OAK HALL SCHOOL

2024–2025

Suggested Review Exercises
for students entering

Precalculus

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!

Name_____

Simplify. Your answer should contain only positive exponents.

1) $a^2 \cdot 2a^4$

2) $\dfrac{2n^5}{10n^9}$

3) $\dfrac{2m^4}{4m^0}$

4) $4n^{-6} \cdot 5n^2$

5) $\dfrac{x}{4x^{-3}}$

6) $\left(4a^4\right)^3$

7) $\left(yx^3 \cdot x^3y^4\right)^3$

8) $\left(\dfrac{2uv}{2u^3v^3}\right)^3$

Simplify.

9) $5\sqrt{8} \cdot \sqrt{10}$

10) $\sqrt{10x^3} \cdot \sqrt{3x^2}$

11) $\dfrac{\sqrt{10}}{\sqrt{45}}$

12) $\dfrac{\sqrt{4}}{2\sqrt{3}}$

13) $\dfrac{5\sqrt{5n^2}}{4\sqrt{2n^2}}$

14) $\sqrt{6} + \sqrt{6}$

15) $-\sqrt{2} - 2\sqrt{2}$

16) $\sqrt{3} + \sqrt{12}$

17) $-2\sqrt{27} - 2\sqrt{3}$

18) $\dfrac{3}{\sqrt{2} + \sqrt{3}}$

Simplify. Use absolute value signs when necessary.

19) $\sqrt{125x^4}$

20) $\sqrt{28x^3}$

Factor each completely.

21) $6y^3 - 4y^2x - 2y^2$

22) $15v + 3v^2 + 24v^3$

23) $24b^3 - 30b^2 + 20b - 25$

24) $15n^3 - 24n^2 - 30n + 48$

25) $x^2 + 6x - 16$

26) $4v^2 + 4v - 80$

27) $7x^2 + 19x + 10$

28) $6n^2 - 23n - 4$

29) $x^4 + 8x^2 - 9$

30) $25b^2 - 16$

31) $16n^2 + 25$

32) $8x^3 + 1$

Solve each equation by factoring.

33) $a^2 - 11a = -24$

34) $2b^2 - 3b + 3 = 5$

Solve each equation with the quadratic formula.

35) $6a^2 - a - 35 = 0$

36) $6n^2 - 2n = 7$

The parent function to the function graphed below, $g(x)$, is $f(x) = x^2$.
a) Describe the transformations represented.
b) Graph the function, $g(x)$, below by plotting at least 5 points.

37) $f(x) = (x + 4)^2 + 2$

Graph the function below by plotting at least 5 points and give the coordinates of the vertex.

38) $f(x) = -x^2 + 8x - 16$

Graph the function below using a table of values. Plot at least 5 points.

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

Evaluate each function.

40) $w(t) = -t^2 + 4t$; Find $w(-3)$

41) $f(x) = x^2 - 4x$; Find $f(-x)$

42) $f(t) = 2t - t^2$; Find $f(z - 1)$

State the excluded values for each.

43) $\dfrac{k - 5}{6k^2 - 30k}$

Identify the domain and range.

44) $y = 2\sqrt{x - 2} + 3$

Find the inverse of each function.

45) $g(x) = -9x - 4$

46) $f(x) = -2x^5 - 1$

Simplify each expression.

47) $\dfrac{m + 8}{m^2 + m - 56}$

48) $\dfrac{a^2 - 5a - 14}{a^2 - 13a + 42}$

49) $\dfrac{2x}{3} \cdot \dfrac{4}{6x}$

50) $\dfrac{4a}{a + 3} \cdot \dfrac{a^2 + 5a + 6}{a + 2}$

51) $\dfrac{n + 7}{n^2 + n - 42} \cdot \dfrac{6n - 36}{2n - 10}$

52) $\dfrac{5}{9k^2} \div \dfrac{3}{10k}$

53) $\dfrac{6v^2 + 60v}{v + 9} \div \dfrac{v + 10}{v + 9}$

54) $\dfrac{r^2 + 2r - 3}{r^2 - 5r - 24} \div \dfrac{r^2 + 15r + 56}{r^2 - 64}$

55) $\dfrac{\dfrac{4}{x + 5}}{\dfrac{1}{4} + \dfrac{16}{x + 5}}$

56) $\dfrac{x + 4y}{4y^2} - \dfrac{5}{5x^3}$

57) $3 + \dfrac{4x}{15x^2}$

58) $\dfrac{6}{r + 5} + \dfrac{3}{r - 2}$

59) $\dfrac{p - 2}{2p^2 - 10p} - \dfrac{2}{2p}$

Solve each equation. Remember to check for extraneous solutions.

