Noesis

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EDITORIAL
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Onward and upward!

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March 15, 1997

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Dear Rick:

I have a few brief comments regarding Noesis 125:and 126:

(1) In issue 125 there seems to be a contradiction in Kevin Langdon's contention that there should be a straight "best fit" line for scaling IQ's vs. raw scores on the Mega Test, and his contention that allowance may be made for a "ceiling bumping effect." On the first horn of this dilemma he remarks on page 13, paragraph 5: "[there is a] strictly linear relationship of IQ to scaled score which I insist upon as reflecting the conclusions that can be vlaidly drawn from the data." On the second horn of the dilemma he remarks in paragraph 3 on that same page: "we can reasonably allow one point for ceiling bumping and accept 46 [raw score]/175 [IQ] as our qualifying level [on the Mega Test]." My reply is that the curves both at the top and the bottom of my scaling for the the Mega Test (see the graph on page 7 of issue 125) are precisely there to allow for both the "ceiling-bumping" effect as well as a floor-bumping effect. Moreover, the curve at the bottom of my graph is based in part on calculated points, not purely on guesswork. The curve at the top of my graph could reasonably be regarded as the mirror image of the effect of floor-bumping at the bottom of the graph. Furthermore, I have repeatedly reminded Kevin over the years of the article titled "Equivalent Scores for the Graduate Record Verbal and Miller Analogies Tests," by Edward E. Cureton and Thomas B. Scott, that was published in Educational and Psychological Measurement (1967, vol. 27, pp. 611-615). Their method clearly permits curved and not just straight lines in scaling one test against another (as my test was scaled against the SAT). Of course one can rationally disagree about just how much to bend one's line in order to allow for ceiling- (or floor-) bumping effects. But clearly Kevin's insistence upon a "strictly linear relationship" is contradicted even by his own remark that allows an adjustment to be made for ceiling bumping. And my "mirror-image" argument provides at least a prima facie case in favor of the degree to which I bend the line at the upper end of the scale, since the bend at the lower end was calculated, not merely imposed by fiat.

(2) In issue 126 of Noesis I made an error in my letter on page 21 in paragraph 2 where I correlated Kevin's notions of consciousness as "passive," as "active," and as the "will" that mediates between the two, with the QD, DA, and A components of a purposive act, respectively. I should have said that they correlate with the QD, DA, and D phases, respectively, since drive (D) is the willing factor in an agent that mediates between incoming data (QD) and outgoing behavior (DA).

(3) I agree with Chris Cole's remark on page 23 of issue 126 to the effect that "when there is a dispute" (paragraph 2) a "simple majority vote is all that is required" (paragraph 3). There is thus no serious need for a complicated (or even a simple) set of by-laws, beyond the few words of Chris's I've just quoted.

Ron Hoeflin

People Need People

Ronald M. Yannone

This is probably going to be a very thought-provoking article. Imagine one morning you wake up, you turn the radio on to hear the news and all you get is static. You then try a second radio in the house and the same thing occurs. Your lights work, but nothing from the radios? You then try the TV sets and again they come on but no picture nor sound - only static. You phone some friends in the neighborhood to inquire if they are experiencing the same dilemma - but no one is answering their telephones!!!???

You look outside to see the birds on the bird feeder, and not one bird is in sight? You proceed with having breakfast and you finally get ready to go shopping. All the neighbor's cars are still in their driveways? Is today some kind of holiday? Where are the people? Why aren't there any cars traveling down the street? You begin to notice that there are no people around. In fact, you notice that there are no living creatures either??? No dogs, cats, birds, squirrels!

You walk over to a neighbor's house and knock on the door. There is no answer and the door is open? You poke your head inside and inquire inquisitively - yet no answer - not a sound!??? You walk inside and inquire as you search through each room. Not a peep. To your surmise, no one is in? Odd?

You finally decide to go to the store to do some shopping. As you drive, there are cars parked over on the sides of the road - with no one inside them? You arrive at the grocery store, and no one is in sight, but the lights are on inside? You proceed to walk in the store and the doors open? You walk down every aisle and still there is no one in sight. The pre-recorded tape music in the store is all that you hear? You finally walk in the back where the worker's offices are - and no one in sight!?

