The Seven Engines

The matrix is not seventy-two facts to memorize. It is seven engines, and every cell in a column is just that engine leaving a fingerprint. Learn the engine and the column writes itself.

Three questions decide almost every cell

Nine rows look like nine independent facts. They aren't. The rows are really three physiological systems, and each drug category does something specific to each system. Answer these three questions about a category and you can rebuild its entire column from scratch.

1 Does it depress the brainstem?

HGN, VGN and lack of convergence are not "intoxication" tests — they are **brainstem tests**. Holding your eyes steady at the edge of gaze is done by a small circuit in the pons and cerebellum called the gaze-holding neural integrator. Sedate that circuit and the eye drifts back toward center, then jerks to catch up. That jerk is nystagmus. Only three categories sedate it: **Depressants, Inhalants, Dissociative Anesthetics — DID**. Nothing else produces HGN. Ever. So the very first thing HGN does for you is delete four columns.

2 Which way does the autonomic engine run?

Pulse, blood pressure, temperature and muscle tone are all downstream of one question: is the sympathetic nervous system flooded or shut off? **UP group** — Stimulants, Hallucinogens, Dissociative Anesthetics: heart up, pressure up, temperature up, muscles rigid. **DOWN group** — Depressants, Narcotics: heart down, pressure down, muscles flaccid. Cannabis is a heart-only "up," Inhalants are chaos. Once you know the group, four rows fall at once.

3 What is happening at the iris?

The pupil has two muscles pulling against each other: the **dilator** (sympathetic, opens it) and the **sphincter** (parasympathetic, closes it). Push the sympathetic side and the pupil dilates. Push the parasympathetic side hard enough and it goes pinpoint. Reaction to light is then simply *how much room is left* for the sphincter to move. That single idea explains both pupil rows in one stroke, including the one everybody gets wrong.

THE FOOTNOTE PREAMBLE — SAY IT OUT LOUD BEFORE EVERY COLUMN

These indicators are the ones **most consistent** with the category. There may be variations due to individual reaction, dose taken, and drug interactions. The matrix is a probability map, not a promise.

COLUMN 1 · DOWN GROUP

CNS Depressants

The dimmer switch.

HGN PRESENT | PUPILS NORMAL | VITALS DOWN | TEMP NORMAL

THE ENGINE

GABA is the brain's brake pedal. Alcohol, benzodiazepines, barbiturates and the Z-drugs all pull that pedal down — they make the GABA-A receptor more effective, so inhibition wins everywhere at once. This is not a targeted drug; it is a **global dimmer**. Every circuit that has to keep firing to hold something steady starts failing: the gaze integrator can't hold the eye out (HGN, and VGN once the dose is high enough), convergence can't be sustained (LOC), the cardiovascular control centers in the medulla ease off (pulse down, pressure down), and motor tone collapses (flaccid).

Now the two cells people miss. **Temperature stays normal** — the hypothalamic thermostat isn't a GABA-driven "effort" circuit, it's a set point, and depressants don't move it. And **pupils stay normal**, because a dimmer switch pushes neither the dilator nor the sphincter; nobody is pulling the iris in either direction, so it sits where it sits. But the light *reflex* is a multi-synapse loop through a sedated brainstem, so the pupil still closes — just **slowly**. Size normal, speed slow. That combination is the depressant's quiet signature.

THE SCENE

He walks and talks exactly like a drunk — swaying, slurring, drowsy, disoriented, thick-tongued — but you don't smell it and the PBT reads low. Internal clock on the Modified Romberg runs **slow**: he calls thirty seconds somewhere past forty. He's uncoordinated on Walk-and-Turn without being agitated about it. He's just... turned down.

ON THE STREET

- **Alcohol** — the reference depressant, and the reason HGN is taught the way it is.
- **Benzodiazepines** — Xanax 6–8 h, Klonopin 6–12 h, Valium, Ativan.
- **Z-drugs** — Ambien 4–5 h. Sleep-driving cases live here.

- **Muscle relaxants** — Soma (carisoprodol), the classic pupil exception.
- **GHB**, barbiturates, Quaaludes, some antidepressants.

