Maths Revision Worksheet: Paper I Functions / Graphing Functions

1. I know that a function is a **'rule'** which yields an **output value of y** for a **given input value of x**.
2. I know that **DOMAIN** is the set of **INPUT (x)** values into a function.
3. I know that **RANGE** is the set of **OUTPUT (y)** values from a function.
4. I know that **CODOMAIN** is the set of all possible **OUTPUT** values from a function.
5. I know that the (input values, output values) ... couples.... of a function coupled together give **ordered (x,y) pairs** and that a **plot of these pairs graphs the function**.
6. I know that graphs of functions can be **linear, quadratic, exponential and cubic**.
7. I know that any set of ordered pairs which contain the **same input x value more than once** are not the result of a valid function!
8. I know that 3 different ways in which a function can be presented to me:

   f(x) = 3x + 4 'f of x is equal to'
   f:x-> 3x + 4 'f is the function such that x maps to 3x + 4
   y = 3x + 4

9. I know that given a function like **f:x-> x + 5** that when asked to **find f(3)** that I am being asked to

   Find the output value y for which the input value x = 3
   So .....
   f:x-> x + 5
   f(x) = x + 5
   f(3) = 3 + 5 = 8 i.e couple is (x,y) (3,8) which is a point on the line y=x+5

   Example 1 Pg 458
   2014 Q4C
10. I know that when I am given a function like **f(x)=5x-2** and asked to **'solve' f(x) = 8** that I am being asked to **find the input value of x for which the output of 5x-2 is equal to 8**

    i.e f(x)=5x-2
    8= 5x – 2
    10 = 5x => x = 2 i.e (x,y) is (2,8)

    I know how to find the value of unknown variables given g(x) = k(1-x) and g(-5)=20 Find k
    2012 Q8a

11. I know how to solve **'composite functions'** when given 2 funtions f(x) and g(x) to find gf(x) and fg(x)

    For example.... f(x) = x+3 and g(x)= x^2-1 Find (i) fg(x) and (ii) fg(2)

    fg(x) means ... find the output of the function f(x)= x+3 when the input value for x is (x^2-1) ....
    so .... fg(x) = (x^2-1) + 3 => fg(x)=x^2-1 +3 => fg(x)= x^2+2
    fg(2) asks us to find the output of fg(x) when the input value x is 2 => **fg(2)=4+2 = 6**

    Example 1 Page 459
12. I know how to find the **unknown coefficients** of a linear function by recognising that **points given on the graph of the function correspond to (x,y) couples/values** which can be used to generate equations which can be solved simultaneously.
    Example 1 Page 463
    2012 Q6a
13. I know how to find the **unknown coefficients** of a quadratic function by recognising that **points given on the graph of the function correspond to (x,y) couples/values** which can be used to generate equations which can be solved simultaneously.

    I know that this method will produce the correct quadratic equation whether it is u shaped on n shaped. Forming a quadratic equation from its roots will not do this automatically.
    Example 2 Page 464

14. I know that I can equate a quadratic function = 0 to find the roots of the function i.e the x values at which a graph of the function cutes the x-axis and that these values can be used to generate the factors of the quadratic and in turn the quadratic equation.
    Q14 page 466

    Graphing Functions – Linear

15. I can graph a function like f(x)=2x-4 in the domain -1≤ x≤ 4 and use the graph to find

    f(3) ... the output value of y for which the input x value is 3
    f(x) = -2 ... the input value x for which the output value of y is -2
    slope of the line (how much y increases or decreases for a 1 unit change in x or by rise/run)

Ex 1 Pg 471

16. Given the equation of a line I can use the intercept method (let x = 0 to find pt (0,y) and let y=0 to find pt (x,0) and join 2 points to plot line.
17. I know that a directly **proportional graph will be a 'straight line' that passes' through the origin (0,0)**

Graphing Functions – Quadratics (parabola shape)

18. I can use my calculator using **Mode 3 (Table)** to generate the (x,y) couples of a quadratic function given the domain. I can also find the (x,y) couples manually.
    2014 Q4
    2013 Q2
19. I know that if the 2nd difference of the y values is constant then the function is a quadratic (also in Patterns and Sequences).
    Ex2 Page 477
20. I know that a positive x^2 coefficient gives a U shape parabola and a negative x^2 coefficient gives an n shape parabola.
21. I know that **f(x)=0 is the same as y=0 (the x axis) and that if I equate the quadratic function = 0 and find x then I will have found the roots/zero's of the quadratic i.e. those values of of x where a graph of the function cuts the x-axis.**
22. I know that a plot of y=6 is a line drawn through y=6 parallel to the x axis.
23. I know that I can solve an equation like

    f(x) = 6 by finding the realising that f(x)=6 is the same as y=6 and that the solution of f(x)=6 is equal to the x values where the line y=6 intersects a graph of a given function.

    For example... given $f(x)=x^2-3x$ I can solve f(x) = 2 **graphically** by plotting $f(x) = x^2-3x$ and drawing the line y=2 and noting the intersection values of x.

    I could also look to find the input value of x for which the output value of y is equal to 2 **algebraically** by

    Equating $x^2-3x = 2 \Rightarrow x^2-3x-2 = 0$ and solving for x using the quad formula...
    SUMMARY: for f(x)=6 draw horizontal line through y=6
    See Pg 479
24. I know that a function is positive for x values above the x axis and negative for values below the x axis.

25. I know that given a function like **$y = 6 + 2x + x^2$** that finding **f(2)** is asking to find the output value y when the input value x is = 2 .... I can find this graphically by plotting a vertical line through x=2 , noting where this cuts the graph and finding the corresponding y value.
    SUMMARY: for f(2) draw vertical line through x=2
26. I know that I can solve the equations of 2 function f(x) = g(x) by plotting the 2 functions and noting the intersection points (x values).

    I know that I can find the intersection points of the 2 functions algebraically by equating one function to the other and solving for x value(s). I then take the x value(s) and sub back into either function to find the corresponding y value(s).

    2013 Q5
27. I know that I can solve the inequality f(x) < g(x) by finding the x values of the given curve below the given line.
    Pg 481
28. I can read the maximum / minimum turning points from a given graph. (Tip x value can be found using x = (-b/2a) and this value can be subbed into function to find corresponding y value)
29. I can use quadratic graphs to solve real life problems.
    Example 1 Pg 486

    Graphing Functions – Cubic

30. I can graph a cubic function and can note where it is **negative (below x axis) and increasing (+ve slope)** ... **positive (above x axis) and decreasing (-ve slope)**
31. I can plot and solve cubic equations
    Example 1 Page 495 NB
    2014 Q5

    Graphing Functions – Exponential i.e. $f(x) = 2^x$

32. I can plot Exponential functions.
    Ex 1 Page 499