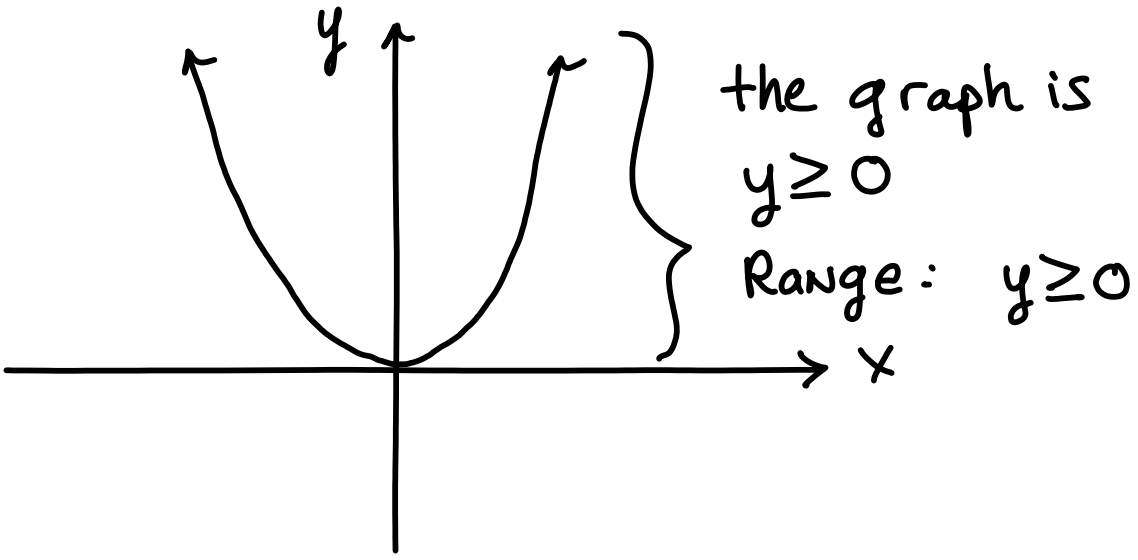
1. False

2. Domain - the set of all values that can be input into a function

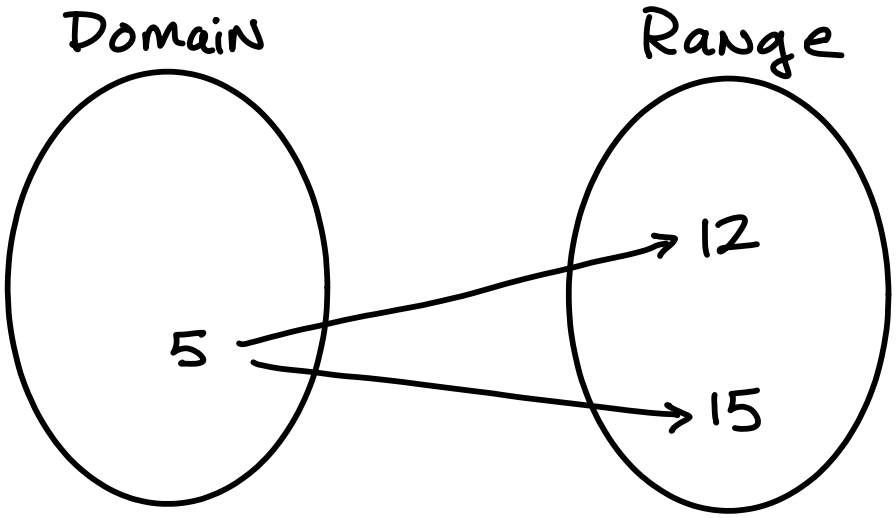
3. Yes the graph is of a function because it passes the VLT (Vertical Line Test)

4. Range of $f(x)=x^2$ $y \geq 0$

use a graph to find range



5.



This is a relation <u>not</u> a function;

it fails to be a function because each domain value can map to only one range value - 5 is mapping to both 12 and 15.

6. Yes, the graph of $f(x)=2x+4$ is a line and function (passes the VLT)

7. The VLT (Vertical Line Test) is a graphical method to determine if a relation is a function. The graph is a function if a vertical line will cross the graph once any place on the graph.

8. $f(x) + g(x) = \frac{3}{2}x - 2$

$(2x + 1) + (-\frac{1}{2}x - 3) = \frac{3}{2}x - 2$

9. $-3f(x) - g(x) = -11/2x$

$-3(2x + 1) - (-\frac{1}{2}x - 3) =$

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

$-11/2x$

10. $2f(x)g(x) = -2x^2 - 13x - 6$

$2(2x+1)(-\frac{1}{2}x - 3) =$

F.O.I.L.

$2[-x^2 - 6x - \frac{1}{2}x - 3] =$

$2[-x^2 - \frac{13}{2}x - 3] =$

$-2x^2 - 13x - 6$

11. $f(g(x)) = -x - 5$

$f(-\frac{1}{2}x - 3) = 2(-\frac{1}{2}x - 3) + 1$

$= -x - 6 + 1$

$= -x - 5$

12. $g(f(x)) = -x - \frac{7}{2}$

$g(2x+1) = -\frac{1}{2}(2x+1) - 3$

$= -x - \frac{1}{2} - 3$

$= -x - \frac{7}{2}$

13. $f(x)=2x+4$ and $g(x)=-\frac{1}{2}x-2$
(Not inverses)

if $f(x)$ and $g(x)$ are inverses then
$f(g(x)) = g(f(x)) = x$

check:

$f(g(x))=2(-\frac{1}{2}x-2)+4$

$=-x-4+4$

$=x$ ✓

$g(f(x))=-\frac{1}{2}(2x+4)-2$

$=-x-2-2$

$=-x-4$

$g(f(x))$ = not equal to x, therefore $f(x)$ and $g(x)$ are not inverses

14. $f(x) = 4x - 5$, $f^{-1}(x) = \frac{x}{4} + \frac{5}{4}$

$y = 4x - 5$

$x = 4y - 5$

$4y - 5 = x$

$4y = x + 5$

$y = \frac{x+5}{4} = \frac{x}{4} + \frac{5}{4}$

$f^{-1}(x) = \frac{x}{4} + \frac{5}{4}$

15. $f(x) = \frac{1}{3}x + 2$ $\quad f^{-1}(x) = 3x - 6$

$y = \frac{1}{3}x + 2$

$x = \frac{1}{3}y + 2$

$\frac{1}{3}y + 2 = x$

$\frac{1}{3}y = x - 2$

$y = 3x - 6$

$f^{-1}(x) = 3x - 6$

check:

$f(f^{-1}(x)) = f^{-1}(f(x)) = x$

$f(f^{-1}(x)) = \frac{1}{3}(3x - 6) + 2$

$= x - 2 + 2 = x$ ✓

$f^{-1}(f(x)) = 3(\frac{1}{3}x + 2) - 6$

$= x + 6 - 6 = x$ ✓

inverse functions verified