

Name: _____

AP Calculus Summer Packet

**DUE THE 1ST DAY OF
SCHOOL!!!!**

Welcome!

Welcome to AP Calculus! This course is both challenging and rewarding. Your goal is to pass the AP exam in May. In doing so, you will be prepared for college level mathematics and you may even receive college credits.

To be successful in AP Calculus, you must be dedicated and conscientious. Your commitment to this course begins now. This summer packet is a review of precalculus and algebra topics that you must have mastery of before learning calculus.

Directions:

1. All work should be completed in this packet (or staple your work to it if you prefer lined paper). It will be collected on the first day of school.
2. We will review the material quickly, and you will be tested on the concepts within the first week of school. The packet will count for half of the test grade.
3. You want these concepts fresh in your mind when you begin the year. Therefore, it is not suggested that you complete this immediately. However, you would do yourself a disservice to leave it for the last minute. Try doing a couple of problems a day, or a topic per week.
4. If you are unsure of how to solve these problems, do NOT skip them! Do your research, using the internet or a textbook. If all else fails, email me questions at mrinaldi-hahn@rpsd.org.

I am looking forward to meeting you all next year and taking this journey with you. Come prepared to work hard and get excited about math. I know I will be. Enjoy the summer. 😊

Name _____

Topic 1: Fractional & Negative Exponents

Simplify using only positive exponents

1. $-3x^{-3}$

2. $-5\left(\frac{3}{2}\right)(4-9x)^{\frac{3}{2}}(-9)$

3. $2\left(\frac{2}{2-x}\right)\left[\frac{-2}{(2-x)^2}\right]$

4. $(16x^2y)^{\frac{1}{4}}$

5. $-\frac{x^{\frac{1}{2}}}{2}\sin\sqrt{x}$

6. $\frac{\sqrt{4x-16}}{\sqrt[4]{(x-4)^3}}$

7. $-4\left(\frac{2x-1}{2x+1}\right)^{-3}\left[\frac{2(2x+1)-2(2x-1)}{(2x+1)^2}\right]$

8. $\frac{\frac{1}{2}(2x+5)^{\frac{3}{2}}}{\frac{3}{2}}$

9. $\left(\frac{1}{x^{-2}} + \frac{4}{x^{-1}y^{-1}} + \frac{1}{y^{-2}}\right)^{\frac{1}{2}}$

Topic 2: Solving Inequalities (absolute value)

Write the following absolute value equations as piecewise equations.

1. $y = |2x - 4|$

2. $y = |6 + 2x| + 1$

~~3. $y = |4x + 1| + 2x - 3$~~

Solve the following absolute value inequalities. Write your solutions in interval notation.

4. $|x - 3| > 12$

5. $|x - 3| \leq 4$

6. $|10x + 8| > 2$

7. $|3x - 4| > -2$

8. $|x - 6| > -8$

Topic 3: Solving Inequalities (quadratic)

Write the following absolute value expressions as piecewise expressions.

1. $|x^2 - 1|$

2. $|x^2 + x - 12|$

3. $|x^2 + 4x + 4|$

Solve the following by factoring and making the appropriate sign charts. Write your solutions in interval notation.

4. $x^2 - 16 > 0$

5. $x^2 + 6x - 16 > 0$

6. $x^2 - 3x \geq 10$

7. $2x^2 + 4x \leq 3$

8. $x^3 + 4x^2 - x \geq 4$

9. $2\sin^2 x \geq \sin x \quad 0 \leq x < 2\pi$

Topic 4: Special Factorization

Factor completely

1. $x^3 + 8$

2. $x^3 - 8$

3. $27x^3 - 125y^3$

4. $x^4 + 11x^2 - 80$

5. $ac + cd - ab - bd$

6. $2x^2 + 50y^2 - 20xy$

7. $x^2 + 12x + 36 - 9y^2$

8. $x^3 - xy^2 + x^2y - y^3$

9. $(x-3)^2(2x+1)^3 + (x-3)^3(2x+1)^2$

Topic 5: Factor Theorem (*p* over *q* method/synthetic division)

Use the *p* over *q* method and synthetic division to factor the polynomial $P(x)$. Then solve $P(x) = 0$.

