

# **Scratch Workbook Solutions**

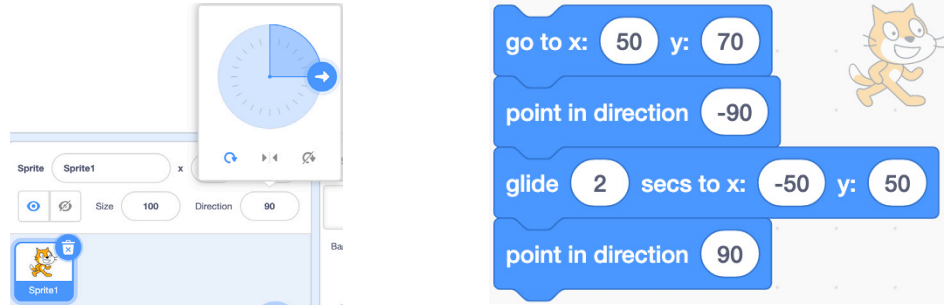
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# Module 1

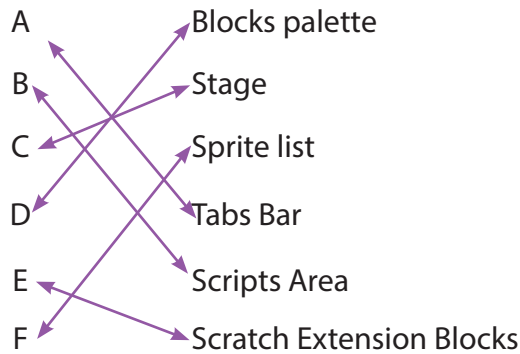
## Say "hello" to Scratch

- 1 Sample Solution  
When the green flag is clicked the sprite will go to the position x:100 y:100 on the stage. The sprite will then pause for 1 second, move downwards by 200 steps, pause for .5 seconds, move left 100 steps and turn forward by 90 degrees. The sprite will glide for 1 second to the stage position x:0 y:0 and point facing in a forward direction.

- 2 Select can rotate button



- 3 The Scratch Interface Quiz



## Playing With Pictures



## Tell me what to do

### 1 Sample Solution

1. Buy a top up voucher in a shop or at a vending machine.
2. Dial 1741 on your phone.
3. Listen to the instructions.
4. Enter the code on the voucher and press the # key on your phone.
5. Listen for your new balance to make sure it's correct.
6. Hang up.

### 2 Sample Solution

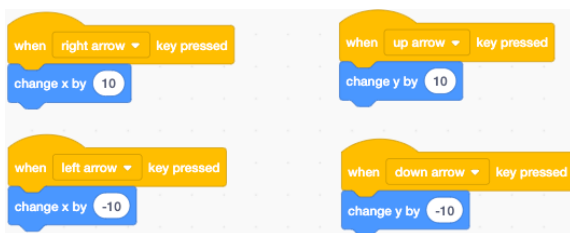
1. Making a cup of tea
2. Brushing your teeth
3. Playing a dvd

### 3 Sample Solution

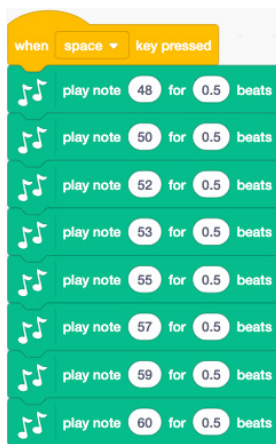
1. Begin on side A
2. Take goat across to side B
3. Return with empty boat to side A
4. Take dog across river to side B
5. Return with goat to side A
6. Take cabbage to side B
7. Return with empty boat to side A
8. Take goat to side B
9. END

