SAMPLE

Building Tomorrow's Licensed Electrical Workers

The Installation's Keeper in the Machine Era

Aiman JoeHanz

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Introduction

Two folklores stand guard over the public's picture of the licensed electrical worker, and both will fail the reader that adopts them. The first is the memorizer's legend: the exam-passing machine, the candidate who "knows the patterns," works the question banks like a slot machine, treats the licence as a test to be beaten rather than a competence to be proven, and walks out of the assessment centre with a licence number and a head empty of everything it was supposed to certify. The second is the entitlement legend, older and more seductive: the veteran who has wired a thousand homes with his own hands, who feels the trade in his fingers, and who regards the assessment as an insult — a bureaucratic hoop between twenty years of honest work and the paper that would make it legal. The memorizer is dangerous because the licence he holds says things his head does not contain; the veteran is dangerous because the experience he holds contains things his signature cannot yet legally say. Both legends miss the same working reality, because both grade the licence as a barrier — an obstacle between the worker and the work — when the licence is in fact the opposite: a promise, made by the state on the public's behalf, that the name on the card can be trusted alone with the thing that kills silently, in the dark, behind every wall in the country. This book treats the Licensed Electrical Worker as what the regulations actually describe: the installation's keeper — the professional whose product is a safe installation, proven on demand, and whose competence is not an opinion but a certified, checkable fact.

The book you are holding is a study companion, and its independence should be stated before anything else is. It is not an official publication of the Energy Market Authority or any other authority; it is not affiliated with, endorsed by, or produced in connection with the Authority, Enterprise Singapore, or any standards body; and it does not reproduce, quote, or closely paraphrase any copyrighted standard, regulation, assessment, or question. The official standards — the Singapore Standard wiring regulations, the code of practice for electrical installations, the handbook the Authority publishes for licensed workers — are sold separately by their publishers, and this book will tell the reader where to buy them and how to read them, but it will not shortcut them: every explanation in these pages is original, written for this volume at the level of general electrical engineering knowledge, and every fact about the licensing structure was verified against the Authority's own public pages during writing. The reader preparing for the assessments should use this book for what it is — a companion, a way of seeing the whole road — and the official documents for what they are: the ground truth. Where the two ever seem to

disagree, the official documents win, and the reader should write to the publisher so the next printing can be corrected.

What follows gives the licence the treatment this series gives every honest trade. Chapter one settles the definition — what the licence actually is, what it permits, and why a society that trusts nobody with its wiring on faith trusts a named, examined, registered keeper. Chapter two maps the licensing landscape: the three classes of licence — electrician, technician, engineer — and what each class permits, in plain language. Chapter three walks the path: the qualification routes, the experience requirements, the application, and the renewal rhythm. Chapter four takes the written assessment apart — its format, its topic areas, the way it is marked, and the preparation that actually transfers to the pass. Chapter five prepares the practical and the technical interview: the single-line diagram, the demonstration of hands that know what the head is saying, and the themes the assessors probe. Chapters six and seven are the book's technical heart: the core principles the licence-holder must own — alternating-current fundamentals, loads, power factor, protection philosophy — and the installation essentials explained from first principles: earthing, cable sizing, circuit arrangements, residual current protection, isolation, and the testing sequence. Chapter eight is about the standards themselves: what the wiring regulations and the testing code are, why they exist, where to buy them, and how a professional reads a standard efficiently without drowning in it. Chapter nine lays out the working study program — an eight-week cadence, the practice discipline, and the common failure points, each named honestly. Chapter ten is the practitioner's path: licence day and after — what the working licensed electrical worker actually holds, what the machine era is doing to the trade, and how a licence is kept for a career rather than framed on a wall.

The series' research conventions apply with one declared exception. As everywhere in this series, no statistics, survey findings, or dated figures appear in these pages, and no invented data dresses up the argument. Unlike the purely professional volumes, however, this companion names real institutions where the subject requires it — the Authority, the standards bodies, the training institutions — because a licensing guide that refused to name the licensor would be useless; what it refuses to do, absolutely, is quote, reproduce, or paraphrase the documents those institutions own. The worked examples throughout are composites written for this book: no person, installation, or assessment described in these pages exists, and every reader of the trade will recognize all of them anyway.

