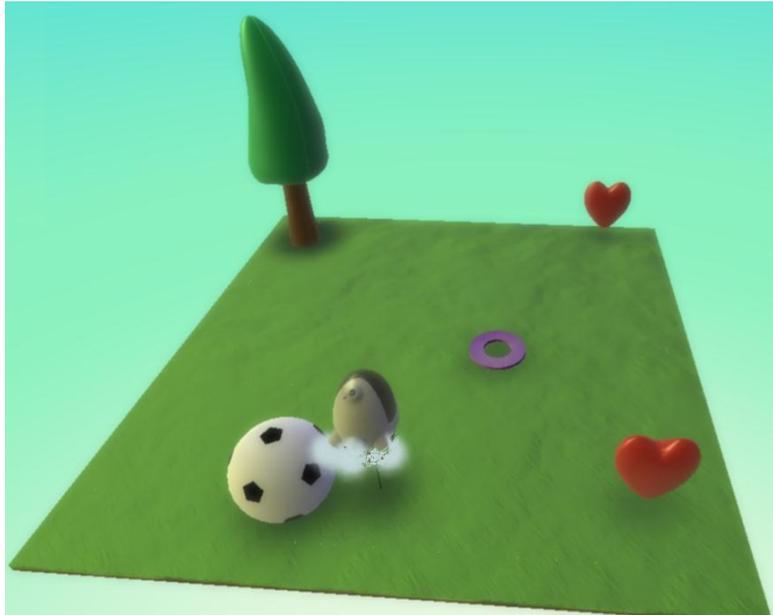


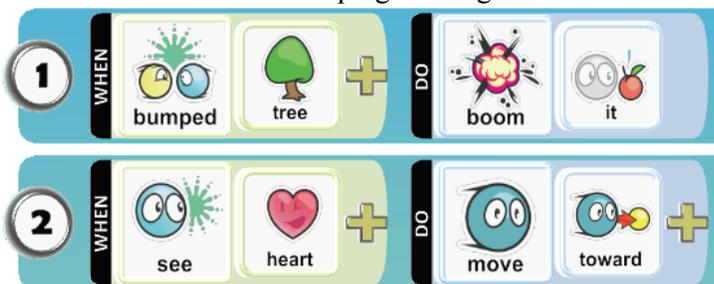
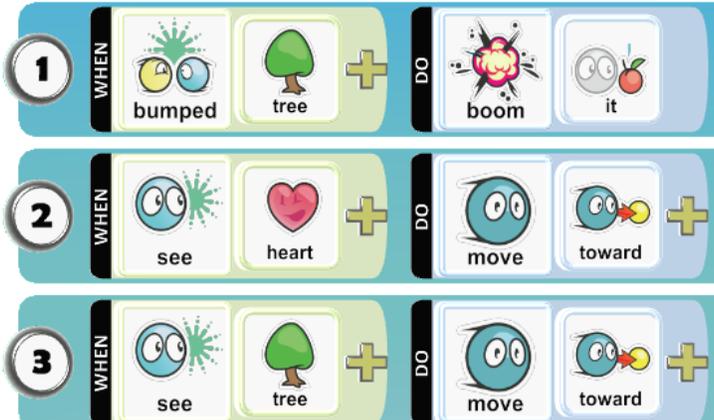
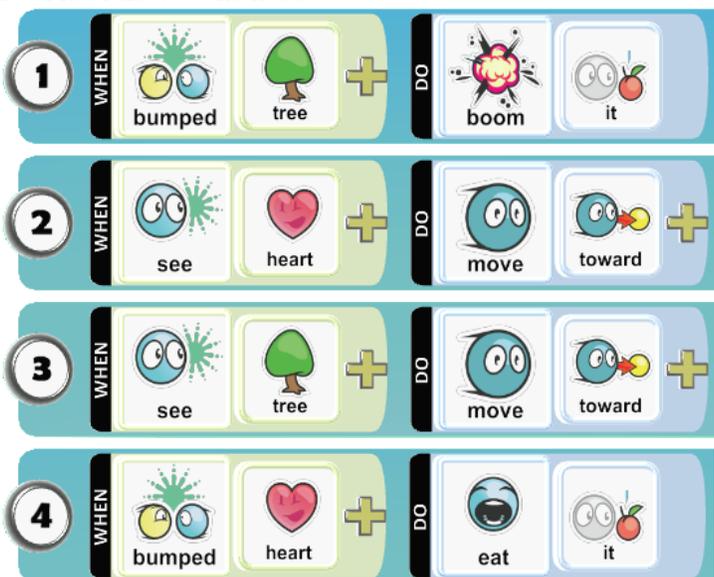
# Module 1: Laws of Kodu Exercise (Laws1)

