

MARK SCHEME for the May/June 2015 series

9691 COMPUTING

9691/31

Paper 3 (Written Paper), maximum raw mark 90

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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1 (a) (i) The table has a repeated group of attributes

(ii) ClassName and ClassLevel and ClassLeader is repeated for each MemberNo

(b) (i)

MemberNo	MemberType	Trainer
510	SF	SAF
808	SS	OLO
756	J	DAV

[1]

(ii)

MemberNo	ClassName	ClassLevel	Trainer
510	Yoga B	B	OLO
808	Swimathon	A	ROG
756	Circuits	I	VAR

Any three correct rows from the original table

All 3 correct – 2 marks

2 correct – 1 mark

1 correct only scores 0

[2]

(iii) 8

[1]

(iv) One to many // 1-to-M

[1]

(v) Primary key / MemberNo in the MEMBER table

(1)

Links to foreign key in the MEMBERCLASSES table

(1)

[2]

(c) (i) MemberNo + ClassName

[1]

(ii) There are a non-key attribute(s) dependant on only part of the primary key // there are partial dependencies

(1)

ClassLevel/ClassLeader is dependent on ClassName

(1)

[2]

Page 3	Mark Scheme	Syllabus Paper
	Cambridge International A Level – May/June 2015	969

(iii) MEMBERCLASSES (MemberNo, ClassName)

CLASS (ClassName, ClassLevel, ClassLeader)

mark as follows:

MEMBERCLASSES has only MemberNo, ClassName (1)

(ignore primary key for MEMBERCLASSES)

new table CLASS (1)

CLASS has 3 attributes ClassName, ClassLevel, ClassLeader (1)

ClassName as primary key (1)

[Max 3]

(d) (i) There are non-key attributes which are dependent (may be stated as part of the attribute description) // transitive dependencies (1)

MemberTypeFee is dependent on MemberType (1)

There is no need to store the MemberTypeFee in the MEMBER table (1)

[Max 2]

(ii) MEMBER (MemberNo, MemberType, Trainer) (1)

FEES (MemberType, MemberTypeFee) (1) [2]

[Total: 19]

2 (a) Alternatives // OR [1]

(b) Rule 2 (1)

The rule is defined in terms of itself / calls itself (1) [2]

(c) (i) Valid (1)

All five rules are used once only (1) [2]

(ii) Invalid (1)

5, 3 // 3, 5 (only) (1) [2]

(iii) Valid (1)

Rule 1 – three times

Rule 2 – three times

Rule 3 – once

Rule 4 – once

Rule 5 – at least once (1) [2]

(iv)

5	$\langle \text{Packet} \rangle ::= \langle \text{Start} \rangle \langle \text{String} \rangle \langle \text{Stop} \rangle \mid \langle \text{Start} \rangle \langle \text{HashString} \rangle \langle \text{Stop} \rangle$
6	$\langle \text{Hash} \rangle ::= \#$
7	$\langle \text{HashString} \rangle ::= \langle \text{Hash} \rangle \mid \langle \text{Hash} \rangle \langle \text{HashString} \rangle$

Mark as follows:

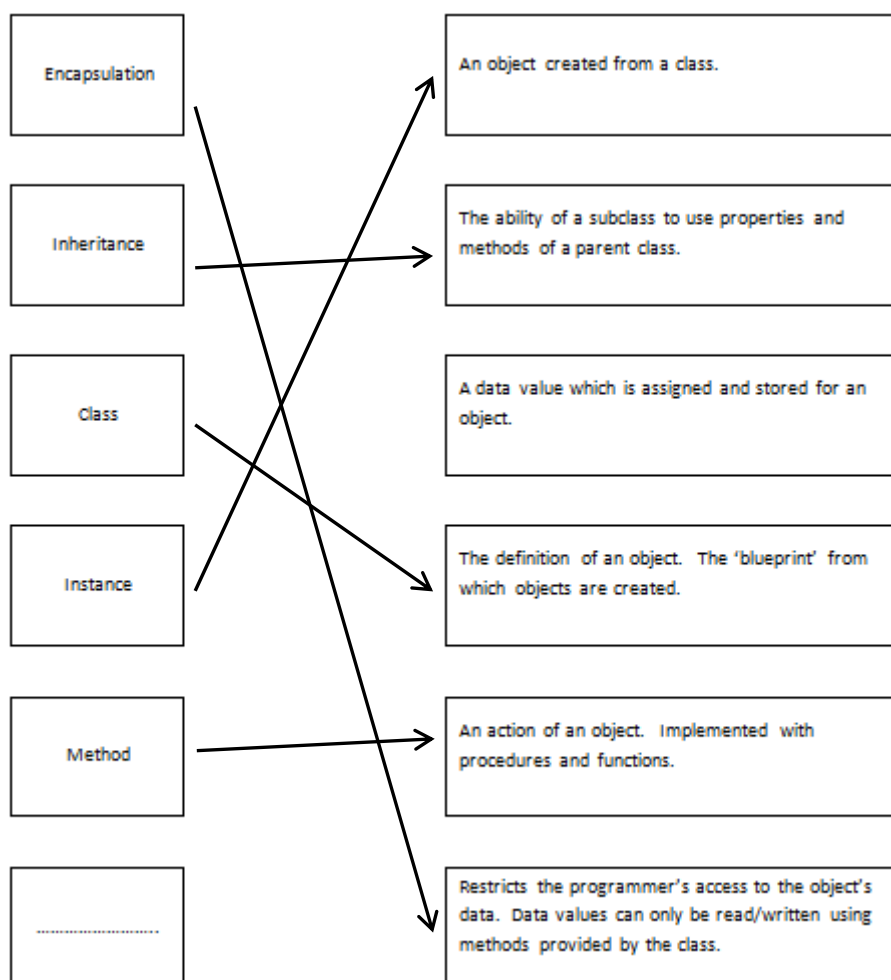
$\langle \text{Hash} \rangle ::= \#$ (1)

