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Mark Scheme (Results)

January 2014

Pearson Edexcel Functional Skills Mathematics Level 2 (FSM02)

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Guidance for Marking Functional Mathematics Papers

General

- All candidates must receive the same treatment. You must mark the first candidate in exactly the same way as you mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- All the marks on the mark scheme are designed to be awarded. You should always award full marks if deserved, i.e. if the answer matches the mark scheme. You should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

Applying the Mark Scheme

- The mark scheme has a column for **Process** and a column for **Evidence**. In most questions the majority of marks are awarded for the process the candidate uses to reach an answer. The evidence column shows the most likely examples you will see:
  if the candidate gives different evidence for the process, you should award the mark(s).
- **Finding 'the answer'**: in written papers, the demand (question) box should always be checked as candidates often write their 'final' answer or decision there. Some questions require the candidate to give a clear statement of the answer or make a decision, in addition to working. These are always clear in the mark scheme.
- If working is **crossed out and still legible**, then it should be marked, as long as it has not been replaced by alternative work.
- If there is a **choice of methods** shown, then marks should be awarded for the 'best' answer.
- A suspected **misread** may still gain process marks.

- It may be appropriate to **ignore subsequent work** (isw) when the candidate's additional work does not change the meaning of their answer. You are less likely to see instances of this in functional mathematics.
- You will often see correct working followed by an incorrect decision, showing that the candidate can calculate but does not understand the demand of the functional question. The mark scheme will make clear how to mark these questions.
- **Transcription** errors occur when the candidate presents a correct answer in working, and writes it incorrectly on the answer line; mark the better answer.
- **Follow through marks** must only be awarded when explicitly allowed in the mark scheme. Where the process uses the candidate's answer from a previous step, this is clearly shown. Speech marks are used to show that previously incorrect numerical work is being followed through, for example '**240**' means **their** 240.
- Marks can usually be awarded where **units** are not shown. Where units, including money, are required this will be stated explicitly. For example, 5(m) or (£)256.4 indicate that the units do not have to be stated for the mark to be awarded.
  - **Correct money notation** indicates that the answer, in money, must have correct notation to gain the mark. This means that money should be shown as £ or p, with the decimal point correct and 2 decimal places if appropriate.
    e.g. if the question working led to £12÷5,
    Mark as correct: £2.40 240p £2.40p
    Mark as incorrect: £2.4 2.40p £240p 2.4 2.40 240
  - Candidates may present their answers or working in many **equivalent** ways. This is denoted **o.e.** in the mark scheme. Repeated addition for multiplication and repeated subtraction for division are common alternative approaches. The mark scheme will specify the minimum required to award these marks.
  - A **range** of answers is often allowed :
    - [12.5,105] is the inclusive closed interval
    - (12.5,105) is the exclusive open interval

- **Parts of question**s: because most FS questions are unstructured and open, you should be prepared to award marks for answers seen in later parts of a question, even if not explicit in the expected part.
- Discuss any queries with your Team Leader

Graphs

The mark schemes for most graph questions have this structure:

Process		**Evidence**
Appropriate graph or chart – (e.g. bar, stick, line graph,)	**1 or**	1 of linear scale(s), labels, plotting (2mm tolerance)
	2 or	2 of linear scale(s), labels, plotting (2mm tolerance)
	3	all of linear scale(s), labels, plotting (2mm tolerance)

The mark scheme will explain what is appropriate for the data being plotted.

A **linear scale** must be linear **in the range where data is plotted**, whether or not it is broken, whether or not 0 is shown, whether or not the scale is shown as broken. Thus a graph that is 'fit for purpose' in that the **data is displayed clearly and values can be read**, will gain credit.

The minimum requirements for **labels** will be given, but you should give credit if a title is given which makes the label obvious.

Plotting must be correct for the candidate's scale. Award the mark for plotting if you can read the values clearly, even if the scale itself is not linear.

The mark schemes for **Data Collection Sheets** refer to **input opportunities** and to **efficient input opportunities**. When a candidate gives an input opportunity, it is likely to be an empty cell in a table, it may be an instruction to 'circle your choice', or it may require writing in the data in words. These become efficient, for example, if there is a well-structured 2-way table, or the input is a tick or a tally rather than a written list.

Section A: An International Company

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q1(a)	I6	Interprets time zones	1	A	11.30 am or 11:30 o.e. Any standard time format
Q1(b)	R2	Process to work with time	1 or	B	Gives a pair of concurrent times, at least one of them is within office hours OR shows correct process for concurrent times in two cities, at least one city is within office hours. Condone missing or incorrect finish times.
	I7	Begins to interpret time zones and office hours	2 or	BC	Gives a pair of concurrent times, both within office hours OR Gives three concurrent times, at least one city is within office hours OR shows correct process for concurrent times in three cities, at least one city is within office hours
	A5	Complete solution for all cities	3	BCD	Finds a suitable start and finish time for the conference in all 3 cities. Times must be concurrent and start times limited between A[15:00, 17:00] L[13:00, 15:00] NY[8:00, 10:00 am]
Total marks for question			4		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q2	R1	Begins to work with percentage	1 or	E	$\frac{30}{100}\times 10\left(=3\right)$ oe
	A4	Complete process to find total number of people	2	EF	$\frac{130}{100}\times 10\left(=13\right)$ OR 10+3(=13)
	R3	Process to work with area	1 or	G	15 × 9(=135) OR '13' × 12(=156) OR 10 × 12+ '3'× 12(=156)
	A4	Process to find figures to compare	2 or	GH	15 × 9 (=135) and '13' × 12(=156) OR '135'÷12(=11.25...) OR '135'÷ '13'(=10.38...)
	I6	Correct decision from accurate figures	3	GHJ	No and 135 (m^2) and 156 (m^2) OR No and 21 (m^2) (extra required) OR No and 11(.25) (people) OR No and 10.38 ... (m^2) or 10.4 (m^2)
Total marks for question			5		

