# Entering Precalculus Summer Homework



**Name**

_____

Please read all instructions before beginning this packet.

This packet is designed to serve as a checkpoint for the material covered in your Delta Math online assignment. You must complete the Delta Math assignment first before starting this packet.

Show all work directly in this packet.
If you need additional space, use lined paper and clearly label each problem.
Submit the completed printed packet when you return to school in August.

To maintain your academic progress, the math department at CSN expects you to spend approximately one hour per week working on these problem sets. Most problems can be completed without a calculator.

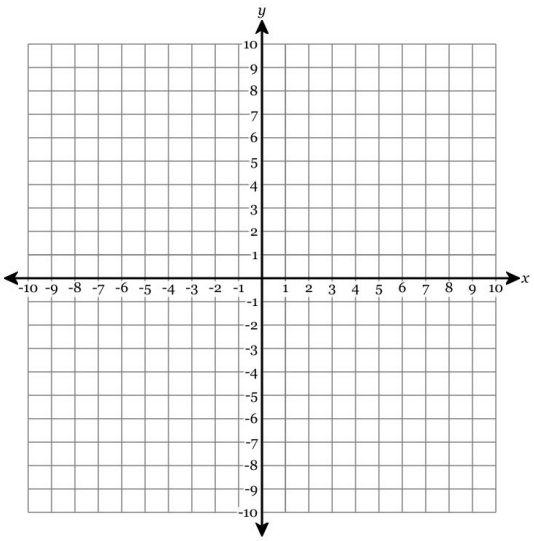
Your grade will be based on:

- Completion
- Accuracy
- A beginning-of-year assessment given during the first week of school

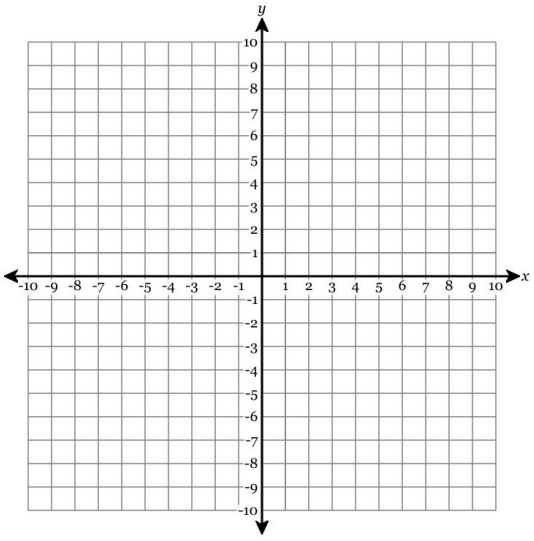
Please give your best effort. This work helps reflect your individual strengths and areas for growth, and it also allows the department to analyze overall student performance. Teachers will use this information to adjust instruction and better support your learning.

Please reach out to your teacher or the department chair with any questions or concerns.

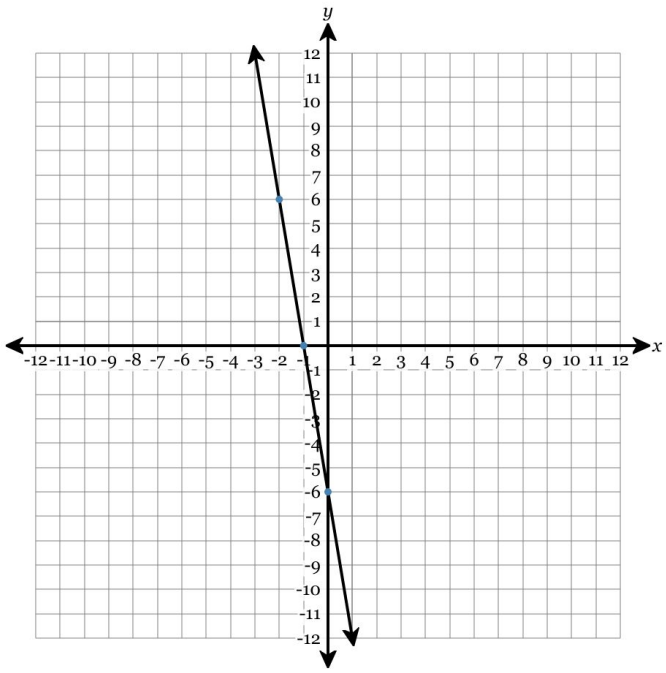
**1.** Graph the line with the equation $y = \frac{3}{4}x - 4$.



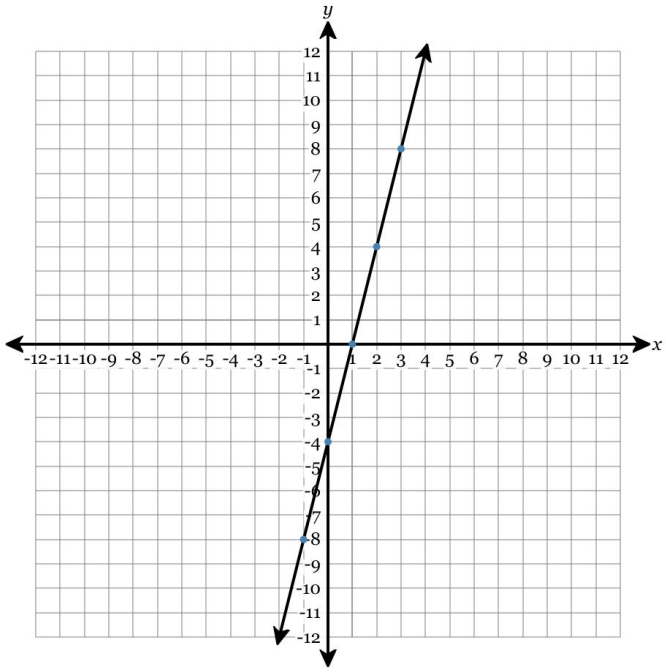
**2.** Graph the line with the equation $y = -\frac{4}{3}x + 4$.



