Mark schemes

Q1.

(a)   −30

                                                         B1

(b) $4(t - 5)$

           Accept 4 × (t − 5)

                                                          B1

(c) $6m - 12$ or $5m + 10$

                                                        M1

       $11m - 2$

                                                        A1

(d) $8g^4k^5$

           B1 for two components correct

                                                         B2

(e) $5q(2q - 3r)$

           B1 for 5(2q² − 3qr) or q(10q − 15r)
           or 10q(q − 1.5r) or 5q(2q − ?)
           or 5q(? − 3r)

                                                         B2

                                                                 [8]

Q2.

(a) $6f + 3e$ or $3e + 6f$

           do not accept further working
           eg 6f + 3e = 9fe

                                                                  B1

(b)   36

                                                         B1

Additional Guidance

Do not allow embedded answer to score any marks without correct answer 36 on answer

                                                               [2]

Q3.

(a)   4

                                                         B1

(b)   −30

                                                         B1

(c) $5c = 19 - 4$ or 15

                                                         M1

3

A1

(d) $4(t − 5)$

Accept 4 × (t − 5)

B1

[5]

Q4.

$3(2x − 3)$ or $4(x − 1)$

oe

Denominator not necessary … marks for numerator terms

M1

$6x − 9 + 4x − 4$

oe   allow one incorrect term

M1 dep

their $10x − 13 = 2 × 12$

oe   eg 20x − 26 = 2 × 24

Do not allow   their 10x − 13 = 2

M1 dep

$(x =)$ 3.7 or $\dfrac{37}{10}$

A1

All steps clearly shown with M3 awarded

Strand (ii)

Q1

[5]

Q5.

(a)   9

B1

Additional Guidance
Answer of 9 on answer line or clearly stated in script is the only acceptable answer
Do not allow embedded answers such as 6 × 9 =

(b) $3y = 9 − 15$ or $3y = −6$

or

$y = \dfrac{9}{3} − \dfrac{15}{3}$ or $y = 3 − 5$

or

$(9 − 15) ÷ 3$

oe

M1

−2

<div align="right">**A1**</div>

Additional Guidance
Embedded answer. M1 A0
T&I is M0 unless answer stated as −2 then it is full marks.

(c) $4w − 2w (= 2w)$ or $7 − 2 (= 5)$

oe

<div align="right">**M1**</div>

$2w = 5$

oe

<div align="right">**A1**</div>

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

ft if M awarded and at most one error

<div align="right">**A1ft**</div>

Additional Guidance
Allow ft if equation written as $2w = a$ but **not** $a = 7$ or $a = 2$
or $bw = 5$ but **not** $b = 4$

$2w = 9$, $w = 4.5$	M1 A0 A1ft
6w = 5, w = $\frac{5}{6}$ or 0.83…	M1 A0 A1ft
$6w = 9$	M0
$2w = 7$, $w = 3.5$	M1 A0 A0ft
$2w = 2$, $w = 1$	M1 A0 A0ft
$4w = 5$, $w = 1.25$	M1 A0 A0ft
Embedded answer	M1 A1 A0

T&I is M0 unless answer stated as 2.5 then it is full marks

<div align="right">**[6]**</div>

Q6.

(a) $3 × 4 (+) 2 × −5$ or $12 (+) −10$

<div align="right">**M1**</div>

2

<div align="right">**A1**</div>

(b) $(c =) 12$

<div align="right">**B1**</div>

(c) $6w − 8 = 7$

$$3w - 4 = 3.5$$

M1

$$6w = 7 + 8 \quad \text{or} \quad 6w = 15$$
$$3w = 3.5 + 4 \quad \text{or} \quad 3w = 7.5$$

M1

$$(w =) 2.5$$

$$\textit{oe} \quad \textit{eg} \quad \frac{15}{6} \quad \textit{or} \quad \frac{5}{2} \quad \textit{or} \quad 2\frac{1}{2}$$

A1

(d) $a^3 + 4a$

B1 for a^3 or $4a$

Do not accept $a4$

B2

[8]

Q7.

(a)   25

Embedded ie 25 − 7 = 18 B0

B1

(b)   An equation whose solution is 8

Equation does not have to be linear

eg $x^2 = 64$

Accept $x = 8$

B1

(c)   Two values where $b - a = 10$

Accept 0, negative numbers and non-integers

B1 for any two values where $a + b = 10$

or for any two values where $a - b = 10$

B1 $10 + a = b$ oe seen

B2

[4]

Q8.

