

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Number

Finding fractions of amounts without a calculator

v1.0

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. e.g. accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
3.14...	Allow answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q1.

$$\frac{33}{8}$$

or equivalent fraction

B1

$$4\frac{1}{8}$$

ft their improper fraction correctly converted to a mixed number

answer only of $4\frac{1}{8}$ scores B1B1

B1ft

Additional Guidance

If their initial answer is a proper fraction they cannot access the second mark

$$\text{eg } \frac{3}{8} \times 11 = \frac{33}{88}$$

B0B0ft

If their ft mixed number can be simplified, the simplification is not required for the second mark

$$\text{eg } \frac{3}{8} \times 11 = \frac{44}{8} = 5\frac{4}{8}$$

B0B1ft

$$0.375 \times 11 = 4.125$$

B1B0

$$33 \div 8$$

B0B0

$$33 \div 8 = 4\frac{1}{8}$$

B1B1

$$\frac{11}{8} = 1\frac{3}{8} \text{ then } 1\frac{3}{8} \times 3 = 3\frac{9}{8} \text{ (this gets first B1)} = 4\frac{1}{8}$$

B1B1

[2]

Q2.

$$12 \times \frac{1}{2}$$

B1

[1]

Q3.

(a) 11

B1

(b) 7.8

B1

[2]

Q4.

125

B1

[1]

Q5.

- (a) $200 \div 5$ or 40
or 200×3 or 600
or $\frac{3}{5} \times 200$
or 0.6×200

120

M1

A1

- (b) Attempt to divide 12.6 by 2 or 6.3

32.1

M1

SC1 for 19.2

A1

[4]

Q6.

- (a) $65 \div 5$

13

M1

A1

- (b) Attempts $3.4 \div 2$ first or 1.7

6.5

M1

SC1 0.5

A1

[4]

Q7.

$$\frac{3}{4} \times 16 \text{ or } 12$$

or

$$\frac{1}{4} \times 16 \text{ or } 4$$

oe

may be seen as 10 more or 12 more squares shaded on diagram

10

M1

A1

Additional Guidance

Allow any indication of shading

$$\frac{12}{16} \text{ or } \frac{4}{16}$$

M1

[2]

Q8.

(a) $\frac{2}{5}$

B1

(b) $\frac{5}{9} \times 72$ or 8×5 or $360 \div 9$

oe e.g. multiples of 8 listed and 5th one chosen with maximum one error

M1

40

SC1 32

A1

Additional Guidance

$\frac{40}{72}$

M1A0

40 out of 72

M1A1

[3]

Q9.

$\frac{7}{5}$ or $1\frac{2}{5}$

B1

28 and 20

or $2\frac{1}{3}$ and $1\frac{2}{3}$ oe mixed numbers or fractions with common denominator

or correct unsimplified fraction or mixed number eg $\frac{14}{10}$ or $1\frac{8}{20}$
or

correct simplification of a fraction where at least one of the values is 28 or 20 and the other is not 12

$\frac{5}{7}$
SC1 $\frac{5}{7}$

B2

Additional Guidance

Allow a fractional numerator and/or denominator in a correct fraction

eg $2\frac{1}{3}$ or $\frac{28}{12}$
 $1\frac{8}{12}$ or $\frac{5}{3}$

B1

$\frac{2.4}{1.8}$ simplified to $\frac{4}{3}$

B0

Ignore an attempt to convert $\frac{7}{5}$ to an improper fraction

eg $\frac{7}{5} = 1\frac{2}{5}$ on the answer line

B2

7 : 5 with no working worthy of B1

B0

[2]

Q10.

$$80 \times \frac{1}{10} (\times 9) \text{ or } 8 \text{ or } 72$$

oe

M1

$$\text{their } 72 \times \frac{1}{3} (\times 2) \text{ or } 24 \text{ or } 48$$

oe

M1dep

$$80 - \text{their } 48 \text{ or their } 24 + \text{their } 8$$

$$\text{or } 32 \text{ or } \frac{32}{80}$$

oe
dep on M2

M1dep

$$\frac{2}{5}$$

$$\text{SC3 } \frac{3}{10}$$

A1

Additional Guidance

SC3 is for omitting the initial $\frac{1}{10}$

[4]