**3.** Write the equation of the line in fully simplified slope-intercept form.



**4.** Write the equation of the line in fully simplified slope-intercept form.



**5.** What is the equation of the line that passes through the point $(-4, 6)$ and has a slope of $-\frac{3}{2}$?

**6.** What is the equation of the line that passes through the point $(-6, 1)$ and has a slope of $-\frac{1}{3}$?

**7.** Find the solution of the system of equations.

$$-2x - 6y = 8$$
$$-6x - 6y = 0$$

**8.** Find the solution of the system of equations.

$$2x + 3y = -2$$
$$4x + 9y = 14$$

**9.** Solve the system by substitution.

$$y = 4x + 3$$
$$y = 7x$$

**10.** Solve the system by substitution.

$$-2x - 4y = -18$$
$$x = y$$

**11.** Find the x- and y-intercepts of the graph of $x + 8y = 7$.

**12.** Find the x- and y-intercepts of the graph of $x + 4y = 5$.

**13.** Factor completely:

$$2x^2(3x^2+10)-(3x^2+10)$$

**14.** Factor $x^2-3x-18$

**15.** Factor $x^2-6x+9$

**16.** Factor the trinomial: $5x^2+22x+21$

**17.** Factor the trinomial: $3x^2+26x+35$

**18.** Solve the equation for *all values* of $x$.

$$-3x(x-4)(100x^2-81)=0$$

**19.** Solve the equation for *all values* of $x$.

$$-3x(x^2-13)(x^2+49)=0$$

**20.** Solve the equation for *all values* of $x$.

$$x+8=0$$

**21.** Solve the equation for *all values* of $x$.

$$4x^2-49=0$$

**22.** Factor $u^3+125$ completely.

**23.** Factor $125 - x^3$ completely.

**24.** Factor completely over the integers: $x^4 + 8x^2 + 7$

**25.** Factor completely over the integers: $x^4 - 2x^2 - 63$

**26.** What is the discriminant of the quadratic equation $4x^2 - 7x - 8 = 0$?

A. 79 B. $-177$ C. $-79$ D. 177

**27.** What is the discriminant of the quadratic equation $-3x^2 + 2x - 7 = 0$?

A. $-88$ B. 88 C. 80 D. $-80$

**28.** What are the roots of the equation?

$$2x^2 + 5x - 6 = -3$$

A. $-1$ and $-\frac{3}{2}$

B. $\frac{3}{2}$ and 1

C. $\frac{1}{2}$ and $-3$

D. 3 and $-\frac{1}{2}$

**29.** What is the intermediate step in the form $(x + a)^2 = b$ as a result of completing the square for the following equation?

$$4x^2 + 582 = 56x - 6$$

$(\_\_\_\_\_)^2 = \_\_\_\_$

**30.** What is the intermediate step in the form $(x + a)^2 = b$ as a result of completing the square for the following equation?

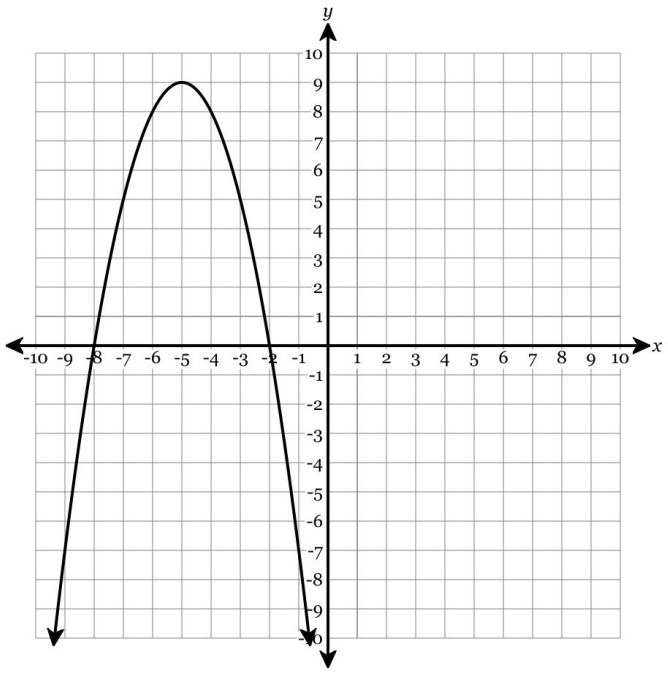
$$x^2 + 9x = 13x + 68$$

$(\_\_\_\_\_)^2 = \_\_\_\_$

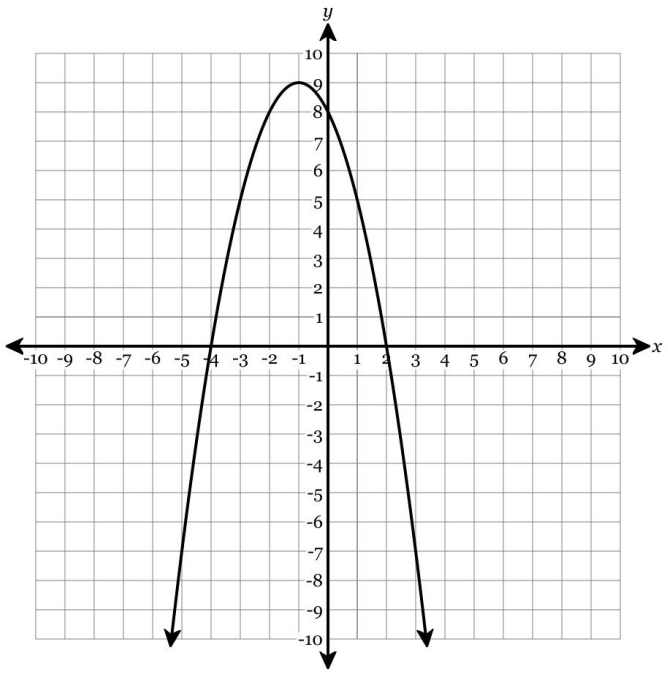
**31.** If using the method of completing the square to solve the quadratic equation below, which number would have to be added to "complete the square"?

