Q1-2

1

Substitute $p = -10$, $q = 3$ and $x = -5$ into the formula, putting brackets around negative numbers

$$y = (-10) - 2 \times 3 \times (-5)^2$$

[1]

$y = -160$ [1]

2

Substitute $c = 8$ into the second equation and solve to find the value of b.

$$\frac{b}{8} = 2$$
$$b = 2 \times 8$$
$$b = 16$$

[1]

Substitute $b = 16$ and $c = 8$ into the first equation and solve to find the value of a.

$$\frac{a}{16} = 3 \times 8$$
$$\frac{a}{16} = 24$$
$$a = 24 \times 16$$

[1]

$a = 384$ [1]

Q3

3

Simplify the numerator and denominator by collecting 'like' terms.

$$\frac{4a + 2b}{10a + 5b}$$

[1]

Factorise both the numerator and the denominator.

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

Either the numerator OR the denominator correctly factorised [1]

Cancel out the common factor $(2a + b)$.

$\frac{2}{5}$ [1]

Q4

4

Expand both brackets.

$$35x + 40 + 6x + 3b \equiv ax + 13$$

Collect 'like' terms.

$$41x + 40 + 3b \equiv ax + 13$$

[1]

Compare the left and right hand sides.
The coefficient of x on the left hand side is 41.

$$a = 41$$

The $40 + 3b$ on the left hand side must have the same value as the constant on the right hand side.
Equate the two expressions and solve to find the value of b.

$$40 + 3b = 13$$

[1]

$$3b = -27$$
$$b = -9$$

$\boldsymbol{a = 41}$ [1]
$\boldsymbol{b = -9}$ [1]

Q5-6

5

Write down an expression for the number of beads that Billy has, given that he has 3 more beads than Amy.

$$x + 3$$

Write down an expression for the number of beads that Carly has, given that she has 4 times as many beads as Billy.

$\boldsymbol{4(x + 3)}$ [1]

The expression $4x + 3$ is incorrect as it states that Carly has 4 times the number of beads that Amy has plus an extra 3.

The expression $3x + 4$ is incorrect as it states that Carly has 3 times the number of beads that Amy has plus an extra 4.

The expression $x + 12$ is incorrect as it states that Carly has 12 more beads than Amy.

6

Substitute $x = -1$ into the formula for y, use brackets around the negative numbers.

$$y = (-1)^4 - 4(-1)^3$$

[1]

$\boldsymbol{y = 5}$ [1]

Q7

7

Substitute the given values into the given formula

$$s = (104.3)(26.5) + \frac{1}{2}(-2.2)(26.5)^2$$

[1]

Find the value of this using your calculator, be careful with negatives and powers, use brackets as shown to help

$$s = 1991.475$$

Round to 4 significant figures and write in standard form
1991 is 1.991×1000, which is 10^3

$\boldsymbol{s = 1.991 \times 10^3}$ [1]
Correct rounding to 4 significant figures [1]
Correct application of standard form [1]

Q8

8a

If $x = 7$ is a solution, then the equation will be true (both sides equal) when $x = 7$ is substituted in

$$a(7)^2 + a = 150$$

[1]

Simplify

$$49a + a = 150$$
$$50a = 150$$

Divide both sides by 50

$$\boldsymbol{a = 3}$$ [1]

8b

Rewriting the full equation using a=3 that was found in part a

$$3x^2 + 3 = 150$$

Subtract 3 from both sides

$$3x^2 = 147$$

Divide both sides by 3

$$x^2 = 49$$

Square root both sides

$$x = \pm 7$$

We already know that $x = 7$ is a solution, so the other solution must be -7

$$\boldsymbol{x = -7}$$ [1]