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COMPUTER

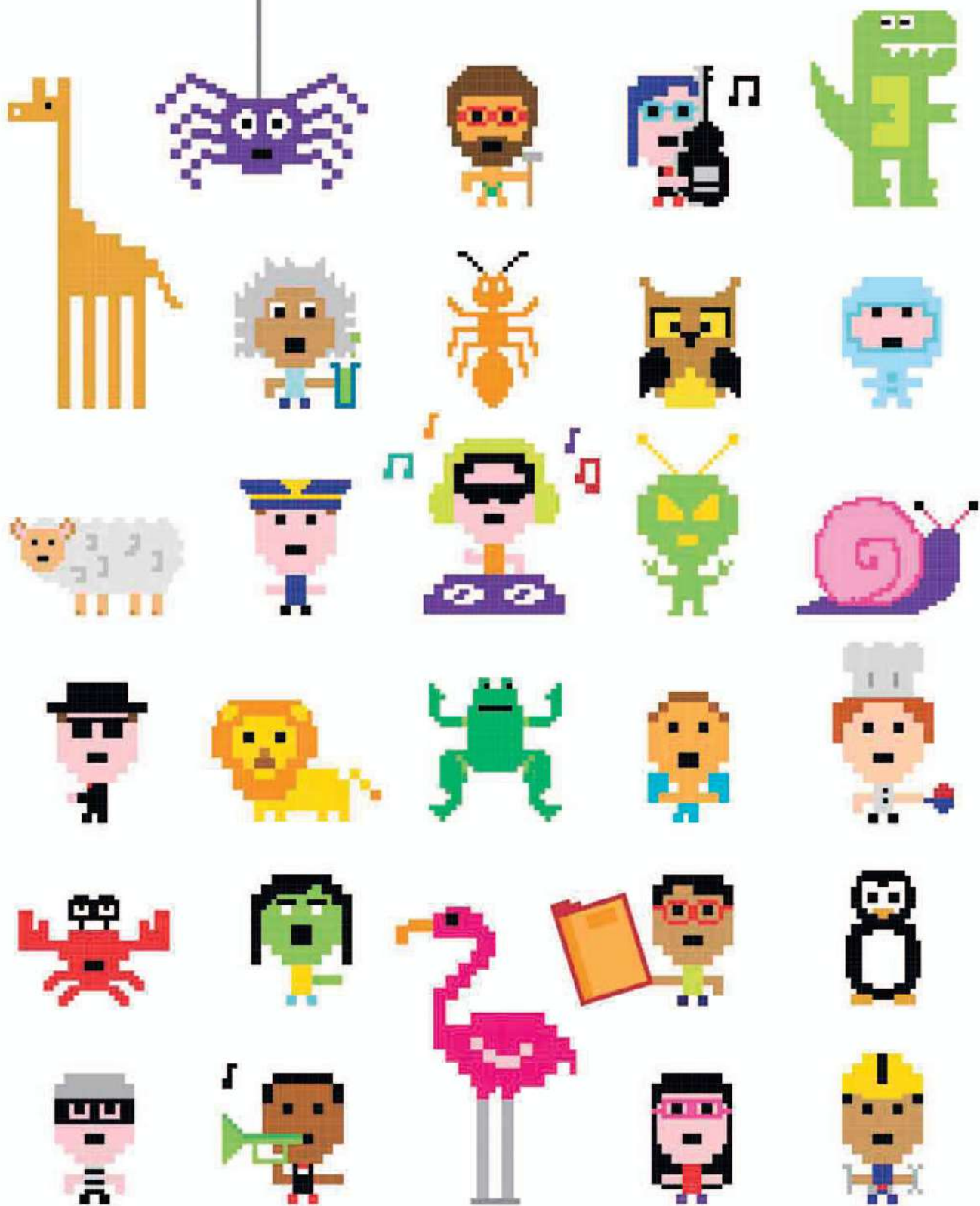
CODING

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FROM BINARY CODE TO BUILDING GAMES



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*COMPUTer*  
*CODing*







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*CODing*

A UNIQUE STEP-BY-STEP VISUAL GUIDE,  
FROM BINARY CODE TO BUILDING GAMES





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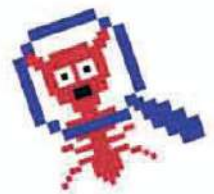
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Find out more at:

[www.dk.com/computercoding](http://www.dk.com/computercoding)



# Foreword

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Just a few years ago, computer coding seemed like a mysterious skill that could only be practiced by specialists. To many people, the idea that coding could be fun was a strange one. But then the world changed. In the space of a few years, the Internet, email, social networks, smartphones, and apps hit us like a tornado, transforming the way we live.

Computers are a huge part of life that we all now take for granted. Instead of calling someone on the phone, we send a text message or use social media. From shopping and entertainment to news and games, we guzzle everything computers have to offer. But we can do more than just use this technology, we can create it. If we can learn to code, we can make our own digital masterpieces.

Everything computers do is controlled by lines of code that someone has typed out on a keyboard. It might look like a foreign language, but it's a language anybody can pick up quite quickly. Many would argue that coding has become one of the most important skills you can learn in the 21st century.

Learning to code is tremendous fun because you can get instant results, no matter how much more you have to learn. In fact, it's such fun creating games and programs that it feels effortless once you're hooked. It's also creative—perhaps the first science that combines art, logic, storytelling, and business.

Not only that, coding is a fantastic skill for life. It strengthens logical thinking and problem-solving skills—vital in many different areas of life, from science and engineering to medicine and law. The number of jobs that require coding is set to increase dramatically in the future, and there's already a shortage of good coders. Learn to code, and the digital world is yours for the taking!