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

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

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

M1

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

oe

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

M1dep

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

oe

Dep on M1M1

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

M1dep

288

A1

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

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

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

M1

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

oe

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

M1dep

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

oe

Dep on M1M1

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

M1dep

288

A1

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

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

where z is the number of people in the office

oe

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

M1

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

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

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

oe

Dep on M1M1

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

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)

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

M1

Works out multiplying factor by 84 ÷ their total number of people wearing glasses

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

M1dep

Multiplies their total of females and males by their multiplying factor

eg   32 × their 6 + 16 × their 6 or (32 + 16) × 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]

Q9.

$(8x =)\ 30 + 10 \quad \text{or} \quad (8x =)\ 40$

M1

5

SC1 2.5 or $\frac{20}{8}$ oe

A1

Alternative method

$$x - \frac{10}{8} = \frac{30}{8}$$

or $x = \dfrac{30}{8} + \dfrac{10}{8}$

or their $(30 + 10) \div 8$

M1

5

$\qquad$ *SC1 2.5 or* $\dfrac{20}{8}$ *oe*

A1

[2]

Q10.

(a) $(5x + 3 =) \ 3x + 6$

B1

$5x - \text{their } 3x = \text{their } 6 - 3$ or $2x = 3$
$\qquad$ *oe*

M1

1.5
$\qquad$ *oe*
$\qquad$ *ft for linear equation if B0 scored*

A1 ft

(b) $2x + 32$ or $4x - 20$
$\qquad$ *Accept ax + ab for M1*

M1

$6x + 12$ or $6(x + 2)$

A1

$a = 6$ and $b = 2$
$\qquad$ *ft from their 6x + 12 if M1 earned*
$\qquad$ *SC2 a = 6 and b = 12*
$\qquad$ *SC1 a = 6*

A1 ft

[6]

Q11.

$5x - x$ or $4x$ or $16 + 2$ or 18 *oe*

M1

$4x = 18$

A1

4.5 *oe*
$\qquad$ *ft their rearrangement with one error if M1 awarded*

A1ft

[3]

Q12.

(a) $3(x − 5)$

B1

(b) $5y + 20t − 10$

B1 for 2 correct terms.
Penalise any incorrect further working.
Eg
$5y + 20t − 10 = 25yt − 10$ is B1
$5y + 20t − 1 = 25yt − 1$ is B0 (error in expansion and incorrect further work)
$5y + 20t − 10 = 5(y + 4t − 2)$ given as answer is B1 as shows a misunderstanding of expanding brackets.

B2

(c) $3w + 6 = 2w − 1$

$$w + 2 = \frac{2}{3} w − \frac{1}{3}$$

M1

$3w − 2w = −1 − 6$

This mark is for rearranging their expansion correctly to get w terms one side and number terms on the other.

$$w − \frac{2}{3} w = − \frac{1}{3} − 2 \text{ (oe)}$$

M1

−7

ft on one error

A1ft

[6]

Q13.

$6x − 2x (= 4x)$ or $13 + 5 (= 18)$

M1

$4x = 18$

A1

4.5, $\frac{18}{4}$, $\frac{9}{2}$, $4\frac{1}{2}$, etc.

ft on one error
incorrect cancelling after a correct fraction seen is not penalised

A1ft

[3]

Q14.

$5x − 3x$ **or** $11 + 9$

*Implied by $2x$ **or** 20*

M1

$2x = 20$

A1

10

ft on one error only

A1ft

[3]

Q15.

(a) $6x = 28 + 5$ *oe*

$$\frac{28 + 5}{6}$$

M1

5.5   *oe*

A1

(b) $2a + 7b$

B1 for one correct term
Do not ignore further work

B2

[4]

Q16.

(a) $5x - 10 (= 35)$

$x - 2 = 7$

M1

$5x = 45$

$x = 7 + 2$

M1

9

ft For M1M0 or M0M1

A1ft

(b) $9y - 12 = 3y$

or $6y - 9y (= -3y)$

M1

$13 - 1 (= 12)$

or $1 - 13 (= -12)$

M1

4

ft For M1M0 or M0M1 with only one rearrangement error

A1ft

[6]

Q17.