$$x^2 - 19x = -40$$

**32.** Using the graph, determine the coordinates of the x-intercepts of the parabola.




**33.** Using the graph, determine the coordinates of the y-intercept of the parabola.



**34.** Find the coordinates of the vertex of the following parabola algebraically. Write your answer as an $(x, y)$ point.

$$y = x^2 + 16x + 62$$

**35.** Find the equation of the axis of symmetry of the following parabola algebraically.

$$y = 2x^2 + 16$$

**36.** For the following quadratic equation, determine the nature of the roots.

$$x^2 + 14x + 49 = 0$$

A. Real, equal, rational

B. Real, unequal, rational

C. Real, unequal, irrational

D. Imaginary / Complex

**37.** For the following quadratic equation, determine the nature of the roots.

$$x^2 - 14x + 12 = 0$$

A. Real, equal, rational

B. Real, unequal, rational

C. Real, unequal, irrational

D. Imaginary / Complex

**38.** Find the sum of $7x^2 + 4x + 7$ and $x^2 - 7x + 9$.

**39.** Subtract $10x^2 + 8$ from $7x^2 - 9x - 3$.

**40.** Express as a trinomial: $(2x - 7)(3x + 10)$

**41.** Express as a trinomial: $(2x - 5)(x + 9)$

**42.** Expand the expression to a polynomial in standard form:

$$(-x+3)(x^2+x-7)$$

**43.** Expand the expression to a polynomial in standard form:

$$(x+2)(x^2-9x+7)$$

**44.** Solve the following system of equations for all three variables.

$$\begin{aligned} -x+8y+2z &= 8 \\ x+6y+z &= -5 \\ -x+6y-4z &= 2 \end{aligned}$$

**45.** Find the quotient of $-20x^4y^4 - 24x^2y^2 - 28xy$ divided by $4xy$.

**46.** Simplify: $\frac{-18s^5+12s^4+9s^3}{-3s^2}$

**47.** Use synthetic division to find the result when $x^3 - 4x^2 - 5x + 14$ is divided by $x + 2$.

**48.** Use synthetic division to find the result when $2x^3 - 19x^2 - 7x - 30$ is divided by $x - 10$.

**49.** What is the degree of the polynomial $f(x)$ defined below?

$$f(x) = -x^2 - 6$$

**50.** What is the leading coefficient of the polynomial $f(x)$ defined below?

$$f(x) = -x^4 - x^3 + 1$$

**51.** Find the *y-coordinate* of the y-intercept of the polynomial function defined below.

$$f(x) = -5 - 2x^4 + 7x - 8x^2 - 3x^3$$

**52.** Find the *y-coordinate* of the y-intercept of the polynomial function defined below.

$$f(x) = -2(x^2 - 1)(x - 3)^3$$

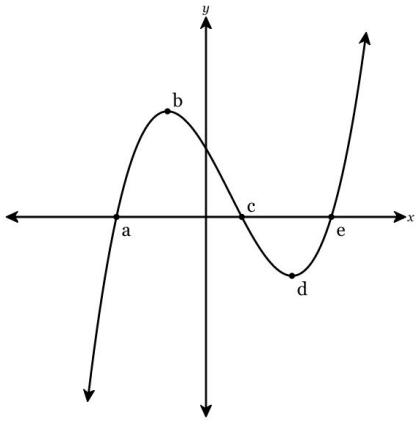
**53.** Find $f(-3) - g(17)$ in simplified form.

| $x$ | $f(x)$ | $g(x)$ |
|---|---|---|
| $-8$ | $10$ | $-19$ |
| $-3$ | $17$ | $12$ |
| $3$ | $3$ | $5$ |
| $5$ | $18$ | $10$ |
| $14$ | $-20$ | $-13$ |
| $-10$ | $12$ | $-8$ |
| $17$ | $11$ | $-9$ |
| $12$ | $14$ | $-15$ |

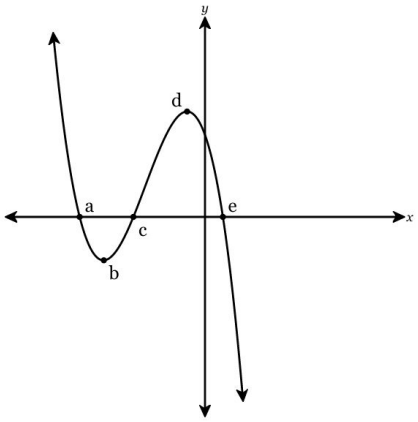
**54.** Find $f(f(-15))$.

| $x$ | $f(x)$ | $g(x)$ |
|---|---|---|
| $-20$ | $11$ | $11$ |
| $-15$ | $-5$ | $9$ |
| $-16$ | $-15$ | $20$ |
| $-5$ | $8$ | $5$ |
| $14$ | $7$ | $-12$ |
| $9$ | $-16$ | $15$ |
| $11$ | $6$ | $-1$ |

