MAKE THINGS

Vectors, Logos and Things That Get Printed

Draw curves that hold at any size, then hand a press a file it will not send back.

Addalu
First edition, September 2026

Series editor: Dr Mustafa Mun
Draft, open for academic review

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First edition, September 2026, build 62a26075.

Written by AI models to a written standard, with Dr Mustafa Mun as series editor. Exam keys checked blind by a second model: 3,665 of 3,666 agreed. Academic review invited.

The manuscript was drafted with the assistance of a large language model and was edited and published under his name. That is stated plainly here rather than left to be discovered, because a reader is entitled to know how a book they are trusting was made.

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This book is the printed form of the course of the same name at addaly.com/learn/vector-and-print. The website is the living version and is corrected first. Where the two differ, the website is right.

Free to read, free to download, free to print, and free to teach from. There is no paid edition and there never will be.

Every diagram in it is drawn from data by code, not generated as a picture, so the numbers on the page are the numbers in the argument. The answers to every check, test and examination question are at the back.

8 modules · 73 lessons · 29 figures · 8 case studies · 56,934 words · about 10 hours

Brief contents

1

MODULE 1

The thing that is actually in the file

Read the geometry inside a vector file by hand, predict which operations are lossless and which silently rasterise, explain a size or line-weight discrepancy by naming the unit or rendering rule that caused it, and choose vector or raster for a job from its output device rather than from habit.

Lesson 1 · 9 min

Why your Photoshop logo cannot go on a hoarding

THE ONE THING TO KEEP

A raster file records pixels at one fixed size; a vector file records geometry with no size at all, which is why only the second can be redrawn for a hoarding.

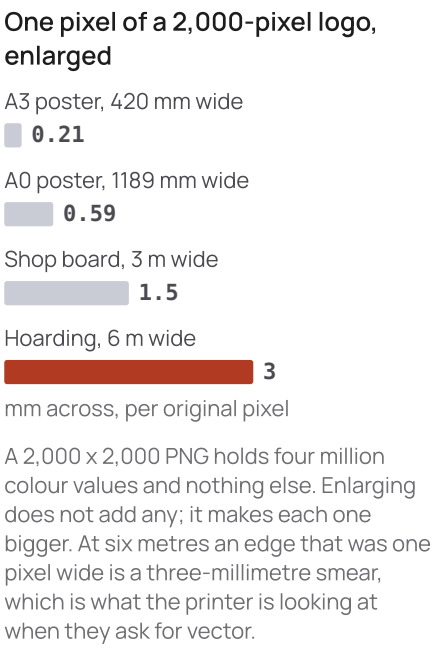
The phone call every beginner gets

You made a logo in Photoshop. It looked sharp. You sent it to the printer for a six-metre hoarding and got a message back: *send vector*. You sent the same PNG at 300 dpi, larger. Same message.

Nothing is wrong with your design. The file is the wrong kind of thing.

A raster file — PNG, JPG, PSD, a Photoshop document — stores a fixed grid of coloured squares. A 2000 × 2000 PNG stores exactly four million colour values and no other information about the picture. Enlarge it to six metres and each of those squares becomes about three millimetres wide. Software can guess what belongs between them, and modern upscalers guess well, but a guess is not the edge you drew. On a hoarding, an edge that was one pixel wide is now a soft three-millimetre smear.

Figure 1.1



A vector file stores something else entirely: instructions. Not "these pixels are black" but "a closed path starting here, curving to there with this tangent, filled with this colour". Nothing in that description has a size. When the file reaches the printer, the RIP — the software driving the press or the large-format machine — reads the instructions and draws them fresh at whatever resolution that machine actually has. Six metres or sixteen pixels, it is drawn cleanly both times.

What the instructions look like

You can read them. An SVG is plain text:

```
<svg viewBox="0 0 100 100" xmlns="http://www.w3.org/2000/svg">
  <circle cx="50" cy="50" r="40" fill="#c0392b"/>
  <path d="M35 50 L65 32 L65 68 Z" fill="#ffffff"/>
</svg>
```

That is a play button. It is about 200 bytes and it is sharp at any size, because there is no size in it. The same mark as a PNG large enough for a hoarding would be tens of megabytes and still soft.