One reading note, and then the definition. The licensing structure described in this book was verified against the Authority's public pages at the time of writing, and licensing regimes change: classes are redefined, requirements move, assessment formats are revised. The reader should treat this book as the map and the Authority's own pages as the territory, checking the current requirements before applying, and treating every specific rule in these pages as a portrait of the structure rather than a substitute for checking it. The map is honest, the territory is official, and the professional this book describes — the keeper, not the memorizer, not the entitled veteran — is the one who reads both.

A word on how to use this book, because a study companion is a tool, and tools deserve instructions. The book runs in three movements: the landscape and the path (chapters one through three) — the what and the how of the licensing system; the gates (chapters four and five) — the written assessment, the practical, and the interview; and the keeper's substance (chapters six through ten) — the principles, the installation essentials, the standards, the study program, and the working path beyond the pass. Three ways of reading it follow from the movements. The candidate at the very beginning reads it in order, one chapter ahead of the calendar, letting each chapter's discipline install before the next one demands it. The candidate already on the path — the wireman logging his years, the degree-holder choosing a route — reads the landscape, the path, and the gates first, then enters the program of chapter nine and works backward through the principles as the program schedules them. The licensed holder reading out of curiosity, or the holder of another class preparing for the next one, should begin at the definition in chapter one and the keeper's path in chapter ten, because the book's deepest argument — that the licence is a keeping, not a credential — is where every reader's calendar actually starts. And one instruction covers all three readers: this book is read with the official documents open beside it — the Authority's current pages, the standards from their custodians — because the book's every chapter teaches the reasoning the documents carry the numbers for, and the reader who studies this book alone has studied half a book, by design.

The book's promises, stated once more at the threshold, so the chapters never have to pause for them: nothing in these pages reproduces any standard, regulation, assessment, or official question — the trade's documents are named, located, taught toward, and never copied; every figure the Authority or the standards bodies own — the fees, the thresholds, the periods, the limits — is deliberately absent and deliberately replaced with the one skill that

outranks every number: the habit of verifying the current figure at the source; every candidate, firm, installation, and failure in these chapters is a composite illustration written for this book, honestly labeled as such; and the book's independence is the reader's protection — it is not an official publication, not affiliated with the Authority or any standards body, and its descriptions of the licensing structure move with the Authority's amendments, which is why the reader verifies at the source before filing anything, trusting this book for the reasoning and the documents for the facts. What the book does promise, without hedging: original explanations, the working trade's own honesty about the folklores that waste candidates' years, a program that fits a working life, and a single idea — the keeper — carried from the first page to the signature it ends with. That is the whole offer; the path begins on the next page, and, as this series says at every door it has ever stood at, the stairs stand open.

Chapter 1: The Definition

The memorizer's legend deserves the first dismantling, because it is the newer of the two and the easier to mistake for a strategy. Watch how the memorizer actually prepares: the question bank purchased from an unlicensed seller, the "guaranteed pass" dumps circulating in group chats, the pattern-matching drilled until the shape of a question recalls the shape of its answer, and the assessment met the way a password form is met — recognized, not understood. The memorizer's method fails in three places at once, and all three are priced in the trade's own experience. It fails at the regulation questions, the section that demands reasoning about what a rule is for, because a memorized rule is a sentence with no spine, and the assessment's regulatory section — the part every candidate is warned carries the heaviest weight — asks why, and why cannot be memorized. It fails at the practical and the interview, where no question bank exists because no bank could exist: the assessor watches the hands, asks the follow-up question whose answer cannot be dumped because it was never asked before, and the memorizer's competence collapses the first time reality deviates from the pattern. And it fails after the licence, in the years the licence was supposed to certify — the holder who passed the test without owning the knowledge now carries a card that says otherwise, works on the public's wiring with a head that holds patterns instead of principles, and is one bad afternoon away from discovering that the assessment was never the barrier but the armor, and that skipping the armor does not lighten the battlefield. The memorizer's legend is not merely lazy; it is a bet against the one structure the licence exists to create — the correspondence between what the card says and what the head contains — and the trade's whole safety record, the reason the public lets a stranger touch its mains, is that correspondence being real more often than not.