## Playing With Music

### 1

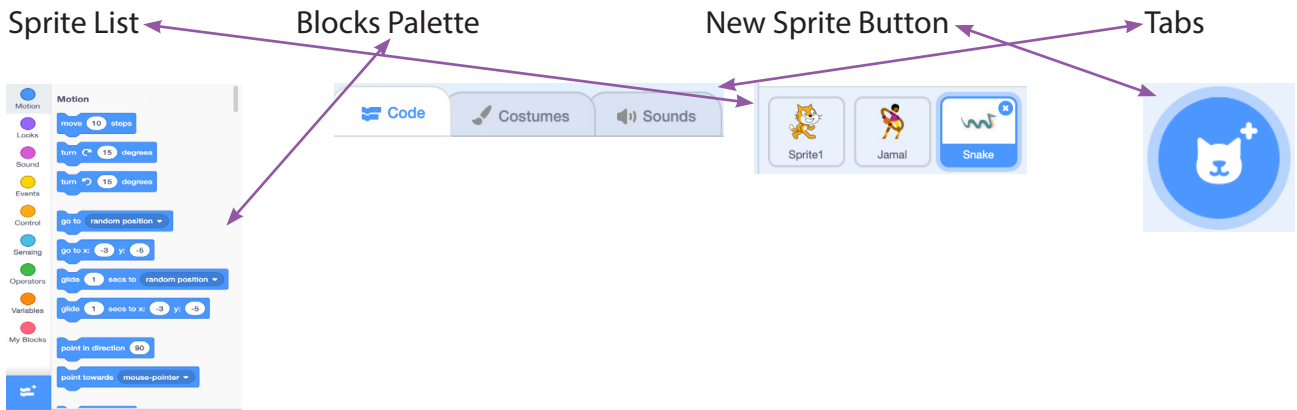


### 2



# End of Module 1 Quiz

- 1 C.
- 2 B.
- 3 A.
- 4 D.
- 5 Match the following parts of the Scratch interface to the images



- 6 Match the letters from the diagram of the Scratch paint Editor to the correct description.

- A Colour palates
- B Flip
- C Toolbar
- D Add image from a file
- E Switch between vector / bitmap modes
- F Zoom

- 7 A.
- 8 B.
- 9 B.

### Think Like a Computer

#### ① Sample Solution

In the centre of the page draw a rectangle about 3mm high 3 cm wide.

At the midpoint of the top side of rectangle draw a line upwards 5cm in length.

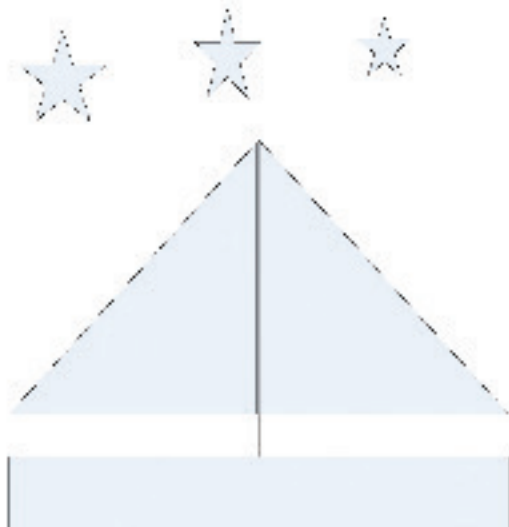
Draw a rectangle 4cm high 2 cm wide with the midpoint of the bottom side touching the top of the upwards line.

Draw 3 circles inside the top rectangle all 1cm in diameter that are centred horizontally across the rectangle and spaced evenly vertically in the rectangle.