Q11.

$$\frac{1}{5} \times 30$$

or

$$\frac{1}{8} \times 80 \text{ or } 10 \text{ or } \frac{5}{8} \times 80$$

oe

M1

6 or 50

A1

56

SC2 54

A1

Additional Guidance

May be seen as a set of equivalent fraction numerators

$$\text{eg } \frac{1}{5} = \frac{6}{30} \text{ and } \frac{5}{8} = \frac{10}{16} = \frac{100}{160} = \frac{50}{80}, 6 + 50 = 56$$

M1A1A1

$$\text{eg } \frac{1}{5} = \frac{6}{30} \text{ and } \frac{5}{8} = \frac{10}{16} = \frac{100}{160} = \frac{50}{80}, \text{ answer } \frac{56}{110}$$

M1A1A0

6 out of 30 or 50 in 80

M1A1

56 out of 110

M1A1A1

Up to M1 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts

[3]

Q12.

(a) $\frac{3}{5}$

$\frac{18}{30}$ or $\frac{9}{15}$ or $\frac{6}{10}$ or 0.6(0) or 60% SC1 $\frac{2}{5}$

B2

Additional Guidance

$\frac{18}{30}$ or $\frac{9}{15}$ or $\frac{6}{10}$ followed by incorrect simplification or any conversion

B1

$\frac{64}{100}$

$\times (30 + 20)$

oe eg 0.64×50 or $64 \div 2$

build up method must be complete

M1

32

A1

14 (out of 20)

ft their 32 – 18 with M1A0 scored

their 32 must be greater than 18

SC1 12.8 (or 13 after 12.8 is seen)

A1ft

(b) **Additional Guidance**

$\frac{14}{20}$

or 70%

M1A1A0

14 = 70% on answer line

M1A1A1

Answer 32 or $\frac{32}{50}$

M1A1A0

64% $\times$ 50 with no further work

M0

$\frac{64}{100}$

$\times 50 = 30$

Answer 12

M1A0A1ft

Example of complete build-up (for 64% of 50)

10% = 5 (no working but correct)

6 $\times$ 5 = 30 (correct with working)

1% = 0.5 (no working but correct)

4 $\times$ 0.5 = 0.20 (incorrect but working shown so still on for M1) = 30.20

(implied correct addition)

then 30.20 – 18 = 12.20

Answer 12.20 (condone decimal value for ft)

M1A0A1ft

Example of incomplete build-up (for 64% of 50)

50% = 25 (no working but correct)

10% = 5 (no working but correct)

2% = 2 (incorrect and no working shown M0)

..... (A0ft cannot award ft when M1 not awarded)

M0A0A0

[5]

Q13.

(a) $\frac{11}{36}$

$\frac{22}{72}$ or 11 out of 36
or correctly simplified proper fraction that originally had a denominator >13

B2

Additional Guidance

Condone 11 out of 36 with $\frac{11}{36}$ (together on the answer line)

B2

$\frac{11}{36}$ in working and 11 out of 36 on answer line

B1

$$\frac{22}{150} = \frac{11}{75}$$

B1

$$\frac{2}{4} = \frac{1}{2}$$

B0

22 out of 72 with no other working

B0

22 out of 72 with $\frac{22}{72}$

B1

11 : 36

B0

(b) $\frac{41}{78}$

oe fraction, decimal or percentage

B1

Additional Guidance

Ignore attempts to simplify or convert a correct fraction

Ignore probability words

Decimals or percentages to 2sf or better

41 out of 78 or 41 in 78 or 41 : 78 is B0

however, condone 41 out of 78 or 41 in 78 with a correct fraction, decimal or percentage (together on answer line)

B1

but do not accept 41 : 78 with a correct fraction, decimal or percentage (together on answer line)

B0

$\frac{17+13}{150}$ or $\frac{30}{150}$ or $30 \div 150$

(c) or 0.2

oe

M1

20

SC1 for 80 (not car)
or 49 or better (Bus)
or 31 or better (Walk)

A1

Additional Guidance

Build up method:

150 = 100%, 15 = 10%, 30 = 20%, answer 20%

M1A1

150 = 100%, 15 = 10%, $15 \times 2 = 10\% \times 2$, 30 = 25%, answer 25%

M1A0

150 = 100%, 15 = 10%, 30 = 15%, answer 15%

M0A0

$\frac{30}{150}$

seen, then 30% of 150 attempted

M1A0

30 out of 150 or 30 : 150 with no other working

M0A0

[5]

Q14.

