edexcel

Mark Scheme (Results)

February 2017

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- If working is **crossed out and still legible**, then it should be marked, as long as it has not been replaced by alternative work.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 mark the working leading to the answer given in the answer box or working box. If there is no definitive answer then marks should be awarded for the 'lowest' scoring method shown.
- 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 indicates 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, 2.40£ 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 questions:** 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 (2 mm tolerance)
	2 or	2 of: linear scale(s), labels, plotting (2 mm tolerance)
	3	all of: linear scale(s), labels, plotting (2 mm 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.
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: Activity holiday centre

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q1(a)	R1	Process to convert to consistent units	1	A	e.g. 250 ÷ 1000 (=0.25) **OR** 8 × 1000 (=8000) This may be awarded anywhere in the answer
	A4	Begins solution	1 or	B	'0.94' × '0.25' (=0.235) oe **OR** 8 ÷ '0.25' (=32) **OR** 33 × 250 (=8250) oe NB allow any value from the table expressed as a decimal less than 1
	R3	Process to find figures to compare	2 or	BC	8 ÷ '0.235' (=34.0..) oe **OR** '32' ÷ '0.94' (=34.0..) **OR** '8250' × '0.94' (=7755) oe **OR** 33 × '0.235' (=7.755) oe
	I7	Valid decision with accurate figures	3	BCD	No **and** 34 **or** 35 (panels) **OR** No **and** 7.755 (kw) **OR** No **and** 7755 **and** 8000 (watts)
Total marks for question			**3**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q1(b)	R1	Interprets problem correctly and begins to address features	1 or	E	Any **three** staff allocated their time slots correctly **OR** Any **five** time slots staffed correctly
	A5	Improves rota	2 or	EF	Any **three** staff allocated their times slots correctly **AND** Any **five** time slots staffed correctly
	I6	Fully correct rota meeting all constraints	3	EFG	Correct table ie: Col 4 hours Col starts at 5pm Ally 2 hours Ally 7 – 8 am slot and 8 – 9 am slot Ben 3 hours Ben starts at 7pm Dan 5 hours Dan 7 – 8 am slot and 8 – 9 am slot Ellie 3 hours Ellie starts at 5 pm or later 2 staff on 7–8am slot and 8–9am 3 staff on 5–6pm, 6–7pm, 7–8pm and 8–9pm slots 1 staff 9-10pm
		Total marks for question	**3**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q1(c)	R2	Begins process to find mean profit or finds estimate of believed total profit	1 or	H	At least 3 of: 4700 − 5200 (= −500) **or** 8750 − 5800 (=2950) **or** 8750 − 5800 (=2950) **or** 9600 − 5800(=3800) **or** 9400 − 5800 (=3600) **or** 9800 − 5800 (=4000) **OR** 4700 + 8750 + 8750 + 9600 + 9400 + 9800 (=51000) **or** 5200 + 5800 + 5800 + 5800 + 5800 + 5800 (=34200) **OR** 3000 × 6 (=18000)
	A4	Process to find total profit for the 6 weeks or the mean income and cost	2 or	HJ	'−500' + '2950' + '2950' + '3800' + '3600' + '4000' (=16800) **OR** '51000' – '34200' (=16800) **OR** 51000' ÷ 6 (=8500) **and** '34200' ÷ 6 (=5700)
	I6	Process to find figures to compare	3 or	HJK	'16800' ÷ 6 (=2800) **OR** '51000' – '34200' (=16800) **and** 3000 × 6 (=18000) **OR** '−500' + '2950' + '2950' + '3800' + '3600' + '4000' (=16800) **and** 3000 × 6 (=18000) **OR** '8500' – '5700' (=2800)
	I7	Valid decision with accurate figures	4	HJKL	No **and** (£)2800 **OR** No **and** (£)18000 **and** (£)16800
		Total marks for question	**11**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q2	R2	Begins to solve problem	1 or	M	800 + 800 + 400 (=2000) **or** 660 + 660 (=1320) **OR** $80 \times \frac{3}{4}$ oe (= 60) **OR** 800 ÷ 80 (=10) **or** 400 ÷ 80 (=5)
	R3	Develops solution	2 or	MN	800 + 800 + 400 (=2000) **and** 660 + 660 (=1320) **OR** 800 + 800 + 400 (=2000) **and** $80 \times \frac{3}{4}$ oe (=60) **OR** 660 + 660 (=1320) **and** $80 \times \frac{3}{4}$ oe (=60) **OR** '10' + '10' + '5'(=25) **OR** 660 ÷ '60'(=11)
	A4	Process to find the times for each terrain	3 or	MNP	'2000' ÷ 80 (=25) **and** '1320' ÷ '60' (=22) **OR** '25' **and** 2 × '11'(=22)
	I6	Correct answer for total time	4	MNPQ	47 (minutes)
	A5	Valid check	1	R	Reverse process or alternative method
Total marks for question			**5**		