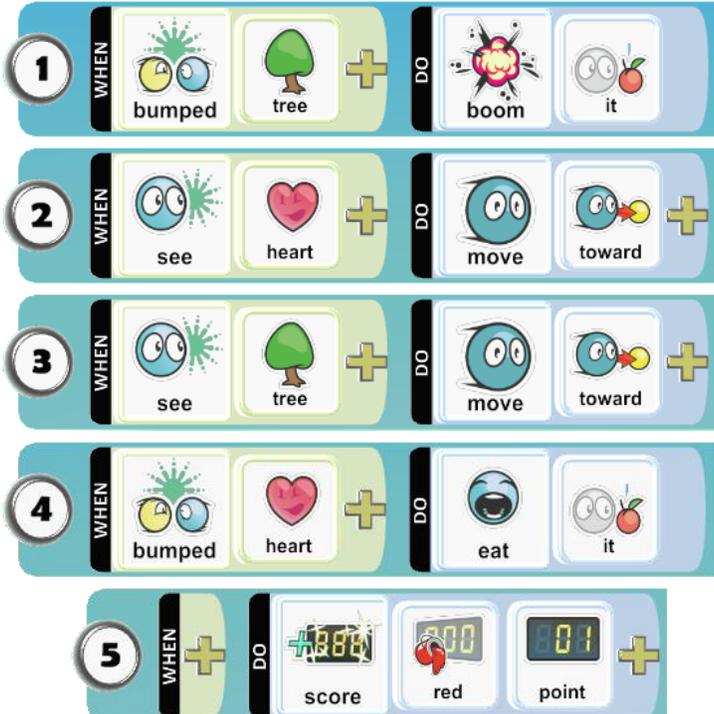
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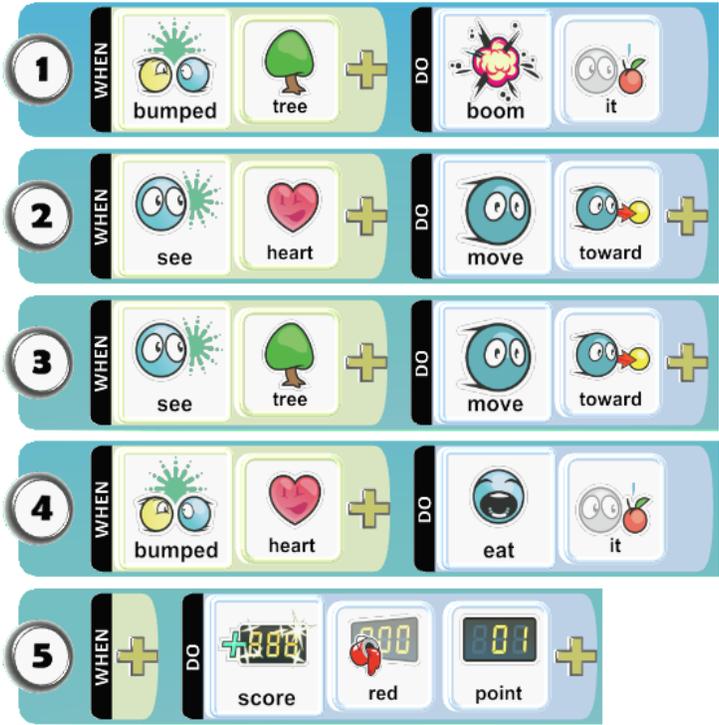
This exercise can be used in any of modules 1-3.



