Grade 7 Computing

Unit 3 · Programming: Variables and Choices

ANSWER KEY · FOR TEACHERS

Full marks 32

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. variable
2. input
3. condition
4. comparison operators
5. Boolean
6. string
7. selection
8. trace table

Each carries 0.5 mark. **K · 4**

2 Label the diagram

1. true
2. false
3. set fare to 0
4. set fare to 30

Each carries 0.5 mark. **U · 2**

3 Multiple choice

i. **c.** 2 **U · 1**

After the first two blocks **score** holds 8. Then **set score to 0** throws the 8 away and puts in 0, and **change score by 2** makes it 2. **set** replaces; **change** adds.

ii. **b.** 105 **U · 1**

join sticks two pieces together one after the other, with nothing between: 10 then 5 is 105. To add them as numbers, use **10 + 5**, which makes 15.

iii. **c.** marks $>$ 39 **A · 1**

40 is not more than 40, and not less than 40, so the first two are false. 40 is more than 39, so **marks $>$ 39** is true. It means "40 or more" for whole marks.

iv. **a.** age $<$ 5 **A · 1**

"Under 5" means 0, 1, 2, 3 or 4: less than 5. **age $<$ 6** would also let 5-year-olds ride free, and **age $=$ 5** is true only for 5-year-olds, who must pay.

v. **b.** Keep trying **U · 1**

7 is not more than 7, so the condition is false and the **else** blocks run. An if/else always runs exactly one of its two parts.

4 True or false

i. ✓ **True**
ii. ✗ **False:** 6 is not more than 6.
iii. ✓ **True**
iv. ✗ **False:** 9 is not less than 6.

Each carries 0.5 mark. **A · 2**

5 What does it say?

a. **MARKING SCHEME** **U · 2**

✓ 8: 5, then 3 added.
✓ `Score:` 2: **set** threw the 8 away and put in 0, then 2 was added.

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b. MARKING SCHEME A · 2

- ✓ 15: **+** adds the two numbers.
- ✓ 123: **join** puts the two side by side, as text.

6 Trace the program

ANSWER A · 3

Step	Block	n	total	Says
1	ask	4		
2	set total to n × 2	4	8	
3	if total > 10? false	4	8	
4	change total by 5	4	13	
5	say total	4	13	13

8 is not more than 10, so the condition is false and the **else** block runs: the program says **13**.

MARKING SCHEME

- ✓ n = 4 and total = 8 after steps 1 and 2.
- ✓ The condition 8 > 10 is false, so step 4 is the else block, change total by 5.
- ✓ total = 13, and the program says 13.

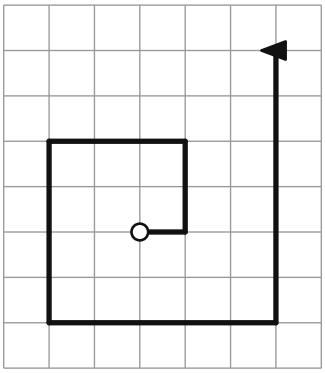
7 Find and fix the bug

MARKING SCHEME A · 3

- ✓ i. “Thank you!”, which is wrong: 5 notebooks should get the pen (5 is not more than 5).
- ✓ ii. Line 2: **notebooks > 5** leaves out 5 itself.
- ✓ iii. **if notebooks > 4 then** (for whole notebooks, “5 or more” is > 4).

8 Draw what the turtle draws

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.

A square spiral. Each line is one square longer than the one before: 1 square right, 2 up, 3 left, 4 down, 5 right, 6 up, turning left after each. The turtle ends 3 squares right of the start and 4 squares up, facing left.

MARKING SCHEME

- ✓ Lines of 1, 2, 3, 4, 5 and 6 squares, each one square longer than the one before.
- ✓ A left turn after each, so the lines go right, up, left, down, right, up: a spiral growing outwards.
- ✓ The end marked 3 squares right and 4 squares up from the start, facing left.

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9 Long answer

ANSWER **A · 4**

Variable: **marks**, a number (what the student types).

```
ask “Marks out of 100?” and keep the answer in marks
if marks > 79 then
    say “Distinction”
else
    if marks > 39 then
        say “Pass”
    else
        say “Not yet”
```

Tests: 95 → Distinction; 80 → Distinction; 79 → Pass; 40 → Pass; 39 → Not yet. (Other designs that give the same answers are right too, for example checking “< 40” first.)

MARKING SCHEME

- ✓ The variable **marks**, a number, kept from an **ask**.
- ✓ An if/else with **marks** > **79** (or another condition that is true for exactly 80 and up) for “Distinction”.
- ✓ A second, nested if/else that says “Pass” for 40 to 79 and “Not yet” below 40.
- ✓ Five tests with the right answer for each, including both sides of each edge (79/80 and 39/40).

10 Think

ANSWER **HA · 2**

10, in the middle (11 is as good). Whatever the answer, “bigger” or “smaller” then leaves only about half the numbers. Keep guessing the middle of the numbers that are left: each guess halves them, so you can always find the number within 5 guesses. This trick is called binary search.

MARKING SCHEME

- ✓ A guess in the middle (10 or 11), because whatever the answer, it leaves only about half the numbers.
- ✓ Keep guessing the middle of what is left, halving the numbers each time (binary search): never more than 5 guesses.

11 Activity: Be the computer

(not marked)

WHAT STUDENTS SHOULD FIND

A player who guesses the middle each time (10, then 5 or 15, and so on) always finds the number within 5 guesses and keeps at least 1 point. Random guesses often run out of guesses. The Points column is a variable that changes, and “right or not” is a true/false variable, as in the unit’s game.

Marks by level	Knowledge	Understanding	Application	Higher ability	**Total**
Marks	4	7	19	2	**32**

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