C3

Problem Solving with Scratch

CHAPTER ASSIGNMENT

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. Show your working. You may use the chapter page to help you.

Questions from *Basic Science and Technology Textbook: Technology (Computing Science), Mathayom 2* (หนังสือเรียนรายวิชาพื้นฐาน วิทยาศาสตร์และเทคโนโลยี เทคโนโลยี (วิทยาการคำนวณ) ชั้นมัธยมศึกษาปีที่ ๒), 4th printing 2023, Institute for the Promotion of Teaching Science and Technology (IPST, สสวท.), Ministry of Education, translated into English, for classroom use.

Review before the lesson (ทบทวนความรู้ก่อนเรียน)

R1 Put a tick ✓ in front of each correct statement.

(a) ☐ An algorithm is one of the components of computational thinking (**แนวคิดเชิงคำนวณ**).

(b) ☐ Breaking a problem into smaller parts reduces the complexity of a big problem, so it is easier to design a way to solve it.

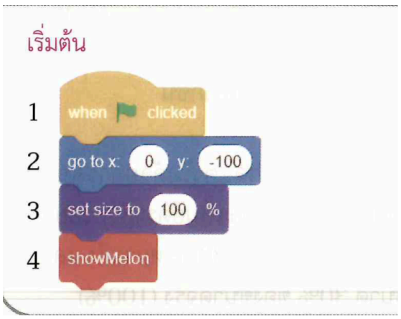
(c) ☐ A way of solving one problem can sometimes be used to solve a sub-problem of another problem.

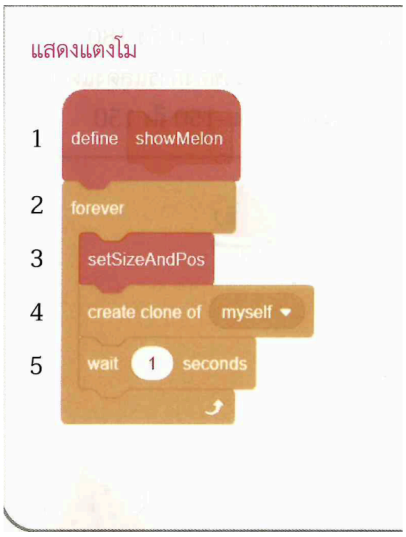
(d) ☐ When cleaning the room, you can divide the work into smaller jobs so that each friend helps with one.

Try it (**ลองทำดู**) Think about the steps of cleaning clothes you have worn, all the way to putting the cleaned clothes away in the wardrobe. What jobs are there?

Functions (ฟังก์ชัน)

T1 *Example 3.1, a watermelon-slicing game (สร้างเกมตัดแตงโม): the main program (เริ่มต้น), the function showMelon (แสดงแตงโม) and the function setSizeAndPos (กำหนดขนาดและตำแหน่งแตงโม).*







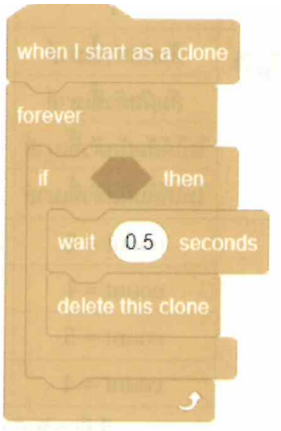
Think about it (ชวนคิด): from the program above, which commands do you think could be removed, with the result still the same?

3.1 Activity 3.1 (กิจกรรมที่ 3.1)

(1) Write the program in Example 3.1, then do the following:

(a) After clones are made, Scratch also has a block for deleting a clone. Try to find the block that does this.

(b) Improve the program from (a) by adding a set of commands to the part where clones are made, using the block `when I start as a clone`, so that if the mouse touches a watermelon, the touched watermelon is deleted.



(c) Improve the program so that it counts and shows a score when a watermelon is touched.

(2) Design drawing various shapes that you want, such as a house, a tree, a flower, a person or a robot, as follows:

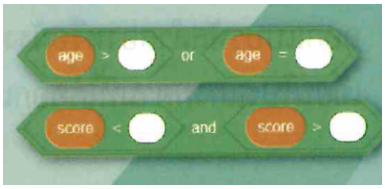
(a) Consider and split the drawing into parts: how many parts are there, what are they, and what does each part do?

(b) Design pseudocode (รหัสลำลอง) or a flowchart (ผังงาน) for each part.

(c) Write the program as you designed it.

Boolean operators (ตัวดำเนินการบูลีน)

T2 Think about it (ชวนคิด): convert the following statements into Scratch commands.