Alternative method 1

40

May be implied

eg $\dfrac{2}{40}$

B1

$2 + x + 2x + 5$ = their 40
or $3x + 7$ = their 40
or (their 40 – 2 – 5) ÷ 3 or 33 ÷ 3

oe equation e.g. $3x + 5 = 38$ (scores B1M1)

their 40 must be an integer

M1

(x =) 11

ft B0M1

Does not have to be an integer

Accept answer rounded or truncated to at least 2 sf

A1ft

$\dfrac{27}{40}$ or 0.675 or 67.5%

Only ft evaluation of $\dfrac{2 \times \text{their integer } x + 5}{40}$

and 0 < answer < 1

Denominator must be 40 (may subsequently be simplified)

B1ft

Alternative method 2

$\dfrac{2}{2 + x + 2x + 5} = \dfrac{1}{20}$ or $\dfrac{x + 2x + 5}{2 + x + 2x + 5} = \dfrac{19}{20}$

oe equation

M2

(x =) 11

A1

$\dfrac{27}{40}$ or 0.675 or 67.5%

Only ft evaluation of $\dfrac{2 \times \text{their integer } x + 5}{40}$

and 0 < answer < 1

Denominator must be 40 (may subsequently be simplified)

B1ft

Alternative method 3

$3x \rightarrow 100\% - 5\% - 12.5\%$ or $3x \rightarrow 82.5\%$

Using 2 → 5% and 5 → 12.5%

oe

M1

$x \rightarrow 82.5\% ÷ 3$ or $x \rightarrow 27.5\%$

oe

$2x + 5 \rightarrow 2 \times 27.5\% + 12.5\%$

oe

$\dfrac{27}{40}$ or 0.675 or 67.5%

Alternative method 4

$3x \rightarrow 1 - \dfrac{1}{20} - \dfrac{2.5}{20}$ or $3x \rightarrow \dfrac{16.5}{20}$

Using $2 \rightarrow \dfrac{1}{20}$ *and* $5 \rightarrow \dfrac{2.5}{20}$

oe

$x \rightarrow \dfrac{16.5}{20} \div 30$ or $x \rightarrow \dfrac{5.5}{20}$

oe

$2x + 5 \rightarrow 2 \times \dfrac{5.5}{20} + \dfrac{2.5}{20}$ or $2x + 5 \rightarrow \dfrac{13.5}{20}$

oe

$\dfrac{27}{40}$ or 0.675 or 67.5%

Additional Guidance

(Alt 1) $x = 6$ (no working)   Answer $\dfrac{17}{40}$ (first B1 implied)

(Alt 1) $2 + x + 2x + 5 = 20$

$x = \dfrac{13}{3}$ Answer $\dfrac{13.666}{20}$

Answer $\dfrac{13.5}{20}$

11 by inspection or T & I scores the first 3 marks

Answer $\dfrac{2x + 5}{40}$

Answer $\dfrac{2x + 5}{3x + 7}$

Ratio eg 27 : 40

Expressed only in words e.g. 27 out of 40

27 out of 40 and $\dfrac{27}{40}$

$\dfrac{27}{40}$ seen with incorrect change of form or incorrect cancelling

eg $\dfrac{27}{40}$ and answer 0.27

Ignore chance words if $\dfrac{27}{40}$ seen

eg $\dfrac{27}{40}$ and answer Unlikely

[4]

Q18.

5(4c + 3) and 2(c − 8)
or
20c + 15 and 2c − 16

> *oe e.g. 10(4c + 3) + 4(c − 8)*
> *Allow one error in expansion if not showing brackets*
> *e.g. Allow 20c + 3 and 2c − 16*
> *Equation or fractions not necessary*

M1

Correct equation with no unexpanded brackets

e.g.1 20c + 15 + 2c − 16 = 10

e.g.2 22c − 1 = 10

e.g.3 $\dfrac{(20c+15)}{10} + \dfrac{(2c-16)}{10} = 1$

e.g.4 $\dfrac{44c-2}{20} = 1$

A1

Eliminates denominators correctly and collects terms for their equation

e.g.1 20c + 2c = 10 − 15 + 16

e.g.2 22c = 11

> *dep on first M1*

Do not award this mark if the denominator has been eliminated incorrectly at any time in the working
Allow one sign error when collecting terms

M1dep

$\frac{1}{2}$ or $\frac{11}{22}$

oe
Only ft from M1 A0 M1 with a maximum of one error in expansions and collecting terms

SC2 Answer $\frac{15}{22}$ oe

A1ft

[4]

Q19.

