



OAK HALL SCHOOL

2024-2025

Suggested Review Exercises
for students entering

*Honors
Precalculus*



*A message from the
Math Department*

Mathematics is a subject that is cumulative in nature as it constructs new knowledge from foundational prior knowledge. Therefore, as it is imperative to our students' success, we require them to have mastered certain skills and concepts before entering a new math course.

Each course in the math department has provided suggested exercises for incoming students as a resource for them to review the required prerequisites that are critical to their success in the course. While we will not be requiring students to complete these exercises as a formal assignment to be turned in, we have the highest expectations of our students as self-aware, proactive learners. Each student is responsible for gauging which prerequisites they need to reinforce and how much studying they need to do for them to start the new school year feeling confident, prepared, and accomplished.

We recommend that our students begin this process mid to late summer in order for everything to be fresh in their minds but also to give them time to recover from the school year they just completed. Rest is not an indulgence; it is a human necessity. We hope everyone has a safe, fun, and restful summer and we look forward to having another great school year when we come back in August!

Honors Precalculus

Simplify.

1) $-2\sqrt{24} - 2\sqrt{6}$

Simplify. Use absolute value signs when necessary.

2) $4\sqrt[3]{56a^3}$

3) $-5\sqrt{128v^3}$

Simplify. Assume all variables represent positive numbers.

4) $-5\sqrt{6x^3} \cdot \sqrt{3x^3}$

5) $(\sqrt{2n} + 1)(\sqrt{2n} - 1)$

6) $\frac{2}{3 + \sqrt{2a}}$

7) $\frac{x}{\sqrt{2+x} - \sqrt{2}}$

Identify the domain and range of each.

8) $y = \frac{1}{2}\sqrt{x+6} + 5$

Simplify. Your answer should contain only positive exponents.

9) $3x^{-3}y^{-2} \cdot x^0y^3 \cdot 3x^{-2}$

10) $\frac{3xy^3}{4x^{-4}y^{-3}}$

11) $(yx^{-1} \cdot x^{-1}y^3)^0$

12) $\left(\frac{a^{-3}b^{-3}}{2a^2b^4}\right)^{-1}$

13) $\frac{2x^{-1}y^{-3}}{yx^3 \cdot 4x^2}$

14) $\frac{u^4v^2 \cdot (2u^{-1}v^{-4})^4}{2u^2v^2}$

15) $g(x) = x - 2, \quad f(x) = x^2 - 4$

a) $(g + f)(x)$ b) $(f - g)(x)$ c) $(g \cdot f)(x)$ d) $\left(\frac{f}{g}\right)(x)$ e) $(f \circ g)(x)$ f) $(f \circ g)(-1)$

16) Test the function $f(x) = x^3 + 10x$ for symmetry with respect to the x-axis, y-axis, and origin.
(Hint: Replace x with $-x$)

Prove algebraically that $h(x)$ and $f(x)$ are in fact inverse functions.

17) $h(x) = -2x^5 - 1$
 $f(x) = \sqrt[5]{\frac{-x-1}{2}}$

Find the inverse of each function.

18) $g(x) = -\frac{2}{x-1} + 2$

Factor each completely.

19) $24n^3 + 16n^2 + 3n + 2$

20) $x^2 - 6x - 40$

21) $5b^2 + 40b - 100$

22) $5n^2 + 57n + 70$

23) $10k^2 - 33k - 54$

24) $5x^4 + 32x^2 + 35$

25) $4x^2 - 9y^2$

26) $9r^2 + 1$

27) $27 + 125x^3$

Solve each equation by factoring.

28) $n^2 = 11n - 24$

29) $6n^3 + 12n^2 = 18n$

30) $-7 + 4x = -3x^2$

Solve each equation by completing the square.

31) $k^2 = 12k + 56$

32) $5x^2 - 5 = -10x$

Solve each equation by taking square roots.

33) $4x^2 + 6 = 134$

Solve each equation with the quadratic formula.

34) $x^2 + 8x = 11$

The parent function to the function graphed below, $f(x)$, is $g(x) = x^2$.

a) Describe the transformations represented.

b) Graph the function, $f(x)$, below by plotting at least 5 points.

35) $f(x) = \frac{1}{2}(x-2)^2 - 3$

36) A missile is fired straight into the air. The missile's height, in feet, is given by the formula,

$h(t) = -16t^2 + 400t + 100$, where t is in seconds.

a) What was the missile's height after 5 seconds?

b) At what time will the missile reach its maximum height?

c) What is its maximum height?

d) When will the missile hit the ground?

