

# GCSE MATHEMATICS Higher Tier REVISION SHEET

## Graphical solution of equations.

1. a) Copy and complete the table of values for the function  $y = x^3 - 7x^2 + 10x$ , giving answers to 1 decimal place.

$x$	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
$y$	0	3.4									

- b) Hence draw the graph of  $y = x^3 - 7x^2 + 10x$  for values of  $x$  from 0 to 5.
- c) By drawing a suitable straight line on your graph, the equation of which must be stated, find approximate solutions to the equation  $x^3 - 7x^2 + 11x - 3 = 0$ .
2. a) Complete the table of values for the function  $y = x^2 - 2x - 5$ , for values of  $x$  between  $-3$  and  $5$ .

$x$	-3	-2	-1	0	1	2	3	4	5
$y$	10								

- b) Hence draw the graph of  $y = x^2 - 2x - 5$  for values of  $x$  from  $-3$  to  $5$ .
- c) By drawing a suitable straight line on the above graph, the equation of which must be stated, find approximations to the solutions of the equation  $x^2 - x - 7 = 0$ .

## Straight line geometry.

1. Find the gradient of the line passing through the points  $A(1, 3)$  and  $B(7, -1)$ .

Hence find the equation of the line through the points  $A$  and  $B$  in the form  $y = mx + c$ .

Show, using algebra, that this equation can be rearranged to give  $3y + 2x = 11$  and verify that the line passes through the point  $(4, 1)$ .

Find the point of intersection of the above line with the line given by  $2y - x = 5$ .

2. Find the gradient of the line passing through the points  $A(1, 5)$  and  $B(5, 11)$ .

Hence find the equation of the line through the points  $A$  and  $B$  in the form  $y = mx + c$ .

Show, using algebra, that this equation can be rearranged to give  $2y - 3x = 7$  and verify that the line passes through the point  $(-1, 2)$ .

Find the point of intersection of the above line with the line given by  $3x - y = 1$ .

3. Find the gradient of the line passing through the points  $A(2, 5)$  and  $B(5, 4)$ .

Hence find the equation of the line through the points  $A$  and  $B$  in the form  $y = mx + c$ .

Show, using algebra, that this equation can be rearranged to give  $3y + x = 17$  and verify that the line passes through the point  $(8, 3)$ .

### **Trial and improvement.**

Solve the following equations to 1 decimal place by *trial and improvement* methods.

a)  $x^2 - 2x = 7$

b)  $x^3 + 2x = 27$

c)  $2x^2 - x = 35$ .

### **Factorising.**

1. Factorise the following.

a)  $x^2 + 7x + 12$

b)  $x^2 + 5x - 6$

c)  $x^2 - 64$

d)  $2x^2 + 5x + 3$

e)  $6x^2 + 13x - 5$ .

2. Solve the following equations by factorising.

a)  $x^2 - 7x + 12 = 0$

b)  $4x^2 + 19x - 5 = 0$

c)  $x^2 - 6x - 7 = 9$ .

### **Completing the square.**

Complete the square for the following.

a)  $x^2 + 4x + 1$

b)  $x^2 - 6x - 2$

c)  $x^2 + 8x$

d)  $2x^2 + 8x - 1$

e)  $2x^2 - 4x + 5$

f)  $3x^2 + 6x + 10$ .

### **Quadratic equations.**

Solve the following equations. Give your answers to 2 decimal places where appropriate.

a)  $(x + 4)^2 - 49 = 0$

b)  $(5x - 4)(x - 2) = 11$

c)  $2x^2 - 3x - 1 = 0$

d)  $2x - \frac{6}{x} + 1 = 0$

e)  $2 + \frac{3}{x} = \frac{6}{x - 1}$ .

Answers.

**Graphical solution of equations.**

1. c) Draw the line  $y = 3 - x$ ,  $x \approx 0.3$  or  $1.8$  or  $4.9$ .
2. c) Draw the line  $y = 2 - x$ ,  $x \approx -2.2$  or  $3.2$ .

**Straight line geometry.**

1. Gradient =  $-\frac{2}{3}$ .

$$y = -\frac{2}{3}x + \frac{11}{3}.$$

Point of intersection = (1, 3).

2. Gradient = 1.5 or  $\frac{3}{2}$ .

$$y = 1.5x + 3.5 \text{ or } 2y - 3x = 7.$$

Point of intersection = (3, 8).

3. Gradient =  $-\frac{1}{3}$ .

$$y = -\frac{1}{3}x + \frac{17}{3} \text{ or } 3y + x = 17.$$

**Trial and improvement.**

- a)  $x = 3.8$ .
- b)  $x = 2.8$ .
- c)  $x = 4.4$ .

**Factorising.**

1. a)  $(x + 3)(x + 4)$       b)  $(x - 1)(x + 6)$       c)  $(x - 8)(x + 8)$   
d)  $(2x + 3)(x + 1)$       e)  $(2x + 5)(3x - 1)$
2. a)  $x = 3$  or  $x = 4$       b)  $x = \frac{1}{4}$  or  $x = -5$       c)  $x = -2$  or  $x = 8$ .

**Completing the square.**

- a)  $(x + 2)^2 - 3$       b)  $(x - 3)^2 - 11$       c)  $(x + 4)^2 - 16$
- d)  $2(x + 2)^2 - 9$       e)  $2(x - 1)^2 + 3$       f)  $3(x + 1)^2 + 7$ .

**Quadratic equations.**

- a)  $x = -11$  or  $x = 3$       b)  $x = -\frac{1}{5}$  or  $x = 3$
- c)  $x = -0.28$  or  $x = 1.78$       d)  $x = -2$  or  $x = 1.5$
- e)  $x = -0.5$  or  $x = 3$ .