Section B: Olivia's organics

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q3	I6	Process to convert to common units of length	1	A	e.g. 75 ÷ 100 (=0.75) **or** 27 × 100 (=2700)
	R3	Process to find number of rows or number of plants in a row	1 or	B	27 ÷ '0.45' (=60) oe **or** 21 ÷ '0.75' (=28) oe **OR** 27 ÷ '0.75' (=36) oe **or** 21 ÷ '0.45' (=46.6…) oe
	R2	Process to find number of plants	2	BC	'60' × '28' (= 1680) **or** '61' × '28' (=1708) **OR** '60' × '29' (=1740) **or** '61' × '29' (=1769) **OR** '36' × '46' (=1656) **or** '37' × '46' (=1702) **OR** '36' × '47' (=1692) **or** '37' × '47' (=1739)
	I6	Process to find expected weight of crop	1 or	D	Total whole number of plants × 1.5 oe e.g. '1680' × 1.5 (=2520) Allow 9 × 1.5 (=13.5)
	A4	Process to convert to tonnes	2 or	DE	e.g. '2520' ÷ 1000 (=2.52)
	I6	Correct answer	3	DEF	2.5 **or** 2.6 **or** 2.7 (tonnes)
Total marks for question			**6**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q4	R2	Process to find a correct multiplier	1 or	G	180 ÷ 12 (=15) **OR** 800 ÷ 50 (=16) Allow build up methods
	A4	Process to use a multiplier to find figures to compare	2 or	GH	'15' × 50 (=750) **OR** '16' × 12 (=192) **OR** 180 ÷ 12 (=15) **and** 800 ÷ 50 (=16) **AND** '15' × 10 (=150) (litres of fertiliser needed) **and** '16' × 10 (=160) (litres of fertiliser available) **OR** e.g. 48 × 4 (=192) from full build up method
	I7	Valid decision with accurate figures	3	GHJ	Yes **and** 750 (ml) oe **OR** Yes **and** 192 (plants) **OR** Yes **and** 150 (litres) **and** 160 (litres)
		Total marks for question	**3**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q5	R1	Starts process to find volume	1 or	K	$1.5 \times 2 \times 1.5$ (=4.5)
	I6	Correct volume with units	2	KL	4.5 m^3 (with correct units)
	A5	Valid check	1	M	e.g. Reverse process or estimation
Total marks for question			**3**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q6	A4	Engages with scale	1	N	e.g. rectangle with one side correct from correct working 16 (sq) **or** 8 (sq) **or** 32 (sq) **or** 4 (sq) **OR** 2 rectangles with sides greater than 4 (sq) by 2 (sq) **and** 2 squares from the edge **and** 2 squares from any other greenhouse **OR** 0.5 × 0.5 (=0.25)
	R1	Engages with area	1 or	P	1 rectangle 16 (sq) by 8 (sq) **or** 32 (sq) by 4 (sq) **OR** 8 (sq) × 4 (sq) **or** 16 (sq) × 2 (sq) **OR** 32 ÷ 0.25 (=128 squares needed)
	A4	Begins to work with constraints	2 or	PQ	2 rectangles 16 (sq) by 8 (sq) **or** 32 (sq) by 4 (sq) **OR** 8 (sq) × 4 (sq) **or** 16 (sq) × 2(sq) **AND** 2 sq from the edge **or** 2 sq from any other greenhouse
	I6	Fully correct answer	3	PQR	Fully correct answer
Total marks for question			**4**		