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	`Present`	Gaze integrator is sedated; the eye can't hold the end position.
VGN	`Present (High Dose)`	Vertical gaze-holding is more robust than horizontal — it only fails once the dose is high for that person.
LOC	`Present`	Convergence is sustained effort. Sedation kills sustained effort.
Pupil Size	`Normal *`	Nothing is pulling the iris either way. *Soma, Quaaludes and some antidepressants usually **dilate**.
Reaction to Light	`Slow`	The reflex arc still works — it's just running through a sedated brainstem.
Pulse Rate	`Down *`	Medullary cardiovascular drive is suppressed. *Alcohol, Quaaludes and some antidepressants may **elevate** pulse.
Blood Pressure	`Down`	Same suppression, plus vasodilation. Everything relaxes.
Body Temperature	`Normal`	**The set point doesn't move.** This is the cell that separates depressants from narcotics.
Muscle Tone	`Flaccid`	Motor drive is dialed down. Loose, rag-doll, no tremor.

> **Hook** — Everything goes *down* except the two things nobody is touching: the thermostat and the iris.
>
> **Hook** — "Drunk without the smell." If it looks like alcohol and the PBT says otherwise, you are in column 1 until proven otherwise.

FIELD RULE

Strong HGN with a PBT of 0.04 is *not* a bad test. The gap between the eyes and the breath is itself the evidence — it points at a second substance, usually another CNS depressant. Trust the training and ask about medications.

COLUMN 2 · UP GROUP

CNS Stimulants

The gas pedal, stuck down.

NO HGN | PUPILS DILATED | LIGHT REACTION SLOW | VITALS UP

THE ENGINE

Cocaine and the amphetamines do one thing: they flood the synapse with **dopamine and norepinephrine** and then block the pumps that would clear it. Norepinephrine is the body's own sympathetic transmitter, so this is a chemical sympathetic storm — the fight-or-flight system held wide open for hours. Heart rate up, blood pressure up, core temperature up (both from central drive and from all that muscle activity), muscle tone **rigid**, with the tremors and jaw-clenching that come with it.

Critically, this is *excitation*, not sedation. The brainstem gaze integrator is not depressed — it may even be sharper. So **no HGN, no VGN, no lack of convergence**. Three clean eye tests with a wide-open pupil is the stimulant eye signature.

Now the cell that trips people: **reaction to light is Slow, not Normal.** Norepinephrine is clamped onto the alpha-1 receptors of the iris dilator, which is actively pulling the pupil open. When you hit it with the penlight, the sphincter has to constrict *against* a muscle that is still being told to pull the other way. It gets there, but visibly sluggishly. Dilated *and* slow — that pairing belongs to stimulants.

THE SCENE

He hasn't stopped talking since you walked up. Eyelid and body tremors, grinding teeth, dry mouth, white pasty residue at the corners, restless — he cannot stand still on the One Leg Stand because standing still is not available to him. Internal clock runs **fast**: he calls thirty seconds at eighteen. Track the **crash phase** though — meth coming down looks exhausted, slow, and depressant-like, and that is where opinions get missed.

ON THE STREET

- **Cocaine / crack** — `up to 2 h`. Short, hot, and gone.

- **Methamphetamine** — `up to 12 h`, then a crash that mimics a CNS depressant.
- **Prescription amphetamines** — Adderall, Ritalin, Vyvanse.
- Ephedrine/pseudoephedrine, khat, some "bath salt" cathinones.

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	`None`	Excitation, not sedation. The gaze integrator is untouched.
VGN	`None`	Same reason. No brainstem depression, no nystagmus.
LOC	`None`	Convergence is fine — arguably easier when you're wired.
Pupil Size	`Dilated`	Norepinephrine on alpha-1 receptors of the iris dilator. Textbook sympathetic pupil.
Reaction to Light	`Slow`	**The sphincter is fighting an actively pulling dilator.** It closes, but you can watch it struggle.
Pulse Rate	`Up`	Direct sympathetic drive to the heart.
Blood Pressure	`Up`	Vasoconstriction plus increased cardiac output.
Body Temperature	`Up`	Central drive plus constant muscle activity plus reduced heat loss.
Muscle Tone	`Rigid`	Sustained motor drive. Tense, twitchy, tremoring.

> **Hook** — Everything up, eyes clean, pupils wide. The only "slow" thing in the whole column is the pupil's reaction — and that is because it's slow *from* being wide.
>
> **Hook** — Stimulant HGN does not exist, and a stimulant cannot cancel someone else's HGN. **HGN has no antagonistic effect.** Nothing reverses it once it's present.

