Mark schemes

Q1.

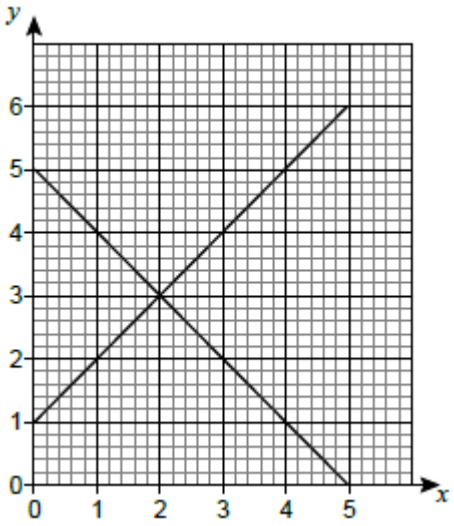
$x = 3$

B1

[1]

Q2.

(a) Straight line through
(0, 1), (1, 2), (2, 3), (3, 4), (4, 5) and (5, 6)



B1 Two correct points plotted

B2

(b) $x = 2$ and $y = 3$
ft their linear graph from (a)

B1ft

[3]

Q3.

Alternative method 1

$4x - 6y = 24$

$10x + 12y = 6$
and
$10x - 15y = 60$

M1

$9x = 27$ or
$x = 3$
$27y = -54$
or $y = -2$

M1dep

$x = 3$ and $y = -2$

oe

SC1 for x = 3 and y = −2 without working or using trial and improvement

A1

Alternative method 2

$$y = \frac{2x - 12}{3}$$

or $y = \frac{3 - 5x}{6}$

$$x = \frac{12 + 3y}{2}$$

or $x = \frac{3 - 6y}{5}$

oe

Rearranging

M1

$9x = 27$

or $x = 3$

$27y = -54$

or $y = -2$

oe

Elimination of one variable and simplification

M1dep

$x = 3$ and $y = -2$

oe

SC1 for x = 3 and y = −2 without working or using trial and improvement

A1

[3]

Q4.

Alternative method 1

$4x - 6y = 48$

and

$18x + 6y = -15$

$6x - 9y = 72$

(and

$6x + 2y = -5$)

oe

Equating coefficients

M1

$22x = 33$

or $x = 1.5$

$-11y = 77$

or $y = -7$

oe

Elimination of one variable

M1 dep

$x = 1.5$ and $y = -7$

oe

SC1 for x = 1.5 and y = −7 without working or using trial and improvement

A1

Alternative method 2

$x = \frac{24 + 3y}{2}$ or $y = \frac{2x - 24}{3}$

or $x = \frac{-5-2y}{6}$ or $y = \frac{-5-6x}{2}$

oe

Rearranging

M1

$22x = 33$

or $x = 1.5$

$-11y = 77$

or $y = -7$

oe

Elimination of one variable

M1 dep

$x = 1.5$ and $y = -7$

oe

SC1 for x = 1.5 and y = −7 without working or using trial and improvement

A1

[3]

Q5.

$4x + 6y = 20$ or $12x - 3y = -3$

oe Allow one error

M1

$7y = 21$ or $14x = 7$ *oe*

M1

$x = \frac{1}{2}$ and $y = 3$ *oe*

A1

Alternative method

$x = \frac{10 - 3y}{2}$ or $y = 4x + 1$ *oe*

or $y = \frac{10 - 2x}{3}$ or $x = \frac{y - 1}{4}$

M1

$7y = 21$ or $14x = 7$ *oe*

M1

$x = \frac{1}{2}$ and $y = 3$ *oe*

A1

[3]

Q6.

$2x + 3y =$ $6x + 9y = 159$

53 $9x - 3y$ $6x - 2y = 38$ *oe*

Allow one error

$= 57$

M1

$11x = 110$ $11y = 121$

M1

$x = 10$ or $y = 11$

A1

$x = 10$ and $y = 11$

A1

Alternative method

$y = 3x - 19$ $x = \frac{y + 19}{3}$ *oe*

Allow one error

M1

$2x + 3(3x - 19) = 53$ $\frac{2(y + 19)}{3} + 3y = 53$

$11x - 57 = 53$ $11y + 38 = 159$

M1

$x = 10$ or $y = 11$

A1

$x = 10$ and $y = 11$

A1

[4]

Q7.

$(2x + 3y = 15.5)$ $(2x + 3y = 15.5)$

$2x + 2y = 12$ $3x + 3y = 18$

Equates coefficients

M1

$y = 3.5$

or $x = 2.5$

oe

A1

$x = 2.5$ and $y = 3.5$

A1

[3]

Q8.

$3b + g = 62$ or $b + 2g = 59$

B1

$3b + g = 62$ and $3b + 6g = 177$ or

$6b + 2g = 124$ and $b + 2g = 59$ or

$3b + g = 62$ and $2b - g = 3$

6 correct attempt at elimination ...

