1. We need to find a solution for two simultaneous linear equations.
First we number the equations for convenience:

$$5y - 8x = -94 \qquad (1)$$
$$3y + 10x = 62 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by 5 and equation (2) by 4 , giving

$$25y - 40x = -470 \qquad (3)$$
$$12y + 40x = 248 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$12y + 25y + 40x - 40x = 248 - 470 \qquad (5)$$

Simplifying equation (5) gives

$$37y = -222 \qquad (6)$$
$$y = -6 \qquad (7)$$

Next we substitute the value for y into equation (1) to obtain the value for x, giving

$$5 \times (-6) - 8x = -94$$
$$-8x = -64 \qquad \text{so}$$
$$x = 8$$

Hence the simultaneous solution to equations (1) and (2) is $(8, -6)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

(1) $5 \times (-6) - 8 \times 8 = -94$ $\qquad\qquad$ (2) $3 \times (-6) + 10 \times 8 = 62$
$-30 - 64 = -94$ $\qquad\qquad\qquad\qquad$ $-18 + 80 = 62$
$-94 = -94$ $\qquad\qquad\qquad\qquad\qquad$ $62 = 62$

Both equations turned into true statements, as required. Hence the answer is correct.)

2. We need to find a solution for two simultaneous linear equations.
First we number the equations for convenience:

$$-2x + 8y = 76 \qquad (1)$$
$$9x + 4y = -62 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (2) by -2 , giving

$$-2x + 8y = 76 \qquad (3)$$
$$-18x - 8y = 124 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$-2x - 18x + 8y - 8y = 76 + 124 \qquad (5)$$

Simplifying equation (5) gives

$$-20x = 200 \qquad (6)$$
$$x = -10 \qquad (7)$$

Next we substitute the value for x into equation (1) to obtain the value for y, giving

$$-2 \times (-10) + 8y = 76$$
$$8y = 56 \qquad \text{so}$$
$$y = 7$$

Hence the simultaneous solution to equations (1) and (2) is $(-10, 7)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

$$(1) \quad -2 \times (-10) + 8 \times 7 = 76 \qquad\qquad (2)\ \ 9 \times (-10) + 4 \times 7 = -62$$
$$20 + 56 = 76 \qquad\qquad\qquad -90 + 28 = -62$$
$$76 = 76 \qquad\qquad\qquad\qquad -62 = -62$$

Both equations turned into true statements, as required. Hence the answer is correct.)

3. We need to find a solution for two simultaneous linear equations.
   First we number the equations for convenience:

$$-3y - 4x = 35 \qquad (1)$$
$$-12y - 16x = 140 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by -4 , giving

$$12y + 16x = -140 \qquad (3)$$
$$-12y - 16x = 140 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$12y - 12y + 16x - 16x = -140 + 140 \qquad (5)$$

Simplifying equation (5) gives

$$0 = 0 \qquad (6)$$

Statement (6) is **always true**, so there is an infinite number of solutions to our simultaneous equations. The lines are superimposed.

4. We need to find a solution for two simultaneous linear equations.
   First we number the equations for convenience:

$$5y - 10x = 25 \qquad (1)$$
$$2y + 6x = 30 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by 3 and equation (2) by 5 , giving

$$15y - 30x = 75 \qquad (3)$$
$$10y + 30x = 150 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$15y + 10y - 30x + 30x = 75 + 150 \qquad (5)$$

Simplifying equation (5) gives

$$25y = 225 \qquad (6)$$
$$y = 9 \qquad (7)$$

Next we substitute the value for y into equation (1) to obtain the value for x, giving

$$5 \times 9 - 10x = 25$$
$$-10x = -20 \qquad \text{so}$$
$$x = 2$$

Hence the simultaneous solution to equations (1) and (2) is $(2, 9)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

(1) $5 \times 9 - 10 \times 2 = 25$ (2) $2 \times 9 + 6 \times 2 = 30$

$$45 - 20 = 25 \qquad\qquad\qquad\qquad 18 + 12 = 30$$
$$25 = 25 \qquad\qquad\qquad\qquad 30 = 30$$

Both equations turned into true statements, as required. Hence the answer is correct.)

5. We need to find a solution for two simultaneous linear equations.
First we number the equations for convenience:

$$10x - 6y = 12 \qquad (1)$$
$$-4x - 5y = -27 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by 2 and equation (2) by 5 , giving

$$20x - 12y = 24 \qquad (3)$$
$$-20x - 25y = -135 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$-20x + 20x - 25y - 12y = -135 + 24 \qquad (5)$$

Simplifying equation (5) gives

$$-37y = -111 \qquad (6)$$
$$y = 3 \qquad (7)$$

Next we substitute the value for y into equation (1) to obtain the value for x, giving

$$10x - 6 \times 3 = 12$$
$$10x = 30 \qquad \text{so}$$
$$x = 3$$

Hence the simultaneous solution to equations (1) and (2) is $(3, 3)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

(1) $10 \times 3 - 6 \times 3 = 12$ (2) $-4 \times 3 - 5 \times 3 = -27$

$$30 - 18 = 12 \qquad\qquad\qquad\qquad -12 - 15 = -27$$
$$12 = 12 \qquad\qquad\qquad\qquad -27 = -27$$

Both equations turned into true statements, as required. Hence the answer is correct.)