

Name MARCH 8, 2016 test

$a = \frac{b}{c} d$

Tuesday, March 08, 2016

AAA

h: 16
w: 9
Make Oval w width h height
MonteCarlo
howManyTurtles: 500
On Off SeePatches
1st step: Make w by h Ellipse
2nd step: MonteCarlo button to get data for an area estimate of the oval.
count cows: 218
count houses: 282
count turtles: 500
count patches: 1089

218 500 1089

1. Calculate the **Monte Carlo estimated area** of the above OVAL using what you have learned. **Be sure to show ALL of your work**, including the NUMERATOR and DENOMINATOR and the setup of any equation so that you not only demonstrate you understand the concept and relationships and equation, but so that if you make arithmetic errors in the calculations, you can still get most or all of the credit. COWS are inside the OVAL, and HOUSES are outside the OVAL. **VIP: Show ALL your work. Work it out on scratch paper first, then neatly show your organized step by step solution to the problem here.**

Always, always, always break down your problem into answering the following three questions:

- i. What is known? Write down what is given. Write down and determine what facts are directly given or that can be derived from what is stated or seen in the problem diagram. Note: It can be VERY IMPORTANT for you to draw a diagram or picture of the situation. It is NOT always given. Or you might add to the picture that is given, like I do below here for you (Photoshop).

Focus ON WHAT

Dr Peter Venkman

This is your ammunition for trying to hit the target. Your bow and arrows.

Or this is your fuel for taking you from the starting point to the destination, from the given to the goal.

- ii. What is unknown? What is the goal? What is the result that is desired? What is the question asking for? That is your target! That is your destination!

Phase I - Understand the problem

① Understand it. ② PLAN it. ③ Code it.

BBB

→ Dr Peter Venkman

① i WHAT is given?

② ii WHAT is the goal?

UNDERSTAND IT

① Understand
the
problem
focus on WHAT
not on HOW.

Given WHAT you know

218 cows (inside oval)

282 houses (outside the oval fence)

500 turtles total

218 cows
+ 282 houses
500 turtles

Oval height = 16
Oval width = 9
Count of patches = 1,089

Goal

To find and know the estimated
area of the OVAL —
that is WHAT you need.

The three steps above are represented by the three Ghostbusters characters:

- i. WHAT is given? Dr. Peter Venkman
WHAT is the goal?
- ii. HOW to get from Dr. Raymond Stantz
i. given start to
ii. the desired result or goal.
- iii. Solve the problem using whatever tools
(Netlogo, Vensim, calculator) and algebra
you need to do.

Dr. Egon Spengler

② Develop a PLAN for
ccc HOW to get from i to ii

Dr Raymond Stantz

Use $a = \frac{b}{c} d$
formula for monte carlo
problems

i to ii
I to O
given to goal
input data to output results

iii. How can you get from i. (given) to ii. (goal).

HOW

You now have a clear idea of where you are at,
and of where you want to go.

What formulas or past similar problem and trips
can help you get from i. to ii.?

You might need the SINE or COSINE or TANGENT.

Or for Monte Carlo you might need the

$$a = \frac{b}{c} d \quad \text{formula.}$$

Or you might need the slope = $\frac{\text{rise}}{\text{run}}$

formula where rise = $(y_2 - y_1)$
and run = $(x_2 - x_1)$

etc. etc. etc.

Mobilize knowledge about circles, slopes,
right triangles, points, distances between
points, trigonometry that is relevant to
the current problem and the i. given facts
that you have WRITTEN DOWN and isolated and
the ii. relevant GOAL that you have also
WRITTEN DOWN as your clear target.

TRIG
Where's
WALDO?

PLAN
IT

Step on
phase #2:

Develop a
PLAN-

Dr Raymond
Stantz

DDD

a is the unknown, the goal.

b is darts in the target area —

b = 218 cows in oval

c = 500, the total "darts" thrown

d = 1,089 patches

$$\frac{b}{c} = \frac{218 \leftarrow \text{cows}}{500} = \frac{436}{1000} = 0.436 = \frac{b}{c}$$

0.436 is the proportion of darts that were on target, inside the oval.

Think of made free throws.

The player shot 43.6% or made 43.6%.

332

d = 1089 patches, area of the grid.

$$a = \frac{218}{500} (1089)$$

(ii)

Goal
Output

(i)

I
Input
Given facts
Known

$a = \frac{b}{c} d$
How to get from i to ii

③ Solve the problem using the EEE
algebra and windows calculator.
Dr. Egon Spengler

- ① Understand it - focus on WHAT
Venkman

② Develop a PLAN for HOW to
Stuntz solve it -
an algorithm
a step by step
recipe.

③ Solve it. Code it.
Spengler Implement it on
computer. Use
calc.exe

Looking at $\frac{218}{500}(1089)$ or $(0.436)(1089)$

I can guess it will be
an area of 400
something, if its
43.6% of the
larger area 1,089.

Note:

33 rows
33 columns
 $33^2 = 1089$

474.804 or 474.8
is answer I get with calculator.

FFF

ccc

So the formula for Monte Carlo has 4 parts:

4 actors

$$a = \frac{b}{c}(d)$$

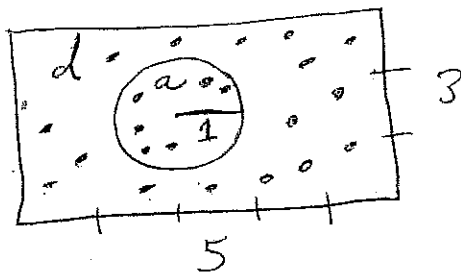
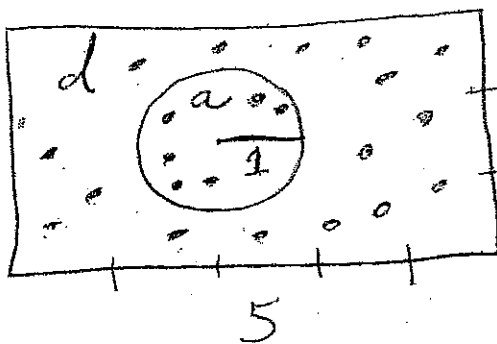
$$a = \frac{b}{c} d$$

a = area of part of a larger region where we generated random (x,y) points (random darts)

b = count of number of points inside the smaller partial area (circle or oval, for example)

c = count of all the darts, points that were used

d = area of the entire region



$$a = 3.14159$$

since radius = 1

$$a = \pi r^2 = \pi 1^2 = \pi$$

$$d = 5 \times 3 = 15$$

$$b = 6$$

$$c = 22$$

6 inside

16 outside

22

$$a = \left(\frac{6}{22}\right)(15) = (0.2727)(15) = 4.09$$

Monte Carlo estimate for area of the circle inside the 5 unit wide and 3 unit tall rectangle (3 by 5 card, perhaps)