#### ② Sample Solution

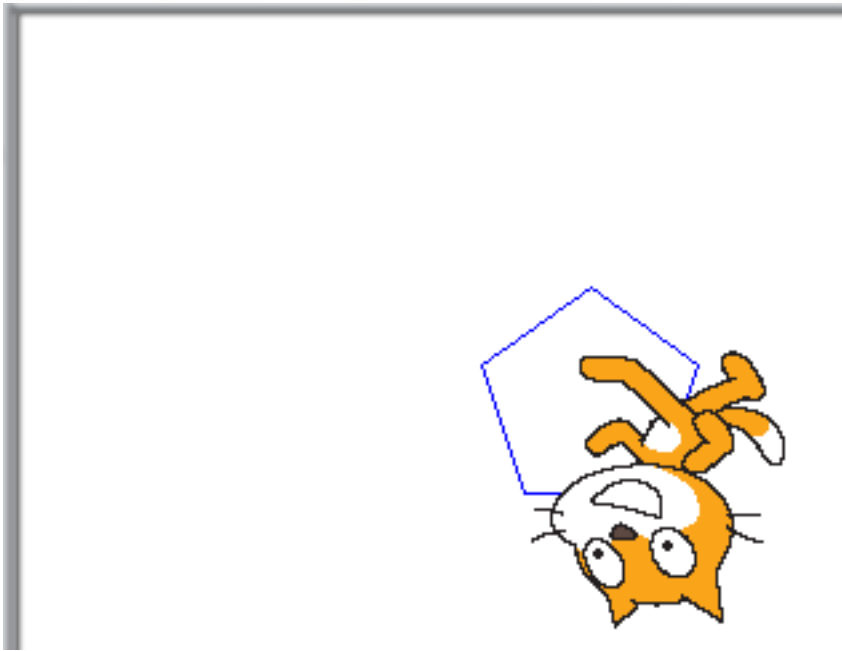
1. Draw 3 circles on top of each other. The top circle is the smallest, the middle circle is middle sized and the bottom circle is the largest
2. On top of the top circle, draw a square with a line underneath it extending out at the sides of the square
3. In the top area of the bottom circle draw a coloured small circle
4. In the centre of the middle circle draw two small coloured circles
5. In the top circle, draw two small solid circles side by side in the upper part of the circle
6. In the top circle, draw three small circles side by side in the bottom part of the circle in a U shape.
7. In the top circle, draw a left facing right angled triangle in the centre of the circle with the base twice the side of the height.
8. On the right hand side of the middle circle, draw a line facing north east direction and at the end of the line draw a small hexagon
9. On the left hand side of the middle circle, draw a line facing north west direction and at the end of the line draw a small hexagon

#### ③



## Could You Repeat That Please?

1

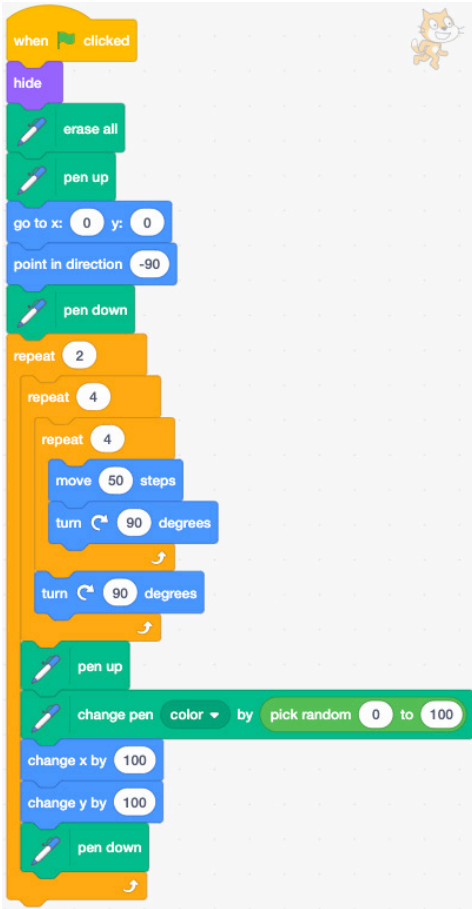


2

```
when clicked
  point in direction -90
  hide
  erase all
  pen up
  set pen color to pick random 0 to 200
  set pen size to 10
  go to x: 0 y: 0
  pen down
  repeat 360
    move 1 steps
    turn 1 degrees
  pen up
  change x by 150
  pen down
  repeat 5
    move 50 steps
    turn 72 degrees
```

