printed forms.
  - b) Copybook forms. c) Grotesque forms.
  - d) Inconsistent letter forms.
- Patching or retouching letters.

### 5.5.2 Detection of Forgeries:

- The original document must be examined, if it exists. Machine generated copies will not reveal many types of forgeries.
- Every questioned document should be scanned with specialized magnification, lighting, and filtering instrumentation:
  - a) Includes, but is not limited to, hand magnifiers, microscopes, VSC, photography, etc.
  - b) Some forgeries can be detected only by the use of this specialized instrumentation.
- Characteristics often associated with forgeries:
  - a) Slow, deliberate writing speed. (speed is considered by many to be the single most important factor utilized to reveal and identify deception)
  - b) Defective or poor line quality, including:
    1. Presence of tremor.
    2. Presence of hesitations and interruptions in the flow of writing.
    3. Presence of wavering strokes and uncertain movements.
    4. "Drawn" appearance rather than fluid, natural line quality.
  - c) Lack of pen pressure variations.
  - d) Blunt beginning and ending strokes.
  - e) Presence of unnatural pen-lifts and broken strokes.
  - f) Unnecessary retouching and patching.
  - g) Unnecessary retracing.
  - h) Wrong line directions.

### 5.5.3 Types of Forgeries:

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 5 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- Freehand, cursive or spurious forgeries:
  - (a) No attempt to imitate the authentic signature.
  - (b) Attempt to eliminate the legitimate owner of the signature utilizing conventional handwriting comparison principles and techniques.
  - (c) Attempt to identify the suspected forger utilizing conventional handwriting identification techniques.
  
- Simulated or copied forgeries:
  - (a) Exhibits one or more of the characteristics commonly associated with forgeries.
  - (b) Includes “muscle forgeries:”
  - (c) Signature is copied upside down and backwards.
  - (d) Characterized by wrong line directions in addition to the poor line quality.
  
- Traced forgeries:
  - (a) Carbon tracings:
    - (b) Exhibits one or more of the characteristics commonly associated with forgeries.
    - (c) Observe exposed carbon lines or “halos” from model signature.
    - (d) Observe carbon particles lodged in paper fibers of adjacent areas.
    - (e) Observe erasure particles lodged in paper fibers of adjacent areas, if corrections were made.
    - (f) Attempt to locate and identify model signature and/or additional duplicate forgeries.
      1. Model signature should exhibit overwriting or impressions from a stylus.
      2. Model signature and/or all forgeries should closely superimpose when examined over transmitted light.
  - (g) Window box, transmitted light or illumination tracings:
    - (h) Exhibits one or more of the characteristics commonly associated with forgeries.
    - (i) Attempt to locate and identify model signature and/or additional duplicate forgeries.
    - (j) Model and/or all forgeries should closely superimpose when examined over transmitted light.
    - (k) Model signature may or may not exhibit any over-writing impressions or other alterations or additions
  
- Impression or indentation tracings:
  - (a) Exhibits one or more of the characteristics commonly associated with forgeries.
  - (b) Utilize oblique or grazing light:
  - (c) All ambient or existing room illumination should be down or off.
  - (d) When illuminated from different directions, horizontal, vertical and slanted the model signature strokes will show up in strong relief.
  - (e) Examine reverse side of document for evidence of “double tracking”.
  - (f) Attempt to locate and identify model signature and/or additional duplicate forgeries:
  - (g) Model signature should exhibit over-writing or impressions from a stylus.
  - (h) Model signatures and/or all forgeries should closely superimpose when examined over transmitted light.

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 6 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- Transfers:

(a) Waxed or freezer paper lifts:

(b) Observe wax deposits in adjacent areas.

1. Often indicated by a sheen when viewed under a strong light at 45 degrees.
2. Often can be detected by feel.

(c) Wax crystals within the strokes themselves can be detected by microscopic examination.

(d) Misalignment of inked paper fiber impressions within the strokes of the signature with the actual fibers in the bearing paper surface.

(e) Observe color changes and abnormalities associated with, or in the area of, the questioned signature by viewing with VSC.

(f) General area of the forgery should appear flattened, indented or embossed from rubbing with the blunt instrument.

(g) Attempt to locate and identify model signature.

1. Should appear to be fainter than normal.
2. Should superimpose with the forgery when examined over transmitted light.
3. General area of signature should appear flattened, indented, or embossed from rubbing with the blunt instrument.

(h) Attempt to locate and identify additional duplicate forgeries.

1. Each successive forgery will appear fainter than the one preceding.
2. Should all superimpose with each other and with the model signature when examined over transmitted light.
3. General area of each forgery should appear flattened, indented or embossed from rubbing with a blunt instrument.

(i) Cellophane tape transfers:

(j) Indicated when a strip of protective transparent tape covers the questioned signature.

