Understanding A Complex Model:
On African Plains

DECOMPOSE into smaller parts

DEFINE each part as a block

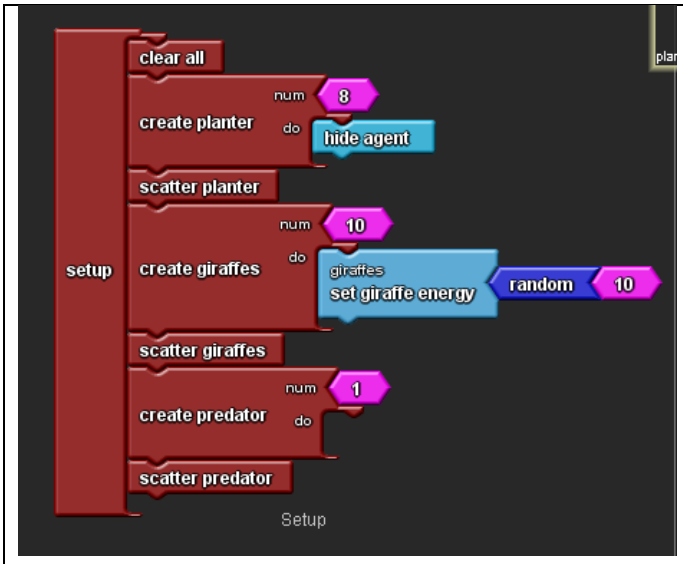
CALL the blocks in correct order

Remember, the key thing about handling complexity is breaking things down into smaller parts, then creating procedures for each small sequence.

Once defined, procedures can be called at runtime

Run the model and observe what happens. Now answer the following questions:

Study the Setup procedure:

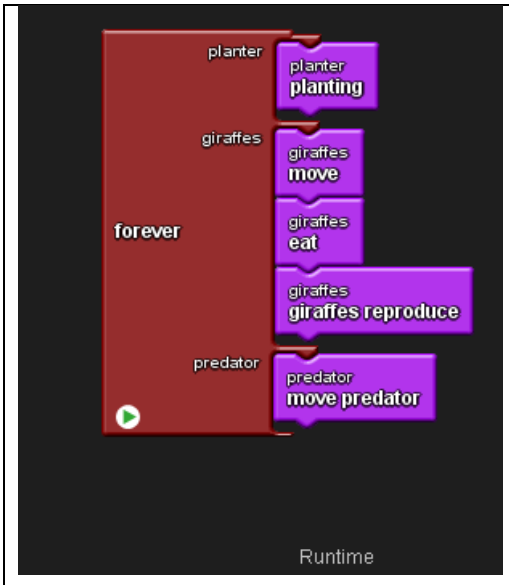


How many different 'breeds' are there in the model?

What is the difference between a 'planter' and the other two breeds?

Giraffes have an energy variable. What value is it set to when each Giraffe is created?

Study the Forever procedure:



Notice that each breed CALLS separate procedures.

The planters and predator each CALL one procedure, whilst the Giraffes CALL three procedures in turn.

This allows us to understand the behaviour of each without having all the detail cluttering the screen.

The detail has been ABSTRACTED away. It is hidden in the procedure DEFINITIONS.

Before we look at these procedures in detail, study the collision area.

	Explain in your own words what happens here.

The easiest behaviour to understand is the predator. You've done something similar with your turtles. Study the Predator breed area.

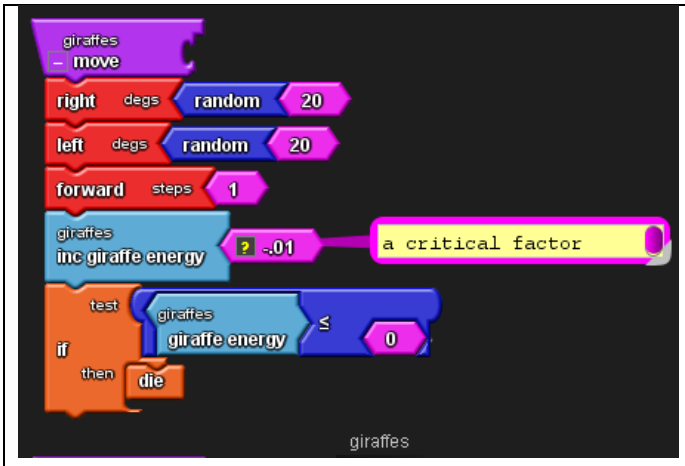
	On each step when the model runs the 'move predator' procedure is CALLED. Explain what the move predator procedure does.

Look now at the Planter breeds procedure:

	On each step of the model, the planter CALLS the 'planting' procedure. The hidden planter moves around like the predator. Study the 'if' block and explain how the planter changes a patch to yellow?

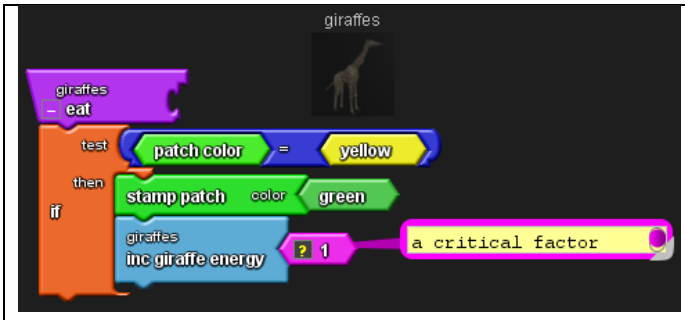
Let's now study the behaviour of the giraffe breed. There is a variable there for Giraffe Energy.

Look carefully at the move procedure:



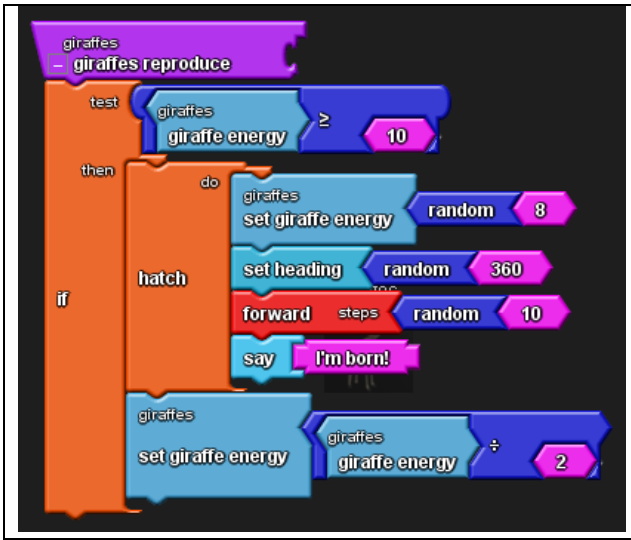
The giraffes use up energy when they move. What happens if their energy reaches 0? Try changing the amount the energy decreases by to - 0.2. What happens when you run the model? Why? Make sure you set this back to - .01 before continuing.

Look now at the eat procedure:



Explain what happens when the 'eat' procedure is CALLED?

How the giraffe reproduces is the most complicated code. Study it carefully then answer the questions below.



What energy level does a giraffe have to have to be strong enough to reproduce?

What happens when a new baby is 'hatched'? Make sure your answer explains what energy the new baby will have, its position and what it says.

Finally, birth takes a lot of energy from mother. Explain how this is coded?

Now that you understand how the model works consider ways to improve it.

Can you alter the predator's behaviour so that it also has energy? You will need to set a Predator energy variable. When the predator moves it should lose energy like the giraffe, and when it eats a giraffe it should gain energy.

Can you also build in reproduction for the predator?