

Graph Transformations – Question Set

Describing Transformations

Q1 State the sequence of transformations that maps $y = \sqrt{x}$ onto $y = -\sqrt{x+5} - 2$.

Q2 Describe the transformation from $y = x^2$ to $y = 4(x - 2)^2$.

Q3 (a) Write the shift for $y = \frac{1}{x-6} + 3$ (b) Write the reflection for $y = -|x|$

Q4 Identify the amplitude, period and vertical shift of $y = 3 \sin(2x) - 1$.

Q5 Does $y = (x + 4)^3 - 7$ involve a vertical stretch? Explain.

Writing Equations from Graph Features

Q6 Give an equation for a cubic that passes through the origin, is reflected in the x -axis, and stretched vertically by $k = 2$.

Q7 The graph of $y = \frac{1}{x}$ is translated 3 units left and 5 units up. Write the new equation.

Q8 A parabola opens downward, has vertex $(1, 4)$ and y -intercept 8. Find its equation in vertex form.

Q9 A circle of radius 4 is centred at $(-5, 2)$. Write its equation.

Sketching & Intercepts

Q10 Sketch $y = |x - 3| - 2$, clearly labelling vertex and intercepts.

Q11 Sketch $y = -2\sqrt{x}$ for $x \geq 0$ and state its domain and range.

Q12 Draw one period of $y = \cos\left(\frac{\pi}{3}x\right) + 1$, marking turning points.

Composite Transformations

Q13 Apply the following to $y = x^2$ in order: (i) stretch vertically by 3, (ii) translate down 5, (iii) reflect in the y -axis. Write the final equation.

Q14 Show that performing a horizontal stretch $x \mapsto 2x$ *after* a right shift of 3 on $y = \sqrt{x}$ produces a different graph than reversing the order.

Piecewise & Step Functions

Q15 Define a piecewise function that equals $2x + 1$ for $x < -1$, 0 for $-1 \leq x < 3$, and $x - 4$ for $x \geq 3$.

Q16 Sketch the greatest-integer (step) function $y = \lfloor x - 1.2 \rfloor$ for $-1 \leq x \leq 4$.

Inverse Transformations

Q17 If $f(x) = 3x - 4$, state the graph transformation required to obtain $y = f^{-1}(x)$.

Q18 Explain why the inverse of $y = (x - 2)^2 + 5$ is *not* a function unless the domain is restricted.

Mixed Practice

Q19 (a) Find the image of the point $(2, -3)$ after reflecting $y = |x|$ in the x -axis (b) Find the pre-image of $(-1, 5)$ for $y = |x|$

Q20 A rational function has vertical asymptote $x = 4$, horizontal asymptote $y = -2$ and passes through $(5, -1)$. Determine its equation in the form $y = \frac{k}{x-4} - 2$.

Q21 A sine curve of amplitude 4 is shifted up 3 and has period 120° . Write its equation if one maximum occurs at $(15^\circ, 7)$.

Q22 State the transformations that map $y = \tan x$ onto $y = -\tan(2x) + 1$.

Challenge Question – Order Matters

Q23 Starting with the basic hyperbola $y = \frac{1}{x}$:

(a) First translate the graph 6 units to the right, *then* reflect it in the y -axis. Write an explicit equation for the resulting curve.

(b) Now perform the *same two* transformations in the reverse order (*reflect in the y-axis first, then translate right*).