The entitlement legend is older, worthier, and more dangerous for exactly those reasons. The veteran's argument deserves to be stated at full strength: twenty years of honest wiring, a thousand installations that never hurt anyone, fingers that know a sound installation from a sick one through a wall, and now a form says he must sit a multiple-choice test with candidates half his age to prove what his life already proves. The argument's failure is not that experience is worthless — experience is the substance of the competence — but that the licence is not about him. The licence is about the stranger: the homeowner who checks the register because she has no other way to check the man at her door; the contractor who must put a name on the submission and needs the name to mean something verifiable; the authority that fields the failures and needs to know, on paper, whose signature stands behind

what. Experience held privately is a fact about the veteran; experience held publicly — examined, registered, checkable — is a fact about the installation, and the licence exists to make the private fact public. The entitlement legend's cost is paid by its holder in a currency he does not feel until it is gone: the veteran who refuses the assessment does not stay a legend in his own right; he becomes, in the eyes of every register, every submission, every insurer, exactly what the unlicensed newcomer is — someone whose competence cannot be checked — and the trade he loves quietly loses his twenty years, because the system he refused to enter was the only place those years could be counted. The assessment, this chapter will argue to the end, is not the insult to the veteran's experience; the assessment is the only instrument the public has for taking his word for it.

Both legends, priced honestly, leave the definition's ground clear. The Licensed Electrical Worker is the installation's keeper: a professional licensed by the state to carry a defined scope of electrical work — to install, maintain, test, and where the class permits, design and certify — and whose licence is a promise the public relies on without ever meeting its holder: that the name on the card knows what the regulations require, can prove it on demand, and answers for the work signed under it. The definition has three parts worth slowing down for, because each part is a place the folklores break.

The first part is the scope, and the scope is the licence's whole architecture. The licence is not a general blessing upon all things electrical; it is a defined, bounded permission — this class, this voltage, this load, this kind of work — and the classes exist because electrical work is not one risk but a ladder of them: the domestic circuit that will hurt the careless, the commercial installation that will hurt the building, the high-voltage switchyard that will kill the experienced. The licensing structure walks the ladder in steps — the electrician's class for the lower rungs, the technician's class for the middle, the engineer's class for the top — and the scope of each class is written not as a compliment to its holder but as a boundary around the public's exposure. The keeper's first discipline is therefore scope honesty: working inside the line the licence draws, declining the work beyond it, and treating the boundary as the promise rather than the inconvenience. The unlicensed job taken "just this once" is not an offense against paperwork; it is the public being wired by someone who has promised the register nothing, and it is the single most reliable predictor, in every composite this book will work, of the accident that ends a career.

The second part is the proof, and the proof is what separates the licence from the résumé. The assessments exist — written, practical, interview — because every other form of claimed competence is unverifiable at the moment it matters: the reference who can be coached, the portfolio that cannot be dated, the confidence that cannot be opened. The written assessment proves the principles are present in the head; the practical proves the hands can execute what the head describes; the interview proves the judgment can travel — that the candidate can reason aloud about a case he has never seen, which is the licence's whole point, because the public's wiring is never the case study. The memorizer's legend collapses at the proof because it tries to counterfeit it; the entitlement legend collapses at the proof because it tries to waive it; and the keeper walks through the proof deliberately, as through a gate rather than a wall — the same gate every colleague walked, the one that makes the licence worth having precisely because it cannot be walked around.

The third part is the accountability, and the accountability is the licence's teeth. The licensed name stands on the work — on the test results, on the certificates, on the submissions — and the register means the standing is real: the installation that fails is traced to the signature that blessed it, the authority that suspends or revokes is suspending a name, not a mood, and the profession's collective credibility is the arithmetic of thousands of signatures that never had to be traced. Accountability is the part of the definition the folklores never mention, because the memorizer is looking for the exit and the veteran is looking for the respect, and neither wants to hear what the licence costs. But the cost is the definition's deepest honesty: the keeper is not merely trusted with the work — the keeper is answerable for it, in a way no unlicensed hand ever is, and the professionals who hold the licence longest are the ones who understood on day one that the accountability is not the fee for the licence but the substance of it: the trade's public promise, personally signed.