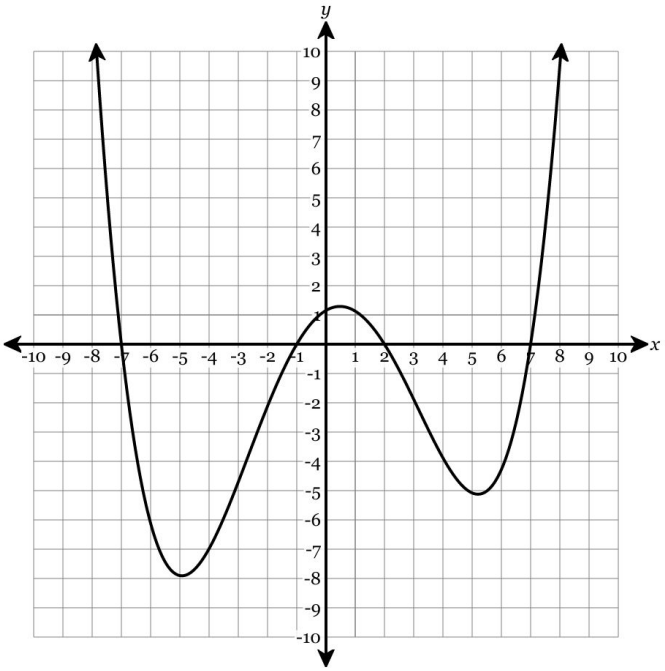
**55.** The function $f(x)$ is graphed below. Circle all relative extrema.



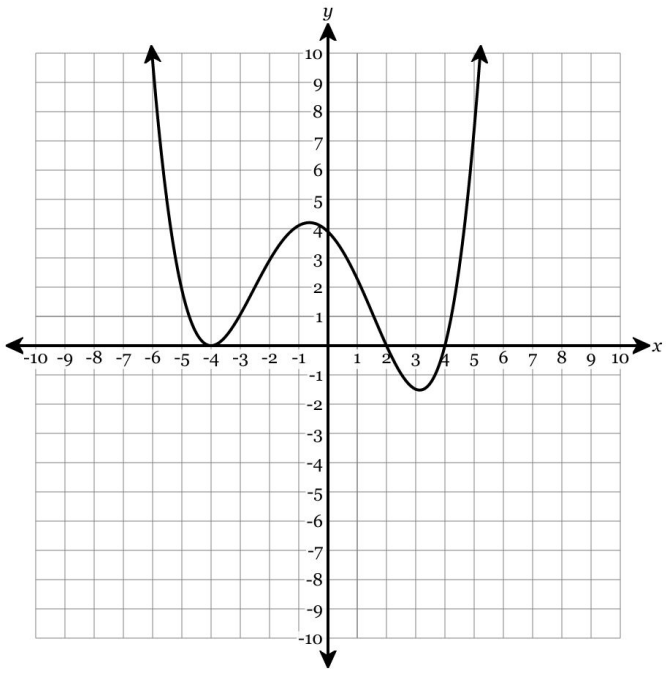
**56.** The function $f(x)$ is graphed below. Circle all relative extrema.




**57.** The graph of y = f(x) is shown below. What are all of the real solutions of f(x) = 0?



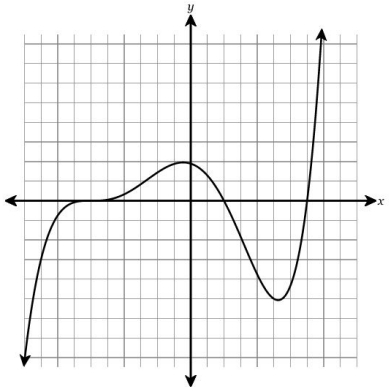

**58.** The graph of y = f(x) is shown below. What are all of the real solutions of f(x) = 0?




**59.** Using the rational root theorem, list out all possible/candidate rational roots of $f(x) = 19x^2 - 4x^4 + 10 - 18x^3 + 3x$. Express your answer as integers or as fractions in simplest form.

**60.** Using the rational root theorem, list out all possible/candidate rational roots of $f(x) = -2x^3 - 23x^2 - 8x + 5$. Express your answer as integers or as fractions in simplest form.