(1) Age is greater than or equal to 13.

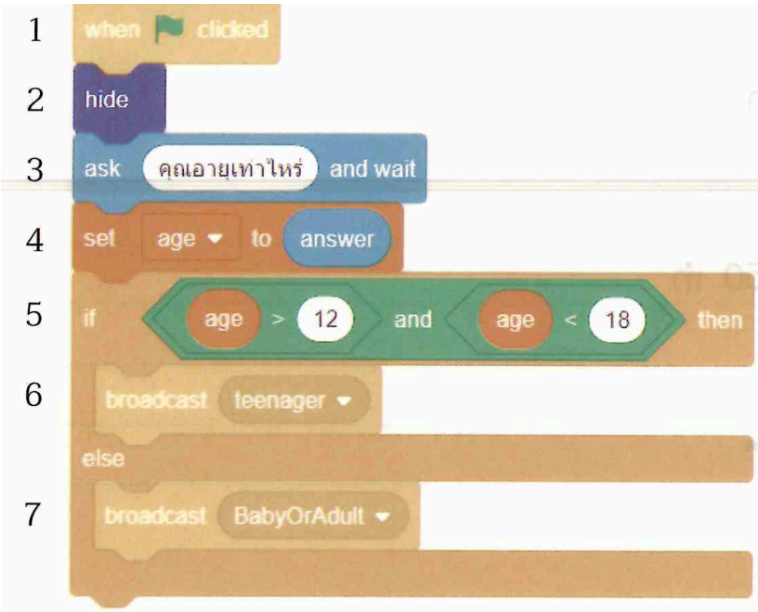
(2) The score is less than 50 but more than 30.

(3) The day is not equal to 3.

(4) The mouse is clicked and touching the mouse-pointer.

(5) Love is not less than 80 but not more than 100.

T3 Think about it (ชวนคิด): download and try running the program, then observe the result. Download the program at oho.ipst.ac.th/M2boolean



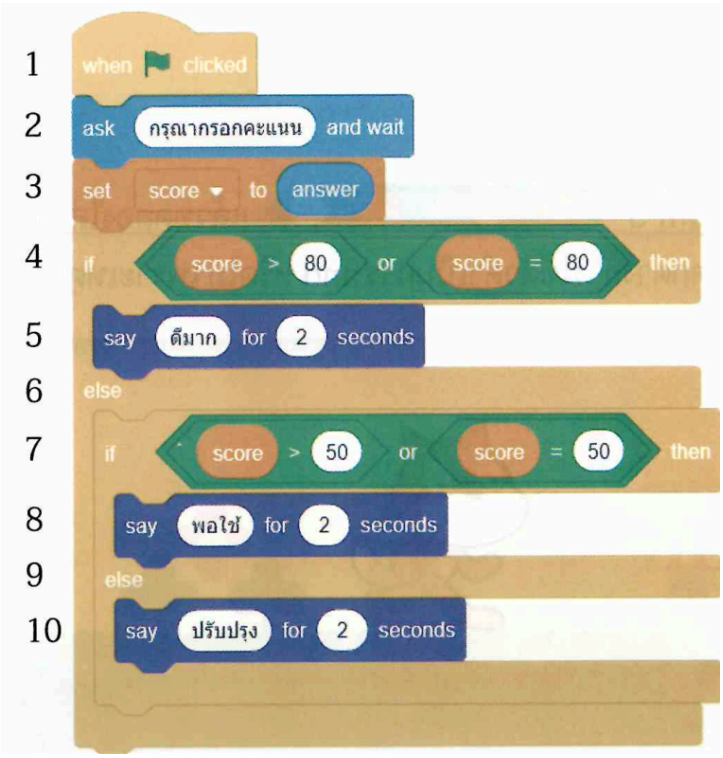
(1) Enter age 9.

(2) Enter age 16.

(3) Enter age 25.

(4) Change the operator `and` to `or` in line 5, then try entering ages 9, 16 and 25 in turn. Is the result different from using the `and` operator? Why?

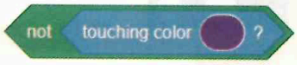
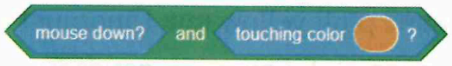
T4 *Example 3.2, a grading program (โปรแกรมตัดเกรด): a language institute tests language level with scores of 0–100. A score of 80 and above is at the level "Very good" (ดีมาก), 50–79 is "Fair" (พอใช้) and below 50 is "Needs improvement" (ปรับปรุง).*



Think about it (ชวนคิด): in Example 3.2 the score is set to be 0–100. So if the score is below 0 or over 100, what is the result? Improve the program so that it covers scores below 0 or over 100.

