Grade 6 Computing

Unit 4 · Programming with Blocks

ANSWER KEY · FOR TEACHERS

Full marks 35

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. program
2. programming language
3. sequence
4. loop
5. nested loop
6. event
7. bug
8. decomposition

K · 4

Each carries 0.5 mark.

2 Label the diagram

1. 90°
2. 120°
3. 60° inside
4. 3 turns × 120° = 360°

U · 2

Each carries 0.5 mark.

3 Multiple choice

i. **c.** up — U · 1

Facing right, a quarter turn to the left makes it face up. Then it moves forward, which is now up.

ii. **c.** repeat 4 times: move 100 steps, turn right 90 degrees — U · 1

A square needs four sides and four turns. The first draws one long straight line, the second only turns on the spot, and the last draws just two sides, an L.

iii. **b.** 72° — A · 1

360° ÷ 5 = 72°. (108° is the size of each corner inside a pentagon, which is a trap: the turtle turns from the way it was going, not by the inside corner.)

iv. **d.** 15 — A · 1

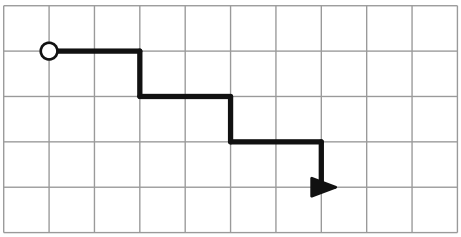
The inside loop moves 3 times. The outside loop runs that whole inside loop 5 times: 5 × 3 = 15 moves. (With no turns, it is just one long straight line, 15 × 50 = 750 steps long, off the edge of the stage.)

v. **b.** someone pressing the space key — K · 1

An event is something that happens, which a program can wait for and react to. A key press is an event. The other three are parts of a program, not things that happen.

4 Read the blocks

a. **ANSWER**



One square is 25 steps. ○ is where the turtle starts; the black arrowhead is where it ends, pointing the way it faces.

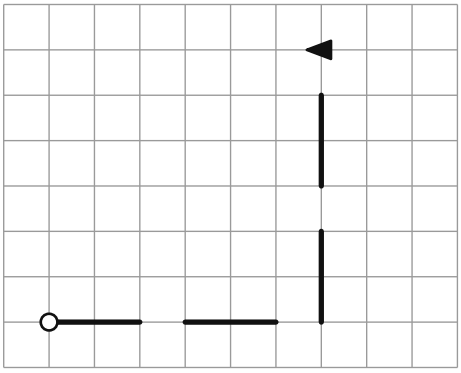
Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking

A staircase of 3 steps going down to the right: each step 2 squares across, then 1 square down. The turtle ends 6 squares to the right of the start and 3 squares lower, facing right. A · 3

MARKING SCHEME

- ✓ Three lines across, each 2 squares (50 steps) long.
- ✓ Three lines down, each 1 square long, between them, so the steps go down to the right (turn right, then left).
- ✓ The turtle's end marked 6 squares right and 3 squares down from the start, facing right.

b. **ANSWER** A · 3



One square is 25 steps. ○ is where the turtle starts; the black arrowhead is where it ends, pointing the way it faces.

The inside loop draws a dash of 2 squares and leaves a gap of 1 square, twice: 6 squares to the right with two dashes. The turtle turns left and does it again going up. It ends 6 squares right of the start and 6 squares up, facing left.

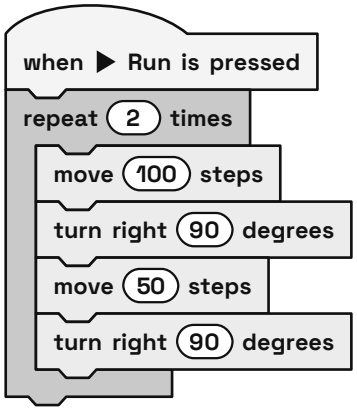
MARKING SCHEME

- ✓ Two dashes of 2 squares going right, with a gap of 1 square after each (no line in the gaps: the pen is up).
- ✓ After a left turn, two more dashes of 2 squares going up from the end of the first gap, the same way.
- ✓ The turtle's end marked 6 squares right and 6 squares up from the start, facing left.

Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking

5 Write the blocks

a. ANSWER A · 3



A rectangle 100 steps long and 50 steps high. Its long side and short side come twice, so the loop repeats 2 times. (Eight blocks without a loop also draw it.)

MARKING SCHEME

- ✓ A repeat 2 times block with the side blocks inside it (a correct script of 8 blocks without a loop gets the other 2 marks only).
- ✓ move 100 steps and move 50 steps, in that order.
- ✓ turn right 90 degrees after each move.

b. MARKING SCHEME U · 2

- ✓ 5 in the repeat block.
- ✓ 72 in the turn block.

6 Find and fix the bug

MARKING SCHEME A · 3

- ✓ An open shape that doesn't close (it turns only 6 × 30° = 180°, half of a 12-sided shape).
- ✓ Block 4, turn right 30 degrees.
- ✓ turn right 60 degrees.

7 Short answers

a. MARKING SCHEME U · 2

- ✓ The program is shorter and easier to read (3 blocks for a square instead of 8).
- ✓ To change it, you change one number instead of many, so there is less chance of a mistake.

b. MARKING SCHEME K · 2

- ✓ Any one event and what happens, such as tapping an icon (the app opens) or a call coming in (the phone rings).
- ✓ Any second, such as pressing the volume button (the sound changes) or the alarm time arriving (the alarm rings).

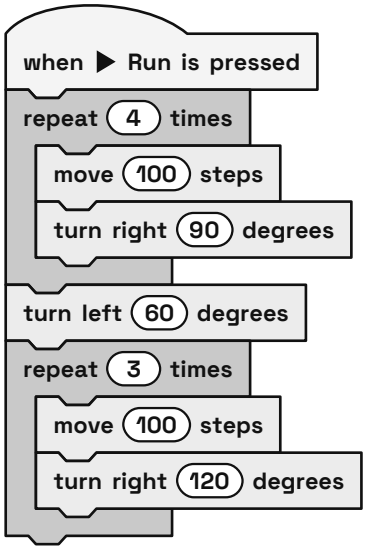
Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking

8 Long answer

ANSWER **A · 4**

i. Draw the square; turn the turtle to face up the roof's left side; draw the triangle.

ii.



After the square the turtle is back at the top-left corner, facing right. Turning left 60° points it up the roof's left side; it turns 120° at the top, comes down the right side, turns 120° again and runs back along the square's top side.

MARKING SCHEME

- ✓ The parts: the square, a turn to face up the roof, then the triangle.
- ✓ The square: repeat 4 times: move 100 steps, turn right 90 degrees.
- ✓ A turn of left 60 degrees between the square and the roof.
- ✓ The roof: repeat 3 times: move 100 steps, turn right 120 degrees (another order of blocks that draws the same house is right too).

9 Think

ANSWER **HA · 2**

5 × 144° = 720°, which is two whole turns. A star's lines cross each other, so the turtle goes all the way round the middle twice before it is back where it started, facing the way it began. A pentagon goes round once, 5 × 72° = 360°.

MARKING SCHEME

- ✓ 5 × 144° = 720°, two whole turns.
- ✓ The star's lines cross, so the turtle goes round the middle twice before it is back at the start facing the same way (a pentagon goes round once, 360°).

10 Activity: Be the turtle

(not marked)

WHAT STUDENTS SHOULD FIND

The first walks a square and the second a triangle: both end where they started, facing the way they began, after turning one whole turn (4 × 90° = 360°, 3 × 120° = 360°). The third turns only 3 × 60° = 180°: the turtle ends facing the opposite way, away from the start, having walked half of a hexagon. Walking it shows why the turn is measured from the way the turtle was going.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	7	8	18	2	**35**

Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking