Worksheet: Graphing Cubic Functions

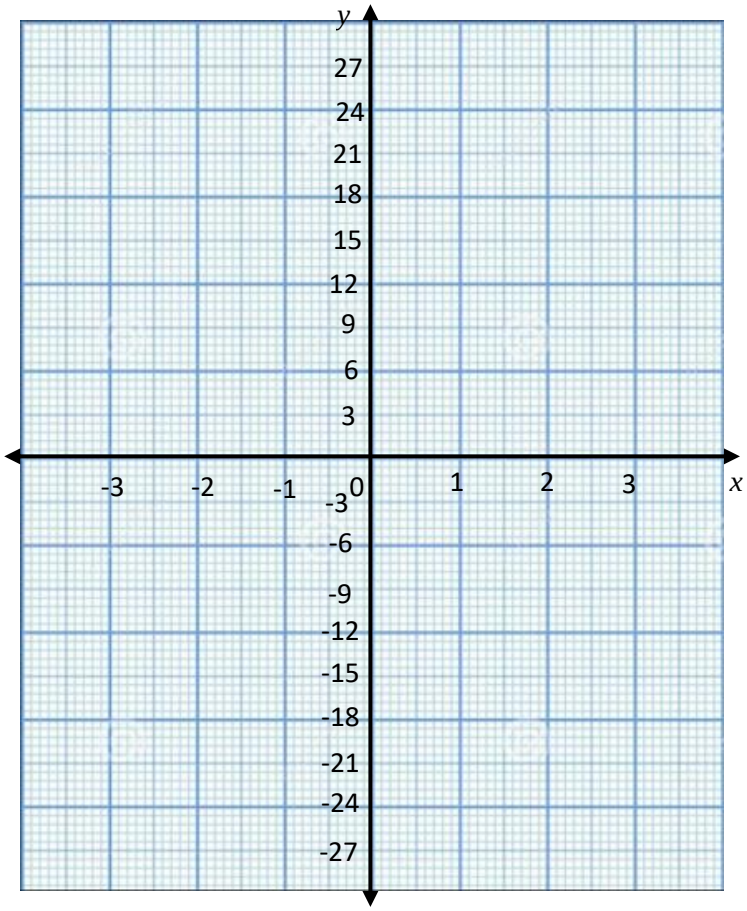
Student Name: _____ **Date:** _____

Section A: Exploring the Basic Cubic Function

1. Sketch the graph of $y = x^3$ for values of x from –3 to 3. Use a table of values.

Table of Values:

x	–3	–2	–1	0	1	2	3
y							



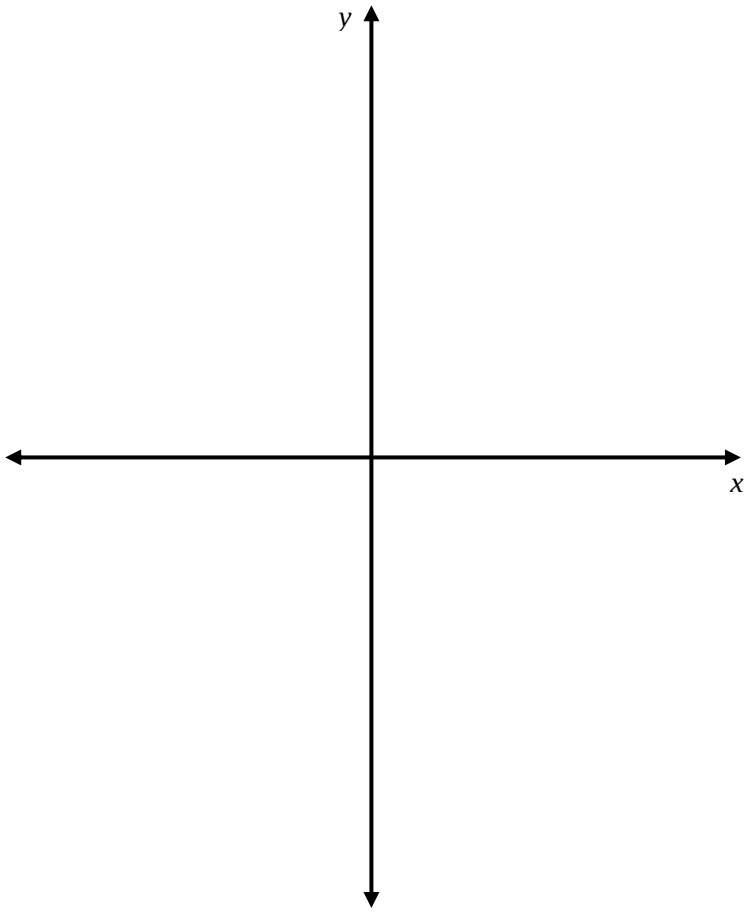
Section B: Transformations of $y = x^3$

2. Describe the transformation of $y = 2x^3$ compared to $y = x^3$.

3. Describe the transformation of $y = -x^3$ compared to $y = x^3$.

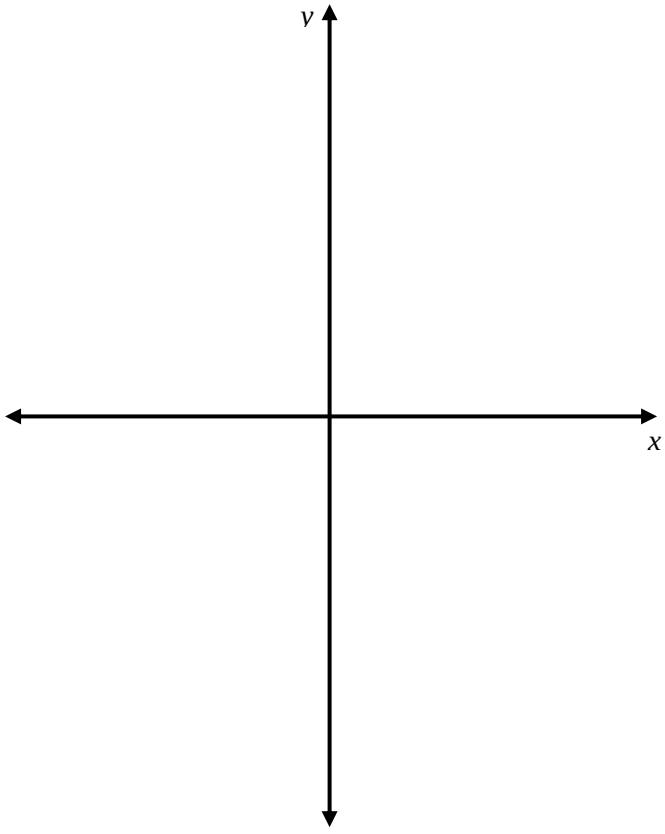
4. Describe the transformation of $y = (x - 2)^3 - 1$ compared to $y = x^3$.

5. Sketch the graphs of $y = x^3$ and $y = (x - 2)^3 - 1$ on the same axes.

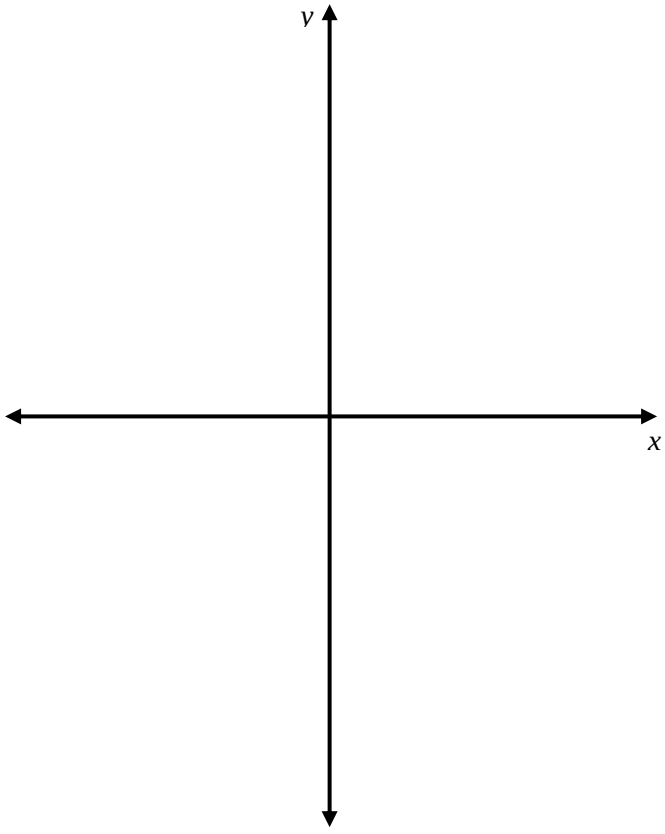


Section C: Analysing Factorized Cubic Functions

6. Sketch the graph of
$f(x) = (x + 1)(x – 2)(x – 4)$.
Label x- and y-intercepts.



7. Sketch the graph of
$f(x) = (x + 3)(x – 1)^2$.
What is the behaviour at $x = –3$ and $x = 1$?



Section D: Constructing Cubic Functions from Given Points

8. A cubic function has x-intercepts at –1, 2, and 4 and passes through (0, –8).
   a) Write the general form using intercepts.
   b) Find the value of '*a*'.
   c) Write the full equation.

9. A cubic function has *x*-intercepts at –3 and 1 (with 1 being a repeated root) and passes through (0, 6).
   a) Write the general form using intercepts.
   b) Find the value of '*a*'.
   c) Write the full equation.

End of Worksheet

Solutions: Graphing Cubic Functions

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Section A Solutions

1. Table of Values:

x:	-3	-2	-1	0	1	2	3
y:	-27	-8	-1	0	1	8	27

Graph: S-curve passing through origin

Section B Solutions

2. $y = 2x^3$ is a vertical stretch by factor 2.

3. $y = -x^3$ is a reflection over the x-axis.

4. $y = (x - 2)^3 - 1$ is a shift 2 units right and 1 unit down.

5. Graph: Both pass through characteristic cubic shapes, second graph shifted.

Section C Solutions

6. Intercepts: $x = -1, 2, 4$; y-intercept = $f(0) = (-1)(-2)(-4) = 8$

7. Intercepts: $x = -3$, $x = 1$ (repeated). Touches x-axis at $x = 1$, crosses at $x = -3$.

Section D Solutions

8a. $f(x) = a(x + 1)(x - 2)(x - 4)$
8b. $-8 = a(1)(-2)(-4) \Rightarrow -8 = 8a \Rightarrow a = -1$
8c. $f(x) = -(x + 1)(x - 2)(x - 4)$

9a. $f(x) = a(x + 3)(x - 1)^2$
9b. $6 = a(3)(1)^2 \Rightarrow 6 = 3a \Rightarrow a = 2$
9c. $f(x) = 2(x + 3)(x - 1)^2$