(a) $\frac{6}{24}$

oe
B1 for correct numerator or denominator

B2

(b) $2 \times 18 (= 36)$

or 6 (cows) + pigs = 18 (sheep)
or $18 - 6$

M1

12

ft their $(18 + 6)$ from (a)

A1ft

[4]

Q15.

(a) 0.6×35

oe or build up method

M1

21

SC1 14

A1

(b) $150 \div 5 \times 4$

Oe
Or 30 seen

M1

120

A1

[4]

Q16.

- (a) 80 children
and
40 adults

B1

45 left (children)
and
35 right (children)

B1

30 left (adults)

ft 75 – their 45, where their 45 is an integer ≥ 0 and answer an integer ≥ 0

B1ft

10 right (adults)

ft their 40 – their 30, where both integers are ≥ 0 and answer an integer ≥ 0

B1ft**Additional Guidance**

Use of relative frequency or probability for an answer is B0 for that answer
Ignore working outside the frequency tree

- (b)

$$\frac{9}{16}$$

ft their 45 and/or ft their 80

their 45

B1ft their 80 not fully simplified

or

correct simplification of their fraction, using numbers from their tree

B2ft**Additional Guidance**

B2ft can only be awarded if their numbers can be simplified, otherwise B1ft
Do not ignore further work for B2 after correct answer seen

$$\frac{9}{16} = \frac{3}{4}$$

B1**[6]****Q17.**

$$2 \times 12$$

or $12 \div 3 (=4)$

or 24 seen

M1

their $24 \div 3$ oe

or their 4×2

M1dep

8

A1**[3]**

Q18.

$$(5 + 1) \times 4$$

24

SC1 for 18 or 20 or 21 on answer line

M1

A1

[2]

Q19.

$$(550 - 250) \div 3 \quad J + W = 250 \text{ or } J + 4W = 550$$

100

$$3W = 300 \text{ or } W = 100$$

M1

A1

250 – their 100

$$100 + J = 250 \text{ or } 400 + J = 550$$

M1dep

150

150

A1

Alternative Method 1

$$\frac{4}{5} - \frac{1}{5} (= \frac{3}{5})$$

M1

$$\text{their } \frac{3}{5} = 300 \text{ or } \frac{1}{5} = 100$$

A1

250 – their 100

M1dep

150

A1

Alternative Method 2

550 marked by top division **and** 250 marked by bottom division on **same** diagram

M1

300 indicated as difference on diagram or 350 and 450 written by intermediate divisions

100 marked between any two divisions is M1, A1

A1

150 marked at bottom

M1dep

150 stated as answer

A1

Alternative Method 3

Guesses a value for weight of jug, subtracts from 250, multiplies answer by 4 and adds to their value

M1

Correct calculations

A1

Guesses a second value for weight of jug nearer to 150 and **correctly** calculates all values

M1dep

150

A1

[4]

Q20.

$$\frac{1}{5} - \frac{1}{6}$$

Value chosen eg
 (£)60 and (£)12 or (£)10 seen
 (£)100 and (£)20 or (£)[16,17]seen