**61.** The graph of $y = f(x)$ is graphed below. What is the end behavior of $f(x)$?



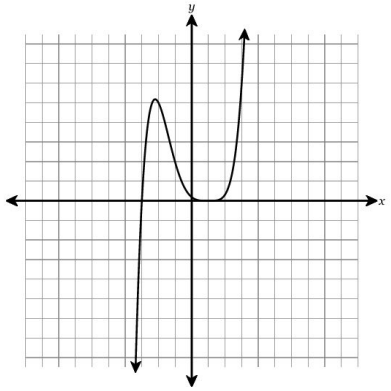

A. as $x \to \infty, y \to -\infty$ and as $x \to -\infty, y \to \infty$

B. as $x \to \infty, y \to \infty$ and as $x \to -\infty, y \to \infty$

C. as $x \to \infty, y \to -\infty$ and as $x \to -\infty, y \to -\infty$

D. as $x \to \infty, y \to \infty$ and as $x \to -\infty, y \to -\infty$

**62.** The graph of $y = f(x)$ is graphed below. What is the end behavior of $f(x)$?



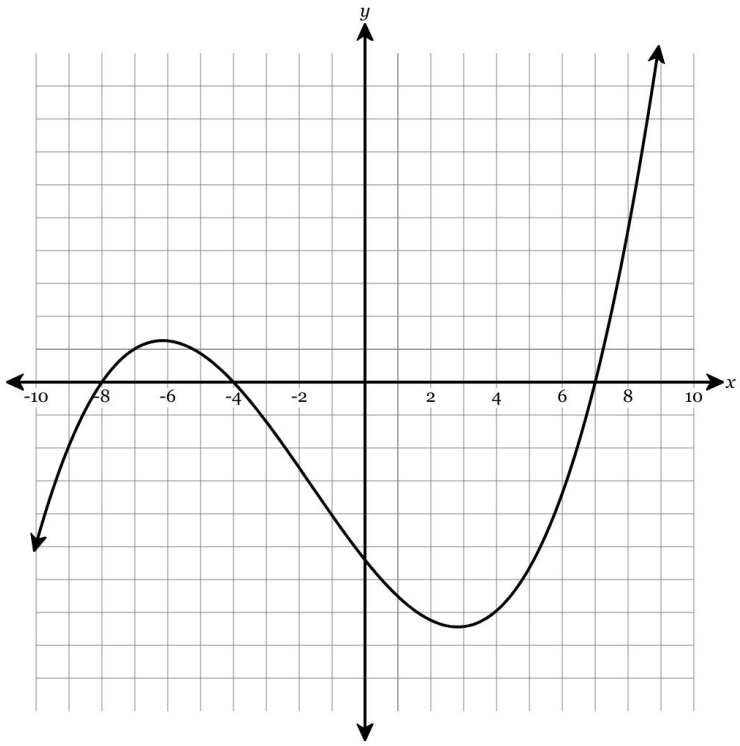

A. as $x \to \infty, y \to \infty$ and as $x \to -\infty, y \to \infty$

B. as $x \to \infty, y \to -\infty$ and as $x \to -\infty, y \to \infty$

C. as $x \to \infty, y \to \infty$ and as $x \to -\infty, y \to -\infty$

D. as $x \to \infty, y \to -\infty$ and as $x \to -\infty, y \to -\infty$

**63.** Which equation choice could represent the graph shown below?



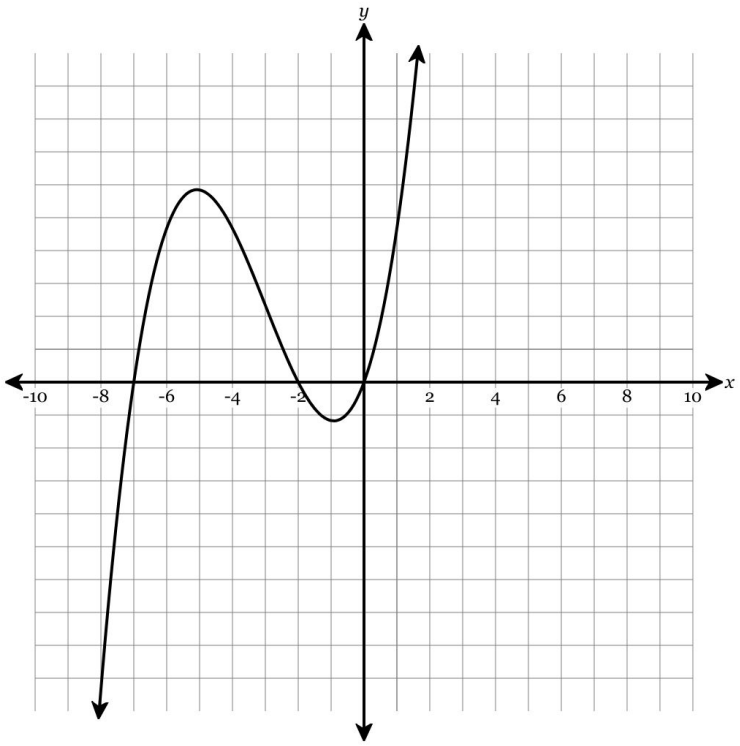

A. $f(x) = (x + 4)(x - 7)(x + 8)$

B. $f(x) = (x - 4)(x + 7)(x - 8)$

C. $f(x) = (x - 4)(x + 7)(x + 8)$