$\langle \text{HashString} \rangle ::= \langle \text{Hash} \rangle \mid \langle \text{HashString} \rangle \langle \text{Hash} \rangle$ (1)

$\langle \text{Packet} \rangle ::= \langle \text{Start} \rangle \langle \text{String} \rangle \langle \text{Stop} \rangle \mid \langle \text{Start} \rangle \langle \text{HashString} \rangle \langle \text{Stop} \rangle$ (1) [3]

[Total: 12]

3 (a)



Each term matched to its correct description × 5
 Missing term – Property / **A.** Attribute

(5)
 (1) [6]

Page 6	Mark Scheme	Syllabus
	Cambridge International A Level – May/June 2015	969

(b) The class diagram includes:

PERMANENT + CONTRACT subclasses (1)

PROGRAMMER + WEBDESIGNER subclasses of PERMANENT
and no other subclasses (1)

Note: for the two above marks – correct class names only

Recognised notation for inheritance (from CONTRACT and PERMANENT only) (1)

Note: property/group of properties cannot be repeated in any subclasses

EMPLOYEE class DateFirstJoined : DATE/STRING (1)

PERMANENT class SalaryGrade : STRING/INTEGER/CHAR
CourseList : STRING (1)

WEBDESIGNER class MarkupLanguage : STRING (1)

PROGRAMMER class Language : STRING (1)

CONTRACT class AgencyName : STRING
HourlyRate : REAL/CURRENCY (1)

JobRole : STRING

[8]

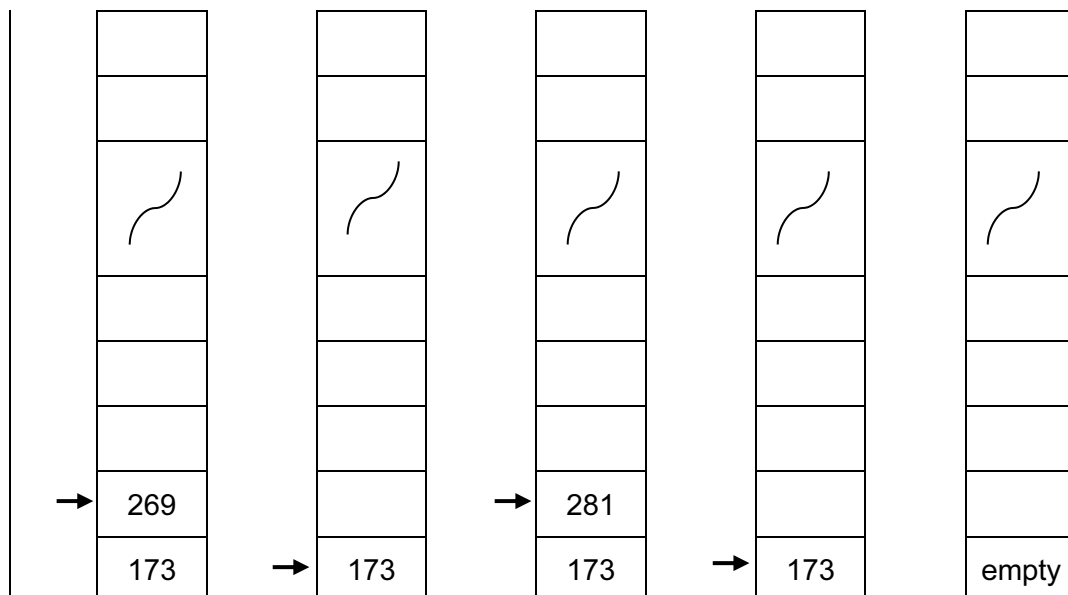
Note: accept any reasonable variations for the property identifiers