Carol Vorderman

CAROL VORDERMAN



# How this book works

This book introduces all the essential concepts needed to understand computer coding. Fun projects throughout put these ideas into practice. Everything is broken down into small chunks so that it's easy to follow and understand.

Each topic is described in detail, with examples and exercises

"See also" boxes list other subjects that are linked to the topic



**170 PLAYING WITH PY**

**BUBBLE BLASTER**

**Figuring out the distance**

In this game, and lots of others, it is often necessary to calculate the distance between two objects. Here's how to do it with a formula to have the computer work it out for you.

**11** This function calculates the distance between two objects. Add this bit of code directly below the code you wrote in step 9.

```
from math import sqrt
def distance(id1, id2):
    x1, y1 = get_coords(id1)
    x2, y2 = get_coords(id2)
    return sqrt((x2 - x1)**2 + (y2 - y1)**2)
```

**42 STARTING FROM SCRATCH**

## Hide and seek

Welcome to the special effects studio! Using the purple "Looks" blocks, find out how to make sprites vanish and reappear, grow and shrink, and fade in and out.

**Hiding sprites**

To make a sprite disappear, use the "hide" block. The sprite is still on the stage, and it can still move around, but it can't be seen unless the "show" block is used to make it visible again.

Use the "hide" block to make sprites disappear in games

**SEE ALSO**  
◀ 38-39 Making things move  
Sending 70-71 messages

**Hide and show**  
To make a sprite vanish, use the "hide" block. When you're ready for it to be seen again, use the "show" block. These blocks are found in the "Looks" section of the blocks palette.

**Disappearing cat**  
Try this script using the cat sprite. It disappears and reappears but it keeps moving, even when you can't see it.

**when clicked**  
forever  
wait 1 secs  
hide  
turn 90 degrees  
move 100 steps  
wait 1 secs  
show

This block hides the cat  
This block rotates the cat clockwise  
The cat still moves even when hidden  
This block shows the cat again

**EXPERT TIPS**  
**Showing sprites**

Select a sprite in the sprite list. Click the "I" button on it to open the information panel. There you can also use the "show" tick box to show or hide a sprite.

Sprite 1  
x: 84 y: -69 direction: -90°  
rotation style:  
can drag in player:   
show:

Show a hidden sprite

Colorful illustrations highlight different programming concepts

Programming scripts and code are explained line by line

Instructions show what to click, drag, or select

## Sizes and effects

Scripts can be used to change the size of a sprite and add special effects to it.

change size by 10

set size to 100 %

△ Changing a sprite's size  
These two blocks can be used to make a sprite bigger or smaller, either by a set amount or by a percentage of its size.

Type in positive numbers to make sprites bigger and negative numbers to make them smaller

Higher numbers make sprites bigger and lower numbers make them smaller. 100 is normal size

Resets all the effects

Choose the type from the dropdown menu. The effect makes become

change

set co

clear g

△ Addi  
The grap  
used to c  
or distort  
experim

## Using effects to teleport

Add a ghost sprite from the "Fantasy" category of the sprite library, and create the script shown below. It makes the ghost appear to teleport when clicked.

**when this sprite clicked**  
clear graphic effects  
repeat (20)  
change ghost effect by 5  
glide 0.1 secs to x: pick random (-150) to (150) y: pi  
repeat (20)  
change ghost effect by -5

The "ghost" effect makes the fade slightly; by repeating the block 20 times the sprite fades away completely

This "Opera" selects a random horizontal

Using this block makes the sprite fade back in

Labels help explain each step

Seven projects build up coding skills. Project pages are highlighted with a blue band

Simple step-by-step instructions guide you through each project

**PYTHON** **BUBBLE BLASTER 171**

**Distance between points**

Useful to know the distance between two points. Use a well-known mathematical formula to work it out.

Get the position of the first object (x1, y1)  
Get the position of the second object (x2, y2)  
Gives back the distance between them

$$\sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

**HIDE AND SEEK 43**

Change the numbers in the blocks to set how strong the effect is

pixelate effect by (25)

blur effect to (0)

Each color is represented by a number. Change the number to set the color

Graphic effects

Graphic effects in Scratch can be used to change a sprite's appearance and its shape. They're fun to experiment with.

You'll never know where I'll appear next!

This block selects a random vertical position

pick random (-150) to (150)

This block makes the ghost move slowly, hidden from view

Find the center of the sub and their radiuses have collided.

Checks for collisions between the sub and any bubbles

b\_r [ bub ] :

Each bubble is worth 10 "points"

**13** Now update the main game loop to use the functions you have just created. Remember that the order is important, so make sure you put everything in the right place. Then run the code. Bubbles should burst when they hit the sub. Check the shell window to see the score.

```

score = 0
#MAIN GAME LOOP
while True:
    if randint(1, BUB_CHANCE) == 1:
        create_bubble()
    move_bubbles()
    clean_up_bubs()
    score += collision()
    print(score)
    window.update()
    sleep(0.01)
  
```

Creates new bubbles

Adds the bubble score to the total

Shows the score in the shell window—it will be displayed properly later

This pauses the action for a very short time—try removing this and see what happens

**EXPERT TIPS**

**Python shortcut**

The code "score += collision()" is a shortcut for writing "score = score + collision()". It adds the collision score to the total score, then updates the total score. Code like this is common, so a shortcut is useful. You can also do the same thing using the "--" symbol. For example, "score -= 10" is the same as "score = score - 10".

Don't forget to save your work

Each line of code is clearly labeled so you can't go wrong

This icon indicates that the project continues on the next page

Boxes give extra information: tips, definitions, and things to remember

Read on and get coding!



**EXPERT TIPS**

**When to save**

This save icon appears on the project spreads. It reminds you when to save the work you've done, so that nothing is lost if the computer crashes. Always remember to save your work frequently.

Don't forget to save your work

**T**



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