The definition can be tested before this book goes further, and the series' standing test applies here in the trade's own terms: the surprise test. List the surprises an installation has produced — the fault that appeared without warning, the test that failed without precedent, the inspection that found what the self-check missed — and grade each against the definition. The pattern is the same one this series has found in every kept discipline: the surprise is never the electricity's; electricity has no surprises, only consequences. The surprise is always an absence of the keeping — the principle not owned, the test sequence skipped, the boundary quietly crossed, the assumption that the pattern bank covered a case it had never seen. The keeper's work, in the

plainest sentence this chapter can end on, is to make the installation's future as boring as the public believes it already is — and the licence, honestly held, is the public's receipt that someone has taken that work on, by name, with proof, and with their signature on the consequences. The chapters that follow build that keeper piece by piece: the landscape, the path, the assessments, the principles, the practice, and the keeping — and the reader who wants the licence for what it is will find the memorizer's shortcut and the veteran's refusal equally useless, because both are ways of asking for the card without the keeping, and the keeping was always the only thing the card contained.

The definition earns one more test before the chapter lets it go, because definitions this important should be asked what they cost. Price the keeper honestly and the price has three line items, and naming them now — before the path chapters fill with fees and study hours — prevents the most common accounting error in the trade: the belief that the licence's price is the examination fee. The first line item is the preparation itself, and it is priced in the one currency the memorizer refuses to spend and the veteran believes he has already spent: attention — the hours in the standards, the evenings in the question practice that is honest because it drills the principle rather than the pattern, the practical rehearsals done slowly enough to be corrected. The second line item is the scope, and this one is priced across a whole career: the licence that authorizes the electrician's class also forbids the engineer's work, and the price of holding the card honestly is the stream of jobs declined, referred, or handed upward — a price that feels like loss at each moment and is, in aggregate, the reason the card stays worth holding. The third line item is the standing itself: the signature, the traceable name, the accountability that cannot be laid down at the end of a shift. An unlicensed hand is free in exactly the way the memorizer and the veteran both quietly envy — free of the register, free of the trace, free of the answerability — and the definition's deepest claim is that this freedom is not wealth but exposure, not the licence's absence but its opposite: the professional who pays all three line items is buying the only thing the public actually sells, which is the right to be believed.

The definition should also be tested against its nearest neighbors, because boundaries are clearest at the edges, and the trade has three neighbors who are routinely mistaken for the Licensed Electrical Worker — each by a different person, each with different consequences. The first neighbor is the handyman, and the confusion is the homeowner's: the friendly generalist who "does a bit of wiring" and is trusted because he is trusted, and whose work differs from

the keeper's not in effort or even, always, in craft, but in the one thing the homeowner cannot see — the test results that were never recorded, the calculations that were never made, the name that appears on no register when the circuit he left in the wall produces its consequence two owners later. The second neighbor is the wireman, and the confusion is the industry's: the skilled tradesman who pulls and terminates under supervision, whose competence is real and whose exposure is bounded precisely because his signature is never the one on the work — he is inside someone else's keeping, and the licence structure exists partly to make sure that someone else exists, is qualified to be someone else, and can be found. The third neighbor is the engineer without the licence, and the confusion is the graduate's: the degree-holder who knows the theory cold and assumes the card is a formality, and who discovers, usually at the first submission, that the trade's arrangement does not ask what he knows but what he has stood for — the authority's register does not read transcripts, it reads licences, and the engineer's class exists precisely to convert knowing into standing. Three neighbors, three confusions, one lesson: the definition's three parts — scope, proof, accountability — are not decorations on the keeper but the fence between the keeper and everyone the public would otherwise have to trust on faith.

The machine era has to be let into the definition now, honestly, because it is already standing in the trade's doorway and pretending otherwise would break this series' one habit. The arriving tools are real, and the keeper should meet them without either fear or flattery: the design software that drafts the schematic and flags the obvious violation; the load-calculation engine that does in seconds the arithmetic that once justified a professional day; the tablet that photographs the installation, files the test record, and prints the certificate; the troubleshooting database that turns a fault's symptoms into a ranked list of causes. Each tool, taken alone, does what the memorizer's question bank only promised — it substitutes memory, speed, and pattern — and a careless observer could conclude that the keeper is being hollowed out by convenience. The observer is wrong, and the reason is the definition itself: every one of those tools operates inside the scope of the licence, not on it; every one of them produces output that must be owned by a standing, accountable name before it touches the public's wiring; and every one of them moves the trade's center of gravity away from recall and toward exactly the two things no tool has — the scope honesty that decides what work is even being attempted, and the accountability that decides who answers when the

attempt goes wrong. The machine era will make the licensed worker more productive, not less necessary, in the same way the calculator made the accountant: by killing the memorized arithmetic and leaving the judgment, the standing, and the answerability — the entire keeper, minus the drudgery — standing in the room when the tool is put away.

