**Calculus H Summer Review Packet**

Welcome to Calculus H. Before you begin this course, it is important to review the topics you have learned in your previous math courses that will not be reviewed in class.

Please complete all work neatly on the following pages. This will take a bit of time, so do not wait until last minute. Calculators are only permitted when specified. All work must be shown neatly for you to receive full credit.

This summer packet is intended for you review and strengthen these basic skills. These skills are foundational to your success in Calculus H. Therefore, do not fake your way through the problems. If you do not remember how to do something ask a friend or look it up.

**This packet is to be completed and handed in the first day of school.** It will be graded as a homework assignment. You will be tested on the material as part of the first marking period grade.

Below are several helpful websites.

> http://www.purplemath.com/modules/index.htm
> http://www.mathematicshelpcentral.com/index.html
> http://tutorial.math.lamar.edu/
> http://www.khanacademy.org/

If you have any questions, please contact us at either of the following email addresses. Please know that we will be away for parts of the summer and may not answer our emails immediately.

See you in the fall.

Have a wonderful summer! ☺

Your Calculus H teachers -

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**Complex Fractions**

1. $\dfrac{\dfrac{25}{a} - a}{5 + a}$

2. $\dfrac{2 - \dfrac{4}{x+2}}{5 + \dfrac{10}{x+2}}$

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

**Functions**

Let $f(x) = 2x + 1$ and $g(x) = 2x^2 - 1$. Find each.

1. $f(2) =$

2. $g(-3) =$

3. $f(x+1) =$

4. $f(g(-2)) =$

5. $g(f(4)) =$

6. $g(f(m+1)) =$

7. $\dfrac{f(5) - f(2)}{5 - 2}$

8. Given $a = 1$ and $b = 3$, find $\dfrac{f(b) - f(a)}{b - a}$

Find $\dfrac{f(x+h) - f(x)}{h}$ for the given function.

9. $f(x) = 9x + 3$

10. $f(x) = 5 - 2x$

11. $f(x) = x^2 - 1$

**Intercepts and Points of Intersection**
Find the *x* and *y* intercepts for each.

1.  $y = 2x - 5$

2.  $y = x^2 + x - 2$

3.  $y = 3x^3 - 4x^2$

Find the points of intersection for the given equations.

4.  $\begin{array}{l} x + y = 8 \\ 4x - y = 7 \end{array}$

5.  $\begin{array}{l} x^2 + y = 6 \\ x + y = 4 \end{array}$

6.  $\begin{array}{l} y = x \\ y = x^3 \end{array}$

**Interval Notation**
Solve each equation.  State your answer in both interval notation and graphically.

1.  $2x - 1 \geq 0$

2.  $-4 \leq 2x - 3 < 4$

3.  $x^2 - 5x - 6 > 0$

**Domain and Range**
Sketch the graph of each and find the domain and range of each function.  Write your answer in INTERVAL notation.

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

2.  $f(x) = -\sqrt{x + 3}$

3.  $f(x) = 3\sin x$

4.  $f(x) = \dfrac{2}{x - 1}$

5.  $f(x) = -2\cos x$

6.  $f(x) = -|x - 4|$

**Inverses**
Find the inverse of each function.

1. $y = 2x + 1$

2. $y = x^2 - 6$

3. $y = \dfrac{2}{x-1}$

4. $y = 2\cos(x+3)$

5. $y = \dfrac{1}{2}\log_3(x-3) + 2$

6. $y = e^{3x+2} - 5$

**Equation of a Line**

1. Write the equation of a line in slope intercept form having a slope of 3 and a y-intercept of 5

2. Write the equation of a line passing through the point (5, -3) with an undefined slope.

3. Write the equation of a line passing through (-4, 2) with a slope of 0.

4. Write the equation of a line passing through the point (0,5) with a slope of $\dfrac{2}{3}$.

5. Write the equation of a line passing through the point (-3, 6) and (1, 2).

6. Find the equation of the line with an x-intercept (2, 0) and y-intercept (0, 3).

7. Find the equation of the line passing through the point (2, 8) and parallel to the line $y = \dfrac{5}{6}x - 1$.

8. Find the equation of the line perpendicular to the y-axis passing through the point (4, 7).

**Trigonometry**

Find the exact value of each.

1. $\sin \pi$

2. $\cos \dfrac{3\pi}{2}$

3. $\sin \dfrac{\pi}{3}$

4. $\tan \dfrac{\pi}{4}$

5. $\cos \dfrac{5\pi}{6}$

6. $\tan \dfrac{2\pi}{3}$

7. $\cos \dfrac{7\pi}{6}$

8. $\sin \dfrac{4\pi}{3}$

Sketch the graph of each function on $-2\pi \le x \le 2\pi$.

9. $y = \sin x$

10. $y = \cos x$

11. $y = \tan x$

Solve each of the following on $0 \le x < 2\pi$.