M1

$$\frac{5}{30} \text{ or } \frac{6}{30}$$

oe

12 and 10 seen
 20 and [16, 17] seen

M1

$$\frac{1}{30} \text{ or } \frac{14}{30}$$

seen oe

2 or 28 seen
 [3, 4] or [46, 47] seen

A1

$$\frac{6}{30} + \frac{5}{30} + \frac{14}{30} \text{ or } \frac{25}{30}$$

$$\text{or } \frac{16}{30} - \frac{5}{30} - \frac{6}{30}$$

$$\text{or } 1 - \frac{14}{30} - \frac{5}{30} - \frac{6}{30}$$

$$12 + 10 + 28 = 50 \text{ or } 60 - 28 - 12 - 10$$

$$20 + [46, 47] + [16, 17] = [82, 84] \text{ or } 100 - [46, 47] - 20 - [16, 17]$$

M1

$$\frac{5}{30} \text{ or } \frac{1}{6}$$

Exact answer for their chosen value
 (£)10

A1

[5]

Q21.

$$8 \div 2 \times 3 \text{ or } 8 \times 3 \div 2 \text{ or } 12$$

M1

$$\text{their } 12 \times 4$$

M1

$$48$$

A1

Alternative method

$$4 \times 8 \text{ or } 32$$

M1

$$\text{their } 32 \div 2 \times 3$$

oe

M1

$$48$$

A1

[3]

Q22.

(a) 450 in Drink coffee Yes

B1

50 in Drink coffee No

ft 500 – their 450

B1ft

90 in At least three cups Yes

ft their 450 ÷ 5

B1ft

360 in At least three cups No

ft their 450 – their 90

B1ft

Additional Guidance

For 90 ft , their 450 ÷ 5 must be truncated or rounded up to the nearest whole number

For 360 ft, their 450 – their 90 must give a positive integer

Accept unambiguous values elsewhere but diagram values take precedence

Correct relative frequencies seen, withhold first B1 that would have been awarded

eg $\frac{400}{500}, \frac{100}{500}, \frac{80}{400}, \frac{320}{400}$

B0 B0ft B1ft B1ft

eg $\frac{400}{500}, \frac{100}{500}, \frac{80}{500}, \frac{320}{500}$

B0 B0ft B0ft B0ft

Do not accept probabilities

eg $\frac{9}{10}, \frac{1}{10}, \frac{4}{5}, \frac{1}{5}$

B0

eg 0.9, 0.1, 0.8, 0.2

B0

- (b) **Alternative method 1**
 $\frac{\text{their } 90}{500}$ (or partially simplified)
 oe e.g. decimal
 ft or correct

B1ft

$$\frac{9}{50} \quad \text{ft their unsimplified fraction fully simplified } \frac{9}{50} \text{ scores B1B1}$$

B1ft

Alternative method 2

$$\frac{9}{10} \times \frac{1}{5} \quad \text{oe e.g. } 0.9 \times 0.2 \text{ or } 0.18$$

M1

$$\frac{9}{50}$$

A1

Additional Guidance

$$\frac{90}{500} = \frac{18}{100}$$

B1B0

$$\frac{80}{500} = \frac{4}{25} \text{ (with 80 in part (a) then ft)}$$

B1ftB1ft

$$\frac{80}{500} = \frac{4}{25} \text{ (with 80 not in part (a) so not ft but then simplest form correct)}$$

B0B1ft

$$\frac{80}{500} = \frac{8}{50} \text{ (with 80 not in part (a) so not ft and simplest form not correct)}$$

B0B0

$$\frac{45}{250}$$

B1B0

$$80 \text{ in (a), } \frac{8}{50} \text{ here}$$

B1B0

$$\frac{90}{400} = \frac{9}{40}$$

B0B1ft

$$\frac{500}{90} = \frac{50}{9}$$

B0B1ft

Do not accept 18% for first mark

[6]

Q23.

$$60 \times 3 \div 2 \text{ or } 90 \text{ seen}$$

oe

M1

$$\text{their } 90 \times 3 \div 2$$

oe

M1 dep

$$135$$

A1

[3]

Q24.