One worked illustration, composite in the series' way, fixes the definition against a single afternoon. A licensed electrician — the lowest class, the domestic scope — is called to a flat for what the tenant describes as a socket that stopped working. He arrives to find three things, not one: the dead socket, a new air-conditioner circuit the previous owner's "friend" installed off the kitchen lighting point, and a water heater the tenant has just bought online with a plug that fits nothing in the flat. The unlicensed friend, the handyman, and the memorizer would each handle this afternoon differently, and each would mishandle it at the point the definition marks. The handyman would make the socket live again — probably — by swapping the accessory, and would leave the air-con circuit and the heater question untouched, because neither was the job he was asked to do and neither is in his imagination a job at all. The memorizer would recognize the socket fault's pattern from the bank, replace what the bank replaced, and feel the deep relief of the pattern matching — and would leave the same two things untouched, because no question ever asked him about a flat with three problems in it. The keeper does what neither can: he tests the dead socket, finds the faulted circuit, records the readings, and fixes it inside his scope; he recognizes the air-con circuit as unlicensed, undocumented, and off the wrong point, refuses to certify what he did not find sound, tells the tenant in plain words what the previous "friend" left in the wall, and refers the landlord to a licensed hand for the rework; and he reads the water heater's rating against the flat's wiring before advising the tenant whether the purchase can be installed at all. One afternoon, one definition: the scope told him what was his to touch, the proof told him what the readings meant, the accountability told him what to put his name on and what to leave unsigned — and the tenant, who will never know the standards the keeper carried into the flat, got the only thing the licence sells: an afternoon in which nothing was left in the wall that a stranger would later have to answer for.

The chapter's close belongs to the reader deciding whether to begin. The path that starts in the next chapter is long, and it is walked honestly under the definition or not at all: the classes climbed in order, the assessments met with owned principles, the scope held at every rung, the name kept worth its

register entry. The memorizer will call this slow; the veteran will call it beneath him; the definition calls it the job. And there is one sentence worth carrying from this chapter into the landscape that follows, because it is the sentence the whole trade stands on: the licence is not permission to do the work — the hands could always do the work — the licence is the public's decision to be allowed to trust it. Whoever wants that trust can start walking; whoever wants only the card will find, somewhere on the path ahead, that the card and the keeping cannot be separated, and that every shortcut between them is a toll road charging exactly what it appears to save.

The definition earns a historical paragraph, because the keeper who knows why the licence was invented holds its meaning differently from the keeper who treats it as scenery — and the invention's story is the trade's own, told here the way the trade tells it, in the series' honest way: no invented dates, no decorated numbers, only the shape of what happened. Electricity entered the world's buildings faster than the world understood it: a new energy, adopted with enthusiasm, installed by anyone who could connect it — and for a generation, the cities that wired themselves fastest also burned themselves often enough to teach the lesson no standard existed yet to write. The licensing structures this book describes were not invented by bureaucrats imagining risks; they were built in the aftermath of the risks, by societies that had watched the invisible energy kill and wanted, before the next adoption wave, a system that made the killer legible — a register of the responsible, an examination of the competent, a scope around the dangerous, and a standard in place of the improvisation. Every clause of today's landscape, read this way, is a scar with the pain removed — and the keeper who holds the history reads the licence not as a modern paperwork but as the trade's entire memory of itself, condensed into a card: the definition's three parts — scope, proof, accountability — are the three lessons the fires taught, still standing between the public and the same energy, kept current because the energy never changed its nature and never will.