Now you are getting worried. You decide to try the pay phone outside the store and dial information. You answer the questions in hopes that maybe someone might come on the line. You get nothing? You try the operator - still nothing!

Now you are beginning to get nervous. No one is in sight, yet things seem to be all right. You wonder if there was an emergency air raid warning regarding a possible nuclear attack that you missed - so you proceed to the nearest air raid shelter. But when you arrive there, not a soul is in sight. In fact, there are only two cars in the parking lot?

You travel around town and do not see a living thing. The traffic lights work. It's a nice day and the summer temperature is getting up there, so you drive to the beach only 10 minutes away. Maybe everyone is at the beach today? When you get there, you see lots of parked cars, but no one is in sight. You look up into the sky for a possible airplane, yet silence? You look out into the ocean, but as far as the eye can see, all the boats are stationary?

You decide to return home. Maybe something has transpired since you left this morning, 4 hours ago? Besides, you are getting hungry. It's time for some lunch. You see nothing in sight as you return home. You pull up in your driveway and park your car. You get out, and as you turn around - you hear . . . nothing. The silence is beginning to get to you.

You go inside and prepare a nice lunch. The electrical power is still available! You decide to try other areas of town after lunch - to no avail! It's soon getting late in the evening and you decide to get ready for bed. You go in your room and look outside - and across the street, to your surprise, you see some lights on in the neighbor's house!!! You are excited. You get dressed, grab your flashlight, and hurry across the street and knock on their door. There is no answer, however. You decide to walk inside. You check the lighted rooms to find no one in sight. You feel the top of the TV set to see if it's been on but learn that it has not. After searching through the house and finding no one in sight, you begin to reason that these lights were turned on from the morning when the people got up - and then mysteriously disappeared.

You return to your house across the street to go to bed. But you are finding it very difficult to sleep. The silence is deafening! You stay up a little to read a book until you get really tired. You finally fall off to sleep. You sleep very soundly - for you were very exhausted and there was no external sounds to awaken you.

You wake up in the morning thinking that what you experienced was nothing but a dream. You replay through the same program: try the radios, TV, and telephones - but to your chagrin, the same as yesterday. You look out the window for any sign of "life," but there is none.

You proceed to scout the neighboring towns to see if the situation is possibly localized to your specific town - but sadly learn that you are truly, all alone! You decide to pack your suitcases and make a long inter-state trip to find life. As you travel hundreds of miles, you begin to get a little desperate. You have free access to gas stations, grocery stores, and hotels - leaving notes along the way. You seem to have "everything" you need? So what seems to be the problem?

You find yourself beginning to thirst for a single soul --- a single warm body who you can converse with and share your experiences with. You begin to thirst for a warm body more than you would water on a hot day in the middle of the desert!

You really would not care if the person were a criminal, a friend, a neighbor, or a stranger. You are at the point now where you *truly* would "value" another fellow human being. It seems odd - you have all your basic needs met, but with the void of other human life forms to share your life with, your "heaven" is quite the opposite.

If the Earth were to be made anew and you were to find yourself all by yourself, you would find that this kind of existence is not for you. You would feel you entered the twilight zone. God made man in His image and likeness. His whole intent was to have a relationship that would be fulfilling, mutually.

If "heaven" were to exist and you were to experience it, you would want others to enjoy it too. Sharing heaven with others, you would find, is extremely vital to your existence, more than you ever realized before. People need people would be the thought that ran through your mind many times throughout the day. You finally return home.

Now, imagine that one person finally intersects your path. How thrilled you would be! You'd want to share with the person all that transpired in the past several days and weeks. You'd want to know if the person experienced the same events. You'd "value" each other regardless of color, creed, sex or background. What would count is that you had a "warm body" to go through the same experiences with. People need people.

