

SUMMER ASSIGNMENT STUDY PACKET

Calculus

(READ CAREFULLY BEFORE YOU START TO WORK)

Dear Calculus student,

This summer assignment will inform you of the prerequisites for your next course. Becoming fluent in this material is a minimum requirement for success in Calculus.

This summer assignment will be reviewed in the first week of school, but it will not be enough time to learn the material from scratch, so you should complete and practice this material mindfully BEFORE the start of classes on August 18th. **You are responsible for knowing how to solve every problem fluently and error-free.**

The problems should be done in chronological order. Each problem should include a summary of the problem statement, a complete step-by-step solution, and a boxed final answer. **You should not use a calculator** to do the problems (even less any AI), but you may use your calculator to check your answer. The calculator may only be used in problems 41 through 44, 61 through 64, and 72 and 73.

You will take a quiz on this summer packet study material at the start of the second week of classes. The quiz will consist of approximately twenty (20) free-response questions (no multiple choice, matching, etc.); you will not be able to use a calculator on the test. This will count as a quiz grade for the first quarter.

If you do not know how to solve a problem, you are expected to use the sources available

to you (notes, handouts, books, Internet, etc.) to figure it out independently. The best study routine during the summer months is to constantly review topics and do a few problems each day, **do not attempt to do the entire packet the day before school starts**. You can also get help **the week before school starts** from 12:00 pm to 1:00 pm (location to be announced).

If you need examples to help you remember concepts or skills, you can go to [Khan Academy](#) where you will find similar problems to the ones in your summer assignment.

Once you finish the Calculus Summer work, proceed to the [Science Department Addendum](#) and complete the exercises ONLY of your elective Science Course (notice that AP science courses are not included in this addendum, as these have their separate summer assignment)

If you have questions, email me at [Eva Petocz](#) after August 7th, 2026.

Enjoy your summer and do your best!

Sincerely,

The ASFG Math Department

No Calculator. Copy each problem on graph paper and solve showing all work.

Simplify each expression.

$$1) \frac{\frac{9}{x-3}}{\frac{x-3}{x+1}}$$

$$2) \frac{\frac{2}{m+5}}{\frac{1}{2}}$$

$$3) \frac{\frac{x+5}{2} + \frac{4}{x+5}}{\frac{1}{4}}$$

$$4) \frac{\frac{x+3}{5} + \frac{1}{5}}{2x+3}$$

$$5) \frac{\frac{x-2}{4} - \frac{1}{8}}{\frac{x+1}{x-2} + \frac{x-2}{16}}$$

$$6) \frac{\frac{x-2}{3} - \frac{9}{x-2}}{\frac{x+4}{3} + \frac{x-2}{x+4}}$$

Solve each system of equations.

$$7) \begin{cases} x^2 + y^2 - x + 9y - 42 = 0 \\ x - 2y + 3 = 0 \end{cases}$$

$$8) \begin{cases} 5x^2 + 6y^2 - 69x - 2y + 160 = 0 \\ x + 2y + 1 = 0 \end{cases}$$

Convert each degree measure into radians and each radian measure into degrees.

$$9) -\frac{109\pi}{36}$$

$$10) 235^\circ$$

$$11) \frac{17\pi}{6}$$

$$12) -315^\circ$$

Divide.

$$13) (-47n^2 - 45 + 10n^3 + 88n) \div (-7 + 10n)$$

$$14) (35x^3 + 29x^2 + 2x + 48) \div (5x + 7)$$

$$15) (5x^4 - 3x^3 + 33x^2 + 19x - 5) \div (5x + 2)$$

$$16) (-14a + 13 + a^3 + 6a^2) \div (-1 + a)$$

Simplify.

$$17) \frac{\sqrt{2}}{\sqrt{3}}$$

$$18) \frac{5 + \sqrt{5}}{2\sqrt{18}}$$

$$19) \frac{2}{5 - 5\sqrt{2}}$$

$$20) \frac{2 + 5\sqrt{5}}{\sqrt{2} + \sqrt{5}}$$

Simplify each and state the excluded values.

$$21) \frac{6a^2 + 7a - 5}{15a + 25} \div \frac{2a^2 + 9a - 5}{5a + 40}$$

$$22) \frac{7x - 21}{21x^3 + 30x^2} \div \frac{49x + 35}{49x^2 + 105x + 50}$$

$$23) \frac{25n^3 + 45n^2}{15n^2 + 27n - 54} \cdot \frac{54 - 27n - 15n^2}{5n + 9}$$

$$24) \frac{7a^2 - 16a - 15}{35a^3 + 25a^2} \cdot \frac{5a^2}{56a^2}$$

Solve each equation by factoring.