Section C: Polar Frozen Foods

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q7	R2	Begins process to compare	1 or	A	16 ÷ 50 (=0.32) **or** 28 ÷ 60 (=0.46..) oe **OR** (16 + 24) ÷ 50 (=0.8) **or** (28 + 14) ÷ 60 (=0.7) oe **OR** 10 ÷ 50 (=0.2) **or** 18 ÷ 60 (=0.3) oe
	A4	Full process to compare	2 or	AB	16 ÷ 50 (=0.32) **and** 28 ÷ 60 (=0.46..) oe **OR** (16 + 24) ÷ 50 (=0.8) **and** (28 + 14) ÷ 60 (=0.7) oe **OR** 10 ÷ 50 (=0.2) **and** 18 ÷ 60 (=0.3) oe NB accept decimals, percentages or comparable fractions
	I7	Valid decision with accurate figures and reason	3	ABC	**Yes** with reason e.g. a higher percentage of women than men think the product good **and** 32(%) **and** [46, 47](%) oe **OR** **No** with reason e.g. a higher percentage of men than women think the product is good or satisfactory **and** 80(%) **and** 70(%) oe **OR** **No** with reason e.g. a lower percentage of men than women think the product is poor **and** 20(%) **and** 30(%) oe
Total marks for question			**3**		

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q8(a)	R1	Process to calculate a weekly wage or finds the difference between the hourly rate or finds the weekly cost or finds 8% staff	1 or	D	35 × 7.20 (=252) **or** 35 × 8.25 (=288.75) **OR** 8.25 – 7.2(=1.05) **OR** 125 × 8.25 (=1031.25) **or** 125 × 7.2 (=900) **OR** 125 × 0.08 (=10) oe
	R3	Develops solution	2 or	DE	Product of 3 of: 125 × 8.25 × 1.08 × 35 **OR** Product of 2 of: 1.05 × 125 × 35 **OR** '288.75' – '252'(=36.75)
	A4	Final process to find new total cost or to find the increase in pay of existing staff or increase in cost per hour of existing staff and number of new staff	3	DEF	125 × 8.25 × 1.08 × 35 (=38981.25) oe **OR** 1.05 × 125 × 35 (=4593.75) **OR** 1.05 × 125 (=131.25) **and** 125 × 0.08 (=10) oe **OR** '36.75' × 125 (=4593.75)
	R2	Full process to find total cost for existing staff or full increase for new staff or full hourly increase for all staff	1 or	G	125 × 7.2 × 35 (=31500) **OR** 125 × 0.08 × 35 × 8.25 (=2887.5) **OR** '131.25' + ('10' × 8.25) (=213.75) **OR** '10' × 8.25 × 35 (=2887.5)
	A4	Full process to find increase	2 or	GH	'38981.25' – '31500' (=7481.25) **OR** '4593.75' + '2887.5' (=7481.25) **OR** '213.75' × 35 (=7481.25)
	I6	Correct increase	3	GHJ	(£)7481.25 NB other methods may be seen

For E mark	113.75	4725	36093.75	311.85
	131.25	36.75	4375	

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q8(b)	I6	Process to work out a unit cost or a total cost in the 'other' currency	1 or	K	110 ÷ 20 (=5.5) **or** 180 ÷ 24 (=7.5) **OR** 110 × 1.22 (=134.2) **or** 180 ÷ 1.22 (=147.54..)
	R2	Process to work out both unit costs in own currency or one unit cost in the 'other' currency	2 or	KL	110 ÷ 20 (=5.5) **and** 180 ÷ 24 (=7.5) **OR** '134.2' ÷ 20 (=6.71) **OR** '147.54..' ÷ 24 (=6.14..)
	A4	Process to find figures to compare	3 or	KLM	'5.5' × 1.22 (=6.71) **or** '7.5' ÷ 1.22 (=6.14..) **OR** '134.2' ÷ 20 (=6.71) **and** 180 ÷ 24 (=7.5) **OR** '147.54..'÷ 24 (=6.14..) **and** 110 ÷ 20 (=5.5)
	I7	Valid decision with accurate figures	4	KLMN	UK **and** 6.71 (euros) **and** 7.5(0) (euros) **OR** UK **and** (£)5.5(0) **and (**£)[6.14, 6.15] NB Can compare costs of same number of meals
Total marks for question			**10**		

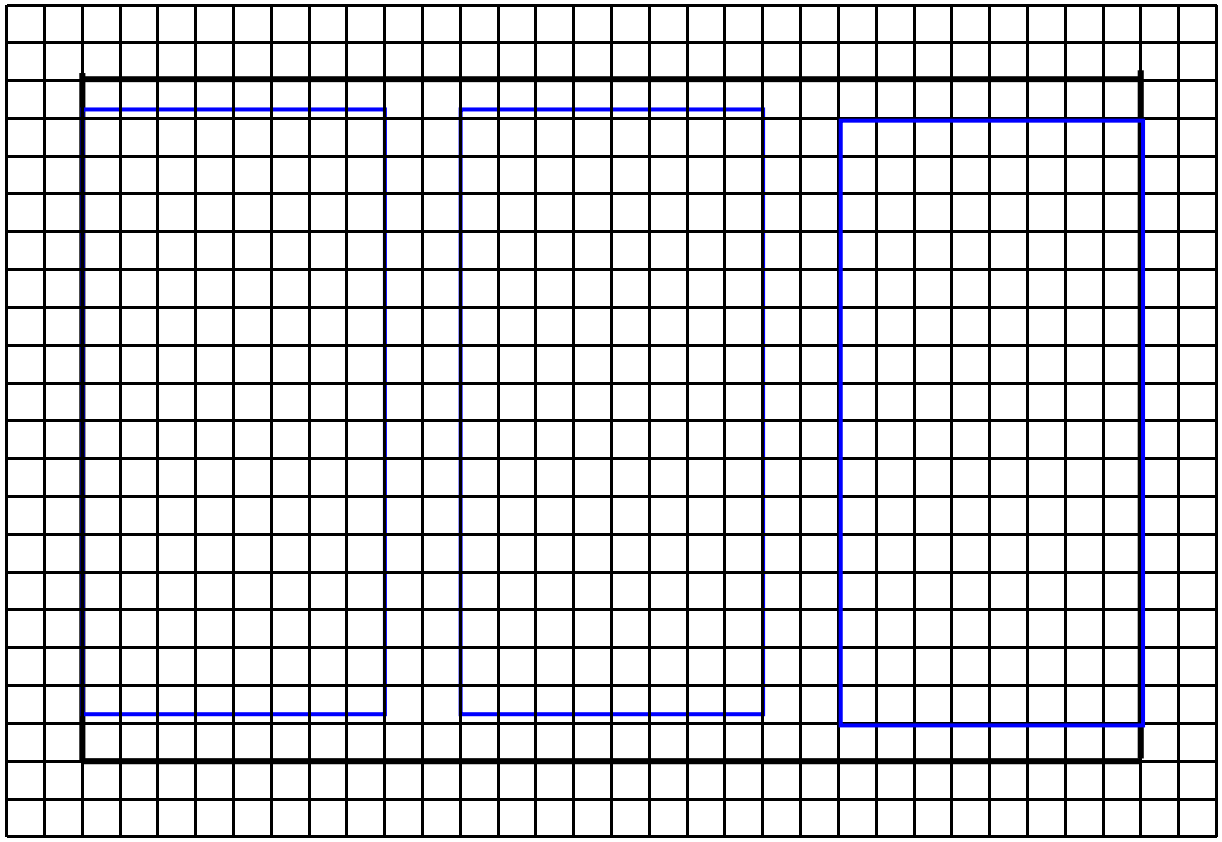
	UK	France
20 meals	£110 or €134.20	[£122.95, £122.96] or €150
24 meals	£132 or €161.04	[£147.54, £147.55] or €180