Open any SVG on your machine in a text editor. Seeing the coordinates is the fastest way to stop thinking of vector as "a better kind of picture" and start thinking of it as a description of geometry.

Where vector is the wrong tool

This is not a hierarchy where vector wins. Vector is bad at photographs, and the failure is worth understanding because people meet it by accident.

Auto-trace — Image Trace in Illustrator, Path > Trace Bitmap in Inkscape, PowerTRACE in CorelDRAW — converts a raster into paths by finding colour boundaries. On a flat logo scanned from a business card, it works. On a photograph it produces thousands of overlapping blobs, because a photograph has no flat regions. A traced portrait can carry 60,000 nodes. The file is enormous, it will not redraw smoothly on your screen, and it can time out on the press's RIP. Print shops lose jobs to this every week.

So: photographs stay raster, and belong in image editing. Logos, type, diagrams, maps, icons, signage, packaging die-lines and anything that must be cut, engraved or stitched are vector.

Resolution independence also does not mean quality independence. A clumsy curve stays clumsy at six metres — it becomes a very large clumsy curve. Vector removes one failure mode. It does not remove drawing.

What to install, including if you have no money

- **CorelDRAW** is the tool of the Indian print trade, of signage shops, of garment and screen-printing units across South and Southeast Asia. If you want paid work at a local press, this is the file they will hand you. It is a paid product; Corel has sold both a subscription and a one-off perpetual licence, so check what is on offer now.
- **Adobe Illustrator** is what agency job ads ask for. Subscription only.

- **Inkscape** is free, open source, runs on Windows, macOS and Linux, and is a genuinely capable vector editor. It draws, edits nodes, does booleans, does type on a path, exports SVG, PDF, EPS and DXF. It is weaker on colour management for press and slower on very heavy files. Nothing else in this course is out of its reach.
- **Affinity Designer** was for years a one-off purchase, which made it the obvious escape from subscriptions. After Canva acquired Serif, the Affinity apps were relaunched in 2025 with free access and some features behind a paid tier — confirm the current terms before you plan around it.
- On a phone, real node editing is unpleasant on a small screen, but it is possible: Infinite Design on Android, Linearity Curve on iPhone. Use a phone to review a PDF and mark it up. Build on the largest screen you can reach, including a cyber café machine.

Install Inkscape today if you have nothing. The concepts in the next eight lessons are the same in all four programs; only the menus move.

One thing to check right now

Open the logo you are proudest of. If the only file you have is a PNG or a JPG, you do not have a logo yet — you have a picture of one. Redrawing it as vector is the work of the next four lessons, and it is the difference between a file a shop can print and a file they will email you back about.

BEFORE YOU MOVE ON

A client sends their logo as a 2000 × 2000 PNG saved at 300 dpi and asks for it on a six-metre hoarding. The print shop refuses the file. What is the actual problem?

A. The PNG is in RGB and the hoarding needs CMYK, so a colour-space conversion is what is blocking the job.

B. 300 dpi is below the resolution large-format printing requires, and the file should be re-exported at a higher dpi.

C. The file stores a fixed grid of four million pixels; enlarged to six metres each pixel becomes a visible block, and no resampling can add detail that was never recorded. A vector file would be redrawn at the machine's own resolution.

D. PNG compression discarded fine detail, so sending the same artwork as an uncompressed TIFF would give enough information to enlarge.

The answer and why: p. 405

Lesson 2 · 9 min

What the `d` attribute is saying

THE ONE THING TO KEEP

An SVG is text you can read and edit, and the `d` attribute is a short list of pen instructions in document coordinates — which is why a 240-byte logo and a 1.9 MB logo can look identical on screen.

Open it in a text editor

Right-click any SVG, open it with Notepad, TextEdit or `nano`, and look. There is no magic in there. There is a list of instructions.

```
<path d="M 20,80 C 20,20 80,20 80,80 Z" fill="#1d4ed8"/>
```

Read it out loud. **M**ove the pen to 20,80. Draw a **C**ubic curve whose first handle points to 20,20, whose second handle points to 80,20, ending at 80,80. **Z** closes the path back to the start.