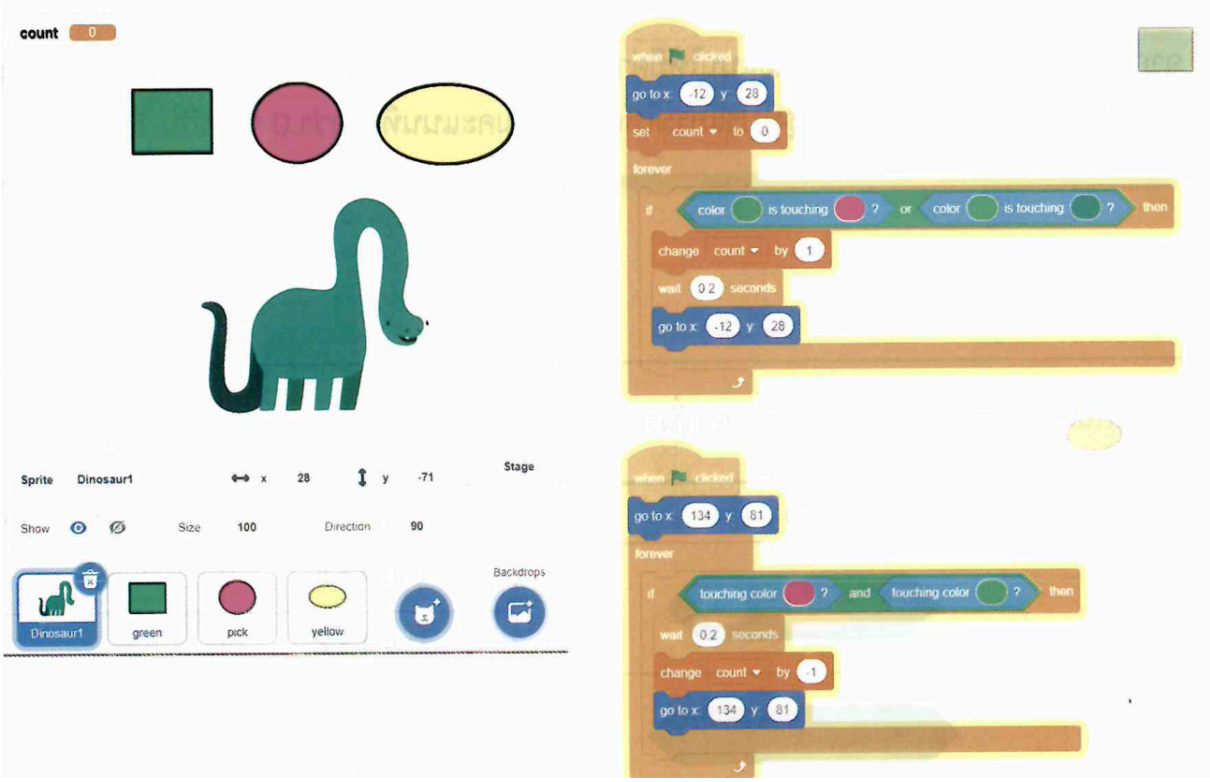
3.2 Activity 3.2 (กิจกรรมที่ 3.2)

(1) Write the result of checking the condition of each of the following commands.

ข้อ	คำสั่ง	สถานการณ์	ผลการตรวจสอบเงื่อนไข
1.1		count = 5	
		count = 2	
1.2		สัมผัสสีแดง	
		สัมผัสสีม่วง	
1.3		คลิกเมาส์และสัมผัสสีเขียว	
1.4		สัมผัสสีม่วง	
		สัมผัสสีชมพู	
1.5		count = 5 และสัมผัสสีชมพู	
		count = 2 และสัมผัสสีส้ม	

ข้อ = No.; คำสั่ง = Command; สถานการณ์ = Situation; ผลการตรวจสอบเงื่อนไข = Result of checking the condition. สัมผัสสีแดง = touching red; สัมผัสสีม่วง = touching purple; คลิกเมาส์และสัมผัสสีเขียว = mouse clicked and touching green; สัมผัสสีชมพู = touching pink; และสัมผัสสีชมพู = and touching pink; และสัมผัสสีส้ม = and touching orange.

(2) Consider the program and the situations given, in order, then say what happens.



