



= Year 12 = Algebra of functions = Worksheet 5

- A. $f(-x) = f(x)$ B. $f(-x) = -f(x)$ C. $f(kx) = kf(x)$, k is a real constant D. $f(x+k) = f(x)$ for some real k
 E. $f(f(x)) = x$ F. $f(x+y) = f(x) + f(y)$ G. $f(x+y) = f(x)f(y)$ H. $f\left(\frac{x+y}{2}\right) = \frac{f(x)+f(y)}{2}$
 I. $f(xy) = f(x)f(y)$ J. $f(xy) = f(x) + f(y)$ K. $f\left(\frac{x}{y}\right) = \frac{f(x)}{f(y)}$ L. $f\left(\frac{x}{y}\right) = f(x) - f(y)$ M. $f(x-y) = \frac{f(x)}{f(y)}$

From the above functional equations, select (one or more) those that are satisfied by the following solution functions. Show working.

1. $f(x) = a \cos\left(\frac{x}{b}\right) + 1$.	2. $f(x) = -3 \sin(-2x)$.
3. $f(x) = c$, where c is a real constant.	4. $f(x) = -x$.
5. $f(x) = \sqrt{x}$	6. $f(x) = x^4$
7. $f(x) = e^{ax}$	8. $f(x) = mx + c$
9. $f(x) = \log_e x^2$	Numerical, algebraic and worded answers. 1. A, D 2. B, D 3. A, D 4. C, E, F, H 5. I, K 6. A, I, K 7. G, M 8. H 9. A, J, L