Alternative method 1

20 (%)

B1

100 – their 20 – 25
or 100 – 45 or 55

M1

$$\frac{\text{their } 55}{100}$$

M1dep

$$\frac{11}{20}$$

ft their 20

A1ft

Alternative method 2

$$\frac{1}{4}$$

B1

$$\frac{4}{20} + \frac{5}{20} \text{ or } \frac{9}{20}$$

*oe with common denominator
Correct adding of fractions*

M1

$$1 - \text{their } \frac{9}{20}$$

M1dep

$$\frac{11}{20}$$

ft their $\frac{1}{4}$

A1ft

Alternative method 3

0.2 and 0.25

B1

1 – their 0.2 – their 0.25 or 0.55

M1

$$\frac{\text{their } 55}{100}$$

M1dep

$$\frac{11}{20}$$

ft their 0.2 and 0.25

A1ft

[4]

Q25.

$$180 \times 5 (= 900) \text{ or } 180 \times \frac{10}{9} = (200) \text{ oe}$$

M1

$$\text{their } 900 \text{ is } \frac{9}{10} \text{ or}$$

$$\text{oe } \frac{9000}{9} \text{ or } 100 \times 10$$

$$\text{their } 900 \times \frac{10}{9} \text{ or their } 200 \times 5$$

M1dep

1000

A1

Alternative method

$$\frac{1}{5} \times \frac{9}{10} (= \frac{9}{50}) \text{ or } \frac{10}{9} (= \frac{50}{9})$$

M1

$$\text{their } \frac{9}{50} \text{ is } 180 \text{ or}$$

$$180 \times \text{their } \frac{50}{9}$$

M1 dep

1000

A1

[3]

Q26.

$$162 \times \frac{5}{3} \text{ or } 162 \div \frac{3}{5} \text{ or } 162 \times 5 \text{ or } 810 \text{ or } 162 \div 3 \text{ or } 54$$

$$\text{oe } 162 \div 0.6$$

M1

270

A1

Additional Guidance

For $162 \times \frac{5}{3}$ as a decimal, allow 162×1.66 or better truncation or rounding or 162×1.67 for

M1

97.2

M0A0

[2]

Q27.

Alternative method 1: expressing C in terms of A

$$(C =) \frac{5}{2}A$$

oe eg $(C =) A + 1.5A$ or $(C =) 2.5A$

M1

$$\left(\frac{C}{B} =\right) \frac{\frac{5}{2}A}{\frac{7}{4}A}$$

oe fraction with A on numerator and denominator

$$\text{eg } \left(\frac{C}{B} =\right) \frac{2.5A}{1.75A} \text{ or } \frac{5}{2}A \div \frac{7}{4}A$$

M1dep

$$\left(\frac{C}{B} =\right) \frac{\frac{5}{2}}{\frac{7}{4}}$$

or

$$14C = 20B$$

oe fraction with A eliminated

$$\text{eg } \left(\frac{C}{B} =\right) \frac{2.5}{1.75}$$

oe method to eliminate A

M1dep

$$\frac{10}{7} \text{ or } 1\frac{3}{7}$$

oe fraction

$$\text{SC3 } \frac{10}{6} \text{ oe fraction with A eliminated}$$

$$\text{SC2 } \frac{7}{7} \text{ oe fraction with A eliminated}$$

A1

Alternative method 2: using a value for A

Chooses a value for A works out the correct value of B or C

$$\text{eg } A = 100 \text{ and } B = 175$$

$$\text{or } A = 20 \text{ and } C = 50$$

M1

Chooses a value for A and works out correct values for B and C

$$\text{eg } A = 10 \text{ and } B = 17.5 \text{ and } C = 25$$

M1dep

Puts the correct values for B and C into fraction form (may have non-integer values)

$$\text{oe eg } \frac{25}{17.5}$$

M1dep

$$\frac{10}{7} \text{ or } 1\frac{3}{7}$$

$$\text{oe fraction eg } \frac{250}{175}$$

$$\text{SC3 } \frac{10}{6} \text{ oe fraction with A eliminated}$$

$$\text{SC2 } \frac{7}{7} \text{ oe fraction with A eliminated}$$

A1

Additional Guidance

Ignore an incorrect conversion of $\frac{10}{7}$ to a mixed number
 $\frac{6}{7}$ is from taking C as 1.5A

SC2

Condone the inclusion of B in the fraction eg $(C =) \frac{10}{7} (\times) B$ or $(C =) \frac{10B}{7}$