2.1 Move sprite green to touch sprites pink, yellow and Dinosaur1, in that order.

2.2 Move sprite yellow to touch sprites pink and green, in that order.

2.3 Move sprite yellow to touch sprites pink and green at the same time.

(3) Continue writing the program from Activity 3.1, with these details:



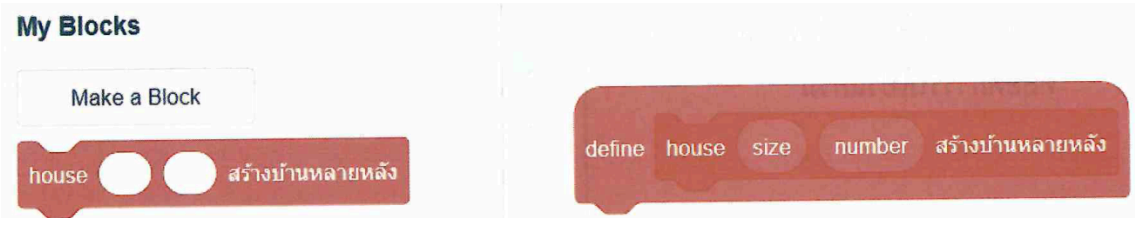
3.1 Add a costume for the watermelon: a watermelon cut in half.

3.2 Add an action: when the mouse is clicked and touches the sprite, change the costume to the watermelon cut in half.

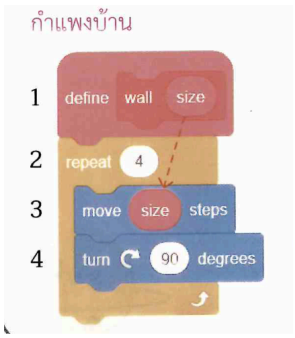
3.3 Add features to make the watermelon-slicing game more interesting.

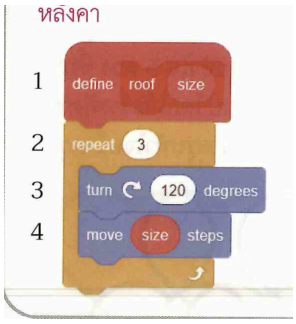
Passing values to functions (การรับค่าและส่งค่าให้ฟังก์ชัน)

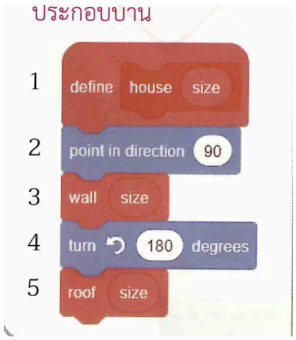
T5 Think about it (ชวนคิด): if you create a function `house` with parameters for the size of the house and the number of houses to build, what type should the parameters for the size of the house and the number of houses be?

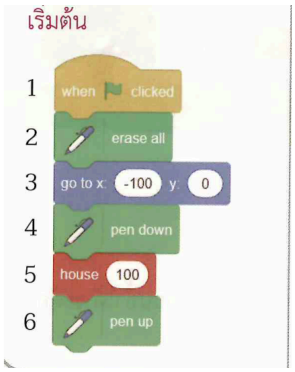


Ex 3.3 *Example 3.3, draw our house (โปรแกรมวาดบ้านของเรา): the functions wall (กำแพงบ้าน), roof (หลังคา) and house (ประกอบบ้าน), and the main program (เริ่มต้น).*









Observe the following drawing program: where does the wall of the house start, at the bottom-left, bottom-right, top-left or top-right corner? And after the roof has been drawn, which way does the sprite turn to face?

3.3 Activity 3.3 (กิจกรรมที่ 3.3)

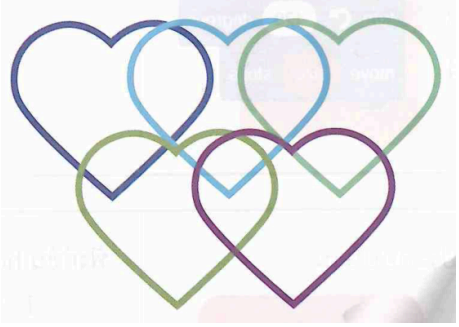
(1) Plan how to improve the house-drawing program in Example 3.3 so that it can draw as many houses as specified, by answering these questions:

(a) Which parts do you need to change?

(b) Do you need to create any new functions? If so, which functions?

(c) Write the program as you designed it.