$C = 0.6(0)n + 2.5(0)$

oe
Must have C = for B3
B2 $C = 0.6n + k$ $(k \neq 0)$
or $C = an + 2.5$ $(a \neq 0)$
or $0.6n + 2.5$
B1 $0.6n$ or $an + 2.5$ $(a \neq 0)$
or $C = 60n + 250$

B3

Additional Guidance

Allow correct fractions eg $\frac{3}{5}$ or $\frac{1}{1.6}$ for 0.6 and/or $\frac{5}{2}$ for 2.5

Allow $0.6 \times n$ or $n \times 0.6$ for $0.6n$

eg $C = 0.6 \times n + 2.5$

B3

$n \times 0.6 + 2.5$

B2

$0.6 \times n$

B1

Penalise by one mark the use of $n0.6$ for $0.6n$

eg $C = n0.6 + 2.5$

B2

$n0.6 + 2.5$

B1

$n0.6$

B0

Penalise by one mark the use of different letters

eg $y = 0.6x + 2.5$

B2

$0.6x + 2.5$

B1

$2p + 2.5$

B0

Transposing 0.6 and 2.5 scores zero   eg $C = 2.5n + 0.6$

B0

Ignore £ signs e.g. £C = £0.6n + £2.5 or C = £0.60n + £2.5

B3

$C = 1.2n + 2.5$

B2

$1.2n + 2.5$

B1

$C = 0.6n + 2.5$ in working with $0.6n + 2.5$ on answer line

B3

Equivalent formula but C not the subject scores B2
eg $100C = 60n + 250$

B2

[3]

Q20.

$3(10 - x)$

or $30 - 3x$

> *Do not accept 54 + 15 x = 3(10 − x)*
> *Do not accept 54 + 15 x = 30 − 3x*
> $\frac{18}{3} + \frac{5x}{3}$
> or $6 + \frac{5x}{3}$

M1

$18 + 5x = 30 - 3x$

> $6 + \frac{5x}{3} = 10 - x$

M1dep

$5x + 3x = 30 - 18$

> *Collecting their 4 terms (2 stages)*
> *oe*

$$\frac{\frac{5x}{3} + x}{} = 10 - 6$$

M1

1.5 or $\frac{3}{2}$ or $1\frac{1}{2}$

dep on 3ʳᵈ M1

A1ft

[4]

Q21.

(a)   4

B1

(b) $2x = 1 - 5$ or $2x = -4$

M1

   −2

A1

[3]

Q22.

$12x - 28 \ (= 20)$

$3x - 7 = 20 \div 4$

M1

$12x = 20 + 28$

$3x = 5 + 7$

$3x = \frac{20}{4} + 7$

This mark is for separating terms in their equation

M1

4

ft if M1M0 or M0M1

A1ft

[3]

Q23.

(a)   **Alternative method 1**
   $4x - 10$

B1

   $6x -$ their $4x =$ their $-10 - 4$

   or $2x = -14$

oe

$\frac{\text{their} - 10 - 4}{6 - \text{their } 4}$

$or \ \frac{-14}{2}$

−7

ft their (4x − 10)

A1ft

Alternative method 2

$3x + 2 = 2x − 5$

B1

their $3x − 2x = − 5 −$ their 2

oe

M1

−7

ft their (3x + 2)

A1ft

Additional Guidance

their $(4x − 10)$ must be two terms with one correct to award the method mark

their $(3x + 2)$ must be two terms with one correct to award the method mark

$6x + 4 = 4x − 5, 2x = −9, x = −\dfrac{9}{2}$

B0M1A1ft

$3x + 4 = 2x − 5, x = − 9$

B0M1A1ft

$6x + 4 = 22x − 25$ (2 incorect terms), $29 = 16x, x = \dfrac{29}{16}$

B0M0A0

(b) $2y − y^4$

B1 each term

Do not ignore fw for B2

B2

Additional Guidance

Do not accept $y2$

$2y + − y^4$

B1

$2y − y^4 = y^3$

B1

$2 × y − y^4$

B1

$y × 2 − y × y^3$

B0

$y2 + − y^4$

B0

[5]

Q24.

9 + 3*x* + *x* − 5 + 2*x*
or 6*x* + 4
or 3*x* + *x* − 5 + 2*x*
or 6*x* − 5

         oe

         M1

Their (6*x* + 4) = 100
or their 6*x* − 5 = 91
or 6*x* = 96

      oe

$$\frac{9}{their\ (6x+4)} = \frac{9}{100}$$

         M1

x = 16

         A1

$$\frac{11}{100}$$

      ft their 16

         B1ft

         [4]

Q25.

(a)   *y* − 8 = 3*w*

$$\frac{y}{3} = w + \frac{8}{3}$$

         M1

$$\frac{y-8}{3} = w$$

or $\frac{y}{3} - \frac{8}{3} = w$

      SC1 $\frac{y-8}{3}$ *or* $\frac{y}{3} - \frac{8}{3}$

      Do not ignore further work

         A1

(b)   5*x* + 20

         B1

5*x* − 3*x* = 23 − 20

or 2*x* = 3

      their 5x − 3x = 23 − their 20

         M1

1.5

      oe

         A1ft

         [5]