Q1

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of 5 and 2 = 10

$$10\left(\frac{4x-1}{5}\right)+10\left(\frac{x+4}{2}\right)=10(3)$$

[1]

Simplify by cancelling each fraction.
The fractions should disappear.

$$2(4x-1)+5(x+4)=30$$

Expand both sets of brackets on the left-hand side.
Remember to expand both parts of the bracket.

$$8x-2+5x+20=30$$

Simplify the left hand side by bringing the x terms together and the number terms together.

$$8x+5x-2+20=30$$
$$13x+18=30$$

Subtract 18 from both sides.

$$13x=30-18$$
$$13x=12$$

[1]

Divide both sides by 13.

$$x=\frac{12}{13}$$

$\boldsymbol{x=\frac{12}{13}}$ [1]

Q2

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of 3 and 4 = 12

$$12\left(\frac{x+1}{3}\right)+12\left(\frac{2x+5}{4}\right)=12(2)$$

[1]

Simplify by cancelling each fraction.
The fractions should disappear.

$$\cancel{12}^{4}\left(\frac{x+1}{\cancel{3}_{1}}\right)+\cancel{12}^{3}\left(\frac{2x+5}{\cancel{4}_{1}}\right)=12(2)$$
$$4(x+1)+3(2x+5)=24$$

Expand both sets of brackets on the left-hand side.
Remember to expand both parts of the bracket.

$$4x+4+6x+15=24$$

[1]

Simplify the left hand side by bringing the x terms together and the number terms together.

$$4x+6x+4+15=24$$
$$10x+19=24$$

Subtract 19 from both sides.

$$10x=24-19$$
$$10x=5$$

[1]

Divide both sides by 10.

$$x=\frac{5}{10}=\frac{1}{2}$$

Divide both sides by 10.

$$x = \frac{5}{10} = \frac{1}{2}$$

$\boldsymbol{x = \frac{1}{2}}$ [1]

0.5 also accepted

Q3

3

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of $3x$ and $2x = 6x$

$$6x\left(\frac{x+2}{3x}\right) + 6x\left(\frac{x-2}{2x}\right) = 6x(3)$$

[1]

Simplify by cancelling the common terms in each fraction.
The fractions should disappear.

$$\cancel{6x}\left(\frac{x+2}{\cancel{3x}}\right) + \cancel{6x}\left(\frac{x-2}{\cancel{2x}}\right) = 6x(3)$$
$$2(x+2) + 3(x-2) = 18x$$

Expand both sets of brackets on the left-hand side.
Remember to expand both parts of the bracket.

$$2x + 4 + 3x - 6 = 18x$$

Simplify the left hand side by bringing the x terms together and the number terms together.

$$2x + 3x + 4 - 6 = 18x$$
$$5x - 2 = 18x$$

Bring the x terms to one side by subtracting $5x$ from both sides.

$$-2 = 18x - 5x$$
$$13x = -2$$

[1]

Divide both sides by 13.

Bring the x terms to one side by subtracting $5x$ from both sides.

$$-2 = 18x - 5x$$
$$13x = -2$$

[1]

Divide both sides by 13.

$$x = \frac{-2}{13}$$

$\boldsymbol{x = -\frac{2}{13}}$ [1]

Q4

4a

Start by expanding the bracket on the left-hand side.
Remember to expand both parts of the bracket.

$$5(f - 3) = f + 10$$
$$5f - 15 = f + 10$$

[1]

Bring the f terms to one side by subtracting the term with the smallest coefficient of f (f).

$$5f - 15 = f + 10$$
$$-f \qquad\qquad -f$$
$$4f - 15 = 10$$

[1]

Add 15 to both sides.

$$4x = 25$$

Divide both sides by 4.

$$f = \frac{25}{4} = 6.25$$

$f = 6.25$ [1]
Or as a fraction $\frac{25}{4}$

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of 3 and 2 = 6.

$$6\left(\frac{h + 7}{3}\right) + 6\left(\frac{2h - 1}{2}\right) = 6\left(\frac{5}{6}\right)$$

[1]

Simplify by cancelling each fraction.
The fractions should disappear.

$$\not{6}^{2}\left(\frac{h + 7}{\not{3}}\right) + \not{6}^{3}\left(\frac{2h - 1}{\not{2}}\right) = \not{6}\left(\frac{5}{\not{6}}\right)$$
$$2(h + 7) + 3(2h - 1) = 5$$

Expand both sets of brackets on the left-hand side.
Remember to expand both parts of the bracket.

$$2h + 14 + 6h - 3 = 5$$

[1]

Simplify the left hand side by bringing the h terms together and the number terms together.

$$2h + 6h + 14 - 3 = 5$$
$$8h + 11 = 5$$

Subtract 11 from both sides.

$$8h = 5 - 11$$
$$8h = -6$$

[1]

Divide both sides by 8.

$$h = -\frac{6}{8} = -\frac{3}{4}$$

$h = -0.75$ [1]

Divide both sides by 8.

$$h = -\frac{6}{8} = -\frac{3}{4}$$

$h = -0.75$ [1]
Any equivalent answer accepted.