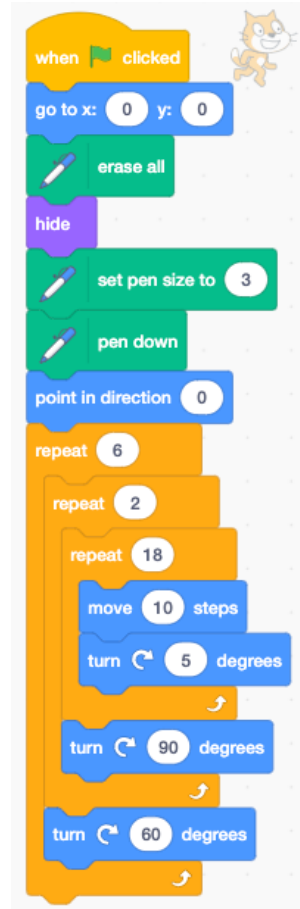
# Over and Over Again

1



```
when clicked
hide
erase all
pen up
go to x: 0 y: 0
point in direction -90
pen down
repeat 2
  repeat 4
    repeat 4
      move 50 steps
      turn 90 degrees
    turn 90 degrees
  pen up
  change pen color by pick random 0 to 100
  change x by 100
  change y by 100
  pen down
```

2



```
when clicked
go to x: 0 y: 0
erase all
hide
set pen size to 3
pen down
point in direction 0
repeat 6
  repeat 2
    repeat 18
      move 10 steps
      turn 5 degrees
    turn 90 degrees
  turn 60 degrees
```

## End of Module 2 Quiz

- 1 C.
- 2 B.
- 3 D.
- 4 C.
- 5 A.



# Module 3

---

## Where Are You now?

Linear Search – 14 checks. Check names 1 by 1.

Binary Search – 3 checks. > 10 Levey, >15 Moloney, =18 Power

Hash Search – 5 checks. Hash key 5, 4<sup>th</sup> item under this hash key list

## Me First Sorting

First Name (A to Z)	Surname (Z to A)	PPSN (low to high)
Anna	Scott	7860133C
Brian	Ryan	7860277B
Mary	Ryan	7861212F
Ruth	Horgan	8392109D
Shane	Hogan	9058693D

### Exercise

3 times through the list

3 swaps required

Anna, Ruth, Brian, Shane, Mary (Original List)

Anna, Brian, Ruth, Shane, Mary (First Pass through list – Swap 1)

Anna, Brian, Ruth, Mary, Shane (First Pass through list – Swap 2)

Anna, Brian, Mary, Ruth, Shane (Second Pass through list – Swap 3)

Anna, Brian, Mary, Ruth, Shane (Third Pass through list no swaps required)

## CSI – Finding Information on the Internet

### Exercise 1

1. Maroon
2. Laithreoirí
3. Unplug
4. Somali Shilling
5. Elleboog
6. Aerophobia
7. Transport
8. Iguazu

Letters 1 – 8: M L U S E A T I

Magic Word Unscrambled: SIMULATE

## End of Module 3 Quiz

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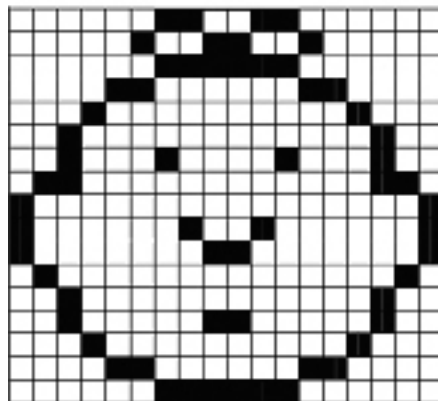
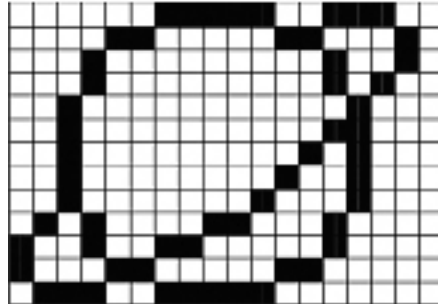
- 1 C.
- 2 D.
- 3 D.
- 4 D.
- 5 A.

## Module 4

---

### Look at Me

①



### End of Module 4 Quiz

---

- ① A.
- ② C.
- ③ B.
- ④ C.
- ⑤ B.
- ⑥ B.
- ⑦ C.