D. $f(x) = (x + 4)(x + 7)(x - 8)$

**64.** Which equation choice could represent the graph shown below?



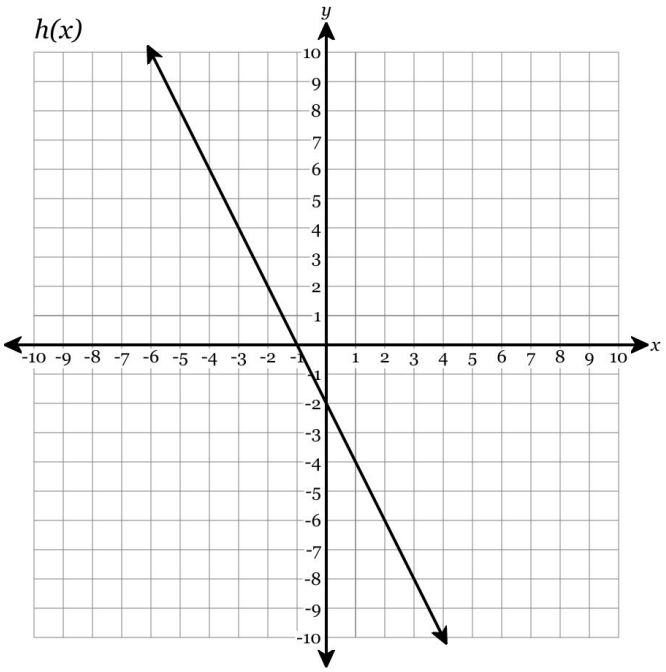

A. $f(x) = x(x - 2)(x - 7)$

B. $f(x) = x(x + 2)(x - 7)$

C. $f(x) = x(x + 2)(x + 7)$

D. $f(x) = x(x - 2)(x + 7)$

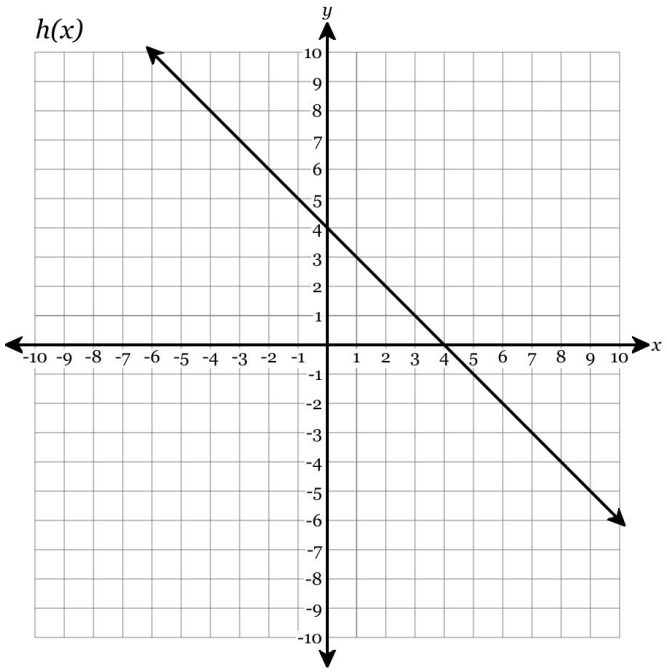
**65.** Find $g(3)$.




$$f(x) = 3x^2 + 3x + 1$$

| $x$ | $g(x)$ |
|---|---|
| $3$ | $-10$ |
| $10$ | $-4$ |
| $0$ | $0$ |
| $-1$ | $8$ |
| $-6$ | $3$ |

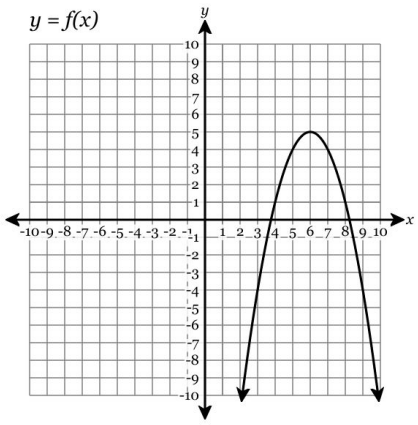
**66.** Find $h(-5)$.



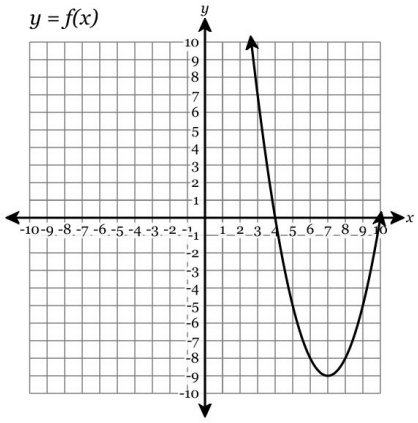

$$f(x) = -3x^2 + 5x + 4$$

| $x$ | $g(x)$ |
|---|---|
| $-1$ | $7$ |
| $2$ | $-7$ |
| $-10$ | $-7$ |
| $-3$ | $-9$ |
| $7$ | $0$ |

**67.** Find the value of $f(3)$.




**68.** Find the value of $f(5)$.




**69.** Given that $f(x) = x^2 - 13x + 40$ and $g(x) = x - 5$, find $(f \div g)(x)$ and express the result as a polynomial in simplest form.

**70.** Given that $f(x) = x^2 - 9x + 14$ and $g(x) = x - 7$, find $(f + g)(x)$ and express the result as a polynomial in simplest form.