Allow one error in the two elimination steps

If substitution method used then allow one error in the substitution or simplification

M1

$5g = 115$ or $5b = 65$

oe

M1 dep

$b = 13$ and $g = 23$

SC2 for correct solution by trial and improvement

A1

[4]

Q9.

$(5x - 4y = 24)$ $(5x - 4y = 24)$

$2x + 4y = 18$ $5x + 10y = 45$

oe for equating coefficients

Allow error in one term

M1

$7x = 42$ $14y = 21$

Correct elimination from their equations

M1

$x = 6$ and $y = 1.5$

SC1 correct answers with no working or using trial and improvement

A1

Alternative method

$x = 9 - 2y$ and $5(9 - 2y) - 4y = 24$

or

$y = \frac{9 - x}{2}$ and $5x - \frac{4(9 - x)}{2} = 24$

Allow one error ... it can be a substitution error (eg $9 - 2y$) or a sign error in the equation

M1

Simplifying and solving as far as $14y = 21$ or $7x = 42$

Correct simplification from their substitution

M1

$x = 6$ and $y = 1.5$

SC1 correct answers with no working or using trial and improvement

A1

[3]

Q10.

Alternative method 1

$2x + x = 18 + 6$

oe

Eliminates a variable

Implied by $3x = n$, where $n \neq 18$

M1

$3x = 24$ or $x = 8$

oe

A1

$x = 8$ and $y = 2$

A1

Alternative method 2

$y - -2y = 18 - 2 \times 6$ or $y - -2y = 18 - 12$

or $y + 2y = 18 - 2 \times 6$ or $x + 2y = 18 - 12$

oe

Eliminates a variable

Implied by $2x - 2y = 12$ followed by $3y = m$ where $m < 18$

M1

$3y = 6$ or $-3y = -6$ or $y = 2$ or $-y = -2$

oe

A1

$x = 8$ and $y = 2$

A1

Alternative method 3

$\frac{18 - y}{2} = y + 6$

or $18 - 2x = x - 6$

oe

Eliminates a variable

M1

$3x = 24$ or $x = 8$ or $3y = 6$ or $y = 2$

oe

Collects terms

A1

$x = 8$ and $y = 2$

A1

Alternative method 4

Correctly evaluated trial of at least one pair of values in one equation for which they do not work

e.g. $9 - 2 = 7$

The pair of values must not be given as the answer

M1

Correctly evaluated trial of at least three pairs of values in one equation for which they do not work

e.g. $9 - 2 = 7$

$2 \times 11 + 5 = 27$

$10 - (-2) = 12$

With none of the three pairs of values given as the answer

M1dep

$x = 8$ and $y = 2$

A1

Additional Guidance

One correct value with one incorrect value (or no second value) and no working

M1A1A0

e.g. $x = 6$ and $y = 2$

M1A1A0

e.g. $y = 2$

M1A1A0

(8, 2) or 8, 2 on answer line (with or without working)

M1A1A1

(2, 8) or 2, 8 on answer line with no working

M0A0A0

Embedded, correct values in one equation only e.g. $2 \times 8 + 2 = 18$

M1A0A0

Embedded, correct values in both equations i.e. $2 \times 8 + 2 = 18$ and $8 - 2 = 6$

M1A1A0

Please check crossed out work, which may indicate correct rejection of a trial in this question, as covered in alternative method 4

[3]

Q11.

$\left(-\frac{1}{3}, -1\right)$

B1

[1]

Q12.

Alternative method 1

$3f + 4p = 82.97$
Or
$5f + 6p = 131.95$

Must be algebraic not word form.

M1

$9f + 12p = 248.91$
And
$10f + 12p = 263.90$

or $15f + 20p = 414.85$
and
$15f + 18p = 395.85$
Condone one error in totals

M1

$f = 14.99$

A1

$p = 9.5(0)$

A1

£205.42

B1ft

Logical argument with steps shown and correct conclusion made

Must gain method marks and make conclusion QWC strand iii

Q1ft

Alternative method 2

$3f + 4p = 82.97$
Or
$5f + 6p = 131.95$

M1

$15f + 20p = 414.85$
and
$15f + 18p = 395.85$

M1

$p = 9.5(0)$

A1

82.97 + 131.95 − their 9.5(0)
or 214.92 − their 9.5(0)

Subtracting cost of one post from total of 8 panels and 10 posts

M1

£205.42

ft their 9.50

A1 ft

Logical argument with steps shown and correct conclusion made

Must gain method marks and make conclusion QWC strand iii

Q1 ft

[6]

Q13.