M3A1

Alt 2 The chosen value of A does not need to be explicitly stated if method is shown and working is unambiguous or values are in correct proportion

[4]

Q28.

$$1\frac{5}{6} \div 4\frac{1}{8}$$

or $\frac{11}{6}$ and $\frac{33}{8}$

oe $\frac{44}{24}$ and $\frac{99}{24}$

M1

$$\frac{11}{6} \div \frac{33}{8}$$

or $\frac{11}{6} \times \frac{8}{33}$ or $\frac{8}{18}$

oe *unsimplified correct fraction*

M1

$$\frac{4}{9}$$

A1

[3]

Q29.

Alternative method 1

$$\frac{3}{12} (+) \frac{2}{12} \text{ or } \frac{5}{12}$$
$$\text{or } \frac{6}{24} (+) \frac{4}{24} \text{ or } \frac{10}{24}$$

oe common denominator

M1

$$1 - \text{their } \frac{5}{12} \text{ or } \frac{7}{12}$$

or 12 – their 5

$$\text{or } 1 - \text{their } \frac{10}{24} \text{ or } \frac{14}{24}$$

or 24 – their 10

or 14 (blue discs)

oe

$$\text{their } \frac{5}{12} \text{ must be from } \frac{1}{4} + \frac{1}{6}$$

M1

7

A1

Alternative method 2

Multiple of 12 for total number of discs

Implied by LCM of 12

or

Number of red discs and white discs in ratio 3 : 2

eg 6R, 4W

M1

Numbers of discs in ratio 3 : 2 : 7

eg 6R, 4W, 14B

M1

7

A1

Additional Guidance

7 out of 12 on answer line

M1M1A1

$$\frac{7}{12} \text{ on answer line}$$

M1M1A0

3 (red) 2 (white) 7 (blue) without 7 on answer line

M1M1A0

$$\frac{1}{4} + \frac{1}{6} = \frac{2}{10}$$
$$1 - \frac{2}{10}$$

M0M1A0

[3]

Q30.

Alternative method 1 – based on a fraction of the number of males

$$\frac{1}{4} \times 2x (+) \frac{3}{8} \times x \text{ or } \frac{7}{8}x \text{ where } x \text{ is the number of males}$$

$$\frac{1}{4} \times 2 (+) \frac{3}{8} (\times 1) \text{ or } \frac{7}{8}$$

M1

$$\frac{1}{4} \times 2x + \frac{3}{8} \times x = 84 \text{ or } \frac{7}{8}x = 84 \text{ or } 7x = 672$$

$$\text{oe} \quad \frac{1}{4} \times 2 + \frac{3}{8} (\times 1) \text{ linked to } 84 \text{ or } \frac{7}{8} \text{ linked to } 84$$

M1dep

$$84 \div \text{their } \frac{7}{8} \text{ or } x = 84 \times \text{their } \frac{8}{7} \text{ or } x = 96$$

$$\text{oe} \quad \text{Dep on M1M1} \quad 84 \div \text{their } \frac{7}{8} \text{ or } 84 \times \text{their } \frac{8}{7} \text{ or } 96$$

M1dep

288

A1

Alternative method 2 – based on a fraction of the number of females

$$\frac{1}{4} \times y (+) \frac{3}{8} \times \frac{y}{2} \text{ or } \frac{17}{16}y \text{ where } y \text{ is the number of females}$$

$$\frac{1}{4} (\times 1) (+) \frac{3}{8} \times \frac{1}{2} \text{ or } \frac{7}{16}$$

M1

$$\frac{1}{4} \times y + \frac{3}{8} \times \frac{y}{2} = 84 \text{ or } \frac{7}{16}y = 84 \text{ or } 7y = 1344$$

$$\text{oe} \quad \frac{1}{4} (\times 1) + \frac{3}{8} \times \frac{1}{2} \text{ linked to } 84 \text{ or } \frac{7}{16} \text{ linked to } 84$$