$$25) 6x^2 + 9x - 109 = -4$$

$$26) 14b^2 = 2b$$

$$27) 0 = -384 - 56n^2 - 400n$$

$$28) 48 + 52x = -12x^2$$

Solve each equation by taking square roots.

$$29) 3a^2 + 4 = 7$$

$$30) 100v^2 + 8 = 33$$

Solve each equation with the quadratic formula.

$$31) 3r^2 - 11r - 1 = -11$$

$$32) 6b^2 - 7b - 57 = -8b$$

Solve each equation. Remember to check for extraneous solutions.

$$33) \sqrt{3 - x} = \sqrt{3x - 1}$$

$$34) (8x + 1)^{\frac{1}{2}} = (2x + 3)^{\frac{1}{2}} + 2$$

$$35) p = \sqrt{29 - 2p} + 7$$

$$36) r = (-90 + 19r)^{\frac{1}{2}}$$

$$37) \frac{x+3}{x} + \frac{4}{x+1} = \frac{x^2+2x-15}{x^2+x}$$

$$38) \frac{3}{v^2-v} = 1 + \frac{1}{v^2-v}$$

$$39) 1 = \frac{12x-36}{x^2-x} + \frac{3x-6}{x}$$

$$40) \frac{1}{6n+5} - \frac{n+3}{n} = \frac{1}{6n^2+5n}$$

Solve each equation.

$$41) -27 = -x^{\frac{3}{2}}$$

$$42) n^{\frac{2}{5}} = 4$$

$$43) 64 = (x-18)^{\frac{3}{2}}$$

$$44) b^{\frac{3}{2}} = 8$$

Solve each equation for $0 \leq \theta < 2\pi$. No calculator

$$45) -1 - 11\sin \theta = 3 - 3\sin \theta$$

$$46) -\frac{14}{3} + 3\tan \theta = -5 + \frac{8}{3} \cdot \tan \theta$$

$$47) 2 - 9\tan \theta = -3\sqrt{3} + 2$$

$$48) 2 - \cos \theta = -2 + 3\cos \theta$$

$$49) -3 - 7\sin \theta = 1 + \sin \theta$$

$$50) \frac{20-\sqrt{2}}{5} + 3\cos \theta = 4 + \frac{13}{5} \cdot \cos \theta$$

Factor each.

$$51) x^8 - 18x^4 + 81 = 0$$

$$52) x^8 - 5x^4 + 4 = 0$$

$$53) x^8 - 20x^4 + 64 = 0$$

$$54) x^6 + 3x^4 - 25x^2 - 75 = 0$$

$$55) x^8 - 10x^4 + 9 = 0$$

$$56) x^6 - 64 = 0$$

Evaluate each function.

57) $k(n) = n^2 + \frac{3}{2}$; Find $k\left(\frac{1}{4}\right)$

58) $h(t) = |-2t - 2|$; Find $h\left(\frac{6}{5}\right)$

59) $g(x) = 2^{2x} - \frac{1}{2}$; Find $g(-1)$

60) $k(n) = n^2 + 5n$; Find $k(-3 - n)$

61) $g(x) = 3x^3 + 1$; Find $g(x + 1)$

Solve each equation.

62) $\log_4 (9 - 5x^2) + \log_4 8 = \log_4 62$

63) $\log_4 (x + 17) + \log_4 (x + 5) = 3$

64) $\log_2 5 + \log_2 (4 - 5x^2) = 4$

65) $\log_5 (3x^2 - 6) - \log_5 3 = \log_5 79$

66) Emily and Rob are selling cheesecakes for a school fundraiser. Customers can buy New York style cheesecakes and apple cheesecakes. Emily sold 10 New York style cheesecakes and 4 apple cheesecakes for a total of \$134. Rob sold 5 New York style cheesecakes and 1 apple cheesecake for a total of \$51. What is the cost each of one New York style cheesecake and one apple cheesecake?

67) The sum of the digits of a certain two-digit number is 13. Reversing its digits increases the number by 9. Find the number.

68) The school that Ndiba goes to is selling tickets to a play. On the first day of ticket sales the school sold 3 senior citizen tickets and 13 student tickets for a total of \$207. The school took in \$192 on the second day by selling 3 senior citizen tickets and 12 student tickets. Find the price of a senior citizen ticket and the price of a student ticket.

69) Alberto left the airport and drove toward the mountains at an average speed of 30 km/h. Jose left two hours later and drove in the same direction but with an average speed of 50 km/h. Find the number of hours Alberto drove before Jose caught up.