Q5

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of 4, 3 and 6 = 12.

$$12\left(\frac{3x-2}{4}\right) - 12\left(\frac{2x+5}{3}\right) = 12\left(\frac{1-x}{6}\right)$$

[1]

Simplify by cancelling the common terms in each fraction.
The fractions should disappear.

$$\cancel{12}^{3}\left(\frac{3x-2}{\cancel{4}_{1}}\right) - \cancel{12}^{4}\left(\frac{2x+5}{\cancel{3}_{1}}\right) = \cancel{12}^{2}\left(\frac{1-x}{\cancel{6}_{1}}\right)$$
$$3(3x-2) - 4(2x+5) = 2(1-x)$$

[1]

Expand all three sets of brackets.
Remember to expand both parts of the bracket and be careful with the negative sign.

$$9x - 6 - 8x - 20 = 2 - 2x$$

Simplify the left hand side.

$$9x - 8x - 6 - 20 = 2 - 2x$$
$$x - 26 = 2 - 2x$$

Bring the x terms to one side by adding $2x$ to both sides and the number terms to the other by adding 26 to both sides.

$$x - 26 = 2 - 2x$$
$$+2x \qquad\qquad +2x$$
$$3x - 26 = 2$$
$$+26 \qquad\qquad +26$$
$$3x = 28$$

[1]

Divide both sides by 3.

$$x = \frac{28}{3}$$

$x = 9\frac{1}{3}$ [1]

The improper fraction is also accepted.

Q6

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of 5 and 4 = 20

$$20\left(\frac{9a-7}{5}\right) - 20\left(\frac{3a-7}{4}\right) = 20(4.55)$$

[1]

Simplify by cancelling each fraction.
The fractions should disappear.

$$\cancel{20}^{4}\left(\frac{9a-7}{\cancel{5}_{1}}\right) - \cancel{20}^{5}\left(\frac{3a-7}{\cancel{4}_{1}}\right) = 20(4.55)$$
$$4(9a-7) - 5(3a-7) = 91$$

Expand both sets of brackets on the left-hand side.
Remember to expand both terms inside each bracket and take care with the "double negative" -5×-7

$$36a - 28 - 15a + 35 = 91$$

[1]

Simplify the left hand side by bringing the x terms together and the number terms together.

$$36a - 15a - 28 + 35 = 91$$
$$21a + 7 = 91$$

Subtract 7 from both sides.

$$21a = 84$$

[1]

Subtract 7 from both sides.

$$21a = 84$$

[1]

Divide both sides by 21.

$$a = \frac{84}{21} = 4$$

$a = 4$ [1]

Q7

Although this may at first appear to be a quadratic equations question, it's actually a linear equations question "in disguise"!

Expand the brackets, noting that $(2x + 5)^2 = (2x + 5)(2x + 5)$.

$$4x^2 + 10x + 10x + 25 = 4x^2 - 2x + 6x - 3$$

[1]

Collect like terms on both sides.

$$4x^2 + 20x + 25 = 4x^2 + 4x - 3$$

Now subtract $4x^2$ from both sides, to reveal the linear equation!

$$\begin{array}{ccc} 4x^2 + 20x + 25 = 4x^2 + 4x - 3 \\ -4x^2 \qquad\qquad\quad -4x^2 \\ 20x + 25 = 4x - 3 \end{array}$$

Solve the linear equation. Subtract $4x$ from both sides.

$$16x + 25 = -3$$

Subtract 25 from both sides.

$$16x = -28$$

[1]

Divide both sides by 16.

$$x = \frac{-28}{16} = -\frac{7}{4}$$

$x = -\frac{7}{4}$ [1]

–1.75 is accepted

Q8

Remove the fractions by multiplying every term by the lowest common denominator.
The lowest common denominator is the LCM of 3 and 3 = 6.

$$6\left(\frac{8-2x}{3}\right) - 6\left(\frac{2x-3}{2}\right) = 6(4)$$

[1]

Simplify by cancelling each fraction.
The fractions should disappear.

$$\cancel{6}^{2}\left(\frac{8-2x}{\cancel{3}}\right) - \cancel{6}^{3}\left(\frac{2x-3}{\cancel{2}}\right) = 6(4)$$
$$2(8-2x) - 3(2x-3) = 24$$

Expand both sets of brackets on the left-hand side.
Remember to expand both terms inside each bracket and take care with the "double negative" in the second bracket (−3 × −3)

$$16 - 4x - 6x + 9 = 24$$

[1]

Simplify the left hand side by bringing the x terms together and the number terms together.

$$16 + 9 - 4x - 6x = 24$$
$$25 - 10x = 24$$

Subtract 25 from both sides.

$$-10x = -1$$

[1]

Divide both sides by -10.

$$x = \frac{-1}{-10} = \frac{1}{10}$$

$\boldsymbol{x = \frac{1}{10}}$ [1]

Q9

9

Although this may at first appear to be a quadratic equations question, it's actually a linear equations question "in disguise"!

First rewrite $fg(x) = f(x)$ in terms of x using composite functions.

$$(x-10)^2 + 6 = x^2 + 6$$

[1]

Expand the brackets; $(x-10)^2 = (x-10)(x-10)$.

$$x^2 - 20x + 100 + 6 = x^2 + 6$$

[1]

Collect like terms on the left hand side.

$$x^2 - 20x + 106 = x^2 + 6$$

Now subtract x^2 from both sides, to reveal the linear equation!

$$x^2 - 20x + 106 = x^2 + 6$$
$$-x^2 \qquad\qquad -x^2$$
$$-20x + 106 = 6$$

Subtract 106 from both sides.

$$-20x = -100$$

And divide both sides by -20.

$$x = \frac{-100}{-20} = 5$$

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

Q10

10

Multiply both sides by 5, remember to apply this to every term

$$15(x-4)+(x+2)=30$$

[1]

Expand the bracket on the left

$$15x-60+(x+2)=30$$

Simplify the left

$$16x-58=30$$

[1]

Add 58 to both sides

$$16x=88$$

[1]

Divide both sides by 16

$$x=\frac{88}{16}=\frac{11}{2}=5.5$$

$x = 5.5$ [1]

Or as a fraction $\frac{11}{2}$