

# Algoritmer

2. september 2013

## Hvad er en algoritme?

Følgende er en kort børnehistorie der beskriver hvad en algoritme er:

"I'm looking for an algorithm to draw a circle, Tinker said. "It's a tough one, so you'll have to use your imagination. I've asked all the adults already, but all they do is mutter about X squared plus Y squared and never get anywhere."

"Take a look at this." He handed her a windup toy animal. It had a Shell, and was Round and Green. "This turtle can do three things: it can move forward or backward, it can turn, and it can draw a little dot on the paper."

"Hey, that's pretty neat!"

"Yes, but the thing is, it doesn't know how to do anything else. That's where the algorithm comes in." Tinker took out a piece of paper and wrote what looked like a little poem:

"Go forward one inch,  
make a mark,  
repeat five times."

Then he wound up the turtle and placed it on the poem. It went zzzrbt bzzaap whuzzzsh, and so on. Then it drew a line of dots, just like the poem said:



"You see?" Tinker said. "If you put little ideas together, you can make bigger ones," Tinker said. "And you can compose those ideas into even bigger and bigger ones."

"How do you do that?" asked Laurie.

"By giving them a name. You can use the name like a handle. Here, let's call the first idea LINE. Then you can put four lines together to make a square:"

LINE:

"Go forward one inch,  
make a mark,

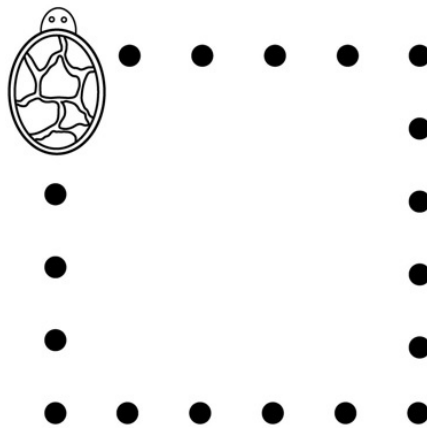
repeat five times."

SQUARE:

"Make a LINE,  
make a right turn,  
repeat four times."

"Make a SQUARE."

The little turtle zzzrbted and whuzzzshed and bzzaaped, etc, then it drew this:



Laurie was amazed. It was like magic, but every step made sense.

"So, knowing what the turtle can do, can you teach it how to draw a circle?" Tinker said.

"I don't know," Laurie said, "but I want to try!"

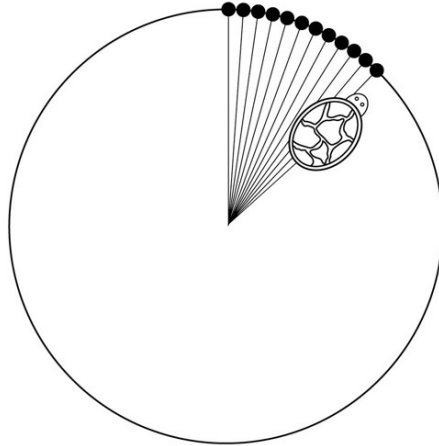
"That's good enough for me. Here, you can work at my desk. There is plenty of paper and compasses and things like that."

Laurie sat down at Tinker's desk. She doodled with the compass and played with the turtle for a while, trying to remember what she knew about circles.

A circle is round. No, not just round, perfectly round. You put the pin in the center, and the pencil spins round. To make a bigger one you open the compass; to make a smaller one you close the compass. If you change the width of the compass when it's spinning, it doesn't make a circle... Suddenly an idea, or maybe a memory, popped into her head: A circle is all of the points that are exactly the same distance from the center. Hmm... what if you

"Go forward one inch,  
make a mark,  
go back one inch,  
turn right a tiny bit,  
then repeat!"

She wound up the little turtle again and placed it on her poem. It buzzed and burred for a moment, then drew this:



"It's working!" she said. "Hey, it's not stopping." The turtle was drawing over dots it had already drawn.

"I think it's because you told it to repeat, but not how many times," said Tinker.

"Well, it should stop when the circle is done," Laurie said.

"It doesn't really understand circles," Tinker said. "It's just a toy turtle, remember? You have to teach it."

Laurie thought a little more, then rewrote her poem:

CIRCLE:

"Go forward one inch,  
make a mark,  
go back one inch,  
turn right one degree,  
repeat three hundred sixty times."

## Opgave

I skal lave en algoritme til at handle nogle bestemte varer ind i Fupta.

I har fået udleveret 3 Fupta layouts som jeres algoritme skal kunne klare.

I starter på feltet "Indgang", og når I har samlet alle varene på indkøbsedlen er I færdige. Hvis man går ind i væggen dør man.

I kan bevæge jer som skildpadden, frem eller tilbage, markere et felt (op til flere gange), dreje 90 grader, eller samle ting op.

I kan se et felts afstand i alle retninger op, ned, højre og venstre. Når I kigger kan I se om der foran jer er et tomt felt (og om det er markeret), en væg eller en vare.

Når I er færdige skal jeres algoritme afprøves i Fupta.

## Indkøbsliste

Cola

Pizza