**71.** Simplify the expression to a + bi form:

$$(2 - 2i) - (-5 + i)$$

**72.** Simplify the expression to a + bi form:

$$(4 + 4i) + (-9 + 9i)$$

**73.** Simplify the expression to a + bi form:

$$(-2 + 8i)(3 - 9i)$$

**74.** Simplify the expression to a + bi form:

$$(10 + 8i)(-5 + 6i)$$

**75.** Express the following fraction in simplest form using only positive exponents.

$$\frac{2(u^3)^5}{5u^{10}}$$

**76.** Express the following fraction in simplest form using only positive exponents.

$$\frac{5(w^4)^2}{10w^8}$$

**77.** Write the expression in radical form.

$$x^{\frac{3}{5}}$$

**78.** Write the expression in exponential form.

$$\sqrt[4]{x}$$

**79.** Evaluate the left hand side to find the value of $a$ in the equation in simplest form.

$$\frac{x^{\frac{3}{4}}}{x^{\frac{1}{2}}} = x^a$$

**80.** Evaluate the left hand side to find the value of $a$ in the equation in simplest form.

$$\left(x^{\frac{4}{3}}\right)^{\frac{3}{2}} = x^a$$

**81.** Select the expression that is equivalent to $\frac{1}{(5x)^{-\frac{3}{2}}}$

A. $\sqrt{(5x)^3}$ B. $\frac{1}{\sqrt{(5x)^3}}$

C. $\frac{1}{\sqrt[3]{(5x)^2}}$ D. $\sqrt[3]{(5x)^2}$

**82.** Select the expression that is equivalent to $\frac{1}{6x^{\frac{3}{2}}}$

A. $\frac{1}{\sqrt[3]{6x^2}}$ B. $\frac{1}{6\sqrt[3]{x^2}}$ C. $\frac{1}{6\sqrt{x^3}}$ D. $\frac{1}{\sqrt{6x^3}}$

**83.** Express $24^{\frac{1}{3}}$ in simplest radical form.

**84.** Express $21^{\frac{1}{3}}$ in simplest radical form.

**85.** Assuming $x$ and $y$ are both positive, write the following expression in simplest radical form.

$$y\sqrt{216x^7y^6}$$

**86.** Assuming $x$ and $y$ are both positive, write the following expression in simplest radical form.

$$\sqrt{36x^7y^4}$$

**87.** Express the product $\left(\sqrt{5}-\sqrt{2}\right)\left(\sqrt{5}+\sqrt{2}\right)$ in simplest form.

**88.** Express the product $\left(6-\sqrt{7}\right)\left(6-\sqrt{7}\right)$ in simplest form.

**89.** Express in simplest form with a rational denominator.

$$\frac{2}{\sqrt{28}}$$

**90.** Express in simplest form with a rational denominator.

$$\frac{5}{\sqrt{7}}$$

**91.** Select the expression that is equivalent to $\sqrt[5]{6^3}\cdot\sqrt[3]{6^2}$.

A. $6^{\frac{19}{15}}$

B. $36^{\frac{19}{15}}$

C. $6^{\frac{2}{5}}$

D. $36^{\frac{2}{5}}$

**92.** Select the expression that is equivalent to $\sqrt[6]{3} \cdot \sqrt[4]{3^5}$.

A. $3^{\frac{5}{24}}$

B. $9^{\frac{5}{24}}$

C. $9^{\frac{17}{12}}$

D. $3^{\frac{17}{12}}$

**93.** Use the properties of exponents to determine the value of $a$ for the equation below given $x > 0$.

$$\frac{(x^{\frac{1}{3}})^4}{\sqrt[3]{x}} = x^a$$

**94.** Use the properties of exponents to determine the value of $a$ for the equation below given $x > 0$.

$$\frac{x^{\frac{1}{2}}}{\sqrt[4]{x}} = x^a$$

**95.** Find the positive solution of the equation.

$$2x^{\frac{7}{6}} - 22 = 32746$$

**96.** Find the positive solution of the equation.

$$8x^{\frac{7}{8}} - 15 = 16777201$$

**97.** Write $\sqrt{-5}$ in simplest radical form.

**98.** Write $\sqrt{-50}$ in simplest radical form.

**99.** Solve for x:

$$\sqrt{x+41}-5=2$$

**100.** Solve for x:

$$\sqrt{3x+37}-17=-10$$

**101.** For the function $f(x)=\sqrt[5]{x-3}$, find $f^{-1}(x)$.

A. $f^{-1}(x)=(x-3)^5$

B. $f^{-1}(x)=\sqrt[5]{x}+3$

C. $f^{-1}(x)=(x+3)^5$

D. $f^{-1}(x)=x^5+3$

**102.** For the function $f(x)=7(x-3)$, find $f^{-1}(x)$.

A. $f^{-1}(x)=\frac{(x-3)}{7}$

B. $f^{-1}(x)=\frac{x}{7}+3$

C. $f^{-1}(x)=\frac{(x+3)}{7}$

D. $f^{-1}(x)=7(x+3)$

**103.** Find the inverse function of the function $f(x)=\sqrt[3]{3x}$.

A. $f^{-1}(x)=\frac{x^3}{3}$ B. $f^{-1}(x)=\frac{x^3}{27}$

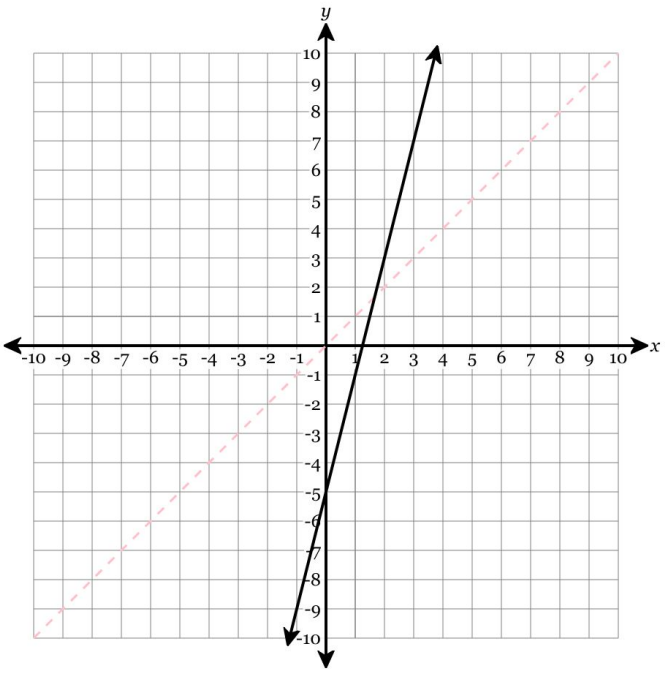
C. $f^{-1}(x)=27x^3$ D. $f^{-1}(x)=3x^3$

