Problem of the Month

A glass rod of a given length is to be dropped and we are only interested in considering the events when it breaks into 3 pieces. The question is, what is the probability that the 3 pieces can be used to form a triangle?

Here's a program to experiment with.

```
to experiment :n
init
drop.rod 1 :n
end

to init
make "a 0
make "b 0
make "c 0
make "count 0
end

to choose.x.y
make "x (1 + random 1000) / 1000
make "y (1 + random 1000) / 1000
if or :x = 1 :y = 1 [choose.x.y]
if or :x = 0 :y = 0 [choose.x.y]
if :x = :y [choose.x.y]
end

to sides
if :y > :x
    [make "a :x make "b :y - :x make "c 1 - :y]
if :x > :y
    [make "a :y make "b :x - :y make "c 1 - :x]
end

to tri?
if :a > .5 [stop]
if :b > .5 [stop]
if :c > .5 [stop]
make "count :count + 1
end

to drop.rod :n :limit
if :n > :limit [ stop]
pr (se :n :count (:count /:n))
choose.x.y sides tri?
drop.rod :n + 1 :limit
end
```

Type: `experiment 20` to see the result of 20 trials.

Discussion of theoretical probability:

If the three sides of the triangle are to be a, b, c, then one must have a+b>c, a+c>b, and b+c>a, else no triangle will result. If the two points, x, y are selected at random on [0,1], then two cases can be distinquished, $x < y$ and $x > y$. In the former the three conditions boil down to $2y > 1$, $2x < 1$, and $y - x < 1/2$. In the latter, the three conditons are $2y>1$, $x-y>1/2$, and $2x<1$. For $x < y$ making a plot in the unit square gives a little triangle of area 1/8. The corresponding analysis for $x > y$ again gives a triangle of area 1/8. Therefore, the answer is 1/4. Confirm by experimentation. □

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understanding of mathematics. This has lifted a cloud from my shoulders. No longer do I have to argue a case for the exclusivity of using Logo, but rather engage in the question of how Logo can enhance the use of other software. This fits in well with the theme of one of the new addendum books from NCTM called "Geometry from Multiple Perspectives." (See John Olive's article on page 2 for a comparision of Logo and the Sketchpad.)

So, it seems to me that what we should do is take advantage of the strengths of other software environments and work with them synergistically so that the rewards are even greater than if we limit ourselves to just one of them. With this new philosophy of abundance, I invite you to engage with me in an exploration of how Logo can be used with other software tools to empower students to discover the joys of mathematical exploration. I look forward to hearing from you in the near future. □