The definition, held against history, also answers a question the newer candidates ask quietly and the older ones have answered in their bones: whether the licence is a local peculiarity or a profession's universal — and the answer is that the keeper's definition travels. Licensing structures differ in their details everywhere the trade is practiced — different authorities, different class boundaries, different routes — and the differences are real, exactly as this book's Singapore chapter two will show. But the structure underneath the details is one of the most convergent ideas in all of professional life:

everywhere that electricity is widespread, societies have arrived, independently, at the same three answers — a defined scope, an examined proof, an accountable name — because the problem is the same everywhere and the solution's logic is the problem's mirror. The candidate who holds this understands something practical, not just philosophical: the licence he is studying for is portable in the way that matters — not the card itself, which belongs to its authority, but the definition, which belongs to him — and the professional who moves between jurisdictions carries the keeping across the border and converts it to the local currency with preparation, not re-invention. The universal also disciplines the trade's complacency: the countries whose structures lag are not arguing about whether to license; they are arriving at the same destination the burned cities arrived at, on a schedule their own fires set.

One last boundary of the definition deserves daylight before the chapter closes, because it is the boundary the trade argues about most among itself: the line between the licensed worker and the licensed system — between the competence of the person and the safety of the arrangement the person works inside. The definition's three parts describe a professional; the landscape's chapters describe structures — classes, installations, registers, standards — and the trade's quiet question, asked over decades in every workroom, is which one actually keeps the public safe: the good professional or the good system. The answer the definition gives is the chapter's last teaching: the question is wrongly cut. The system without the professional is a rulebook no one has read at working speed — the standard on the shelf protects nobody, the register entry unbacked by owned principles is the memorizer's card made institutional, and the inspection that finds paperwork immaculate and wiring lethal is the landscape's nightmare, not its product. The professional without the system is the veteran's legend with its cost made visible: magnificent judgment, held privately, unverifiable by the public that depends on it, and lost entire at the professional's retirement because it was never written into the profession. What keeps the public safe is the correspondence — the system's structures occupied by professionals who own them, the definition made institutional: scopes held by honest holders, proofs carried by heads that actually contain them, accountabilities signed by names that know what they signed. The keeper, fully defined, is therefore neither the hero nor the clerk but the correspondence itself, lived by a person — and that is why this book trains the person and teaches the system in the same chapters, because the licence has never been a choice between them, and the trade's future, like its

past, is built by the professionals who refused to see them apart.

ABOUT THE AUTHOR

Aiman JoeHanz writes the Building of Tomorrow and Building Tomorrow's People series -- a volume-per-subject account of the systems and professions defining this decade, from the algorithms and their infrastructure to the consultants, chief executives, founders, executives, people leaders, team leaders, managers, negotiators, speakers, operators, sales leaders, AI engineers, coaches, content creators, creatives, fashion designers, filmmakers, graphic designers, interior designers, journalists, musicians, photographers, translators, legal professionals, librarians, nonprofit leaders, politicians, professors, writers, social workers, teachers, accountants, actuaries, crypto traders, financial advisors, forex traders, financial analysts, insurance professionals, investors, real estate investors, stock traders, doctors, and facilities managers -- and now the licensed electrical workers whose safe installations power every volume's practice. Each book takes the same structural approach: the anatomy, the failure modes, the instruments, and the operating discipline a practitioner can run. In this volume the author treats the Licensed Electrical Worker as the installation's keeper -- the licensing landscape, the path, the assessments, the principles and installation essentials explained originally, the standards and how to read them, the study program, and the practitioner's path -- with one hard rule held throughout: the official standards are named, taught toward, and never reproduced.

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The series takes one working role per book and gives it one unflattered definition: what the job is once the mythology is peeled off, what the arriving tools are doing to it, and the practice a working professional can start this quarter without asking anyone's leave. Fifty-two roles have now received the treatment -- from the consultants and chief executives of the earliest installments through leadership, management, the specialist functions, the communicators, the creatives, the helping professions, the finance trades, and the doctors and facilities managers of the newest volumes -- and this volume adds the seat every other volume plugs into: the licensed electrical worker, whose safe installation powers the doctor's ward, lights the professor's lecture, cools the facilities keeper's tower, and carries every working day this series has ever described. The installments share a deliberate shape: two folklores named at the start, a keeper known by the guarded thing -- and in this volume the installation itself -- and a closing argument that a craft that cannot be practiced on a weekly cadence is a sentiment, not a profession. Each book reads alone and in any order; the set reads best whole, because the keepers keep meeting one another in these pages -- and the machine era's flood, which this volume meets inside the trade's own instruments, breaks in every book of the series on the same unautomatable acre: a name that answers, with proof, for the work.