Now imagine that each time either of you thought or did something wrong that the other person would vanish out of thin air - finding yourself back to solitude. Imagine that after several days the person were to reappear. You try to explain to each other what you

believed happened. The incident repeats itself. After a while you learn that each time either of you thinks or does something in opposition to Biblical principles, that the same separation occurs? You realize that you must coexist in harmony.

What a fantastic situation! Harmony with each other or else separation and loneliness. Awesome. And as the two of you were to live harmoniously together, a third person "enters" the scene. The same thing happens. The third person is instructed about the "living in harmony" principle, or else total separation and loneliness for each of you --- in a place that would other- wise be a haven of rest. This process repeats until the local "neighborhood" is restored and the everyone lives in harmony with each other.

People need people - would be the running theme of the town. Total compliance to harmonious living or total separation. Caring for each other would be of paramount importance. No evil would be thought. No wrong actions would take place. Evil, itself, would be loathed by everyone, not the people committing the evil.

The Bible tells us that those who "qualify" for heaven will all, by definition, live in harmony with each other. This tells us that to the best of our ability, and by the grace of God, we would need to live as harmoniously as possible with every being here on earth now. True, there will be wrong thoughts and actions by people toward us. But the attitude we would need to develop is one of hatred for what sin, in and of itself, has produced, rather than the person (instrument) it manifested itself through.

This is the mind-set we must cultivate -- the mind of Christ: "hate the sin, but love the sinner." I pray that we all can develop this mind-set.

Glenn A. Morrison, 706 Brown Av, Evanston, IL 60202-1908 11-30-96

Dear Rick,

Evidently my last letter got lost, so I am sending my update plus a check for $10.

In response to the enticing incentive offered, here are my answers to your trivia quiz: 1f 2t 3f 4t 5f 6f 7t 8t 9f 10f 11f 12t 13t 14f 15t 16t 17f 18t 19f 20t 21f 22f 23f 24t 25f.

I thought some of our readers might have fun with this little problem:

1. Two small frictionless pulley wheels are located at the same height, d meters apart. Place a closed-loop rope, of total length 2 meters, on the wheels as shown (a) and allow it to reach equilibrium. Obviously for values of d a little less than 1, the upper and lower (catenary) segments of the rope will assume equal lengths. The problem is to find the value of d where the upper and lower segments begin to assume unequal lengths. Under what conditions does unstable equilibrium exist? What happens if the rope is looped over three wheels equally spaced as in (b)?

Solution to number series in #103: 91, 100, 231, 640, *1003*. These refer to the number of romantic conquests in various countries by the title character in Mozart's *Don Giovanni*.

Kevin Langdon: I did not intend to make the equation New Class = producers of culture, but can see now how that impression might have come through. I regard makers of "solid" culture in all areas as part of the producer class; the "derivative shlock and B.S." I would readily lump in with NC. One characteristic of NC occupations is the difficulty of gauging the actual quality level of ones' performance. Incompetence becomes harder to spot, hence the NC becomes a haven for mediocrity....another cause of increase of the NC, which I forgot to include, was the adoption of Keynesian economics as a response to the Depression. Keynes observed that total demand had fallen below a certain critical mass, and recommended a vast increase in government spending to bridge the gap, not realizing, or at least not admitting, that this would eventually create a huge, politically entrenched, parasitic segment of the economy, tempting the public with utopian schemes which incidentally perform the all-important function of enhancing NC bank balances...Those searching for a cause for the stagnation in real incomes over the past 20 years might take a hard look at the ascendancy of the New Class.

I read a good book the other day: *Growing up Absurd*, by Paul Goodman, written about 1959 or thereabouts. He essentially predicted the romantic upheaval of the 60s as a revolt against what he called the Organized System or Rat Race, which at that time consisted almost exclusively of the world of big business. The marginal 50s "beatnik" concept

evolved rapidly into the mass-cultural "hippie". But sadly the 60s movement failed to find an antidote to the tragic and universal predicament of modernity: the shortage of meaningful work in which a person can engage with sincere "loving dedication". Hence comes the New Class shibboleth of "service to society" and later, disillusionment and the turn toward nihilism.

