

Past-paper walk-through

Developing Procedures ■ 3.13

eXercise

Questions in this set

- 2025 Set 1 Q2
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Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 2

2025 Set 1 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(a) Consider the first selection statement included in the Procedure section of your Personalized Project Reference. Identify the Boolean expression in this selection statement. Identify a specific value or set of values that will cause this expression to evaluate to true. Explain why the specified value(s) will cause the expression to evaluate to true.

Question 2

2025 Set 1 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(b) Consider the procedure included in part (i) of the Procedure section of your Personalized Project Reference. Suppose another programmer modifies the code within this procedure. Describe a modification the other programmer could make that would cause this procedure to have a logic error. Describe how the behavior of this procedure would change because of the error.

Question 2

2025 Set 1 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(c) Consider the list included in the List section of your Personalized Project Reference. Suppose another programmer adds several new elements to the end of the list. Explain how the code segment in part (ii) of the List section would need to be modified to account for the additional elements. If no changes to the code segment are necessary, explain why this is the case for your program.

Solution 2

(a) Mark scheme

- Written Response 2a (Algorithm Development), scored 0-1 points against the student's own PPR – no single fixed answer exists. To earn the point the response must: (1) identify the Boolean expression in the first selection statement in the Procedure section of the PPR (if multiple selection statements exist, use the first one; the header form, e.g. 'if ($x > 2$)', is acceptable instead of just ' $x > 2$ '; it need not be stated verbatim as long as it is described, and need not be inside a procedure), (2) identify a specific value or set of values that will cause that Boolean expression to evaluate to true, and (3) explain why the specified value(s) cause it to evaluate to true. The selection statement may or may not contain an else clause. Do NOT award the point if the PPR's Procedure section has no

Solution 2

selection statement, if the identified Boolean expression doesn't match the first selection statement's code, if the identified true-causing value(s) don't match that code, or if the identified expression/value is implausible, inaccurate, or inconsistent with the program.

Solution 2

(b) Mark scheme

- Written Response 2b (Errors and Testing), scored 0-1 points against the student's own PPR – no single fixed answer exists. To earn the point the response must:
(1) describe a modification another programmer could make to the procedure in part (i) of the PPR's Procedure section that would cause it to have a logic error (a mistake causing incorrect/unexpected behavior, including a described crash), and (2) describe how the procedure's behavior would change because of that introduced error. The modification may be a code change, addition, or deletion. If multiple procedures are given, use the one the response references (or the first procedure if none is referenced). If more than one modification is described, the behavior change must be correctly described for every one of them. Do NOT

Solution 2

award the point if no procedure is included in part (i) of the Procedure section, if the response doesn't apply to that procedure, if the response only states the program 'will not run' without further explanation, or if the described modification/behavior change is implausible, inaccurate, or inconsistent with the procedure.

Solution 2

(c) Mark scheme

- Written Response 2c (Data and Procedural Abstraction), scored 0-1 points against the student's own PPR – no single fixed answer exists. To earn the point the response must EITHER (a) explain how the code segment that accesses or manipulates data stored in the list (or other collection type) from part (i) of the PPR's List section would need to change if another programmer appended several new elements to the end of the list, OR (b) explain why no change to that code segment would be necessary. If multiple lists are given, use the list(s) the response references (or the first list if none is referenced); the point can still be earned if the described modification changes the program's functionality. Do NOT award the point if no list/collection is included in part (i) of the List section, if the

Solution 2

response doesn't apply to that list, if the list's use is trivial and doesn't help fulfil the program's purpose, if the described modification makes the list unnecessary, or if the explanation is implausible, inaccurate, or inconsistent with the program.

Question 2

2025 Set 2 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(a) Consider the first selection statement included in the Procedure section of your Personalized Project Reference. Identify the Boolean expression in this selection statement. Identify a specific value or set of values that will cause this expression to evaluate to false. Explain why the specified value(s) will cause this expression to evaluate to false.

Question 2

2025 Set 2 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(b) Consider the code segment in part (ii) of the List section of your Personalized Project Reference. Suppose another programmer modifies this code segment. Describe a modification the other programmer could make to this code segment that would result in a logic error. Explain why this modification would result in a logic error.