Question	Skills Standard	Process	Mark	Mark Grid	Evidence
Q9	A4	Process to use formula	1 or	P	$1.8 \times (-20) + 32 (= -4)$
	I6	Correct answer	2	PQ	-4 (^{o}F)
	A5	Valid check	1	R	e.g. approximation or reverse calculation
Total marks for question			**3**		

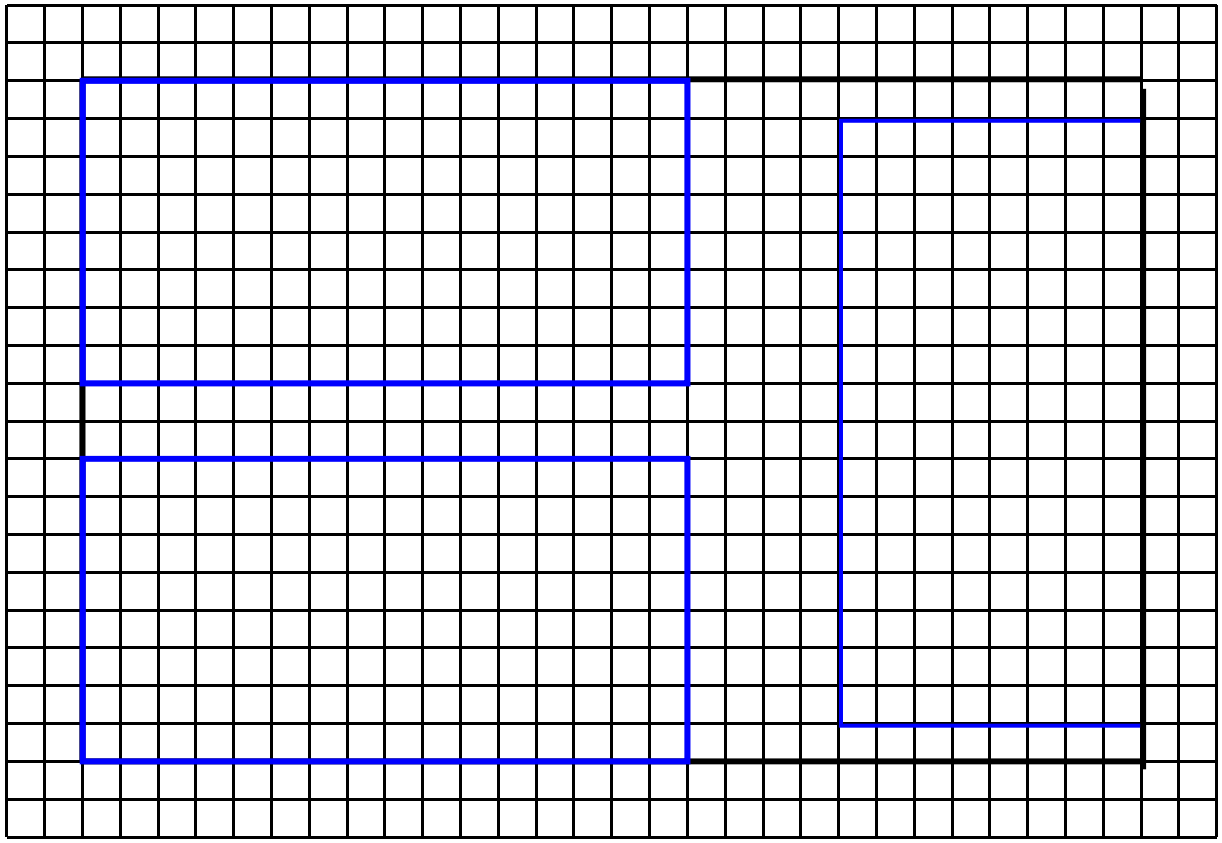
Example solution for Q1(b)

		2 staff		3 staff		1 staff	
	7 - 8 am	8 - 9 am	5 – 6 pm	6 - 7 pm	7 - 8 pm	8 - 9 pm	9 - 10 pm
Ally							
Ben							
Col							
Dan							
Ellie							

Example solution for Q6



Example solution for Q6



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