It is certainly true that most people just try to get by, however one could say the same thing about many a pre-war situation...much of the impetus behind the war spirit of 1914 was a fervent longing to ditch the daily grind and go out seeking adventure; if a great Cause was behind it, so much the better... and speaking of getting by, the celebrated, emerging "road rage" phenomenon, in which one motorist attempts to pass another and gets shot for his trouble, must be a barometer of something. My hunch is that something is not domestic tranquility...

New Agers' "tacit agreement...not to question one another's beliefs too closely" is a good example of denial of a scale of truth or quality. My attention was arrested by this quotation:

"...We are now at the end of the Age of Reason. The intellect has...become a disease of life. A new age of magical interpretation of the world is coming in terms of will and not intelligence....there are ascending grades on the way to the achievement of higher levels of consciousness. "

This could be taken as a position statement, almost a mini-manifesto, by any New Age celebrity from Shirley Maclaine on down. All surely would be discomfited to discover the source: a 1930s speech by Adolf Hitler. Some authors such as Constance Cumbey have claimed that New Age is actually a resurgence of Nazism. I rather would say that Nazism is a particular outbreak of that more general phenomenon of "postmodernism", the retreat from reason, of which New Age is one more religious manifestation. What remains for New Age is to attempt to create a consistent mythology to replace the Biblical story. Skeptics and believers debating the "alien abduction" and "space brothers" stories that have saturated the media have largely ignored one plausible theory, which I believe is due to Jung: that these tales are nothing less than the seed of an emerging religious mythology which is, for better or worse, more in tune with our technological times. One might almost think of it as a modernized version of Saul's conversion on the road to Damascus, or the reported visitations by demons in the Middle Ages....

A peculiar and significant thing occurred a few years ago in connection with the above. One of the foremost literary deconstruction theorists, Prof. Paul De Man of Yale, was exposed as a Nazi collaborator, having made propaganda for the Vichy regime during the War. Now if one follows the common idea that deconstructionists are simply leftover Marxists who have not yet heard the bad news about the fall of the Empire, one might easily predict a breaking away, a revulsion among his colleagues. What actually happened was precisely the opposite. Academic support rallied behind De Man, making arguments that a traditionally rational person would find beyond belief: for example, that De Man's

actions were not his at all, but merely those of "ideology speaking through him". This echoes once again the return to a prehistoric magical way of seeing the world, that of the Oracle and the Shaman as a link between the human and the supernatural.

I did consider the possibility of using a Lagrangian point for locating the space telescope, however two objections arise. First, the L-points, strictly speaking, exist only in an isolated two body system with a circular orbit, the small mass being less than .0385 times the large mass. The Earth-Moon system satisfies the mass ratio requirement but fails in the other, from the Sun's presence and the Moon's pronounced ellipse. That could be the reason for the lack of debris in these areas, unlike the Sun-Jupiter system, where asteroids have been found at the L-points. So we must deal with either stability with debris, or a lack of stability. The other objection is that the Earth tidal force is still large at that distance, about 100 times that produced by the Sun. Admittedly, the tidal forces would seriously affect only the larger telescopes, say > 100 meters diameter. Upshot is, I would guess the distant retrograde orbit is probably the best; it's stable, relatively debris-free, tidal forces are low, the only problem is it takes the repairman/woman a while to get to the work site.

...and I guess I shouldn't be too upset at the misspelling of my name. Compared to what? Some local acquaintances suspected yours truly of being the infamous Unabomber, probably due to a propensity for tinkering with electronics and stuff, combined with a severe allergy toward automobiles...

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5/28/97

Series Solution of Polynomial Equation of Any Degree.

Here is a simple method for generating series solutions for a polynomial algebraic equation. The standard way to get series solutions is to find a branch of the inverse function of the polynomial, and to express that function as a series. The following method should make the calculation a little easier.

The proposed equation is:

$$f(x) = x^n + c_1 x^{n-1} + c_2 x^{n-2} + \ldots + c_n = 0 \qquad (1)$$

Let $x = x_0 + u$. The complex number x_0 will be the arbitrarily chosen first term of the generated series. Substitute into eqn (1), expand and collect terms on u, getting an equation of the form:

$$f(u) = u^n + p_1 u^{n-1} + p_2 u^{n-2} + \ldots + p_{n-1} u - h^n = 0 \qquad (2)$$

$$\text{where } p_m = 1/(n-m)!\ d^{n-m} f(x_0) / d x^{n-m}$$

Expressing the last term as $-h^n$ instead of p_n is for convenience in later calculations, mainly to avoid a lot of unsightly fractional exponents.

Next, introduce the parameter t, which will drop out later on. The purpose is to make it possible to arrive at a variety of different series having different convergence conditions.

Select any two terms of eqn (2) and multiply them by $t^0 = 1$; multiply each of the rest of the terms by $t^1 = t$. The coefficients of these two terms will then appear in the first term of the t series. Also, the coefficients of the selected terms will, with few exceptions, appear in the denominators of the final generated series.

Selecting different terms does produce different series. For example, select the first and last terms, and write:

$$u^n + t p_1 u^{n-1} + t p_2 u^{n-2} + \ldots + t p_{n-1} u - h^n = 0 \qquad (3)$$

Now express u as a power series in t:

$$u = k_0 + k_1 t + k_2 t^2 + k_3 t^3 + \ldots \qquad (4)$$

Substitute into eqn (3) and expand the result as a series in t:

$$(k_0^n - h^n) + (\ldots.)\, t + (\ldots.)\, t^2 + \ldots = 0$$

Set each term equal to zero. Starting with the first term, solve the system for the k coefficients.

After setting t = 1, a root of equation (1) becomes

$$x = x_0 + k_0 + k_1 + \ldots$$

One could use exponents higher than one for t in the non-selected terms, but this would only change the order of the terms, not the series itself. Actually, this is a useful approach which can be used to make the structure of the series clearer.

Examples: Quadratic:

Begin with $x^2 + c_1 x + c_2 = 0$ and $x = x_0 + u$:

$$u^2 + (2x_0 + c_1)\,u + (x_0^2 + c_1 x_0 + c_2) = 0.$$

Define $p_1 = 2x_0 + c_1$, and $-h^2 = x_0^2 + c_1 x_0 + c_2$. Select the first and last terms:

$$u^2 + t\,p_1 u - h^2 = 0 \qquad (5)$$

Plugging in eqn (4):

$$(k_0^2 - h^2) + (2k_0k_1 + p_1k_0)\,t + (2k_0k_2 + k_1^2 + p_1k_1)\,t^2 + \ldots$$

Solving the system successively starting with k_0 gives the two series:

$$x = x_0 + h - p_1/2 + p_1^2/8h - p_1^4/128h^3 + \ldots$$
$$x = x_0 - h - p_1/2 - p_1^2/8h + p_1^4/128h^3 + \ldots \qquad (6)$$

The convergence condition here is $|p_1/2h| < 1$. Selecting the first and second terms of eqn (5) and repeating the process yields two additional series:

$$x = x_0 + h^2/p_1 - h^4/p_1^3 + 2h^6/p_1^5 - 5h^8/p_1^7 + \ldots \qquad (7)$$
$$x = x_0 - p_1 - h^2/p_1 + h^4/p_1^3 - 2h^6/p_1^5 + \ldots$$

These converge when $|p_1/2h| > 1$. Now let $x_0 = -c_1/2$, the "average" of the two roots. Then $p_1 = 0$, and immediately the familiar formula pops out of eqns (6):

$$x = -c_1/2 \pm h = -c_1/2 \pm (1/2)\,(c_1^2 - 4c_2)^{1/2}$$

For any degree of polynomial there is one special series of practical value, of which eqn (7) is an example, found by selecting the last two terms of eqn (2). If we start with a value of x_0 much closer to one particular root than to all the other roots, this series will converge to that root with great rapidity. The first few terms of this series in the case of the cubic equation (n = 3) are:

$$x = x_0 + h^3 / p_2 - p_1 h^6 / p_2^3 - h^9 / p_2^4 + 2p_1^2 h^9 / p_2^5 + \ldots$$

The first two terms here are really nothing more than the Newton-Raphson root-finding method applied to the complex number plane: $-h^3$ is equal to the value of the polynomial at x_0 and p_2 is the first derivative.