M1dep

$$y = 84 \div \text{their } \frac{7}{16} \text{ or } y = 84 \times \text{their } \frac{16}{7} \text{ or } y = 192$$

$$\text{oe} \quad \text{Dep on M1M1} \quad 84 \div \text{their } \frac{7}{16} \text{ or } 84 \times \text{their } \frac{16}{7} \text{ or } 192$$

M1dep

288

A1

Alternative method 3 – based on a fraction of the total number of people

$$\frac{1}{4} \times \frac{2}{3} \times z \text{ or } \frac{4z}{24} \text{ or } \frac{3}{8} \times \frac{1}{3} \times z \text{ or } \frac{3z}{24}$$

where z is the number of people in the office

$$\text{oe } \frac{1}{4} \times \frac{2}{3} \text{ or } \frac{4}{24} \text{ or } \frac{3}{8} \times \frac{1}{3} \text{ or } \frac{3}{24}$$

M1

$$\frac{1}{4} \times \frac{2}{3} \times z + \frac{3}{8} \times \frac{1}{3} \times z = 84 \text{ or } \frac{7z}{24} = 84$$

$$\text{oe } \frac{3}{8} \times \frac{1}{3} + \frac{1}{4} \times \frac{2}{3} \text{ linked to } 84 \text{ or } \frac{7}{24} \text{ linked to } 84$$

M1dep

$$z = 84 \div \text{their } \frac{7}{24} \text{ or } z = 84 \times \text{their } \frac{24}{7} \text{ or } 7z = 2016$$

oe

Dep on M1M1

$$84 \div \text{their } \frac{7}{24} \text{ or } 84 \times \text{their } \frac{24}{7}$$

M1dep

288

A1

Alternative method 4 – chooses numbers of females and males and factors up or down
Chooses numbers for females and males in the ratio 2 : 1 and works out the numbers of females and males wearing glasses (which should be in the ratio 4 : 3)

$$\text{eg } 32 \text{ females and } 16 \text{ males and } \frac{1}{4} \times 32 (+) \frac{3}{8} \times 16 \text{ or } 8 \text{ and } 6 \text{ or } 14$$

M1

Works out multiplying factor by $84 \div$ their total number of people wearing glasses

$$\text{eg } 84 \div \left(\frac{1}{4} \times 32 + \frac{3}{8} \times 16 \right) \text{ or } 84 \div 14 (=6)$$

M1dep

Multiplies their total of females and males by their multiplying factor

$$\text{eg } 32 \times \text{their } 6 + 16 \times \text{their } 6 \text{ or } (32 + 16) \times \text{their } 6$$

M1dep

288

A1

Additional Guidance

If more than one method is attempted:

if an answer is given, mark the method leading to that answer

if no answer is given, mark each method and award the best mark

[4]

Q31.

Alternative method 1

$45 \times \frac{5}{3}$ or 75 75 seen as total of Small column implied by 120 seen as overall total
M1

(their 75 + 45) ÷ (1 + 3)

or 120 ÷ 4

or 30 (Yellow) 30 seen as total of Yellow row

M1dep

their 30 – 12

or 18 (Large Yellow)

18 in Large Yellow cell

M1dep

27 Accept 27 in correct cell if answer blank

A1

Alternative method 2

$45 \times \frac{5}{3}$ or 75 75 seen as total of Small column implied by 120 seen as overall total
M1

their 75 – 12

or 63 (Small Green)

63 in Small Green cell

M1dep

(their 75 + 45) ÷ (1 + 3) × 3

or 120 ÷ 4 × 3

or 90 (Green)

dep on first M1

90 seen as total of Green row

M1dep

27 Accept 27 in correct cell if answer blank

A1

Alternative method 3

$45 \times \frac{5}{3}$ or 75 75 seen as total of Small column implied by 120 seen as overall total
M1

their 75 – 12

or 63 (Small Green)

63 in Small Green cell

M1dep

their $63 + x = 3(45 - x + 12)$

oe $63 + x = 171 - 3x$

M1dep

27

Accept 27 in correct cell if answer blank

A1

Additional Guidance

In alt 2, 90 only implies M1M0M1 – 63 is also needed for M1M1M1

[4]