COLUMN 3 · UP GROUP

Hallucinogens

Crossed wires above the brainstem.

NO HGN | PUPILS DILATED | LIGHT REACTION NORMAL | VITALS UP

THE ENGINE

LSD, psilocybin and mescaline are **serotonin 5-HT2A agonists**, and the receptors they hit are concentrated in the cortex — the layers that assemble raw sensation into a coherent picture of the world. The drug doesn't sedate anything and it doesn't add energy the way a stimulant does; it **miswires perception**. Sounds acquire color, walls breathe, time and distance stop meaning anything. Serotonin also drives sympathetic output, so the vitals come up: pulse up, pressure up, temperature up, tone rigid, pupils dilated.

That is the problem — **the vitals column is identical to stimulants.** Same four vitals, same pupil size, same three clean eye tests. So the matrix gives you exactly one quiet tiebreaker cell: **reaction to light is Normal.** Hallucinogen dilation is driven centrally, not by clamping norepinephrine onto the iris dilator, so the sphincter has nothing to fight and the pupil snaps closed the way it should. Dilated + normal reaction = hallucinogen. Dilated + slow reaction = stimulant.

Everything else that separates them is behavioral, and you have to go get it.

THE SCENE

He's dazed, sweating, and not entirely with you. He answers a question you didn't ask. He reports seeing or hearing things that aren't there, or describes senses bleeding into each other. Mood swings from euphoric to paranoid inside a minute. Time and distance estimates are wildly off — and unlike cannabis, he may not be able to tell you where he is at all. Piloerection, disorientation, nausea, poor perception of pain.

ON THE STREET

- **LSD** — 6–8 h. The long one; watch for a subject still up hours after the stop.
- **Psilocybin** — up to 5 h.

- **MDMA / ecstasy** — 1–3 h. Amphetamine backbone, hallucinogenic head; hyperthermia is the danger.
- **Mescaline / peyote**, DMT, 2C-series and other psychedelic amphetamines.

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	None	Cortical drug. The brainstem gaze circuit is never touched.
VGN	None	Same.
LOC	None	Convergence is a brainstem/midbrain reflex and it holds.
Pupil Size	Dilated	Serotonergic sympathetic outflow opens the pupil.
Reaction to Light	Normal *	**Nothing is clamped on the dilator**, so the sphincter has free rein. *Certain psychedelic amphetamines may cause **slowing**.
Pulse Rate	Up	Serotonergic sympathetic drive.
Blood Pressure	Up	Same drive, plus vasoconstriction.
Body Temperature	Up	Serotonin moves the hypothalamic set point up. MDMA hyperthermia is the extreme case.
Muscle Tone	Rigid	Elevated motor tone; trembling and jaw tension are common.

> **Hook** — A stimulant column with a normal light reaction and a person who isn't in the same room as you.
>
> **Hook** — The matrix will not separate hallucinogens from stimulants for you. **Your interview will.** The hallucination is the differentiator.

COLUMN 4 · UP GROUP · OFFICER SAFETY

Dissociative Anesthetics

The severed line.

HGN PRESENT | PUPILS NORMAL | LIGHT REACTION NORMAL | VITALS UP

THE ENGINE

PCP, ketamine and DXM are **NMDA receptor antagonists**. NMDA is the receptor that lets the cortex assemble sensory input into "this is happening to me, right now." Block it and you cut the line: the body is awake, moving, and fully capable of hurting you, but the person is not inside it. That is what "dissociative" means, and it is why this is the officer-safety category — **pain does not register**, so pain compliance does not work.

Here is what makes this column unique in the entire matrix. NMDA blockade suppresses the brainstem gaze integrator exactly the way a depressant does — so you get **HGN, VGN and LOC, all present**. But PCP *also* blocks dopamine and norepinephrine reuptake, which drives the sympathetic system up like a stimulant. **This is the only column where "eye tests positive" and "all vitals up" occupy the same box.** Nothing else in the matrix does that. When you see it, you're done.

And the pupils stay **normal**, with a **normal** light reaction — the dissociation happens above the iris, and neither muscle is being pushed. Positive eye tests with an ordinary-looking pupil that reacts crisply is a genuinely strange combination, and it's the one that seals this column.