Step or Question	Answer
1. Start a new world. Add a kodu, a tree, a soccer ball close to the kodu, and two hearts well separated from the kodu and from each other. Alternatively, load the Laws1 world.	
2. What will happen when we run this world?	Nothing, because there are no rules.
3. Program the kodu with rule 1: 	
4. Is this a pursue rule or a consume rule, and why?	Consume rule: it removes the tree.
5. What will happen when you run the world?	Nothing, because rule 1 cannot run. The kodu is not bumping the tree, and there is no pursue rule.

<p>6. Add rule 2 to the kodu's programming:</p> 	
<p>7. Is rule 2 a pursue rule or a consume rule, and why?</p>	<p>It's a pursue rule because it involves motion towards an object.</p>
<p>8. Does it matter that the consume rules comes after the pursue rule?</p>	<p>No. The Second Law says that the rules will run no matter which order they appear in.</p>
<p>9. What will happen when we run the world?</p>	<p>The kodu will go to a heart and get stuck there.</p>
<p>10. Which heart will the kodu go to and why?</p>	<p>It will go to whichever heart it is closest to. That is the First Law.</p>
<p>11. Add rule 3 to the kodu:</p> 	
<p>12. Where will the kodu go first: the heart or the tree? Why?</p>	<p>It will go to the heart because of the Third Law: rule 2's action overrides rule 3's action.</p>
<p>13. Add rule 4 to the kodu:</p> 	

14. Is rule 4 a pursue rule or a consume rule?	A consume rule: it eats the heart.
15. What will happen when we run this world?	The kodu will eat the first heart, eat the second heart, boom the tree, and then stop.
<b>The following steps apply if you have made it to Module 3.</b>	
16. Suppose we want to count the hearts as we eat them. Which idiom applies?	Count Actions (or Do Two Things)
17. What rule should we use to count the hearts?	→ [5] <i>WHEN DO score red-score 1 point</i>
<p>18. Add rule 5 to the kodu:</p>  <p>The image shows five rule blocks for a Kodu character. Each block has a 'WHEN' section and a 'DO' section. Rule 1: WHEN bumped tree + DO boom it. Rule 2: WHEN see heart + DO move toward. Rule 3: WHEN see tree + DO move toward. Rule 4: WHEN bumped heart + DO eat it. Rule 5: WHEN + DO score red point.</p>	
19. What law does the indentation of rule 5 evoke?	The Fourth Law: an indented rule can run only if its parent can run.
20. What happens when we run the world?	The kodu eats both the hearts, then booms the tree, and then just sits around, with the red score showing 2 points.

<p>21. Remove the indentation from rule 5.</p> 	
<p>22. What happens if we don't indent rule 5?</p>	<p>The red score runs up at an extremely fast rate.</p>
<p>23. How do you explain this behavior in terms of the laws?</p>	<p>The Fourth Law no longer applies because rule 5 is not indented. The Second Law applies because a rule with an empty WHEN part can always run, so rule 5 runs on every cycle.</p>
<p>24. Re-indent rule 5 and verify that this fixes the problem.</p>	
<p>25. When the program begins, is the kodu bumping the soccer ball? How could we find out without disturbing the soccer ball by eating or booming it?</p>	<p>Add a "WHEN bumped" rule that plays a sound or increments a score other than the red score.</p>

26. Add rule 6 to the kodu:

1 WHEN bumped tree + DO boom it

2 WHEN see heart + DO move toward +

3 WHEN see tree + DO move toward +

4 WHEN bumped heart + DO eat it

5 WHEN + DO score red point +

6 WHEN bumped ball + DO score white point +

27. Run the world and see if the kodu is bumping the soccer ball. Try changing the kodu's starting position and observing the effect.