That is the whole vocabulary you need, and there are only a handful of commands:

- `M x,y` — move without drawing. Starts a new subpath.
- `L x,y` — straight line to a point. `H x` and `V y` are the horizontal and vertical shorthands.
- `C x1,y1 x2,y2 x,y` — cubic Bézier: two handle positions, then the end point. This is by far the most common.
- `S x2,y2 x,y` — smooth cubic. Reuses the previous curve's outgoing handle, mirrored. This is how exporters compress a smooth run of curves.
- `Q` and `T` — quadratic Bézier, one handle. TrueType fonts are built from these; PostScript and SVG artwork mostly is not.
- `A rx,ry rot large-arc sweep x,y` — elliptical arc. Rarely written by hand, common in output from charting libraries.
- `Z` — close the subpath.

A capital letter means **absolute** coordinates. A lowercase letter means **relative** to where the pen already is. `l 10,0` means "ten units right of here". Exporters use lowercase because the numbers come out shorter.

The coordinate frame

Two attributes decide what those numbers mean.

```
<svg viewBox="0 0 100 100" width="40mm" height="40mm">
```

`viewBox` sets the internal coordinate system: this drawing is 100 units across. `width` and `height` say how large to render it. Change the width to `400mm` and nothing inside the file changes — the same 100 units are simply stretched over

a larger area. **This is the whole of resolution independence, in one attribute.**

If `width` and `height` are missing, the renderer uses the viewBox and falls back to 96 units per inch. That default is the cause of a great deal of confusion, and it is the next lesson.

Why two identical-looking logos differ by 8,000×

Export the same mark two ways and you will see something like this:

```
play-drawn.svg       240 bytes    3 path elements
play-traced.svg    1,912,406 bytes  412 path elements
```

Three things inflate a file, and all three are visible in the text:

1. **Node count.** A traced logo has hundreds of anchor points where a drawn one has eight. Every anchor is six numbers.
2. **Decimal precision.** Illustrator and Inkscape happily write `47.238471950000003`. Fifteen significant figures on a drawing that will be cut at half-millimetre accuracy is sixty bytes of nothing.
3. **Embedded rasters.** An `<image xlink:href="...">` means somebody placed a photograph inside what they called a vector file. This is the single most common reason a "vector logo" fails when the printer enlarges it.

Search the file for `base64`. If you find it, you do not have vector artwork.

Cleaning up, free

`svgo` and `scour` both strip precision, merge paths and remove editor metadata:

```
npx svgo --precision=2 logo.svg -o logo.min.svg
```

Two decimal places on a 100-unit viewBox is accuracy to one hundredth of the drawing's width. Nothing you print can hold more.

The part nobody tells you: batch editing

Because it is text, you can do things no menu offers. A client changes their brand blue and you have forty icons:

```
sed -i 's/#1d4ed8/#0f766e/g' icons/*.svg
```

Forty files, one second, no application open. You can also grep an entire folder for `base64` to find the fake vectors, or for `font-family` to find the files where somebody forgot to outline the type.

This is not a trick for programmers. It is the single most useful thing about the format, and it is why SVG is also the only vector format that diffs sensibly in version control — you can see, line by line, what changed between two versions of a drawing.

Watch out for `transform`

A path can sit inside nested groups, each with its own `transform="translate(...) scale(...) rotate(...)"`. The numbers in `d` are then not the numbers on your ruler. If coordinates look wrong, look upward at the groups. Most editors have an "ungroup and bake transforms" step; in Inkscape, Edit ▸ Preferences ▸ Behaviour ▸ Transforms ▸ *Store transformation: Optimized* pushes transforms down into the path data where you can read them.

BEFORE YOU MOVE ON

Two SVG files of the same simple logo look identical on screen. One is 240 bytes; the other is 1.9 MB. Opening the large one in a text editor shows 412 `<path>` elements and coordinates written to fifteen decimal places. What does that tell you about the large file, and what will go wrong with it?

A. It was saved at a higher resolution setting, so it will print more sharply but will take much longer to render on the press.

B. It is uncompressed, so gzipping it will make the two files equivalent.

C. It was auto-traced, so it carries hundreds of redundant anchors that will wobble when enlarged or cut.

D. It contains CMYK colour values, which are longer than hex and cannot be compressed.

The answer and why: p. 406

Lesson 3 · 9 min

Points, millimetres, and two different inches

THE ONE THING TO KEEP

A vector file stores unitless numbers plus a rule for how many of them make an inch — and because PostScript says 72 and the web says 96, a file that does not state its units can open at the wrong size in perfectly working software.

