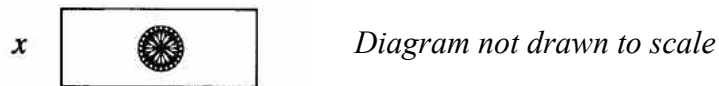


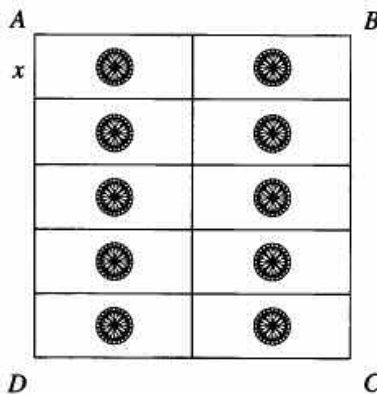
GCSE MATHEMATICS Intermediate Tier, topic sheet.
MISCELLANEOUS ALGEBRA 1

1. a) Simplify $6y - 7 - 2y - 3$.
b) What is the value of $5a + 3b$ when $a = 2$ and $b = -4$?
2. a) Simplify $3x + 6y + 2x - 4y$
b) Solve the following equation. $3x - 7 = 11$
3. a) Solve the following equation. $8x + 5 = 13 + 6x$
b) Solve the following equation. $4(x - 6) = 20$
4. Solve the equation $3x - 14 = 5(6 - x)$.

5. The diagram shows a tile. The width of the tile is x cm. The length of the tile is 15 cm more than its width.



When 10 of the tiles are put together as shown in the diagram below they form a square, $ABCD$.



Use the fact that $ABCD$ is a square to write down an equation that is satisfied by x .

Solve your equation and write down the value of the width of a tile.

6. a) Concert tickets, for a part of a theatre known as the stalls, cost $\pounds x$ each. What, in terms of x , is the cost of 6 tickets for the stalls?
- b) A ticket for another part of the theatre known as the circle costs $\pounds 3$ less than a ticket for the stalls. What, in terms of x , is the cost of one ticket for the circle?
- c) What, in terms of x , is the cost of 5 tickets for the circle?
- d) Given that the total cost of 6 tickets for the stalls and 5 tickets for the circle is $\pounds 62$, write down an equation in x and solve it to find the price of a ticket for the stalls.

7. Write down, in terms of n , the n th terms of the following sequences.

i) 8 13 18 23

ii) 2 5 8 11

iii) $\frac{5}{6}$ $\frac{15}{10}$ $\frac{25}{14}$ $\frac{35}{18}$ $\frac{45}{22}$

8. a) The inequality $7 - 3n < 12 - 5n$ can be rearranged into one of the following forms:

EITHER the form $n < \text{a number}$
OR the form $n > \text{a number}$

Rearrange the inequality into whichever form is correct.

b) Write down the least or greatest whole number value of n which satisfies your inequality.
State whether it is the least or the greatest.

9. a) Rearrange the inequality $3 + 7n < 2n + 22$ into the form $n < \text{some number}$.

b) Given that n also satisfies the inequality $3n > 1$, write down all the integer values (whole number) of n that satisfy both inequalities.

10. a) Rearrange the inequality $3 - 2n > 3n - 24$ into the form $n < \text{some number}$.

b) Given that n also satisfies the inequality $3n > 2$, write down all the integer values (whole number) of n that satisfy both inequalities.

11. Solve the following simultaneous equations by an algebraic (not graphical) method.

Show all your working. $6x + y = 37$
 $2x + 2y = 19$

12. Solve the following pairs of simultaneous equations by an algebraic (not graphical) method. Show all your working.

a) $3x - 5y = 19$ b) $3x - 5y = 34$ c) $3x - 2y = 17$
 $5x + 3y = 9$ $5x + 3y = 0$ $5x + 3y = 3$.

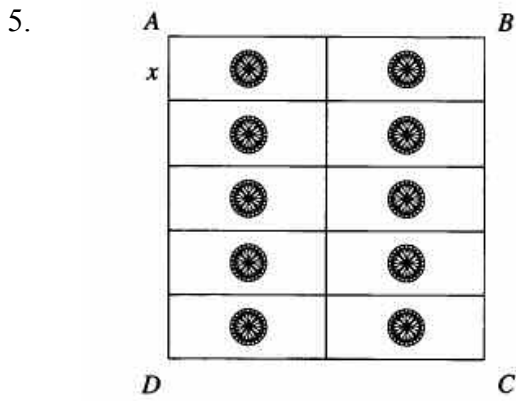
13. Given that $h = \frac{12(a-11)}{m}$, find the value of h when $a = 5$ and $m = -3$.

14. Given that $h = \frac{16(a-15)}{m}$, find the value of h when $a = 6$ and $m = -3$.

15. Given that $h = \frac{15(a-5)}{m}$, find the value of h when $a = -1$ and $m = 3$.

SOLUTIONS / ANSWERS.

1. a) $4y - 10$ b) -2 .
2. a) $5x + 2y$ b) $x = 6$.
3. a) $x = 4$ b) $x = 11$.
4. $x = 5.5$.



If $ABCD$ is a square then the lengths of AB and AD must be equal.

Now $AD = 5x$ and $AB = x + 15 + x + 15$ which equals $2x + 30$.

Thus $5x = 2x + 30$

which we solve to give $x = 10$.

So width = 10 cm.

6. a) $6x$ b) $x - 3$ c) $5(x - 3)$ or $5x - 15$
 d) $11x - 15 = 62$, $x = 7$ and so cost = £7.

7. i) $5n + 3$ ii) $3n - 1$ iii) $\frac{5n}{4n + 2}$.

8. a) We are simply being asked to solve the inequality $7 - 3n < 12 - 5n$.

Add $5n$ to both sides:	$7 - 3n + 5n < 12$
	$7 + 2n < 12$
Subtract 7:	$2n < 5$
Divide 2:	$n < 2.5$

less than

{i.e. n is any number less than 2.5}

- b) greatest value of $n = 2$.

9. a) $3 + 7n < 2n + 22$
 $3 + 5n < 22$ {after subtracting $2n$ }
 $5n < 19$ {after subtracting 3}
 $n < 3.8$ {after dividing by 5}

- b) We have $n < 3.8$ which says “ n must be less than 3.8”
 and $3n > 1$ or $n > \frac{1}{3}$ which says “ n must be larger than one-third”.

Putting these two statements together gives whole number values of n ; 1, 2 and 3.

10. a) $n < 5.4$ b) 1, 2, 3, 4, 5.

11.
$$\begin{array}{l} 6x + y = 37 \\ 2x + 2y = 19 \end{array}$$

Double the top equation to get: $12x + 2y = 74$
 {Leave the bottom equation alone!} $2x + 2y = 19$

Now that both equations have a **2y** term, subtract to get: $10x = 55$
 and thus $x = 5.5$.

To find y , use the original equation: $6x + y = 37$
 which means $6 \times 5.5 + y = 37$
 and thus $33 + y = 37$
 and hence $y = 4$.

12. a) {Multiply the top equation by 3 and the bottom equation by 5. Then add the two new equations to get: $34x = 102$.}

Answer: $x = 3, y = -2$.

b) $x = 3, y = -5$ c) $x = 3, y = -4$.

13. 24.

14. -48.

15. -30.