# Module 5

## Easy Exercises

### 1 Move to a Beat

Check that the sprite moves when clicked. Make sure that drum beats are included in the script. Encourage the use of costume changes.

```
when this sprite clicked
  forever loop
    move 100 steps
    play drum (1) Snare Drum for 0.25 beats
    next costume
    move -100 steps
    play drum (1) Snare Drum for 0.25 beats
    next costume
```

### 2 Colour Burst

Check that the green flag starts the program. Both sprites require code to change colour.

#### Zebra Script

```
when green flag clicked
  forever loop
    if touching Bug ? then
      change color effect by 25
      wait 1 seconds
```

#### Bug Script

```
when green flag clicked
  forever loop
    if touching Zebra ? then
      change color effect by 25
      wait 1 seconds
```

### 3 Polly Moves About

A wait command can be used to control the speed of the parrot. Use the "if on edge, bounce" command to make the parrot bounce off the edge of the stage.

```
when green flag clicked
  forever loop
    switch costume to parrot-a
    wait 0.5 seconds
    move 5 steps
    switch costume to parrot-a
    wait 0.5 seconds
    move 5 steps
    if on edge, bounce
```

#### 4 Random Drum

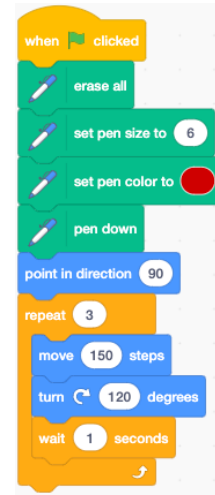
Use the pick random command. The most efficient way of playing 5 random beats is using a repeat loop rather than 5 separate “play drum” commands.



```
when this sprite clicked
set color effect to pick random 1 to 100
repeat 5
  play drum pick random 1 to 18 for 0.25 beats
```

#### 5 Draw a Triangle

The most effective way of drawing a triangle is by using a repeat loop to draw and rotate 3 times instead of 3 separate draw and 3 rotate commands. Don't forget to put the pen down to start drawing!

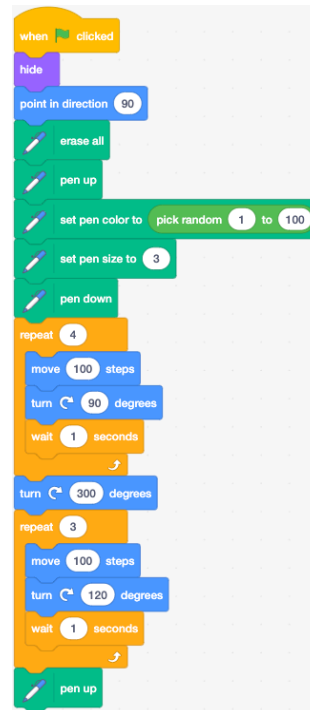


```
when clicked
erase all
set pen size to 6
set pen color to red
pen down
point in direction 90
repeat 3
  move 150 steps
  turn 120 degrees
wait 1 seconds
```

### Difficult Exercises

#### 1 Build a House

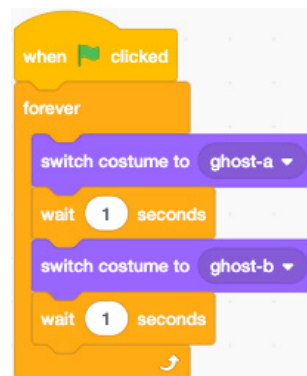
You will need to use 2 repeat loops for the triangle and square parts of the house. Make sure your sprite is pointing in the right direction and that you position the sprite correctly inside the house.



```
when clicked
hide
point in direction 90
erase all
pen up
set pen color to pick random 1 to 100
set pen size to 3
pen down
repeat 4
  move 100 steps
  turn 90 degrees
  wait 1 seconds
turn 300 degrees
repeat 3
  move 100 steps
  turn 120 degrees
  wait 1 seconds
pen up
```

#### 2 Spooky Surprise

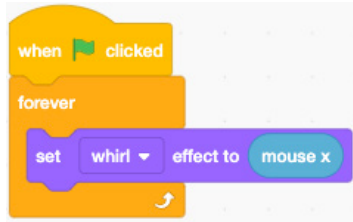
Create costume 2 by copying and editing costume 1 in the paint editor. Use a forever loop to repeat the switch between costume 1 and costume 2 continuously. A wait command can be used to decrease the speed of the animation.



```
when clicked
forever
  switch costume to ghost-a
  wait 1 seconds
  switch costume to ghost-b
  wait 1 seconds
```