The two inches

There are two competing definitions of a "unit" in graphics, and both are correct in their own world.

- **The PostScript point.** 72 points to the inch. This is the unit of typesetting, of PDF, and of everything that goes to a press. A 12 pt type size is one sixth of an inch of em, and a 3 mm bleed is 8.504 pt.

CASE STUDY · MODULE 1

The hoarding, the WhatsApp logo and the three-day deadline

An illustrative case, built from documented patterns.

A four-person signage shop on the Mumbai road at Nashik, four days before a jewellery showroom opens.

Sundeep runs a signage shop with three staff and a small CNC router. On Wednesday afternoon a jewellery showroom books him for an opening on Sunday: a six-metre by three-metre flex hoarding for the approach road, and 1.2 metre acrylic letters for the fascia above the shutter.

He asks for the logo. What arrives on WhatsApp is a JPEG, 480 pixels wide, forwarded twice. The owner says it was made in 2019 by his nephew, who has since moved to Dubai. There is no other file, nobody knows what typeface the name is set in, and the owner is confident he has supplied a logo, because he can see it on his phone.

Two jobs, two different problems.

The flex hoarding will accept a raster file, because the large-format RIP will take whatever it is given. At six metres wide, each of those 480 pixels becomes 12.5 mm across. Even at the generous 30 ppi a hoarding seen from thirty metres can get away with, the file would need to be about 7,000 pixels wide. It is fifteen times short. An upscaler will invent detail, and the detail it invents will be a guess about somebody else's curves.

The acrylic letters are worse, because the router does not read pixels at all. It follows paths. Somewhere between the JPEG and the machine, somebody has to produce geometry.

Sundeep has two routes and he has to choose on Wednesday evening.

Trace it. Twenty minutes in PowerTRACE. The output is roughly 2,400 nodes of contour found along a staircase of pixels, with the corners rounded where the tracer decided a corner was noise. On the hoarding the wobble on each letter is about a centimetre. On the routed letters it is worse, because the

bit follows every wobble at a constant feed rate and the edge comes out rippled where it should be straight. The traced file also becomes the showroom's logo for the rest of its life, because it will be the only vector anyone has.

Redraw it. Identify the typeface, rebuild the diamond mark from two circles and a rotated square, and draw the wordmark over a locked, dimmed template. Sundeep has done this before and it takes him between two and three hours. Those hours are not billed: the client believes he has supplied artwork, and Sundeep has not raised the question of charging for it.

The cost of redrawing is not really the three hours. It is that the flex file then misses Thursday night. The printer he uses has one machine, Friday is already full with municipal election work, and the next clear slot is Saturday morning. If anything goes wrong on Saturday there is no float before the Sunday opening.

The cost of tracing is nothing on Wednesday and something every year afterwards.

Sundeep's brother-in-law, who does the installations, has a view: nobody stands close enough to a hoarding to see a wobble, the showroom is paying for a sign and not for archaeology, and Sunday is Sunday. That argument is half right, which is what makes it hard. At thirty metres the wobble genuinely does not read. At the fascia, where customers wait for their car with their nose a metre from the acrylic, it does.

There is a third consideration that neither of them raises on Wednesday. Whoever produces the vector will be the only person in Nashik who has it, and the showroom will need it again for a visiting card, a bill book, a shutter sticker and a box for every purchase.

YOUR ANSWERS

1. The client is certain he has supplied a logo. What is the fastest honest way to show him otherwise?

2. Suppose the job had been the hoarding alone, with no routed letters. Would tracing have been defensible?

3. What should Sundeep keep when the job is finished, and why does it matter commercially?

STOP HERE

Write your answers before you turn the page. How it played out starts on p. 46.

CASE STUDY · MODULE 1

How it played out

Sundeep redrew it, and what decided him was one measurement rather than an argument. He printed a 300 mm crop of the traced capital S at full size on the office inkjet, taped it to the counter, and stood at the door. The wobble was visible from six feet, which is roughly where a customer stands.

The redraw took two hours forty minutes: the mark was two circles and a square rotated 45 degrees, and the wordmark turned out to be a widely available face with the R leg redrawn. He sent the flex file at eleven that night, kept the Thursday slot, and routed the letters on Friday afternoon.