Incidentally, series solutions of polynomials can be expressed in terms of the so-called hypergeometric functions, which are solutions of a certain type of differential equation.

Solving the quintic equation using Cardan's third degree formulas.

This way of solving the quintic will result in a series involving square and cube roots. Start with a quintic form of eqn (2). Instead of selecting two terms, select the first, third and fourth terms:

$$u^5 + t p_1 u^4 + p_2 u^3 + p_3 u^2 + t p_4 u - t h^5 \qquad (8)$$

Carrying out the above procedure yields the series in t:

$$(k_0^5 + p_2 k_0^3 + p_3 k_0^2) + (5 k_0^4 k_1 + p_4 k_0 + p_1 k_0^4 - h^5 + 3 p_2 k_0^2 k_1 + 2 p_3 k_0 k_1)\, t + \ldots$$

The two $k_0 = 0$ solutions from the first term are not valid; they lead to division by zero in the formula for k_1. Thus, after dividing the term by k_0^2,

$$k_0^3 + p_2 k_0 + p_3 = 0$$

Note that not selecting the second term of eqn (8) results in a cubic equation with a zero second degree term, the type most easily solved by Cardan's formulas. The simplest of the three Cardan solutions for this case is

$$k_0 = Z - p_2 / 3Z \quad \text{where} \quad Z = [\,(p_2^3 / 27 + p_3^2 / 4)^{1/2} - p_3 / 2\,]^{1/3}$$

Solve the second term of the t series for k_1 :

$$k_1 = (h^5 - p_4 k_0 - p_1 k_0^4) / (5 k_0^4 + 3 p_2 k_0^2 + 2 p_3 k_0)$$

and so on. In eqn. (8) we could have selected the second, fourth, and fifth terms, or the third, fifth and sixth. In each of the three cases, we end up with a different series of radicals.

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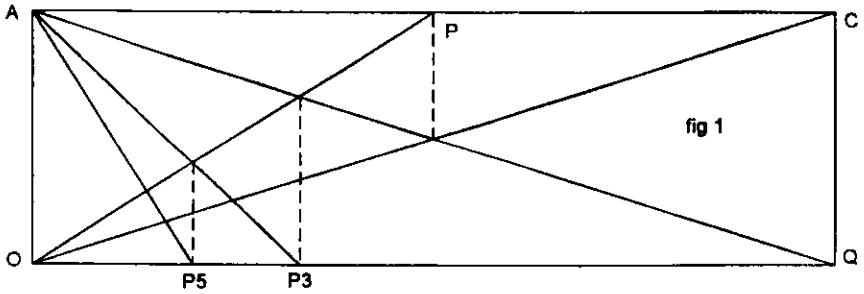
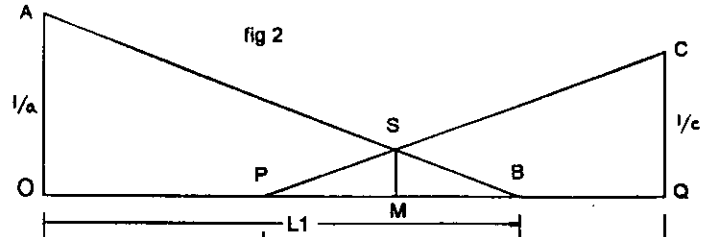
In 1995 two Connecticut high school students Daniel Litchfield and David Goldenheim, in response to a challenge from their teacher Charles Dietrich, discovered a simple solution for one of Euclid's famous geometry problems: to divide a given line segment into a specified number of equal segments. Mathematicians believe their idea may be the first advance in this problem since antiquity, and it raised a considerable stir in the math world.