(a) $30y + 120w$ or $30(y + 4w)$

oe

B1 for 30y or 120w or 0.3y + 1.2w

Do not ignore fw for B2

SC1 for 30p + 120c

B2

Additional Guidance
$30yp + 120wp$

B2

$30p + 120w$

B1

$30y = 120w$

B1

$0.3y + 120w$

B1

$30y + 1.20w$

B1

$30y + w120$

B1

$30y + 120w + 150yw$

B1

$30w + 120y$

B0

$30a + 120b$

B0

$y30 + w120$

B0

$30p + 120p$

B0

$30py + 120pw$

B0

Use of letters other than y or w is B0
Ignore p as units

(b) Alternative method 1

$2p + r = 265$ or $p + 5r = 200$
or $3p + 6r = 465$

May work in pence or pounds

M1

$(2p + r = 265)$
$2p + 10r = 400$
$10p + 5r = 1325$
$(p + 5r = 200)$

Equating coefficients
oe

M1

$9r = 135$
or $r = 15$
$9p = 1125$ or $p = 125$

Eliminating a variable
oe

A1

Pen = (£)1.25 and Ruler = £0.15

Condone 15p on answer line

A1

Alternative method 2

$2p + r = 265$ or $p + 5r = 200$
or $3p + 6r = 465$

May work in pence or pounds

M1

$r = 265 - 2p$

or $r = \frac{200 - p}{5}$

$p = 200 - 5r$

or $p = \frac{265 - r}{2}$

Making p or r the subject

oe

M1

$9p = 1125$
or $p = 125$ $9r = 135$ or $r = 15$

Eliminating a variable

oe

A1

Pen = (£)1.25 and Ruler = £0.15

Condone 15p on answer line

A1

Additional Guidance
Accept: £0.15p or 125p with £ sign crossed out
Do not accept: 0.15p with £ sign crossed out or £125p

Answers reversed

M1M1A1

2 × pens + 1 ruler = 265 with no further working

M0

T&I scores 0 or 4

Use any two different letters, e.g. x and y, p and r

Letters not words required for the first M mark, but can be recovered by showing correct working for following M mark(s)

[6]

Q14.

$3a + 1.5b = 9(.00)$

or $2a + 4b = 13.2(0)$

B1

$6a + 3b = 18$ and $6a + 12b = 39.6$

oe equating coefficients
Allow one error in totals

M1

$9b = 21.6$

Subtracting

M1

Apples = 1.80

A1

Blackberries = 2.40

1.8 and 2.4 is A1 A0

A1

[5]

Q15.

Draws $3x + 2y = 6$

B1 Works out or plots at least two points satisfying $3x + 2y = 6$
eg (2, 0) and (0, 3)

B2

$x = 2.5$ and $y = -0.7$

ft their graph
$\pm\frac{1}{2}$ *square*

B1ft

[3]

Q16.

$15 + 20m = 40 + 15m$

$0 = -25 + 5m$ or $0 = 25 - 5m$

M1

$20m - 15m = 40 - 15$

$5m = 25$ or $-5m = -25$

M1

$m = 5$

A1

($T =$) 115

A1 ft

Alternative method

$\frac{T-15}{20} = \frac{T-40}{15}$

M1

$15(T - 15) = 20(T - 40)$

M1

$15T - 225 = 20T - 800$

M1

(T =) 115

A1

[4]

Q17.

$2y - -y = 10 - 13$
or $3y = -3$
or
$3x + 6x = 10 + 26$
or $9x = 36$

Eliminates a variable

M1

$y = -1$ or $x = 4$

A1

$y = -1$ and $x = 4$

A1

[3]

Q18.

Alternative method 1

$3a$ (+) $4c$ (=) 23
and
$3a$ (+) $15c$ (=) 45
or
$15a$ (+) $20c$ (=)
115
and
$4a$ (+) $20c$ (=) 60

oe eg works in pence
Multiplies one or both equation(s) to equate coefficients of a or c
Allow one error in multiplication

M1

$11c$ (=) 22
or
11a (=) 55

oe
Subtracts equations to eliminate one variable
Allow one error in subtraction

M1

(a =) 5 or (€) 2

A1

(*a* =) 5 and (*c* =) 2

A1

Alternative method 2

$a = \frac{23 - 4c}{3}$

or $a = 15 - 5c$

or

$c = \frac{23 - 3a}{4}$

or $c = \frac{15 - a}{5}$

oe

Makes a or c the subject

M1

$\frac{23 - 4c}{3} = 15 - 5c$

or

$\frac{23 - 3a}{4} = \frac{15 - a}{5}$

oe

Correctly substitutes their expression to eliminate one variable

M1

(*a* =) 5 or (*c* =) 2

A1

(*a* =) 5 and (*c* =) 2

A1

Additional Guidance

Accept any letters, or 'adult' and 'child', as variables
To allow one error in the first mark of alt 1, the 'equal' coefficients must be the same. eg
allow $3a + 4c = 23$ and $3a + 15c = 15$
but not $3a + 4c = 23$ and $3a + 5c = 45$

[4]