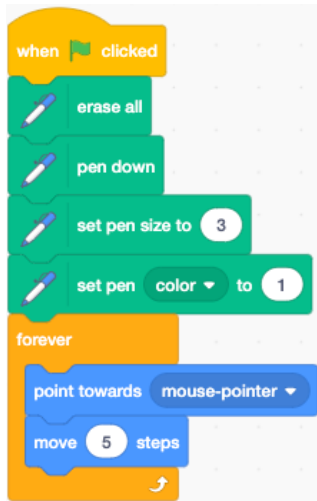
### 3 Extraordinary Whirl

The set whirl effect should be placed in a forever loop. The forever loop allows the whirl effect to change continuously as the x position of the mouse changes. The “mouse x” command is found in the sensing block.



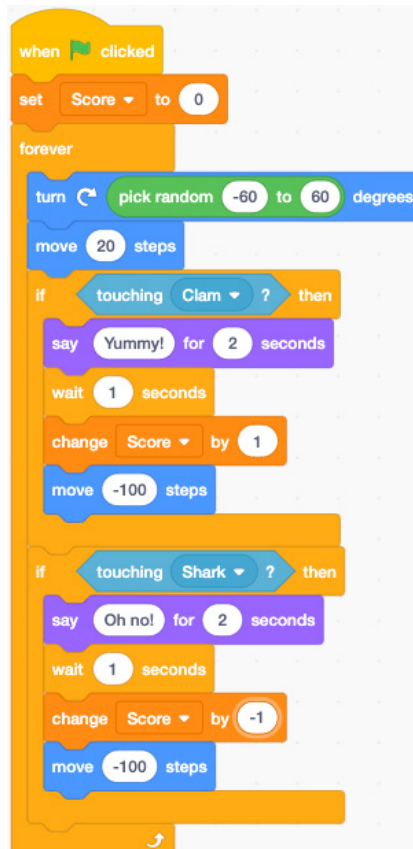
### 4 Scribbling Dog

Use the pen down command to allow the sprite to scribble on the stage. Set the pen to any size or colour. Use the “point towards mouse-pointer” inside a forever loop to follow the mouse. Move the sprite to leave a trail.



### 5 Score goes Up and Down

Create a variable score. Use the wait command to decrease the speed of the animation..



## Extreme Exercises

### 1 What's the Answer?

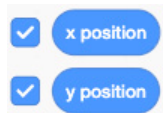
Create 3 variables: Number 1, Number 2 and Answer. Use an if else statement. By using the 'when Sprite 1 clicked' command, clicking on the sprite should tell you if the answer is right or wrong. Remember to double click on your variables to make them into sliders as shown on the card.

```
when this sprite clicked
if (Number 1 + Number 2 = Answer) then
  say Right Answer for 3 seconds
else
  say Wrong Answer for 3 seconds
```

### 2 Keeping Track

To make the variables for x position and y position appear on the stage, click the check box next to the block as shown here.

```
when clicked
go to x: 0 y: 0
point in direction 90
wait 2 seconds
forever
  turn pick random -30 to 30 degrees
  move pick random 5 to 100 steps
  wait 1 seconds
  if on edge, bounce
```



Once the variables appear on stage, you can then use a forever loop and pick random commands to make the sprite move randomly. The variables track the position of the sprite.

### 3

```
when clicked
set Timer to 5
repeat until (Timer = 0)
  say Five for 2 seconds
  wait 1 seconds
  change Timer by -1
  say Four for 2 seconds
  wait 1 seconds
  change Timer by -1
  say Three for 2 seconds
  wait 1 seconds
  change Timer by -1
  say Two for 2 seconds
  wait 1 seconds
  change Timer by -1
  say One for 2 seconds
  wait 1 seconds
  change Timer by -1
broadcast blast off
say Blast Off for 5 seconds
```

### 5,4,3,2,1

Draw a rocket or just use a picture of a plane from the Scratch image library. Create a variable called Timer and set it to 5. Use a 'repeat until' loop. When Timer = 0, broadcast 'blast off' to the rocket sprite.