THE SCENE

The blank stare — a thousand-yard, unblinking, non-responsive gaze — is the single most reported PCP indicator. Behavior is **cyclic**: calm, then violent, then calm again, with no warning and no trigger. Speech is slow, slurred, sometimes repetitive. There's a chemical or ether-like odor on him. He's sweating profusely. He doesn't react to injury. He may be confused about where he is or fully catatonic. Keep your distance, and get more units.

ON THE STREET

- **PCP** — 4–6 h. Sherm, wet, angel dust; often a cigarette dipped in liquid PCP.

- **Ketamine** — up to 2 h (intranasal ~30–45 min). Note the tell: **immediate, pronounced HGN onset**.
- **DXM** — 3–6 h. Over-the-counter cough syrup, "robotripping."

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	Present	NMDA blockade suppresses the gaze integrator, same endpoint as sedation.
VGN	Present	Note: **flat "Present"**, no high-dose qualifier — unlike depressants and inhalants. Dissociatives produce VGN readily.
LOC	Present	Sustained convergence fails along with everything else the brainstem coordinates.
Pupil Size	Normal	Neither iris muscle is being pushed. The dissociation is happening upstream.
Reaction to Light	Normal	The pupillary reflex arc is intact and unopposed — it snaps. This cell separates it from depressants and inhalants.
Pulse Rate	Up	The second mechanism: dopamine/norepinephrine reuptake blockade.
Blood Pressure	Up	Same sympathetic drive. PCP hypertension can be severe.
Body Temperature	Up	Sympathetic drive plus agitation plus no sense of overheating.
Muscle Tone	Rigid	Markedly rigid — part of why restraint is so difficult and so dangerous.

> **Hook — Depressant eyes bolted onto stimulant vitals.** Two engines in one drug — that collision exists in exactly one column.
>
> **Hook** — Positive eye tests but the pupil looks and behaves completely normal? Column 4.

OFFICER SAFETY

Elevated pain threshold, unpredictable cyclic violence, and rigid musculature in the same subject. Pain compliance is unreliable. Plan the contact before you make it.

COLUMN 5 · DOWN GROUP

Narcotic Analgesics

The pinhole.

NO HGN | PUPILS CONSTRICTED | LIGHT: LITTLE OR NONE | ONLY DOWN TEMP

THE ENGINE

Opioids bind **mu receptors**. Mu activation is inhibitory, but the beautiful part is *what* it inhibits at the eye: it shuts off the cells that normally restrain the Edinger-Westphal nucleus. Remove the restraint and that nucleus fires flat out, sending maximum parasympathetic drive to the iris sphincter. The sphincter clamps down as hard as it can go — **pinpoint pupils**.

And that single fact gives you the next row for free. Reaction to light is "how much room is left for the sphincter to move." At pinpoint, **there is no room left.** Shine the penlight and nothing visible happens — **little or none visible**. Two cells, one mechanism. That pairing belongs to nobody else in the matrix.

Elsewhere, opioids depress the medulla: respiratory rate down, pulse down, pressure down, tone flaccid. And uniquely, they **reset the hypothalamic thermoregulatory set point downward** — this is the **only category in the entire matrix where body temperature goes DOWN**. Learn that cell as a standalone fact; it wins questions. Meanwhile the gaze integrator is largely spared, so no HGN, no VGN, no LOC.

THE SCENE

He is **on the nod** — droopy eyelids at half mast, head dipping and catching, drifting out mid-sentence and coming back. Speech is a low raspy whisper. He's **scratching**, constantly, at his face and arms (opioids trigger histamine release). Movement is slow and deliberate, dry mouth, fresh puncture marks. Bring the penlight up in the dark room and the pupil is already a dot and simply doesn't change.

ON THE STREET

- **Fentanyl** — 2–3 h. Now the default street opioid; counterfeit "M30" pressed pills.
- **Heroin** — 3–5 h.

- **Methadone** — 6–8 h. Long tail; treatment-program subjects.
- **Prescription opioids** — oxycodone, hydrocodone, morphine, codeine, Dilaudid, tramadol.