He also put a line on the invoice: "Logo reconstruction from supplied image, 2.5 hours." Itemised, with the traced version and the redrawn version printed side by side and stapled to it. The showroom paid it without comment.

Eighteen months later that file had been used for the visiting cards, two shutter stickers, a bill book, a Diwali hoarding and a wedding-season van wrap, and every one of those orders came back to Sundeep, because he was the person who had the file.

The questions, discussed

1. The client is certain he has supplied a logo. What is the fastest honest way to show him otherwise?

Print one letter from the supplied image at the size it will actually be used and put it in front of him. A 300 mm crop on an office printer, seen from where a customer stands, settles in ten seconds what an explanation of raster and vector will not settle in ten minutes. The argument is not that the file is low quality; it is that the file records pixels at one fixed size and the job needs geometry at another.

2. Suppose the job had been the hoarding alone, with no routed letters. Would tracing have been defensible?

Tracing would have been beside the point, because the hoarding could have taken the raster directly. The real problem there is resolution: 480 pixels across six metres is about fifteen times short even of the 20 to 40 ppi a

hoarding needs, so the file is inadequate whether it is traced or not. The honest options would have been an upscale, disclosed as invented detail, or a redraw. And the redraw still earns its keep, because the artwork will be reused.

3. What should Sundeep keep when the job is finished, and why does it matter commercially?

The redrawn vector master, clearly named and archived with the date, plus an outlined PDF as a format-independent copy. Being the only person who holds a usable file makes him the default supplier for every later job, and it protects the client from the same problem recurring in three years when a different shop is asked for a sticker. Charging for the reconstruction openly, and itemising it, is what turns an unpaid favour into a service the client understands they bought.

MODULE 1 TEST

Check what stuck

6 questions, one right answer each. This one is for you, not for a record. The answers, and the reason behind each, are in the key on p. 404. If two go wrong, re-read the module before the exam.

1 A 100 mm square drawn in Inkscape 0.91 measures 93.75 mm when the same file is opened in Inkscape 1.x. What happened?

A. The file was saved at 90 dpi and the newer version resampled it to 96 dpi

B. The viewBox was written wrongly by the older version and has now been silently corrected

C. The bare numbers in the file were read at 96 units to the inch instead of 90

D. Millimetres were converted using 72 points to the inch rather than 25.4

2 A keyline set to 'hairline' proofs perfectly on the 600 dpi office laser and is missing from five thousand printed cartons. What is the mechanism?

A. The PDF export dropped the stroke because the object had no fill

B. The press trapped the line away when it spread the lighter colour into the darker one

C. The line was set to overprint, so it printed beneath the background

D. Hairline means the device's thinnest line, which on a platesetter is 0.011 mm

3 A ring built from a large circle and a small one previews as a solid disc. Which fix is the more portable, and why?

A. Reverse the direction of the inner subpath

B. Move the inner circle to the top of the stacking order

C. Group the two circles rather than combining them

D. Set the object to even-odd fill in the application

4 A 40 MB photograph was cropped to a 20 mm square in the layout, and pdfimages lists it in the exported PDF at 6000 by 4000 pixels. What does that tell you?

A. The export downsampled the file but kept its original colour depth
B. The crop was a clipping path, so the whole photograph is still there
C. The image was embedded rather than linked, which doubles its size
D. PDF/X requires both a low-resolution preview and the full image to be stored

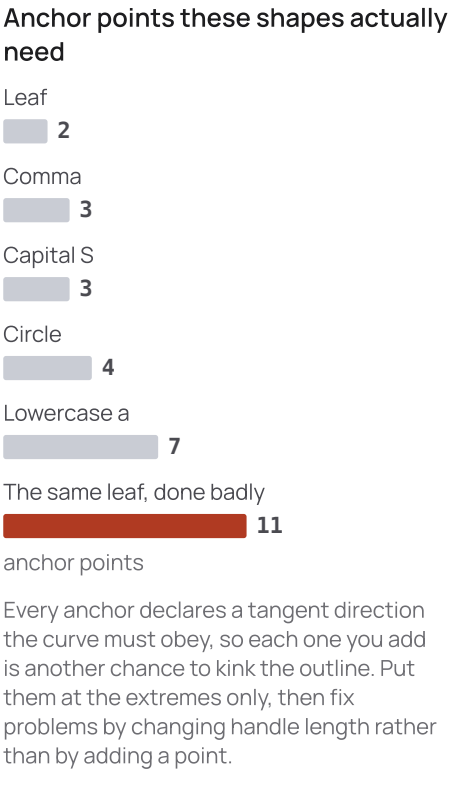
5 A drop shadow looks perfect on screen and prints visibly stepped and chunky. Which setting explains it?