The rocket sprite contains the following code.

```
when I receive blast off
  glide 5 secs to x: 0 y: 100
```

#### 4 Bigger and Bigger

Make the sprite shrink to zero. Create a variable named size. Use a repeat until loop to make the sprite grow to until it reaches full size (100%) again.

```
when clicked
set size to 0
switch costume to costume1
repeat until size = 100
  set size to size %
  change size by 1
  wait 0.1 seconds
switch costume to explode
```

The code starts with a 'when clicked' event. It sets a variable 'size' to 0 and switches the costume to 'costume1'. A 'repeat until' loop is used to grow the sprite until 'size' reaches 100. Inside the loop, 'size' is multiplied by 10% (using the '%' block), then increased by 1. A 0.1-second wait is included. After the loop, the costume is switched to 'explode'.

#### 5 Shape Sensation

Use variables to store sides and angle. Start with a triangle. Use a 'repeat until' loop to stop when sides = 9. Use 'wait' to slow things down.

```
when clicked
hide
erase all
pen up
change pen color by pick random 1 to 100
set pen size to 3
go to x: -40 y: 70
point in direction 90
pen down
set sides to 3
set angle to 360 / sides
repeat until sides > 8
  repeat sides
    move 100 steps
    turn angle degrees
  change sides by 1
  set angle to 360 / sides
  change pen color by pick random 1 to 100
```

The code begins with a 'when clicked' event, followed by 'hide', 'erase all', 'pen up', and a 'change pen color' block using a random value from 1 to 100. The pen size is set to 3. The sprite is moved to x: -40, y: 70 and pointed in direction 90. 'pen down' is called. A variable 'sides' is set to 3, and 'angle' is set to 360 / sides. A 'repeat until' loop runs while 'sides' is less than or equal to 8. Inside this loop, a 'repeat' block repeats 'sides' times, each time moving 100 steps and turning 'angle' degrees. After the inner loop, 'sides' is increased by 1, 'angle' is recalculated as 360 / sides, and the pen color is changed by a random value from 1 to 100.



## Module 6

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### Changing Things Solutions

The full Scratch solutions for Module 6 modified projects are located at:  
<https://scratch.mit.edu/studios/226005>

# Module 7

## Towers Of Hanoi

- ① For 15 disks  $(2^n - 1) = 2^{15} - 1 = 32768 - 1 = 32767$   
For 25 disks  $(2^n - 1) = 2^{25} - 1 = 33554432 - 1 = 33554431$   
For 1,099,511,627,775 moves  $1,099,511,627,775 = (2^n - 1)$   
 $1,099,511,627,775 + 1 = 2^n$   
 $1,099,511,627,776 = 2^n$   
 $\log_2(1,099,511,627,776) = n$   
 $n = 40$

Number of Disks	Number of Moves Required to Solve the Problem
6	63
9	511
15	32,767
25	33,554,431
40	1,099,511,627,775
64	9,223,372,036,854,775,808

## The Travelling Salesman Problem

②

Date	Journey From	Journey To	Distance
Jun-21	Dublin	Portlaoise	85
Jun-22	Portlaoise	Thurles	65
Jun-23	Thurles	Tipperary Town	45
Jun-24	Tipperary Town	Limerick	45
Jun-25	Limerick	Tralee	110
Jun-26	Tralee	Cork	120
Jun-27	Cork	Clonmel	100
Jun-28	Clonmel	Waterford	55
Jun-29	Waterford	Kilkenny	60
Jun-30	Kilkenny	Dublin	125
Total Distance			810

## End of Module 7 Quiz

---

- ① B.
- ② D.
- ③ A.
- ④ C.
- ⑤ B.

## End of Module 8 Quiz

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- ① D.
- ② B.
- ③ C.
- ④ D.

## End of Module 9 Quiz

---

- ① C.
- ② B.
- ③ C.
- ④ B.

## End of Module 10 Quiz

---

- ① C.
- ② B.
- ③ A.
- ④ C.