(k) More often involves pencil signatures, ostensibly to protect them from erasures.

(l) Ball pen inks do not transfer as readily with this method.

1. Distinguished by absence of a furrow from the rolling ball.
2. Flat, lifeless line quality.

(m) Observe any air bubbles in the tape.

1. Absence of graphite clinging to the raised air bubble indicates the tape is over a genuine signature.
2. Graphite particles adhering to the inside surface of the air bubble indicate a transferred signature.

(n) Can sometimes observe the paper fiber pattern or actual fibers of the original document from which the signature was lifted, impressed into the transfer tape.

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 7 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

(o) Attempt to identify the original signature and additional transferred forgeries.

1. They will appear fainter with each successive transfer.
2. Should all superimpose when examined over transmitted light.

(p) Electrostatic copy machine transfers:

(q) Usually utilized when original document is claimed to be unavailable or missing.

(r) Examine for microscopic discrepancies.

1. Portions of writing (e.g. tops, bottoms, beginning and ending strokes) missing abruptly as though cut off.
2. Presence of minute remnants (crossbars, intersecting lines, ruled lines) of lines and writing on the original document.

(s) Attempt to identify the original signature/document:

1. By skips, gaps, etc., in all the same places.
2. May be able to determine generation of the forgery by size reductions.
3. Forgery should superimpose with the original, except for overall size, when examined over a transmitted light source.

(t) Transfer by Offset printing:

(u) Exhibits complete lack of indentation.

(v) Signature or writing appears to lie on top of document, and is not an integral part of it.

(w) Under magnification, exhibits the presence of fill-in, pin-holing, or half-tone, characteristic of offset.

(x) Machine forgeries (signature machines, pantographs, telenotes) (y) Usually exhibit lack of pen pressure variations.

(z) Beginning strokes exhibit a crater effect.

(aa) Ending strokes are blunt.

(bb) Often exhibit unnatural and holographic forgeries.

(cc) Autograph manuscript and holographic forgeries.

(dd) Utilize all techniques listed above.

(ee) Examine the nature of pen, ink, paper, and any other materials involved, utilizing all scientific equipment available.

### 5.5.4 Determining Direction of strokes:

a) Observe striations in curved ball point strokes:

1. Consist of ink-free striations within a ball point pen stroke that give it a candy-cane effect.
2. The striations will generally run toward the outside edge of the curve in the direction the pen was moving.
  - Observe all areas of pen writing to determine consistent or inconsistent striation patterns by the same pen.

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 8 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- b) Observe gooping just after a sudden change in direction by a ball point pen.  
c) Observe ink or carbon deposits piled against the near side of the paper fibers:
1. Usually requires high magnification.
  2. Utilize either a direct overhead (ink) or transmitted (pencil) light source.
  3. A polarizing microscope is often very helpful in these observations.

### 5.5.5 Determining Sequence of Lines:

- In many cases, it is impossible to come to an accurate conclusion.
  - (a) At present, there is no infallible method or technique for determining the sequence of lines.
  - (b) It is a problem that requires the utmost caution.
  - (c) Careful and deliberate examination of these problems should be conducted. Extreme caution should be exercised when rendering conclusions in this area.
  - (d) Literature studies are recommended prior to undertaking such an analysis.
- Influencing factors that warrant consideration and caution:
  - (a) Fluidity and drying time of the inks or writing materials involved.
  - (b) Time intervals between production of the lines.
  - (c) Relative pressures involved in producing the lines.
  - (d) Colors involved – dark lines usually appear to be on top, even when they are not.
- Preliminary considerations and determinations:
  - (a) Type of materials involved, such as:
    1. Nature of the inks or deposits (fluid, dry, wax, graphite).
    2. Nature of the paper surface (soft or hard, smooth or fibrous, closed or porous).
  - (b) Amount of pressure in each line.
  - (c) Direction of each line.
  - (d) Other line intersections where they occur normally on the document.
  - (e) Conduct experiments to reproduce the questioned intersections.
- Characteristics to look for:
  - (a) Dragging or drawing ink or deposits from the first line along the second line.
  - (b) Dragging, drawing or disrupting paper fibers in the direction of the second line.
  - (c) Various effects caused when the second line jumps the channel or groove of the first line:
    1. Narrowing the second line.
    2. Break in the second line.

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 9 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

3. Gooping of the writing material along the edge of the channel.

- Observation and examination techniques:

(a) Magnification:

1. With the microscope angled at 30-40.
2. With grazing light (caution: can be misleading)

(b) IR-UV lighting and filtering equipment:

1. Usually works only when different inks or writing materials are involved.
2. Can show elements of one ink dragged along the second line.