[Total: 14]

4 (a) Last item in is the first item out // First item in is the last item out

R. LIFO

(b) (i)



Mark as follows:

1 mark per correct change $\times 5$

Note: Final 'empty' contents is conditional on one value only in the previous stack

1 mark for consistent TOS pointing to 'their' stack contents (allow omitted from final stack)

[Max 5]

(ii) PROCEDURE PushAddress

IF TOS = 100

THEN

OUTPUT "Stack/memory is FULL"

(1)

ELSE

INPUT NewAddress

(1)

TOS $\leftarrow$ TOS + 1

(1)

Stack[TOS] $\leftarrow$ NewAddress

(1)

ENDIF

ENDPROCEDURE

[4]

Page 8	Mark Scheme	Syllabus
	Cambridge International A Level – May/June 2015	9690

(c)

PROCEDURE PopAddress

IF **TOS = 0** // **TOS < 1**

THEN

OUTPUT "There are no current procedure calls"

ELSE

OUTPUT "Address " Stack[TOS]

TOS ← TOS - 1

ENDIF

ENDPROCEDURE

(1)

(1)

[2]

[Total: 12]

5 (a) (i) 111
6F

(ii) -29
E3

(1)
(1) [2]

(b) -128

[1]

(c) Fewer digits used to represent any number // long string difficult to interpret

(1)

Less likely to make a mistake when copying/converting a digit string

(1)

Easy to convert from binary/denary to hex (vice versa) (than binary to denary)

(1)

[Max 1]

(d)

124	0	1	1	1	1	1	0	0
7	0	0	0	0	0	1	1	1
	1	0	0	0	0	0	1	1

+

124 and 7 correct pattern

(1)

Correct addition // ft

(1)

Overflow has occurred // the answer should be 131/their 'ft' value is outside the possible range // the final pattern is a negative value

(1) [3]

(e) (i) 9837

[1]

(Exact – with no additional characters)

(ii) 1101 is not a valid BCD digit string // 1101 represents 13

[1]

[Total: 11]

Page 10	Mark Scheme	Syllabus
	Cambridge International A Level – May/June 2015	969

6 (a) Systems flowchart

- (b)
- 1 – Source code in language XYZ
 - 2 – Text editor
 - 3 – Source code in assembly language
 - 4 – Error report
 - 5 – Program library code
 - 6 – Linker
 - 7 – Loader

[7]

(c) Benefit:

Interpreter makes for easier debugging // better diagnostics (1)

Testing can be done without all the code being written (1)

(Max 1)

Drawback:

Interpreter needed/source code always present every time program execution attempted (1)

Execution will be slower (1)

(Max 1)

[2]

[Total: 10]

Page 11	Mark Scheme	Syllabus
	Cambridge International A Level – May/June 2015	9690

7 (a) • Twisted pair

Two copper wires insulated from each other and twisted together

- Coaxial cable

Central copper wire shielded from outer metal mesh

- Optical fibre

Glass strands to send light/optical signals

- Electro-magnetic / long wavelength communication

radio waves / microwave // satellite communication // mast relays
'wireless' but not in the context of WiFi

2 × (Name – 1 mark + Description – 1 mark)

[Max 4]

(b) Mark as follows:

- End terminator for the LAN cable X 2 (1)
- C4 computer + Laser printer connected to the cable (1)
- File server labelled Server Y connected to the cable (1)
- Firewall / Proxy server + Indication of a connection to the WAN/other shop (1)
- Router at Shop A / Shop B / Shop C's LAN to connect to the WAN/other shop (1)
- Modem + Indication of a connection to the WAN/other shop (1)

[Max 4]

(c) (i) Web server [1]

(ii) (Web) browser [1]

- (iii) Information being communicated may be sensitive/confidential/secure // needs protection from being seen by unauthorised people // content only available within the organisation
 Good control of who can access/update the content
 Information on system will be relevant/accurate/reliable
 Should reduce paperwork
 Presents information using a familiar interface/browser software // Provides web server content to client computers
 Intranet uses the same communication protocols as the Internet

[Max 2]

[Total: 12]