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	`None`	Mu receptors aren't the gaze integrator's problem. Opioids spare it.
VGN	`None`	Same.
LOC	`None`	Convergence holds — which is itself notable in someone this sedated.
Pupil Size	`Constricted`	Edinger-Westphal is disinhibited; the sphincter goes to maximum. The only constricted column.
Reaction to Light	`Little or None Visible`	**Already fully constricted — there is nowhere left to go.**
Pulse Rate	`Down`	Medullary depression, alongside the respiratory depression that kills people.
Blood Pressure	`Down`	Reduced sympathetic tone plus histamine-driven vasodilation.
Body Temperature	`Down`	**The set point itself is lowered.** The only DOWN temperature in the matrix.
Muscle Tone	`Flaccid`	Deeply relaxed. Slack jaw, loose limbs, slumped posture.

> **Hook** — *Pinpoint that won't budge, and the only temperature that drops.* Three cells nobody else in the matrix owns.
>
> **Hook** — Depressant and narcotic are both DOWN — but the depressant has HGN and normal pupils and normal temp, and the narcotic has none of those. Eyes and temperature split them instantly.

NARCAN

If naloxone reversed the subject, the impairment involved an **opioid** — naloxone reverses nothing else. But it wears off faster than the drug does, so re-sedation during your evaluation is a real possibility. Document the time of administration.

COLUMN 6 · MIXED

Inhalants

A solvent bath, not a key in a lock.

HGN PRESENT | PUPILS NORMAL | LIGHT REACTION SLOW | VITALS UNPREDICTABLE

THE ENGINE

Every other category on this page is a key fitting a lock — a molecule shaped to hit one receptor. Inhalants are not. They are **lipid-soluble chemicals that dissolve straight into neuronal membranes** and disrupt whatever happens to be in them. There is no target. That one fact explains the whole column, including why half of it refuses to commit to an answer.

Because the disruption is general and heaviest where the membranes are busiest, you get **brainstem depression exactly like a depressant**: HGN present, VGN at high dose, LOC present, reaction to light slow, pupils normal (possibly dilated). If you covered the vitals rows, columns 1 and 6 would be nearly indistinguishable.

The vitals are where it falls apart — and it falls apart because "inhalants" isn't one drug class, it's three. **Volatile solvents and aerosols** (toluene, gasoline, Dust-Off) irritate and stimulate: blood pressure *up*. **Anesthetic gases** (nitrous oxide, ether, halothane) do what anesthetics do: blood pressure *down*. So the matrix simply prints both. Pulse is Up. Temperature is **Up, Down, or Normal**. Muscle tone is **Normal or Flaccid**. **Don't read those as sloppy answers — read them as the correct answer to a question with three different chemistries in it.** On the drill, "the messy one" *is* the inhalant column.

THE SCENE

You smell it before anything else — a solvent, paint, or fuel odor that doesn't belong on a person. There's **residue on his face, around his mouth and nose, or on his hands**. Face is flushed, eyes watering, nose running, possible chemical burns or a rash around the mouth ("huffer's rash"). He's disoriented, confused, and he may already be improving while you're standing there — onset is **rapid** and so is recovery. Look for the delivery: a rag, a plastic bag, a duster can, whippet cartridges on the floorboard.

ON THE STREET

- **Volatile solvents** — toluene, gasoline, paint thinner, glue, correction fluid. `Hours.`
- **Aerosols** — spray paint, hair spray, **DFE / Dust-Off** computer duster.
- **Gases** — **nitrous oxide** (whippets), ether, chloroform, propane, butane.
- **Nitrites** — amyl/butyl "poppers."

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	`Present`	General membrane disruption in the brainstem — same endpoint as a depressant.
VGN	`Present (High Dose)`	Same dose-dependence as depressants. Vertical fails later than horizontal.
LOC	`Present`	Sustained convergence fails.
Pupil Size	`Normal *`	No directed push on either iris muscle. ***Possibly **dilated**.
Reaction to Light	`Slow`	Depressed reflex arc, exactly like column 1.
Pulse Rate	`Up`	Irritation, hypoxia and cardiac sensitization push the rate up across all three sub-types.
Blood Pressure	`Up/Down`	**Up** with volatile solvents and aerosols; **down** with anesthetic gases.
Body Temperature	`Up/Down/Normal`	All three chemistries pull differently. The matrix declines to guess — and so should you.
Muscle Tone	`Normal or Flaccid`	Depression of motor tone, but inconsistently and dose-dependently.

> **Hook — Depressant eyes, chaos vitals, chemical smell.** Nine words, whole column.
>
> **Hook —** Any cell with a slash in it belongs to inhalants. They own every ambiguous answer on the grid.