**104.** Find the inverse function of the function $f(x)=\frac{5x}{4}$.

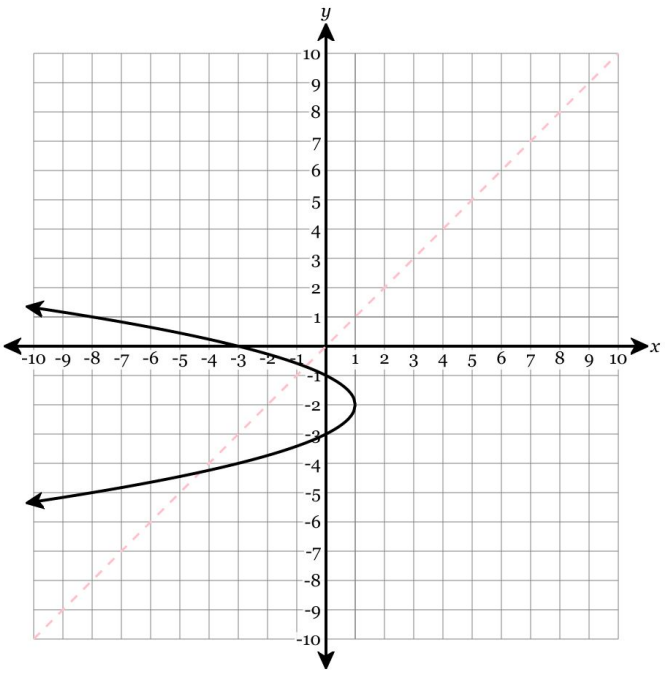
A. $f^{-1}(x)=\frac{5x}{4}$ B. $f^{-1}(x)=\frac{4x}{5}$

C. $f^{-1}(x)=\frac{4}{5x}$ D. $f^{-1}(x)=\frac{5}{4x}$

**105.** Graph the inverse of the provided graph on the accompanying set of axes. You must plot at least 5 points.




**106.** Graph the inverse of the provided graph on the accompanying set of axes. You must plot at least 5 points.




**107.** Solve for all values of $x$:

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

**108.** Solve for all values of $x$:

$$1 - \frac{7}{x-1} = -\frac{7x}{x-1}$$

**109.** Simplify the expression completely if possible.

$$\frac{4x+8}{8x^3+16x^2}$$

**110.** Simplify the expression completely if possible.

$$\frac{3x^4-3x^3}{3x}$$

**111.** Simplify the following expression completely.

$$\frac{x^2 + 16x + 64}{x^2 - 2x - 80}$$

**112.** Simplify the following expression completely.

$$\frac{x^2 + 19x + 90}{x^2 + 12x + 20}$$

**113.** A town has a population of $7{,}000$ and grows at $2.5\%$ every year. What will be the population after $12$ years, to the nearest whole number?

**114.** A town has a population of $8{,}000$ and grows at $4\%$ every year. What will be the population after $13$ years, to the nearest whole number?

**115.** What is the value of $\log_5 5$?

**116.** What is the value of $\log_8 512$?

**117.** Find the common difference of the arithmetic sequence $17, 26, 35, \ldots$

**118.** Find the common ratio of the geometric sequence $-18, 36, -72, \ldots$

**119.** The first three terms of a sequence are given. Write your answer as a decimal or whole number. Round to the nearest *thousandth* (if necessary).

$$452, 443, 434, \ldots$$

Find the 50th term.

**120.** The first three terms of a sequence are given. Write your answer as a decimal or whole number. Round to the nearest *thousandth* (if necessary).

$$6, 36, 216, \ldots$$

Find the 9th term.

**121.** What could be the formula for the nth term of the given sequence?

$$20, -100, 500...$$

A. $a_n = 20(-\frac{1}{5})^{-n}$

B. $a_n = -4(-5)^{n-1}$

C. $a_n = -4(-\frac{1}{5})^{-n}$

D. $a_n = 20(-5)^{1-n}$

**122.** What could be the formula for the nth term of the given sequence?

$$-4, -1, 2...$$

A. $a_n = -4 + 3(n + 1)$

B. $a_n = -4 + 3n$

C. $a_n = -4 + 3(n - 1)$

D. $a_n = -4(3)^{n-1}$

**123.** Find the sum of the first $7$ terms of the following sequence. Round *to the nearest hundredth* if necessary.

$$75, \quad 81, \quad 87.48, ...$$

Sum of a finite geometric series:

$$S_n = \frac{a_1\left(1 - r^n\right)}{1 - r}$$

**124.** Find the sum of the first $7$ terms of the following sequence. Round *to the nearest hundredth* if necessary.

$$81, \quad 27, \quad 9, ...$$

Sum of a finite geometric series:

$$S_n = \frac{a_1\left(1 - r^n\right)}{1 - r}$$

**125.** Evaluate the summation below.

$$\sum_{k=0}^{3}(2 + 8k^2)$$

**126.** Evaluate the summation below.

$$\sum_{m=0}^{3}(6m - 2)$$

**127.** Find the sum of the first 34 terms of the following series, *to the nearest integer*.

$$13, 19, 25, ...$$

**128.** Find the sum of the first 10 terms of the following series, *to the nearest integer*.

$$40, 32, \frac{128}{5}, ...$$

**129.** Condense the logarithm:

$$5 \log y - \log q$$

**130.** Condense the logarithm:

$$8 \log k + g \log a$$

**131.** Expand the logarithm fully using the properties of logs. Express the final answer in terms of $\log x$, and $\log y$.

$$\log \frac{x^2}{y^3}$$

**132.** Expand the logarithm fully using the properties of logs. Express the final answer in terms of $\log x$, and $\log y$.

$$\log xy^2$$

**133.** Solve for a positive value of x.

$$\log_x(64) = 6$$

**134.** Solve for a positive value of x.

$$\log_2(16) = x$$

**135.** Given the definitions of $f(x)$ and $g(x)$ below, find the value of $f(g(-1))$.

$$f(x) = 4x - 9$$
$$g(x) = x^2 - 3x - 9$$

**136.** Given the definitions of $f(x)$ and $g(x)$ below, find the value of $(f \circ g)(1)$.

$$f(x) = x^2 + 2x - 10$$

$$g(x) = 4x - 8$$