Fig. 1 illustrates the Litchfield-Goldenheim algorithm for dividing a segment into any odd number n of equal parts:



Construct a rectangle with base OQ equal to the given length. (Length OA is arbitrary). Draw lines OC and QA, find their intersection and drop a perpendicular up to P. Draw OP and find its intersection with AQ. Drop perpendicular to P3. Length OP3 is 1/3 of OQ. Draw line AP3, intersect with OP and drop perpendicular to P5. OP5 is 1/5 of OQ, and so on, for a series of odd reciprocal lengths. After reading about this I attempted to develop the basic L-C method into an efficient technique for large n, with the following result.

Extended Litchfield-Goldenheim Method for Solving Euclid's Problem: Five lengths are input to this construction (fig. 2): L1, L2, 1/a, 1/b, and 1/c



Construct segment OB of length L1. Backtracking, construct segment BP of length 1/b. Reverse again to construct PQ of length L2. Construct perpendiculars OA and QC of lengths 1/a and 1/c respectively. Construct lines PCand AB with intersection S. Drop a

perpendicular from S to point M. The length of SM is defined as 1/m. The directions in which segments L1, L2, 1/a, 1/b, and 1/c are drawn represent positive values. (Input lengths of 1/2 or less must be available from a previous stage in the construction).

Solve for m: write equations for lines AB and PC, then solve for the y coordinate of S:

$$y(S) = 1/m = 1 / (baL1 + bcL2); \qquad m = baL1 + bcL2 \qquad (1)$$

Get the 1/m = 1/2 segment by letting all five input lengths equal the given length. To get 1/3, transfer the 1/2 length to OA and redo the construction, with 1/a = 1/2 and the other lengths unchanged. Repeat the process to get reciprocal lengths for all integers.

Method for large n

Now let L1 = 1 + 1/b; L2 = 0; c = 0. Using m = baL1 + bcL2 gives: m = a (b + 1). Let b = a or -a giving a choice of m = a (a + 1) or m = a (1 - a).

For example if one has arrived at a segment of length 1/7, one can readily produce length 1/42 or 1/56.

For large n, reduce the amount of work involved by chaining together several of these constructions, going back and forth between OA and QC, using plus or minus the result 1/m from each link as the 1/a and 1/b inputs for the next link.

Certain steps will involve additions of the form m = a + c; these require a construction of the type of fig. 2, with L1 = L2 = 1/b = 1.

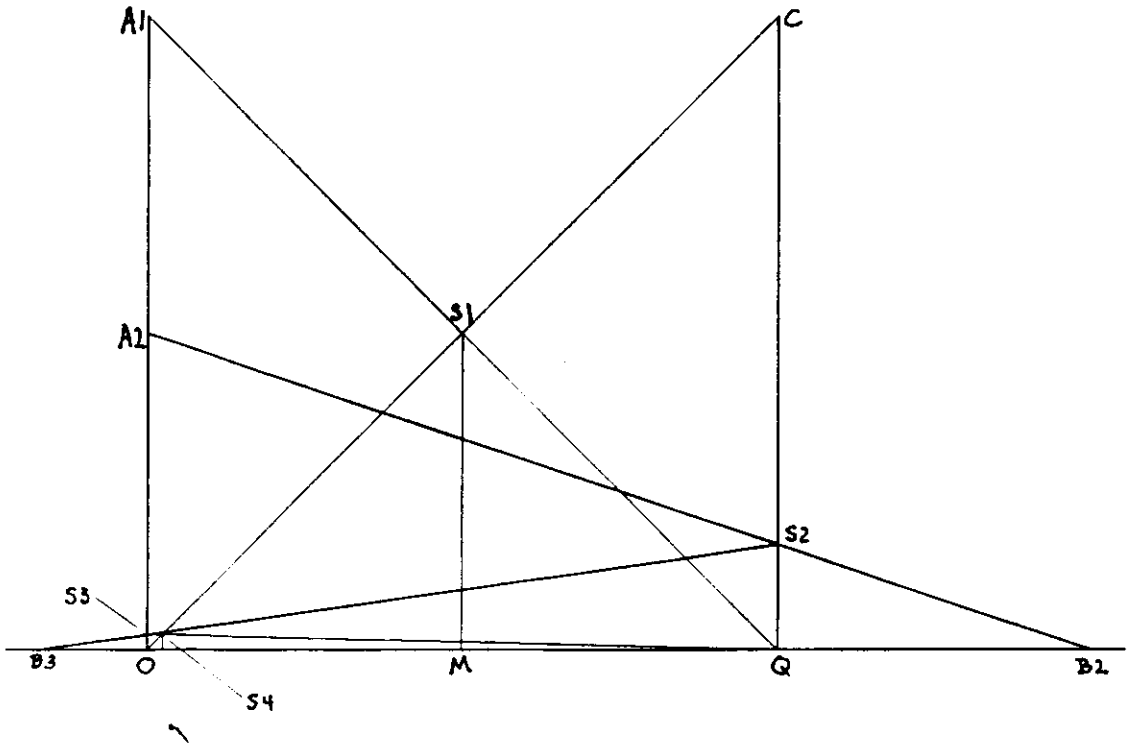
First, to decompose n, find the two integers INT(SQR(n)) and 1 + INT(SQR(n)). Multiply and get the remainder:

$$r1 = n - INT(SQR(n))*(1 + INT(SQR(n))).$$

Decompose the remainders in the same way. If n or a remainder is close to a perfect square, use the construction of fig. 2 and eqn(1) with L1 = 1, L2 = 0, b = a.

Illustrated example (fig 3): n = 43. Decompose n: 43 = 42 + 1; 42 = 6*(6+1); 6 = 2 * (2+1); 2 = 1+1.

In fig 3, draw baseline through given length OQ. Draw perpendiculars OA1 and QC. Find intersection S1 of OC and A1Q. Draw perpendicular S1M, transfer to OA2. Also transfer this length to QB2. Now draw A2B2. Then S2Q is length 1/6 by the formula above. Going left, transfer S2Q to OB3. Draw S2B3. Length of OS3 is 1/42. Then use the addition mode of fig 2: L1 = L2 = 1/b = 1. Draw S3Q (1/a = 1/42) and OC (1/c = 1), then find intersection S4. Length from this point to the baseline by eqn (1) is then 1/43.


A1
C
S1
A2
S2
S3
B3
O
M
Q
B2
S4

S E A N C E

Welcome to my Seance.

This Seance is experimental. It's the first time I have attempted to materialise two of the spirits of the dead at once - a double-header.

Here are the magic words for #1 :
CAMERA, PENULTIMATE, BIRDIE, LIBERTY, LEGISLATIVE, HIP, EMPLOYMENT, SATO, HOOK, NETHERLANDS, MIRAFLORES, MAGIC, IDENTITY, ANVIL, WORDS.

Now the magic words for #2 :
BOND, SPLIT, JONES, RADIO, CLOTH, VACILLATE, PLUMP, ICE-CREAM, BLUES, VISION, UPSTAIRS, DOWNSTAIRS, INSECT.

Well I see #1 who's easy to recognise but #2 keeps fading. Oops,I think #2 is still alive! Now they've both gone. Did we zap #2?

So can you find the two spirits? You want to know the rules? There are none. You are free to boot your Crays. When you truly find them you will be certain. As certain as Sir Isaac when he thought :-

"For what I tell...is not an Hypothesis but the most rigid consequence not conjectured by barely inferring tis thus because not otherwise or because it satisfies all phaenomena...but evinced by ye meditation of experiments concluding directly & without any suspicion of doubt."

When you are that certain S-mail your detailed solutions to

BOB PARK, 16 HASTINGS ROAD, WARRAWEE, NSW, AUSTRALIA, 2074.

including your name, address and Society. The megelegant lomnigical solution will be published. And did we Boot Hill #2? - bonus points for a health report.

REFERENCE

"The Correspondence of Isaac Newton" Ed. by H.W. Turnbull, J.F. Scott. A.R. Hall and Laura Tilling. 7 vols. Cambridge, England, 1959-77.