1. $P(x) = x^3 + 4x^2 + x - 6$

2. $P(x) = x^3 + 5x^2 - 2x - 24$

3. $P(x) = x^3 + 6x^2 + 3x - 10$

4. $P(x) = x^3 + 2x^2 - 19x - 20$

5. $P(x) = x^4 + 5x^3 + 6x^2 - 4x - 8$

6. $P(x) = x^4 + 11x^3 + 41x^2 + 61x + 30$

Topic ψ : Solving Quadratic Equations and Quadratic Formula

Solve each equation.

1. $7x^2 - 3x = 0$

2. $4x(x-2) - 5x(x-1) = 2$

3. $x^2 + 6x + 4 = 0$

4. $2x^2 - 3x + 3 = 0$

5. $2x^2 - (x+2)(x-3) = 12$

6. $x + \frac{1}{x} = \frac{13}{6}$

7. $x^4 - 9x^2 + 8 = 0$

8. $x - 10\sqrt{x} + 9 = 0$

9. $\frac{1}{x^2} - \frac{1}{x} = 6$

Topic 7: Complex Fractions

Simplify the following:

$$1. \frac{x}{x - \frac{1}{2}}$$

$$2. \frac{\frac{1}{x} + 4}{\frac{1}{x} - 2}$$

$$3. \frac{x - \frac{1}{x}}{x + \frac{1}{x}}$$

$$4. \frac{\frac{3}{x} - \frac{4}{y}}{\frac{4}{x} - \frac{3}{y}}$$

$$5. \frac{1 - \frac{2}{3x}}{x - \frac{4}{9x}}$$

$$6. \frac{\frac{x^2 - y^2}{xy}}{\frac{x + y}{y}}$$

$$7. \frac{x^{-3} - x}{x^{-2} - 1}$$

$$8. \frac{\frac{x}{1-x} + \frac{1+x}{x}}{\frac{1-x}{x} + \frac{x}{1+x}}$$

$$9. \frac{\frac{4}{x-5} + \frac{2}{x+2}}{\frac{2x}{x^2 - 3x - 10}} + 3$$

Topic 8: Solving Rational (fractional) Equations

Solve each equation for x:

$$1. \frac{2}{3} - \frac{5}{6} = \frac{1}{x}$$

$$2. x + \frac{6}{x} = 5$$

$$3. \frac{x+1}{3} - \frac{x-1}{2} = 1$$

$$4. \frac{x-5}{x+1} = \frac{3}{5}$$

$$5. \frac{60}{x} - \frac{60}{x-5} = \frac{2}{x}$$

$$6. \frac{2}{x+5} + \frac{1}{x-5} = \frac{16}{x^2-25}$$

$$7. \frac{x}{x-2} + \frac{2x}{4-x^2} = \frac{5}{x+2}$$

$$8. \frac{x}{2x-6} - \frac{3}{x^2-6x+9} = \frac{x-2}{3x-9}$$

$$9. \frac{2x+3}{x-1} = \frac{10}{x^2-1} + \frac{2x-3}{x+1}$$

Topic 9: Basic Right Angle Trig.

Solve the following problems.

If point P is on the terminal side of θ , find all 6 trig functions of θ . Draw a picture.

1. $P(-2, 4)$

2. $P(\sqrt{5}, -2)$

3. If $\cos \theta = \frac{-5}{13}$, θ is quadrant II,
find $\sin \theta$ and $\tan \theta$.

4. If $\cot \theta = 3$, θ in quadrant III,
find $\sin \theta$ and $\cos \theta$.

Find the exact value of the following without a calculator:

5. $\sin^2 225^\circ - \cos^2 300^\circ$

6. $(6 \sec 180^\circ - 4 \cot 90^\circ)^2$

7. $(4 \cos 30^\circ - 6 \sin 120^\circ)^{-2}$

Solve the following triangles (3 decimal place accuracy)

8. $A =$ $a = 21.7$
 $B = 16^\circ$ $b =$
 $C = 90^\circ$ $c =$

9. $A =$ $a = 6 \text{ feet}$
 $B =$ $b =$
 $C = 90^\circ$ $c = 95 \text{ inches}$

Topic |0: Solving Trigonometric Equations

Solve each equation on the interval $[0, 2\pi)$.

1. $\sin x = \frac{1}{2}$

2. $\cos^2 x = \cos x$

3. $2\cos x + \sqrt{3} = 0$

4. $4\sin^2 x = 1$

5. $2\sin^2 x + \sin x = 1$

6. $\cos^2 x + 2\cos x = 3$

7. $2\sin x \cos x + \sin x = 0$

8. $8\cos^2 x - 2\cos x = 1$

9. $\sin^2 x - \cos^2 x = 0$