(c) Lifting techniques:

1. Utilizes transparent cellophane adhesive tape for Kromekote paper.
  - Lifting medium is anchored over the line intersection and rubbed with a blunt instrument.
  - When peeled off, will show continuous edges of tape line.

(d) Warnings:

1. This method has proven unreliable for fluid ink and pencil strokes.
2. Acceptable lifts of ball pen ink cannot be obtained with increased passage of time (over one hour after writing).
3. When lines are drawn with varying degrees of pressure, incorrect interpretations of line sequence result.

(e) Lines over folds in the paper:

1. One line may be broken by the crease, indicating it was there before the folding.
2. The other line may show indications of having been written after the document was folded.
  - Skipping or globbing as the pen jumps the fold or crease.
  - Some inks may flow or leach out into the broken paper fibers along the fold or crease.

(f) Writing or marks on the backside of the document may indent or be indented by the lines on the front side, indicating which was there first.

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 10 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

## 5.6 Methods

Writing examinations are performed per [ASTM E2290-07a](#).

## 5.7 Additional General Guidance and Considerations for the Process of Comparison

### 5.7.1

Prior to conducting any comparisons, examine the questioned writing to identify characteristics that may be suitable for comparison:

- a. Note its general appearance and style.
- b. Check for indications of natural writing:
  - i. Apparent lack of conscious attention to the structure of the writing.
  - ii. Fluent, continuous strokes.
  - iii. Variations in pen pressures.
  - iv. Tapered beginning and/or ending strokes.
- c. Check for characteristics of unnatural or abnormal writing:
  - i. Slow, deliberate writing speed.
  - ii. Presence of tremor.
  - iii. Presence of unnatural pen-lifts and broken strokes.
  - iv. Different writing speeds.
  - v. No pen pressure variation on upstrokes and downstrokes.
  - vi. Blunt beginning and ending strokes.
  - vii. Awkward looking forms.
  - viii. Meaningless blobs in the angle of writing.
  - ix. Frequent changes in the angle of writing.
  - x. Unnecessary retouching.
- d. Causes:

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 11 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- i. Unaccustomed handed writing.
- ii. Intoxication and/or drugs.
- iii. "Guided-hand" writing.
- iv. Multiple writers.
- v. Disease or injury.
- vi. Stress, e.g., writing done in conjunction with a suicide attempt.
- vii. Temporary conditions, such as:
  - 1. Extreme cold.
  - 2. Violence
  - 3. Exercise.
  - 4. Unsuitable writing conditions, instruments or surface.
- viii. Intentional distortion or disguise.
- ix. Forgery.

e. Examine the questioned writing and adjacent areas with special instrumentation for any subtle or latent indications or fraudulent intent:

- i. Hand magnifier (linen tester). ii. Microscope, utilizing:
  - 1. Direct light.
  - 2. Transmitted light.
  - 3. Grazing light.
  - 4. VSC, utilizing:
    - a. Reflected I.R.:
      - i. Direct.
      - ii. Transmitted.
      - iii. From the back of the document.
    - b. Transmitted I.R.
    - c. I.R. luminescence:
      - i. Direct.
      - ii. Transmitted.
      - iii. From the back of the document.
    - d. Ultraviolet light source:

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 12 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

- i. Long and short wave.
- ii. Other forensic light sources (hand held).

### **5.7.2**

Examine the known writing samples.

a. Organize the standards:

i. Group the requested samples together and the collected samples together. ii. Arrange in chronological order:

- 1. By consecutive dates, for collected samples.
- 2. In numerical order given, for requested samples.

b. Note the general appearance and style of the known writing standards.

- i. Note any indications of disguised writing and/or other abnormalities.
- ii. Note any highly significant characteristics.

### **5.7.3**

Arrange the questioned and known materials so that the same letters, words, or phrases are side by side.

### **5.7.4**

Make a comparative examination of the questioned writing with the known standards:

- a. Identify significant characteristics in the questioned material.
- b. Attempt to find the same significant characteristics in the known writing standards.
- c. Document the significant similarities and differences observed.

### **5.7.5**

Weigh the comparative values of the significance of the various similarities and differences observed.

### **5.7.6**

Arrive at a conclusion per applicable ASTM standard guidelines.

	<b>QD-PM 5.0 Writing Examinations</b>	
	<i>Document #: 2985</i>	<i>Page 13 of 13</i>
	<i>Revision #: 4</i>	<i>Issued Date: 12/09/2019</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Jeffrey Nye</i>

## 5.8 References:

[Glossary of Handwriting](#) (Duayne Dillon, April 1975)

ASTM International:

E1658-08 Standard Terminology for Expressing Conclusions of Forensic Document Examiners

E2195-09 Standard Terminology Relating to the Examination of Questioned Documents

E2290-07a Standard Guide for the Examination of Handwritten Items