EVIDENCE WINDOW — THIS IS THE URGENT ONE

- **DFE (Dust-Off) can be gone from blood in roughly 25 minutes.** Nitrous is similar.
- Volatile solvents last hours; gases and aerosols last *minutes*.
- Draw blood **immediately** — do not let it wait behind the rest of the evaluation. Mark the tubes, and route nitrous samples to the Mesa lab.
- The physical evidence at the scene (can, rag, bag, residue) may end up being stronger than your toxicology.

COLUMN 7 · MIXED

Cannabis

The convergence miss.

NO HGN | LOC PRESENT | PUPILS DILATED | TEMP & TONE NORMAL

THE ENGINE

THC is a **CB1 receptor agonist**, and where CB1 sits is the whole story. It is dense in the cortex, hippocampus, cerebellum and basal ganglia — memory, attention, time perception, coordination. It is **sparse in the brainstem**. That is the reason cannabis is famously hard to overdose on (no respiratory center to shut down) and it is the reason **cannabis produces no HGN**, even in a subject who is visibly, badly impaired.

But convergence is different from nystagmus. Crossing your eyes to track a finger to your nose is not a pure brainstem reflex — it needs cortical attention and sustained voluntary effort, and that is precisely what CB1 disrupts. So you get the pairing that belongs to nobody else on the grid: **lack of convergence present, HGN absent.** If you learn one thing about column 7, learn that. It is the cleanest single-cell identification in the entire matrix.

CB1 also sits on the presynaptic terminals of the autonomic nerves feeding the heart, so pulse and blood pressure come **up** — often dramatically, in the first hour. But there's no thermoregulatory push and no motor drive, so **temperature is Normal and muscle tone is Normal**. Cannabis is the "up in the chest, normal everywhere else" column. Pupils are Dilated (possibly Normal), and the light reaction stays **Normal**.

THE SCENE

Bloodshot, glassy eyes with dilated pupils and often a **greenish coating on the tongue**. Eyelid and body tremors. Odor of burnt or raw marijuana. Relaxed inhibitions, disoriented, possible paranoia, impaired short-term memory — he loses the instructions halfway through the test. **Time and distance distortion** is the driving tell: either extreme speeding because the road feels slower than it is, or crawling twenty under because it feels faster. On Walk-and-Turn, watch the **turn** specifically — that's where the divided attention breaks down. And in the dark room, look for **rebound dilation**.

ON THE STREET

- **Smoked / vaped** — 3–4 h. Peak impairment is early and steep.
- **Edibles** — up to 8 h. Slow onset, long tail, frequent overconsumption.
- **Concentrates** — wax, shatter, dabs, distillate carts. Far higher THC than plant material.
- **Synthetic cannabinoids** — K2/spice; unpredictable and often far more severe.

HOW THE ENGINE WRITES THE ROW

ROW	ANSWER	BECAUSE
HGN	None	**CB1 is sparse in the brainstem.** The gaze integrator never gets the message.
VGN	None	Same reason.
LOC	Present	**Convergence needs cortical attention and effort — the exact thing THC breaks.**
Pupil Size	Dilated *	CB1-mediated autonomic shift opens the pupil. *Possibly **normal**.
Reaction to Light	Normal	The reflex arc is intact and nothing is fighting the sphincter.
Pulse Rate	Up	CB1 on cardiac autonomic terminals. Often the most dramatic finding.
Blood Pressure	Up	Follows the heart rate.
Body Temperature	Normal	**No push on the thermostat.** This is what separates cannabis from stimulants.
Muscle Tone	Normal	No motor drive and no motor suppression. The only flatly "Normal" tone in the matrix.

> **Hook — LOC present, HGN absent = cannabis.** No other column has that pairing. One cell, one answer.
>
> **Hook** — "Up in the chest, normal everywhere else." Pulse and pressure up; temperature and tone normal.

DRAW BLOOD FAST — AND KNOW WHY

THC is **lipophilic**: it leaves the bloodstream for fat tissue very quickly. Delay the draw and you capture only the non-impairing metabolites, which prove past use and nothing about impairment now. Also note that measured impairment can outlast the subjective high — a driving-simulator study found effects at 24 hours — so a subject who says "that was yesterday" has not explained anything away.

The whole grid at once

Color encodes the engine, not the drug: **blue = the down group**, **rust = the up group**, **violet = mixed**. Read down a column to rehearse one engine; read across a row to see which categories that row actually separates.