A. The rendering intent, which was left on saturation
B. The image downsampling threshold in the PDF export
C. The line screen, which the RIP set too coarse for the stock
D. The document's raster effects resolution, left at 72 ppi

6 Auto-tracing a clean scan of a square logo returns rounded corners. Which stage of the tracer did it, and what do you change?

A. The threshold: raise the brightness cutoff so the ink is fully black
B. The corner detection: lower the corner threshold so corners survive
C. The curve fitting: loosen the error tolerance so fewer nodes are used
D. The speckle filter: raise it so small features are discarded

Figure 2.1



The habit that fixes it

1. Before you click anything, look at the shape and mark the extremes mentally. Those are your anchors. Nowhere else.
2. Click and drag at each one. Drag along the direction of travel, holding **Shift** to lock the handle to horizontal or vertical.
3. Make the handle roughly one third of the distance to the next anchor. This is a rule of thumb, not a law, but it gets you close and stops the overshooting bulge that comes from handles that are too long.
4. Only then go back and adjust. Adjust handle length before you consider adding a point. Adding a point is almost always the wrong fix.

Where the curve genuinely changes direction — a corner — you want a **cusp** node, where the two handles move independently. Hold **Alt** and drag a handle to break the pair in Illustrator and Inkscape; in CorelDRAW, select the node and press the cusp button on the property bar. Where the curve should flow

through smoothly, you want a **smooth** node, where the handles stay in a straight line through the anchor. Inkscape has explicit commands for this on the node tool: **Shift+S** to make a node smooth, **Shift+Y** for symmetric, **Shift+C** for cusp.

The drill

Set a capital **S** in a heavy typeface at 400 points. Lock it on its own layer at 30% opacity. Trace it with three anchors. You will get it wrong the first four times. When the curve finally sits on the letter with three points, you have learned the thing this lesson exists to teach, and it will not leave you.

Then do a lowercase **a**, which has an inner counter and a spur, and needs about seven.

Auto-trace is not a shortcut past this

Image Trace, Trace Bitmap and PowerTRACE all place their nodes along the pixel boundary they found, at intervals the algorithm chose. They routinely give you 200 nodes on a shape that needs eight. The result looks acceptable on screen at 100% and reveals its wobble the moment it is enlarged, cut in vinyl or embroidered.

Simplify helps a little — **Ctrl+L** in Inkscape, Object > Path > Simplify in Illustrator, the node-reduction slider on CorelDRAW's Shape tool property bar — but it removes points by averaging, so it rounds off the corners you wanted to keep while leaving the misplaced points that caused the wobble. Treat a trace as a template to redraw over, not as artwork.

It transfers

This is cubic Bézier geometry, standardised decades ago. The same handles run the pen tool in Figma and Penpot, mask paths in After Effects, curves in Blender, motion paths in animation software, and the outline of every letter you are reading. Learn the handles once and you have learned every pen tool you will ever meet.

EXAMINATION

Vectors, Logos and Things That Get Printed: final examination

This paper covers the whole course:

- what is actually inside a vector file
- drawing and correcting curves
- type and its licences
- colour that survives a press
- designing and delivering a mark
- building a document that survives a late change
- the handover to a printer
- preparing files for machines that cut, stitch and burn

56 questions, the whole pool. The site draws 25 for a sitting, pass mark 70%. Work any 25 under your own conditions. Answers from page 454.

1 Module 1 · The thing that is actually in the file

An SVG path reads M 20,80 C 20,20 80,20 80,80 Z. What are the first four numbers after the C?

A. The positions of the two handles, before the end point is given

B. A control point and the chord length from the previous anchor

C. Two points on the curve that it is guaranteed to pass through

D. A centre point and a radius, which the renderer turns into an arc

2 Module 1 · The thing that is actually in the file

You open a 1.9 MB file somebody has sent you as a vector logo and find the string base64 inside it. What have you got?