<table>
<tr><th>Question</th><th>Skills Standard</th><th>Process</th><th>Mark</th><th>Mark Grid</th><th>Evidence</th></tr>
<tr><td rowspan="3">Q3(a)</td><td>R2</td><td>Process to use ratio</td><td>1 or</td><td>K</td><td>12 ÷2(=6) OR 15 ÷ 3(=5) OR
3:2, 6:4, 12:8 OR 15:12, 5:4: 2.5:2 OR 3:2 and 15:12</td></tr>
<tr><td>A4</td><td>Process to find number of staff needed</td><td>2 or</td><td>KL</td><td>‘6’×3(=18) OR ‘5’×2(=10) OR 18:12 OR 15:10 OR
12 × ‘1.5’(=18) OR 3:2 and 5:4 OR 15:12, 3:2.4 OR
Complete build-up method</td></tr>
<tr><td>I7</td><td>Conclusion with evidence from correct figures</td><td>3</td><td>KLM</td><td>No
E.g.
18 salespeople are needed OR
Only 10 office workers would be needed OR
15:12 in lowest form is 5:4, not 3:2
Allow table for build up method with clear explanation.
<table><tr><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td></tr><tr><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr></table></td></tr>
</table>

Q3(b)	R2	Process to work with scale for printer	1 or	N	Rectangle inside printer section with one correct side **and** one of: 2nd correct side at most 3 cm from the power point 1.5 cm × 2 cm **OR** rectangle 0.75 × 1, at most 1.5 cm from plug
	I6	Correct solution for printer using scale and constraints	2	NP	Rectangle inside printer section with 2 correct sides 1.5 cm × 2 cm **AND** at most 3 cm from the power point
	A4	Process to work with scale for table	1 or	Q	Rectangle against wall **or** outside printer section with two of: One side 5 cm One side 3 cm At least 2 cm from door **or** at least 2 cm from cupboard **OR** Rectangle 2.5 × 1.5 against wall **and** at least 1 square from cupboard and door
	I6	Correct solution using scale and constraints for table	2	QR	Rectangle against wall **and** outside printer section with all of: One side 5 cm One side 3 cm At least 2 cm from door **and** at least 2 cm from cupboard
Total marks for question			4		

Section B: Light aircraft

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q4	R1	Begins to work with costs or income.	1 or	A	90 × 8 (= 720) OR 90 × 12 (=1080) OR (2340 + 2884 + 20)÷ 12(=437) OR 262 × 12(=3144) OR 2340 ÷ 8 (=292.5) and 2884 ÷ 8 (= 360.5) and 262 ÷ 8(=32.75) and 20 ÷ 8(=2.5)
	R3	Process to find total figure to compare for costs OR income	2 or	AB	2340 + 2884 + '3144' + 20 (= 8388) OR 90 × 8 × 12 (=8640) OR '437' + 262 (= £699) OR 90 × 8 – 262 (= 458) per month after parking OR '292.5' + '360.5' + (32.75 × 12) + '2.5' (= 1048.5)
	A4	Full process to find figures to compare.	3 or	ABC	2340+ 2884+'3144' + 20 (= 8388) and 90 × 8 × 12(=8640)OR ('437' + 262) ÷ 8 (=87.375) OR '(£)8388'÷8(=1048.50) and 90 × 12 (=1080) OR ('458' × 12) – 2340 – 2884 – 20 (=252) OR 90 × 8 (= 720) and '437' + 262 (= £699) OR '699' ÷ 90 (=7.76...)
	I6	Correct comparison from accurate figures or surplus found.	4	ABCD	Yes AND (£)8640 AND (£)8388 OR Yes AND (£)[87.36, 87.38] OR Yes AND (£)1080 AND (£)1048.5(0) OR Yes AND (£) 720 AND (£)699 Yes AND £252 surplus Yes AND 7.76... people
	A5	Appropriate checking procedure	1	E	E.g. reverse calculation or alternate method or estimation.
Total marks for question			5		