INDICATOR	DEPRESS.	STIM.	HALLUC.	DISSOC.	NARCOTIC	INHALANT	CANNABIS
HGN	Present	None	None	Present	None	Present	None
VGN	Present (High Dose)	None	None	Present	None	Present (High Dose)	None
LOC	Present	None	None	Present	None	Present	Present
Pupil Size	Normal	Dilated	Dilated	Normal	Constricted	Normal	Dilated
Reaction to Light	Slow	Slow	Normal	Normal	Little or None Visible	Slow	Normal
Pulse Rate	Down	Up	Up	Up	Down	Up	Up
Blood Pressure	Down	Up	Up	Up	Down	Up/Down	Up
Body Temperature	Normal	Up	Up	Up	Down	Up/Down/Normal	Normal
Muscle Tone	Flaccid	Rigid	Rigid	Rigid	Flaccid	Normal or Flaccid	Normal

DOWN GROUP UP GROUP MIXED NEUTRAL / NO EFFECT

MATRIX FOOTNOTES — THE SIX EXCEPTIONS

- **1 · Depressant pupils** — Soma, Quaaludes and some antidepressants usually **dilate**. Otherwise Normal.
- **2 · Depressant pulse** — ETOH, Quaaludes and some antidepressants may **elevate** pulse. Otherwise Down.
- **3 · Hallucinogen light reaction** — certain psychedelic amphetamines may cause **slowing**. Otherwise Normal.
- **4 · Inhalant pupils** — possibly **dilated**. Otherwise Normal.
- **5 · Inhalant blood pressure** — **down** with anesthetic gases, **up** with volatile solvents and aerosols.
- **6 · Cannabis pupils** — possibly **normal**. Otherwise Dilated.

REFERENCE RANGES YOU ARE MEASURING AGAINST

- **Pulse** — 60–90 bpm. Taken **three times**, at steps 3, 6 and 9.
- **Blood pressure** — systolic 120–140, diastolic 70–90 mmHg.

- **Temperature** — 98.6 °F ± 1°.
- **Pupils** — room light 2.5–5.0 mm · near total darkness 5.0–8.5 mm · direct light 2.0–4.5 mm.
- **Internal clock** (Modified Romberg) — 30 ± 5 seconds, capped at 90. Fast = stimulants. Slow = depressants, cannabis, narcotics.

The five pairs that actually get confused

Nobody mixes up narcotics and stimulants. These five are where the real errors live — each pair shares most of a column, so learn the specific cells that split them and stop worrying about the rest.

Stimulants vs. Hallucinogens

Identical on eight of nine rows: no HGN, no VGN, no LOC, dilated, pulse up, BP up, temp up, rigid.

THE CELL **Reaction to Light.** Stimulant = Slow. Hallucinogen = Normal.

THE SCENE Stimulant is *wired* — talkative, restless, grinding, fast clock. Hallucinogen is *elsewhere* — dazed, sweating, perceiving things that aren't there.

DON'T Don't try to split these on vitals. You can't. Go to the interview.

Depressants vs. Inhalants

Identical on all five eye and pupil rows: HGN present, VGN high dose, LOC present, pupils normal, light slow.

THE CELLS **Pulse** (Down vs. Up), **BP** (Down vs. Up/Down), **Temp** (Normal vs. Up/Down/Normal), **Tone** (Flaccid vs. Normal or Flaccid).

THE SCENE Chemical odor and residue on the face or hands. Rapid onset *and* rapid recovery — a depressant subject does not visibly improve while you're writing.

FAST TEST Depressant-looking eyes with an **elevated** pulse should send you looking for a can or a rag.

Depressants vs. Narcotic Analgesics

Both are the DOWN group: pulse down, BP down, muscle tone flaccid, subject sedated and slow.

THE CELLS **HGN** (Present vs. None), **Pupil** (Normal vs. Constricted), **Light** (Slow vs. Little or None), **Temp** (Normal vs. Down).

THE SCENE Depressant walks and talks drunk. Narcotic is on the nod, whispering, scratching.

FAST TEST One look in the dark room ends it. Pinpoint and non-reactive is never a depressant.

Dissociative Anesthetics vs. Stimulants

Both are the UP group: pulse up, BP up, temp up, muscle tone rigid.