60) $\dfrac{5}{6k} = \dfrac{1}{2} - \dfrac{1}{6k}$

61) $\dfrac{1}{x^2 + x - 30} = \dfrac{6}{x^2 + x - 30} - \dfrac{1}{x + 6}$

62) $\dfrac{4}{n^2} + \dfrac{n + 3}{n} = \dfrac{n^2 + 4n - 5}{n^2}$

63) $\dfrac{1}{n^2 + 2n} + \dfrac{n^2 - 5n - 6}{n^2 + 2n} = \dfrac{1}{n}$

Perform the indicated operation.

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

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

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.

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

Answers to Summer Assignment

1) $2a^6$

2) $\dfrac{1}{5n^4}$

3) $\dfrac{m^4}{2}$

4) $\dfrac{20}{n^4}$

5) $\dfrac{x^4}{4}$

6) $64a^{12}$

7) $y^{15}x^{18}$

8) $\dfrac{1}{u^6v^6}$

9) $20\sqrt{5}$

10) $x^2\sqrt{30x}$

11) $\dfrac{\sqrt{2}}{3}$

12) $\dfrac{\sqrt{3}}{3}$

13) $\dfrac{5\sqrt{10}}{8}$

14) $2\sqrt{6}$

15) $-3\sqrt{2}$

16) $3\sqrt{3}$

17) $-8\sqrt{3}$

18) $-3\sqrt{2} + 3\sqrt{3}$

19) $5x^2\sqrt{5}$

20) $2|x|\sqrt{7x}$

21) $2y^2(3y - 2x - 1)$

22) $3v(5 + v + 8v^2)$

23) $(6b^2 + 5)(4b - 5)$

24) $3(n^2 - 2)(5n - 8)$

25) $(x + 8)(x - 2)$

26) $4(v - 4)(v + 5)$

27) $(7x + 5)(x + 2)$

28) $(n - 4)(6n + 1)$

29) $(x^2 + 9)(x - 1)(x + 1)$

30) $(5b + 4)(5b - 4)$

31) Not factorable
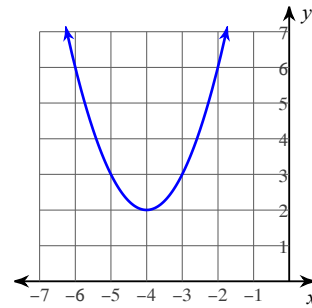
32) $(2x + 1)(4x^2 - 2x + 1)$
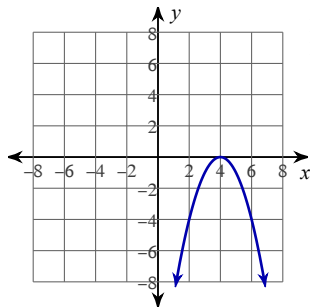
33) $\{8, 3\}$

34) $\left\{-\dfrac{1}{2}, 2\right\}$

35) $\left\{\dfrac{5}{2}, -\dfrac{7}{3}\right\}$

36) $\left\{\dfrac{1 + \sqrt{43}}{6}, \dfrac{1 - \sqrt{43}}{6}\right\}$
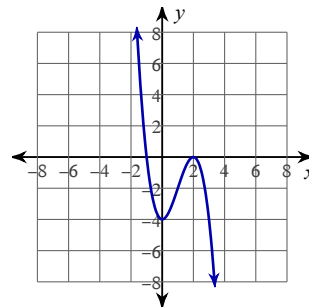
37)

38)

Minima: None
Maxima: $(4, 0)$

39)

40) -21

41) $x^2 + 4x$

42) $-z^2 + 4z - 3$

43) $\{0, 5\}$

44) Domain: $x \geq 2$
Range: $y \geq 3$

45) $g^{-1}(x) = -\dfrac{1}{9}x - \dfrac{4}{9}$

46) $f^{-1}(x) = \sqrt[5]{\dfrac{-x - 1}{2}}$

47) $\dfrac{1}{m - 7}$

48) $\dfrac{a + 2}{a - 6}$

49) $\dfrac{4}{9}$

50) $4a$

51) $\dfrac{3}{n - 5}$

52) $\dfrac{50}{27k}$

53) $6v$

54) $\dfrac{r - 1}{r + 7}$

55) $\dfrac{16}{x + 69}$

56) $\dfrac{x^4 + 4x^3y - 4y^2}{4y^2x^3}$

57) $\dfrac{45x + 4}{15x}$

58) $\dfrac{9r + 3}{(r - 2)(r + 5)}$

59) $\dfrac{-p + 8}{2p(p - 5)}$

60) $\{2\}$

61) $\{10\}$

62) $\{9\}$

63) $\{7, -1\}$

64) 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) $\left(\dfrac{f}{g}\right)(x) = x + 2$
    e) $(g \circ f)(x) = x^2 - 6$

65) 4, 2, or 0 possible real zeros
    3 or 1 possible positive zeros
    1 possible negative zero

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

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