Functions, Curved Graphs and Transformations

Graphs · 6 questions · step-by-step answers at the end

Name: Date: Score: / 6

USEFUL EQUATIONS

$fg(x) = f(g(x))$ $f(f^{-1}(x)) = x$ $y = f(x - a) + b$ $y = ab^x$

Questions

Show your working in the space under each question.

1. EASY $f(x) = x^2 + 1$. Find $f(-3)$.

2. EASY Find the intercepts of $y = x^2 - 4$.

3. MEDIUM The graph of $y = x^2$ is moved 3 right and 2 up. Write its equation and turning point.

4. MEDIUM Find the inverse of $f(x) = 5x + 2$.

5. HARD $y = f(x)$ has a maximum at (2, 5). Find the maximum of (a) $y = f(x + 3)$, (b) $y = 2f(x)$, (c) $y = f(2x)$.

6. HARD The curve $y = ab^x$ passes through (0, 3) and (2, 12). Find a and b ($b > 0$) and the value of y when $x = 5$.

Step-by-step answers

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1. $(-3)^2 + 1 = \mathbf{10}$.

2. x = 0 gives y = −4. y = 0 gives x = ±2. **(0, −4), (2, 0), (−2, 0)**.

3. $\mathbf{y = (x - 3)^2 + 2}$, with minimum at **(3, 2)**.

4. y = 5x + 2, so x = (y − 2)/5. $\mathbf{f^{-1}(x) = (x - 2)/5}$.

5. (a) 3 left: **(−1, 5)**. (b) y doubled: **(2, 10)**. (c) x halved: **(1, 5)**.

6. x = 0 gives a = 3. Then $3b^2 = 12$, so b = 2. $y = 3 \times 2^5 = \mathbf{96}$.