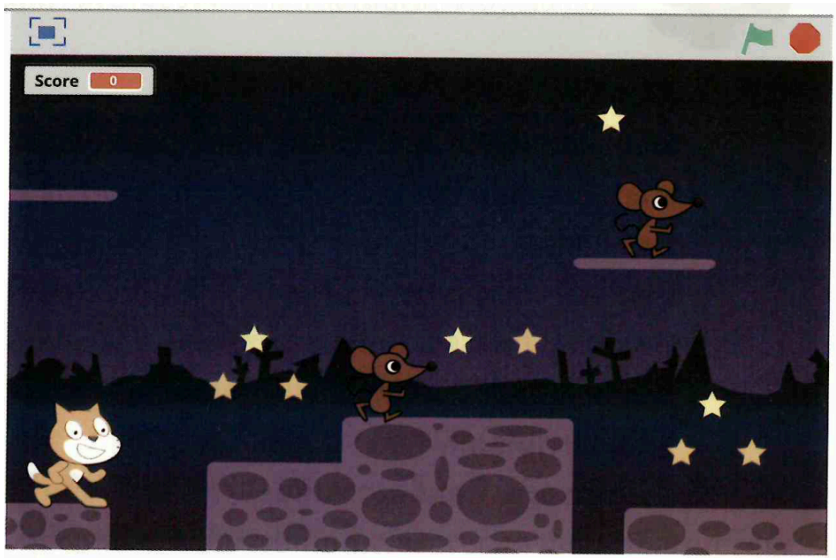
(2) Write a program that draws 5 hearts, five coloured overlapping hearts as in the picture, by creating a function `myHeart` that draws one heart.



T6 Think about it (ชวนคิด): if you want to draw various shapes where you can set the line length, the angle and the number of repeats, how should the program be designed?

End-of-chapter activity (กิจกรรมท้ายบท)

Activity Design and write a cat-catches-mouse game program (เกมแมวจับหนู) as you imagine it, by considering the sub-tasks the game can do: for example, how many sprites there are, what sub-tasks each sprite has, and how scores are given.



End-of-chapter exercises (แบบฝึกหัดท้ายบท)

1. *Solve each problem by following the problem-solving steps, to get a Scratch program for each of the following situations.*

   The village where you live is holding a New Year party. You have been given the job of washing and storing a large number of plates. Every plate is the same size. When they are washed, they must be stored in boxes that hold 3 stacks of 10 plates each. Work out the smallest number of boxes that must be prepared so that they hold the plates exactly, with no boxes left over.

2 You earn extra income by taking food to sell, and receive a share of the sales from the shop owner as follows:

Food item	Price per unit (baht)	Share per unit (baht)	Extra share
Cake (ขนมเค้ก)	10	2	More than 20 pieces: goes up to 3 baht a piece
Chicken sticky rice (ข้าวเหนียวไก่)	20	5	More than 30 packs: goes up to 7 baht a pack
Orange juice (น้ำส้ม)	15	3	More than 30 bottles: goes up to 5 baht a bottle

If you make sales of more than 500 baht, you receive a further share of 10 percent of the sales. From these conditions, write a program to summarise the total sales and the share received.

3 Which ride? (ขึ้นรถอะไรดี)

• An air-conditioned bus charges 5 baht per kilometre per person; for less than 1 kilometre the charge is 5 baht.

• A public taxi (รถรับจ้างสาธารณะ): the fare starts at 35 baht for the first 3 kilometres; distance beyond that is charged at an extra 2 baht per kilometre. One taxi takes at most 4 passengers.

You and a group of friends want to travel to a place. Which ride should you choose to save the most on fares?

4 Your form teacher gives you the job of recording your friends' height, weight and sex, and making a summary report made up of the following:

- name, surname, sex, height, weight
- the average height and weight of the whole class, and separated by sex

5 The teacher hires Auntie Cherry (ป้าเชอรี่) to make basil-chicken rice with fried egg (ข้าวกะเพราไก่ไข่ดาว) at school, x boxes, and Auntie Cherry must prepare the ingredients herself. How much do you think it costs Auntie Cherry altogether to make the basil-chicken rice with fried egg, and how much should she charge per box to make a profit of 30 percent?

15 boxes of basil-chicken rice use these ingredients:

Ingredient	Price of ingredient
Jasmine rice 2 kilograms	38 baht/kilogram
Chicken 1 kilogram	70 baht/kilogram
Holy basil leaves 200 grams	20 baht/kilogram
Chillies 200 grams	45 baht/kilogram
Garlic 20 grams	80 baht/kilogram
Eggs 15	3.50 baht/egg

Note: seasonings (sauce, soy sauce, sugar), the stove, water, electricity and containers for cooking are provided by the school, and are not counted as costs.