Q5 (a)	R2	Works with consistent units	1 or	F	12 × 4.55(=54.6) OR 2.16 × 4.55(=9.828) OR 150 ÷ 2.16(=69.44..)
	A4	Full process to find figures to compare	2 or	FG	'54.6'× 2.16 (=117.93..) OR '9.828' × 12 (=[117.84, 117.96]) OR 150 ÷'9.828'(=15.26..) OR '69.44' ÷ 4.55(=15.26..)
	I7	Comparison with correct figures.	3	FGH	Yes AND (£) [117.93,117.94], or (£)117.96 OR Yes AND [15.25,15.27] (gallons)
Q5(b)	R2	Correctly calculates time for flight	1	J	160 ÷140 =1.14... OR 1 hr [8,10] min oe
	R3	Process to calculate total flight time (allow their incorrect flight time between 1 hour 5 min and 1 hour 20 min) or starts to process fuel needed	1 or	K	'1.14..' × 7(=8) OR clear narrative for approximation '1.14..' + 0.75(=1.89..) (allow their incorrect flight time between 1 hour 5 min and 1 hour 20 min) OR 20 ÷ 7(=2.85...) OR ¾ hour × 7 (=5.25) (gallons) oe
	A4	Full process to find whether fuel is sufficient	2 or	KL	'1.89..'× 7(=13.25) OR '8' + '5.25'(=13.25) OR 20 ÷ 7(=2.85...) and '1.14..' + 0.75(=1.89..) OR (20 – '8') ÷ 7(=1.71..) OR '8' + enough fuel for at least 45 minutes (= 15)
	I7	Compares using accurate figures or convincing approximation with justification	3	KLM	Yes and 13.25 or 13.3 (gallons) OR Yes and 2.85 (hours) and 1.89 (hours) OR Yes and 1.71 (available hours for emergency flying time) Yes and convincing approximation with justification
		Total marks for question	7		

Q6	R1	Process to calculate flight time	1	N	e.g. 35 + 40 (mins) (=1 hour 15 min) oe May be implicit in subsequent working
	A4	Process to calculate total cost	1 or	P	150 × '1.25'(=187.5) allow 2 hours: 150 × 2 = 300 OR 150 ÷ 3(=50)
	A4	Process to find figures to compare	2 or	PQ	'187.5' × 2 ÷ 3(=125) OR '187.5' ÷ 3(=62.5) OR allow '300' ÷ 3(=100) '50' × 2 × '1.25'(=125)
	I7	Correct decision from accurate figures	3	PQR	(£)125 OR (£)62.5(0)
		Total marks for question	4		

Section C: Energy costs

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q7	R2	Read correctly from graph	1	A	50, [105, 110], [215, 220], 140
	A4	Process to find cost of electricity for 1 year	1	B	'50' + '[105, 110]'+ '[215, 220]'+ '140'(=[510,520])
	R3	Works with consistent time	1 or	C	40 × 12 (=480) OR '[510, 520]' ÷ 12 (= '[42.5, 43.33..]')
	I6	Finds accurate figures to compare	2	CD	[510, 520] AND 480 OR [42.5 , 43.33..]
	I7	Correct decision from their figures provided marks B and C are awarded	1	E	E.g. No AND '480' < '[510,520]' OR No AND '[42.5 , 43.33..]' OR No AND needs to pay [30,40] more per year provided marks B and C are awarded
Total marks for question			5		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q8(a)	R1	Starts to substitute into formula or begins reverse calculation	1 or	F	Multiplies two of 260 × 39 × 1.02 OR Divides by 3.6 OR 2873 × 3.6 (= 10342.8) OR 2873 ÷ 260 (= 11.05) OR 2873 ÷39(= 39.6...) OR 2873 ÷ 1.02(=2816.6...)
	A4	Full process for substitution or reverse calculation	2 or	FG	$Gas(kwh) = \frac{260 \times 39 \times 1.02}{3.6} (= 2873)$ OR Units of gas = $\frac{2873 \times 3.6}{39 \times 1.02} (= 260)$
	I7	Valid decision with correct calculation	3	FGH	Yes with full substitution seen
Q8(b)	R3	Process to calculate standing charge or process to calculate cost of gas	1 or	J	19.2 × 31 (=595.2) OR 7.03 × 23(=161.69) OR 7.03 × 23 × 31 (=5012.39) OR 7.03 × 23 + 19.2 (=180.89)
	A4	Complete process to find bill	2 or	JK	'595.2' + '5012.39'(=5607.59) OR '180.89'× 31(=5607.59)
	I6	Accurate cost in correct money notation	3	JKL	£56.07 or £56.08 or £ [55.80, 56.20] correct money notation
Total marks for question			6		

Q9(a)	R3 A4	Uses fraction Finds new monthly payment	1 or 2	M MN	38 ÷ 5(=7.6) oe (£)45.6(0)
Q9(b)	R1 A4 I7	Process to work with percentage Finds figure to compare Valid decision with correct figures	1 or 2 or 3	P PQ PQR	0.33 × 85(=28.05) o.e. OR 85 ÷ 3 (=28.33) OR 30 ÷ 85 × 100(=35.29..) OR 0.64 × 100 (= 64) (£)28.05 OR 85 ÷ 3 (=28.33) OR 35(.29 %) oe OR No AND 64.7 and 67 No and (£)28.05 OR No and £1.95 extra paid OR No and (£)28.33 OR No and [35, 35.3]%
Total marks for question			5		

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