Question 2

2025 Set 2 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(c) Consider the procedure identified in part (i) of the Procedure section of your Personalized Project Reference. Describe the functionality provided by this procedure. Explain how implementing this functionality as a procedure results in your program being easier to maintain than if the functionality were not implemented as a procedure.

Solution 2

(a) Mark scheme

- Create Performance Task — Written Response 2a: Algorithm Development (0–1 pt). Scored against the FIRST selection (if) statement in the Procedure section of the student's own Personalized Project Reference — no fixed numeric answer. Full credit (1 point) requires ALL three: (1) correctly identify the Boolean expression from that first selection statement (e.g., for 'if (score > 2)' the expression is 'score > 2'; naming the full 'if (...) ' header instead of just the expression is also acceptable); (2) give a specific value or set of values for the variable(s) in the expression that makes it evaluate to 'false' — e.g., 'score = 2' or 'score = 0' both make 'score > 2' false; (3) explain WHY that value makes the expression false — e.g., 'because 2 is not greater than 2, the condition score > 2

Solution 2

evaluates to false'. The statement doesn't need to be inside a procedure, and may or may not have an else clause. No credit if: the Procedure section has no selection statement; the identified expression doesn't match the actual code; the given value wouldn't actually make the real expression false; or the expression/value is implausible or inconsistent with the program.

Solution 2

(b) Mark scheme

- Create Performance Task — Written Response 2b: Errors and Testing (0–1 pt). Scored against the code segment shown in part (ii) of the List section of the student's own Personalized Project Reference — no fixed answer. Full credit (1 point) requires: (1) describe ONE specific modification to that code (changing, adding, or deleting a statement — anywhere in the part (ii) code, not necessarily to the list itself) — e.g., 'change the loop bound from `len(myList)` to `len(myList) + 1`', or 'change the index used to access the list from `i` to `i + 1`'; (2) explain why that modification causes a LOGIC ERROR — i.e., why the program would then behave incorrectly or unexpectedly (a crash counts as a logic error too, e.g. an out-of-bounds index) — e.g., 'this would make the program try to access an index

Solution 2

that doesn't exist in the list, so it would crash or read/use the wrong data, giving an incorrect result even though the program keeps running'. If more than one modification is described, ALL of them must be correctly explained to earn the point. No credit for: stating only 'the program won't run' with no further explanation; a list/collection not actually present in part (ii); a modification/explanation that doesn't match the real code in part (ii); or an implausible/inaccurate explanation.

Solution 2

(c) Mark scheme

- Create Performance Task — Written Response 2c: Data and Procedural Abstraction (0–1 pt). Scored against the procedure identified in part (i) of the Procedure section of the student's own Personalized Project Reference — no fixed answer. Full credit (1 point) requires BOTH: (1) describe what the identified procedure actually does (its functionality) — e.g., 'the checkWin procedure checks whether the player's score has reached the target value and returns true or false'; (2) explain how implementing that functionality AS A PROCEDURE (rather than repeating the same code inline everywhere it's needed) makes the program easier to maintain — e.g., 'because the win-checking logic exists in one place inside the procedure, if the winning condition changes later the programmer only has to edit

Solution 2

it once instead of finding and fixing every copy of that logic scattered through the program, which reduces the chance of missing a spot or introducing new bugs'. The response does not need to mention a parameter; if it does, an explicit or an implicit parameter is both acceptable. No credit if: no procedure is included in part (i); the response describes a different procedure than the one in part (i); or the maintainability explanation is vague or incorrect (e.g., just 'it makes the code shorter/organized' without tying it to why future maintenance is easier).

Question 2

2024 Set 1 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(a) Consider the first iteration statement included in the Procedure section of your Personalized Project Reference. Describe what is being accomplished by the code in the body of the iteration statement.

Question 2

2024 Set 1 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(b) Consider the procedure identified in part (i) of the Procedure section of your Personalized Project Reference. Write two calls to your procedure that each cause a different code segment in the procedure to execute. Describe the expected behavior of each call. If it is not possible for two calls to your procedure to cause different code segments to execute, explain why this is the case for your procedure.

Question 2

2024 Set 1 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(c) Suppose another programmer provides you with a procedure called `checkValidity(value)`

Question 2

that returns `true` if a value passed as an argument is considered valid by the other programmer and returns `false` otherwise. Using the list identified in the List section of your Personalized Project Reference, explain in detailed steps an algorithm that uses `checkValidity` to check whether all elements in your list are considered valid by the other programmer. Your explanation must be detailed enough for someone else to write the program code for the algorithm that uses `checkValidity`.