70) A passenger plane left Los Angeles eight hours before a cargo plane. The planes flew in opposite directions. The cargo plane flew at 190 mph for four hours. After this time the planes were 5320 mi. apart. What was the passenger plane's speed?

Answers to No Calculator. Copy each problem on graph paper and solve showing all work.

- 1) $\frac{9x+9}{x^2-6x+9}$
- 2) $\frac{4}{m+5}$
- 3) $\frac{2x^2+20x+66}{x+5}$
- 4) $\frac{x+4}{10x+15}$
- 5) $\frac{4x^2-18x+20}{x^2+12x+20}$
- 6) $\frac{x^3-92-39x}{x^3+9x^2-12x-20}$
- 7) $(3, 3), (-7, -2)$
- 8) $(5, -3)$
- 9) -545°
- 10) $\frac{47\pi}{36}$
- 11) 510°
- 12) $-\frac{7\pi}{4}$
- 13) $n^2-4n+6-\frac{3}{-7+10n}$
- 14) $7x^2-4x+6+\frac{6}{5x+7}$
- 15) $x^3-x^2+7x+1-\frac{7}{5x+2}$
- 16) $a^2+7a-7+\frac{6}{-1+a}$
- 17) $\frac{\sqrt{6}}{3}$
- 18) $\frac{5\sqrt{2}+\sqrt{10}}{12}$
- 19) $\frac{-2-2\sqrt{2}}{5}$
- 20) $\frac{-2\sqrt{2}+2\sqrt{5}-5\sqrt{10}+25}{3}$
- 21) $\frac{a+8}{a+5}; \left\{-\frac{5}{3}, -8, \frac{1}{2}, -5\right\}$
- 22) $\frac{x-3}{3x^2}; \left\{0, -\frac{10}{7}, -\frac{5}{7}\right\}$
- 23) $-5n^2; \left\{\frac{6}{5}, -3, -\frac{9}{5}\right\}$
- 24) $\frac{a-3}{56a^2}; \left\{0, -\frac{5}{7}\right\}$
- 25) $\left\{\frac{7}{2}, -5\right\}$
- 26) $\left\{\frac{1}{7}, 0\right\}$
- 27) $\left\{-\frac{8}{7}, -6\right\}$
- 28) $\left\{-\frac{4}{3}, -3\right\}$
- 29) $\{1, -1\}$
- 30) $\left\{\frac{1}{2}, -\frac{1}{2}\right\}$
- 31) $\{2, 1.667\}$
- 32) $\{3, -3.167\}$
- 33) $\{1\}$
- 34) $\{3\}$
- 35) $\{10\}$
- 36) $\{9, 10\}$
- 37) $\{-3\}$
- 38) $\{2, -1\}$
- 39) $\{3, -5\}$
- 40) $\left\{-1, -\frac{8}{3}\right\}$
- 41) $\{9\}$
- 42) $\{32, -32\}$
- 43) $\{34\}$
- 44) $\{4\}$
- 45) $\left\{\frac{7\pi}{6}, \frac{11\pi}{6}\right\}$
- 46) $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$
- 47) $\left\{\frac{\pi}{6}, \frac{7\pi}{6}\right\}$
- 48) $\{0\}$
- 49) $\left\{\frac{7\pi}{6}, \frac{11\pi}{6}\right\}$
- 50) $\left\{\frac{\pi}{4}, \frac{7\pi}{4}\right\}$
- 51) $(x^2-3)^2 \cdot (x^2+3)^2 = 0$
- 52) $(x-1)(x+1)(x^2+1)(x^2-2)(x^2+2) = 0$
- 53) $(x-2)(x+2)(x^2+4)(x^2-2)(x^2+2) = 0$
- 54) $(x^2+3)(x^2-5)(x^2+5) = 0$
- 55) $(x^2-3)(x^2+3)(x-1)(x+1)(x^2+1) = 0$
- 56) $(x-2)(x^2+2x+4)(x+2)(x^2-2x+4) = 0$
- 57) $\frac{25}{16}$
- 58) $\frac{22}{5}$
- 59) $-\frac{1}{4}$
- 60) $-6+n+n^2$
- 61) $3x^3+9x^2+9x+4$
- 62) $\left\{\frac{1}{2}, -\frac{1}{2}\right\}$
- 63) $\{-1\}$
- 64) $\left\{\frac{2}{5}, -\frac{2}{5}\right\}$
- 65) $\{9, -9\}$
- 66) New York style cheesecake: \$7, apple cheesecake: \$16
- 67) 67
- 68) senior citizen ticket: \$4, student ticket: \$15
- 69) 5 hours
- 70) 380 mph