THE CELLS **All three eye tests** (Present vs. None) and **Pupil** (Normal vs. Dilated).

THE SCENE Blank stare, cyclic behavior, chemical odor, no pain response — versus talkative, tremoring, restless.

FAST TEST HGN with up-vitals is dissociative. Full stop. Nothing else on the grid does both.

Cannabis vs. Stimulants

Both dilated, both pulse up, both BP up, both no HGN or VGN.

THE CELLS **LOC** (Present vs. None), **Light** (Normal vs. Slow), **Temp** (Normal vs. Up), **Tone** (Normal vs. Rigid).

THE SCENE Bloodshot eyes, green tongue coating, marijuana odor, memory loss mid-instruction — versus dry mouth, bruxism, and a mouth that won't stop.

FAST TEST Convergence. Cannabis fails it; a stimulant does not.

Filling the grid, in the order that costs the least

When you're drilling the blank matrix, don't work left to right. Work in the order that eliminates the most columns per decision — the same order the eye examination gives you the information in real life.

1 Fill the three eye rows first. They are one decision, not three.

DID — Depressants, Inhalants, Dissociatives — get *Present* on HGN and LOC. VGN is *Present (High Dose)* for Depressants and Inhalants but flat *Present* for Dissociatives. Then add the one exception: **Cannabis gets LOC only** (**DIDC** for the LOC row). Everything else is None across all three. That's 21 cells from two mnemonics.

2 Pupil size: CASH makes big eyes.

Cannabis, **A**mphetamines (stimulants), **H**allucinogens = Dilated. **Narcotics alone** = Constricted. The remaining three — Depressants, Dissociatives, Inhalants — = Normal. Nine cells, one mnemonic.

3 Reaction to light: Narcotics first, then "slow means fighting or sedated."

Narcotics = Little or None Visible — no room left to move. **Slow** goes to the three with a compromised or opposed reflex: Depressants, Inhalants (sedated arc) and Stimulants (sphincter fighting the dilator). **Normal** goes to the three where the arc is clean and unopposed: Hallucinogens, Dissociatives, Cannabis.

4 Pulse and blood pressure: two groups plus two specials.

Down = Depressants, Narcotics. **Up** = Stimulants, Hallucinogens, Dissociatives, Cannabis. Inhalants: pulse **Up**, BP **Up/Down**. Those two rows are nearly the same row — write BP by copying pulse and then changing only the inhalant cell.

5 Temperature: the row with the most exceptions. Slow down here.

Up = the three true UP categories: Stimulants, Hallucinogens, Dissociatives. **Down** = Narcotics *only*, the single down-temperature in the matrix. **Normal** = Depressants *and* Cannabis — the two categories with no thermostat push. **Up/Down/Normal** = Inhalants. This is where most grid errors happen: cannabis is Up on pulse and BP but *Normal* on temperature, and the depressant is Down on everything else but *Normal* here.

6 Muscle tone: it tracks the vitals, with two odd ones out.

Flaccid = the DOWN group, Depressants and Narcotics. **Rigid** = the UP group, Stimulants, Hallucinogens and Dissociatives. Then the two that don't follow: **Cannabis = Normal** (up vitals, no motor drive) and **Inhalants = Normal or Flaccid**.

THE RULES THAT BEAT THE MATRIX

- **HGN has no antagonistic effect.** A stimulant cannot cancel a depressant's HGN. Nothing reverses it once present.
- **VGN never appears alone.** No VGN without at least four HGN clues — VGN with clean HGN means procedural error or a medical condition, not a rare drug.
- **Strong HGN, low PBT** = evidence of a second substance, usually another CNS depressant. Ask about medications.
- **Ketamine** is the immediate, pronounced HGN onset.
- **Poly-drug is additive, not cancelling.** 1 + 1 = 2 or more. Speedball pupils are the classic antagonistic pair; cannabis plus fentanyl on HGN is simply null.
- **The absence of HGN is evidence.** It eliminates three entire columns before you take a single vital sign.

Answers on this page follow the 2023 Drug Symptomatology Matrix as verified against the So Smart DRE curriculum data, including all six footnote exceptions. The matrix records the indicators *most consistent* with each category — individual reaction, dose and drug interactions all produce variation, and no single cell is an opinion by itself.

Study aid only. It does not replace the DECP curriculum, your instructor, or the evaluation itself.