Solution 2

(a)

Mark scheme

- Written Response 2(a) — Algorithm Development (1 point). Describe what is being accomplished by the code in the body of the iteration (loop) statement — a summary of what the iteration does in the context of the program, or the purpose of the statements in the loop body. Do NOT award if: the procedure contains no iteration statement; the description does not match the code in the loop body; the response only restates the lines of code; the iteration is trivial; or the described behaviour is implausible/inconsistent with the program.

Solution 2

(b) Mark scheme

- Written Response 2(b) — Errors and Testing (1 point). Give two calls to the student-developed procedure where each call causes a DIFFERENT program code segment to execute, and describe the expected behaviour of each call — OR explain why it is not possible for two calls to cause different code segments to execute. The procedure must use an explicit parameter (defined in the header) whose value changes which code segment runs. A description of each call (rather than exact code) and a general description of argument values are acceptable. Do NOT award if: no procedure/explicit parameter is identified; the parameter is irrelevant; the two calls are to different procedures; or the described behaviour is inconsistent with the program.

Solution 2

(c) Mark scheme

- Written Response 2(c) — Data and Procedural Abstraction (1 point). Explain, in detailed steps, an algorithm (in code, pseudocode, or plain English) that uses the list to check whether all of its elements are valid, describing how each element of the identified list is passed into the validity check at least up to the first invalid element. Do NOT award if: no list is identified; the algorithm assumes the list contains a single element; the identified list is not referenced in the response; the response implements the validity check rather than describing its use; or the response is too vague for another programmer to recreate the algorithm.

Question 2

2024 Set 2 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(a) Consider the first conditional statement included in the Procedure section of your Personalized Project Reference. Describe your conditional statement, including its Boolean expression. Describe what the procedure does in general when the Boolean expression of this conditional statement evaluates to false.

Question 2

2024 Set 2 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(b) Consider the procedure and procedure call identified in parts (i) and (ii) of the Procedure section of your Personalized Project Reference. Describe the outcome that your procedure call is intended to produce. Write a new procedure call with at least one different argument value that will produce the same outcome, if possible, and explain why this procedure call produces the same outcome. If it is not possible to write a new procedure call that produces the same outcome, explain why this is not possible.

Question 2

2024 Set 2 ■ Q2

Refer to your Personalized Project Reference when answering this question.

(c) Consider the procedure identified in part (i) of the Procedure section of your Personalized Project Reference. Identify the parameter(s) used in this procedure. Explain how your identified parameter(s) use abstraction to manage complexity in your program.

Solution 2

(a)

Mark scheme

- Written Response 2(a) — Algorithm Development (1 point). Describe what is being accomplished by the code in the body of the iteration (loop) statement — a summary of what the iteration does in the context of the program, or the purpose of the statements in the loop body. Do NOT award if: the procedure contains no iteration statement; the description does not match the code in the loop body; the response only restates the lines of code; the iteration is trivial; or the described behaviour is implausible/inconsistent with the program.

Solution 2

(b) Mark scheme

- Written Response 2(b) — Errors and Testing (1 point). Give two calls to the student-developed procedure where each call causes a DIFFERENT program code segment to execute, and describe the expected behaviour of each call — OR explain why it is not possible for two calls to cause different code segments to execute. The procedure must use an explicit parameter (defined in the header) whose value changes which code segment runs. A description of each call (rather than exact code) and a general description of argument values are acceptable. Do NOT award if: no procedure/explicit parameter is identified; the parameter is irrelevant; the two calls are to different procedures; or the described behaviour is inconsistent with the program.

Solution 2

(c) Mark scheme

- Written Response 2(c) — Data and Procedural Abstraction (1 point). Explain, in detailed steps, an algorithm (in code, pseudocode, or plain English) that uses the list to check whether all of its elements are valid, describing how each element of the identified list is passed into the validity check at least up to the first invalid element. Do NOT award if: no list is identified; the algorithm assumes the list contains a single element; the identified list is not referenced in the response; the response implements the validity check rather than describing its use; or the response is too vague for another programmer to recreate the algorithm.