A. A font embedded in the file, which is normal in an SVG

B. An editor's metadata, which svgo or scour will strip out for you

C. A raster image embedded inside a file that is called a vector

D. A compressed set of path data that any editor can expand again

3 Module 1 · The thing that is actually in the file

A client asks you for a 300 dpi version of their logo. What is the useful reply?

A. Export the SVG at 300 dpi from the document properties dialog

B. Ask what the finished size is, because a vector file has no dpi

C. Send a 300 dpi PNG at 1000 pixels, which covers most uses

D. Explain that 300 dpi applies only to CMYK files, not to RGB ones

4 Module 1 · The thing that is actually in the file

A mark drawn at 200 mm with a 2 mm outline is scaled to a 15 mm badge and the outline looks like a blob. What happened?

A. The miter limit bevelled the corners once the shape got smaller than the limit

B. The stroke alignment changed from centre to outside during scaling

C. Dot gain thickened the line, which is normal at that size in print

D. The stroke was set not to scale with the object, so it stayed 2 mm

5 Module 1 · The thing that is actually in the file

A line specified as 10 mm long, with a 4 mm round cap at each end, measures 14 mm on the artwork. Why?

A. The measurement includes the bounding box, not the geometry
B. The stroke width was added to the length by the export
C. Round caps extend half the stroke width past each endpoint
D. The path was drawn 14 mm and the dimension recorded wrongly

6 Module 1 · The thing that is actually in the file

Why is a black rectangle drawn over a name in a PDF not redaction?

A. It is a drawing on top, and the text underneath is still extractable
B. It flattens into a raster region, which some viewers then render as grey
C. It only works if the PDF is exported as PDF/X-1a with no layers
D. It hides the name on screen but prints the text on a press

7 Module 1 · The thing that is actually in the file

Why can a multi-colour auto-trace produce a doubled edge on a cutting plotter even though it looks correct on screen?

A. The plotter cannot read fill colours, so it cuts every path it finds
B. The tracer writes each colour as a separate file that the plotter merges
C. Each region is stroked as well as filled, so the blade follows both
D. The output is a stack of opaque shapes that overlap by a pixel or two

Module 1 · The thing that is actually in the file

The module starts on p. 11.

MODULE 1 TEST

Module 1 test, Q1, p. 48

A 100 mm square drawn in Inkscape 0.91 measures 93.75 mm when the same file is opened in Inkscape 1.x. What happened?

Answer C: The bare numbers in the file were read at 96 units to the inch instead of 90

Why: The file stored 354.33 unitless numbers and never stated what a unit was. Inkscape 0.91 wrote them at 90 units to the inch; Inkscape 1.x reads them at 96, so 354.33 divided by 96 times 25.4 gives 93.75 mm. Nothing is resampled and nothing is corrupt, because there are no pixels involved at all. This is why you measure one known edge after importing anything old.

Module 1 test, Q2, p. 48

A keyline set to 'hairline' proofs perfectly on the 600 dpi office laser and is missing from five thousand printed cartons. What is the mechanism?

Answer D: Hairline means the device's thinnest line, which on a platesetter is 0.011 mm

Why: Hairline is not a measurement. It resolves to one divided by the device's resolution, so it is 0.042 mm on a 600 dpi laser and 0.011 mm on a 2400 dpi platesetter. The second is thinner than a press can hold ink, so the line breaks into dots or disappears. Quote a real number instead: about 0.1 mm positive on offset litho, 0.15 mm reversed.

Module 1 test, Q3, p. 48

A ring built from a large circle and a small one previews as a solid disc. Which fix is the more portable, and why?

Answer A: Reverse the direction of the inner subpath

Why: Under non-zero winding, two subpaths drawn the same way give a winding number of 2 in the middle, which is not zero, so it fills. Reversing the inner loop makes the counts cancel to zero and produces a hole. Switching to even-odd also works, but direction is stored in the geometry and travels with the file, while a fill-rule attribute is something some importers drop. Grouping never makes a hole, because a group is separate objects.

Module 1 test, Q4, p. 49

A 40 MB photograph was cropped to a 20 mm square in the layout, and pdfimages lists it in the exported PDF at 6000 by...

Answer B: The crop was a clipping path, so the whole photograph is still there

Why: A clip is an instruction to render only part of an object. The object itself is untouched, so every pixel of the original travels in the file, bloats it, and costs the RIP time it decodes and throws away. It is also recoverable by anyone who releases the clip, which is why a clip is never redaction. Turn on crop image data to frames on export, or crop the picture in a raster editor.

Module 1 test, Q5, p. 49

A drop shadow looks perfect on screen and prints visibly stepped and chunky. Which setting explains it?

Answer D: The document's raster effects resolution, left at 72 ppi

Why: A drop shadow is not geometry; it is a picture generated at a resolution the document sets, and the default on a new Illustrator document was Screen at 72 ppi for years. At 72 ppi it looks right on a screen that is roughly 72 to 110 ppi and prints as visible steps. Set it to 300 ppi on day one, and check it again whenever you open somebody else's file.

Module 1 test, Q6, p. 49

Auto-tracing a clean scan of a square logo returns rounded corners. Which stage of the tracer did it, and what do you change?

Answer B: The corner detection: lower the corner threshold so corners survive

Why: Every tracer reduces to regions, walks contours, decides which staircase steps are genuine corners, then fits curves. Rounded corners come from the third stage deciding your corner was sampling noise, so the corner threshold is the control. Loosening the fit makes it worse, and the speckle filter only discards small features. A wobbly straight edge, by contrast, is the fourth stage smoothing a staircase and wants a better scan.

THE LESSON CHECKS

Lesson 1, p. 16

A client sends their logo as a 2000 × 2000 PNG saved at 300 dpi and asks for it on a six-metre hoarding. The print…

Answer C: The file stores a fixed grid of four million pixels; enlarged to six metres each pixel becomes a visible block, and no resampling can add detail that was never recorded. A vector file would be redrawn at the machine's own resolution.

Why: A raster file records pixels at one fixed size; a vector file records geometry with no size at all, which is why only the second can be redrawn for a hoarding.

A The PNG is in RGB and…: Treats a routine colour conversion as the obstacle instead of the missing geometry.

B 300 dpi is below the resolution…: Reads dpi as a quality dial that must rise with size, when the requirement actually falls as viewing distance grows.

D PNG compression discarded fine detail, so…: Blames lossy compression for a resolution limit, when PNG is lossless and the pixel count is identical either way.

Lesson 2, p. 20

Two SVG files of the same simple logo look identical on screen. One is 240 bytes; the other is 1.9 MB. Opening the large one…

Answer C: It was auto-traced, so it carries hundreds of redundant anchors that will wobble when enlarged or cut.

Why: An SVG is text you can read and edit, and the `d` attribute is a short list of pen instructions in document coordinates — which is why a 240-byte logo and a 1.9 MB logo can look identical on screen.

A It was saved at a higher…: Assumes a vector file has a resolution. Nothing in an SVG stores one; the size difference is entirely node count and number precision.

B It is uncompressed, so gzipping it…: Confuses transport size with geometry. Compression shrinks the bytes but leaves 412 paths for the renderer and the cutter to process.

D It contains CMYK colour values, which…: SVG has no CMYK. Colour notation is a handful of bytes either way and never accounts for a megabyte.

Lesson 3, p. 24

A 100 mm square drawn in Inkscape 0.91 is opened in Inkscape 1.x and now measures 93.75 mm. The file is not damaged and both…

Answer B: The file stored 354.33 bare units, which 0.91 wrote at 90 per inch and 1.x reads at 96 per inch.

Why: A vector file stores unitless numbers plus a rule for how many of them make an inch — and because PostScript says 72 and the web says 96, a file that does not state its units can open at the wrong size in perfectly working software.

A The older version saved in points…: Mixes up the two conversions. Points and millimetres would give a far larger discrepancy than 6.25%, and the file's units were never points.

C Inkscape 1.x defaults to a 93.75%…: Invents a default. Document scale is 1 unless someone changes it; the discrepancy comes from the units-per-inch constant, not a scale factor.

D SVG cannot store millimetres, so any…: SVG stores real unit suffixes perfectly well. The problem is files that omit them, leaving the renderer to apply its own constant.

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