For the function below, $f(x)$, find the following:

a) Domain

b) Range

c) (x, y) coordinates of hole(s)

d) Vertical Asymptote(s)

e) Horizontal Asymptote(s)

f) Graph

$$37) \frac{4x^2 + 24x}{10x^3 + 80x^2 + 120x}$$

Simplify each expression.

$$38) \frac{x^2 + 5x - 14}{x - 2}$$

$$39) \frac{6k - 6}{7k^2 - k - 6}$$

$$40) \frac{3x^3 - 30x^2 + 72x}{3x^3 + 6x^2 - 72x}$$

$$41) \frac{8}{n^2 + 15n + 50} \cdot \frac{60 - 4n - n^2}{n - 6}$$

$$42) \frac{40k^2 + 48k}{3k - 5} \cdot \frac{3k^2 + 10k - 25}{5k^2 + 31k + 30}$$

$$43) \frac{3x - 7}{x - 9} \div \frac{21x^2 - 49x}{7x}$$

$$44) \frac{2x^2 - 23x + 45}{4x^2 - 18x + 20} \div \frac{7x + 5}{14x^2 - 18x - 20}$$

$$45) \frac{\frac{x - 3}{x + 5}}{\frac{x + 5}{x - 3} - \frac{x + 4}{x + 5}}$$

$$46) \frac{3}{8n^2 - 24n} + \frac{4n}{n - 3}$$

$$47) \frac{6}{x - 4} - \frac{2x}{6x - 36}$$

Solve each equation. Remember to check for extraneous solutions.

$$48) \frac{1}{x + 4} = \frac{6x - 18}{x^2 + 2x - 8} + \frac{5}{x - 2}$$

$$49) 5 + \frac{n + 6}{n - 3} = \frac{3}{n^2 - 5n + 6}$$

$$50) \frac{1}{x + 1} - \frac{1}{x^2} = \frac{1}{x^3 + x^2}$$

State the possible number of real zeros, the possible number of positive and negative zeros, and the possible rational zeros for the function. Then find all zeros.

$$51) f(x) = 3x^4 - 5x^3 + x^2 - 5x - 2$$

Answers to Honors Precalculus

1) $-6\sqrt{6}$

5) $2n - 1$

9) $\frac{9y}{x^5}$

13) $\frac{1}{2x^6y^4}$

2) $8a\sqrt[3]{7}$

6) $\frac{6 - 2\sqrt{2a}}{9 - 2a}$

10) $\frac{3x^5y^6}{4}$

14) $\frac{8}{v^{16}u^2}$

3) $-40|v|\sqrt{2v}$

7) $\sqrt{2+x} - \sqrt{2}$

11) 1

15) a) $(g + f)(x) = x^2 + x - 6,$

b) $(f - g)(x) = x^2 - x - 2$

c) $(g \cdot f)(x) = x^3 - 2x^2 - 4x + 8$

d) $\left(\frac{f}{g}\right)(x) = x + 2$

e) $(f \circ g)(x) = x^2 - 4x$

f) $(f \circ g)(-1) = 5$

4) $-15x^3\sqrt{2}$

8) Domain: $x \geq -6$

Range: $y \geq 5$

12) $2a^5b^7$

16) $f(x)$ has symmetry with respect to the origin

17)

18) $g^{-1}(x) = \frac{2}{-x+2} + 1$

19) $(8n^2 + 1)(3n + 2)$

20) $(x + 4)(x - 10)$

21) $5(b - 2)(b + 10)$

22) $(5n + 7)(n + 10)$

23) $(5k + 6)(2k - 9)$

24) $(5x^2 + 7)(x^2 + 5)$

25) $(2x + 3y)(2x - 3y)$

26) Not factorable

27) $(3 + 5x)(9 - 15x + 25x^2)$

28) $\{3, 8\}$

29) $\{0, 1, -3\}$

30) $\left\{-\frac{7}{3}, 1\right\}$

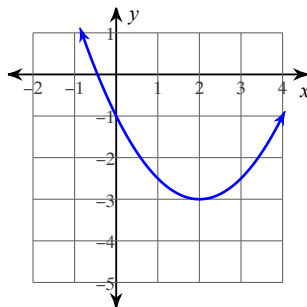
31) $\{6 + 2\sqrt{23}, 6 - 2\sqrt{23}\}$

32) $\{-1 + \sqrt{2}, -1 - \sqrt{2}\}$

33) $\{4\sqrt{2}, -4\sqrt{2}\}$

34) $\{-4 + 3\sqrt{3}, -4 - 3\sqrt{3}\}$

35)



36) a) 1700 feet

b) 12.5 seconds

c) 2600 feet

d) approximately 25.248 seconds

37) Domain: $(-\infty, -6) \cup (-6, -2) \cup (-2, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$

Holes: $\left(0, \frac{1}{5}\right), \left(-6, -\frac{1}{10}\right)$

Vertical Asymptote: $x = -2$

Horizontal Asymptote: $y = 0$

38) $x + 7$

39) $\frac{6}{7k + 6}$

40) $\frac{x - 6}{x + 6}$

41) $-\frac{8}{n + 5}$

42) $8k$

43) $\frac{1}{x - 9}$

44) $x - 9$

45) $\frac{x^2 - 6x + 9}{37 + 9x}$

46) $\frac{3 + 32n^2}{8n(n - 3)}$

47) $\frac{22x - 108 - x^2}{3(x - 6)(x - 4)}$

48) $\left\{-\frac{2}{5}\right\}$

49) $\left\{1, \frac{5}{2}\right\}$

50) $\{2\}$

51) 4, 2, or 0 possible real zeros
3 or 1 possible positive zeros
1 possible negative zero

possible rational zeros: $\pm 1, \pm \frac{1}{3}, \pm 2, \pm \frac{2}{3}$

zeros: $2, -\frac{1}{3}, \pm i$