12. $\sin x = -\dfrac{1}{2}$

13. $2\cos x = \sqrt{3}$

14. $\tan^2 x = 1$

15. $\sqrt{2}\cos x = 1$

16. $2\cos^2 x - \cos x + 1 = 0$

17. $4\sin^2 x - 3 = 0$

Simplify the following using the basic trig identities.

18. $\sin a \tan a$

19. $\tan^2 x - \tan^2 x \sin^2 x$

20. $\dfrac{1 - \sin^2 \theta}{\cos \theta}$

21. $\dfrac{1}{1 + \cos \theta} + \dfrac{1}{1 - \cos \theta}$

**Exponents and Logarithms**

Graph each of the following.

1. $y = 2^x$

2. $y = e^x$

3. $y = \log_2 x$

4. $y = \ln x$

Solve each.

5. $3^{\frac{x}{2}} = 9$

6. $3(5^{x+1}) = 15$

7. $4^x = 10$

8. $\log_6 x - \log_6 (x+1) = 2$

9. $\ln(x+2) + \ln x = 0$

**Radicals and Rational Exponents**

1. $\sqrt{9}$

2. $\sqrt[3]{24}$

3. $\left(\sqrt[3]{-125}\right)^3$

4. $27^{\frac{1}{3}}$

5. $\left(\dfrac{1}{\sqrt{32}}\right)^{-\frac{2}{5}}$

6. $\sqrt{\dfrac{72}{z^3}}$

7. $\sqrt[3]{16x^5}$

8. $\sqrt{75x^2 y^{-4}}$

9. $\dfrac{1}{\sqrt{3}}$

10. $\dfrac{2}{5 - \sqrt{3}}$

11. $2\sqrt{50} + 12\sqrt{8}$

12. $7\sqrt{80x} - 2\sqrt{125x}$

**Rational Functions**

Find any vertical asymptotes, horizontal asymptotes and or holes for the following. Determine the domain of each function.

1.  $y = \dfrac{x-2}{x+5}$

2.  $f(x) = \dfrac{x+2}{x^2-4}$

3.  $f(x) = \dfrac{x^2-2x+1}{x^2-1}$

4.  $f(x) = \dfrac{x^3+1}{x^2}$

5.  $y = \dfrac{-x^2-3x}{x^2+5x+6}$

6.  $y = \dfrac{x^2-7x+10}{x-1}$

**Factoring**

1.  $x^2+4x-5$          $x^2+9x+14$          $x^2-5x+6$

2.  $x^2-x-6$          $x^2-7x-12$          $x^2-8x+15$

3.  $x^2+12x+20$          $x^2+7x+18$          $16x^2-81$

4.  $2x^2-5x-3$          $3x^2+16x+15$          $8x^2-2x-3$

5.  $4x^2-16x+15$          $9x^2+9x-4$          $5x^2+17x+6$

6.  $4x^2-3x-10$          $9x^2+21x+10$          $12x^2-17x+6$

7.  $8x^2+26x-7$          $27x^3-343y^3$          $216x^3y^6+125z^3$

8.  $x^{12}y^3+729$          $8x^9-27y^3$          $x^3y^3-512a^3b^6c^9$

9.  $14(x-5)-3x(x-5)$          $(x-3)^2+3(x-3)+2$          $10x^2+16x+6$

**Factor the following polynomials. (Factor first by grouping, and then continue to factor if possible.)**

10. $x^3 + 2x^2 - 25x - 50$ $\qquad$ $x^3 - 3x^2 - 4x + 12$ $\qquad$ $x^3 - 5x^2 + 4x - 20$
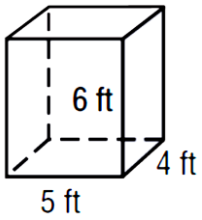
11. $9x^3 + 18x^2 - 25x - 50$ $\qquad$ $4x^3 + 36x^2 - x - 9$ $\qquad$ $9x^3 - 27x^2 + 4x - 12$

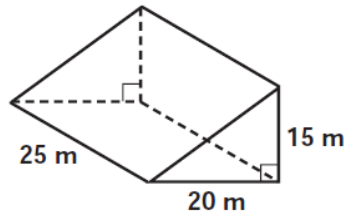**Geometry**
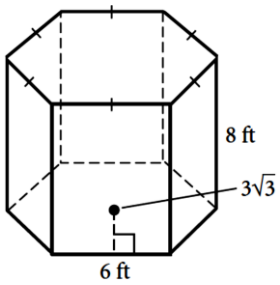
Find the surface area and volume of each solid.

1.



6 ft
4 ft
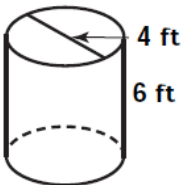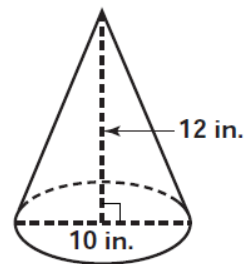5 ft

2.



25 m
15 m
20 m

3.



8 ft
$3\sqrt{3}$
6 ft

4.



3 cm
8 cm
8 cm

5.



4 ft
6 ft

6.



12 in.
10 in.
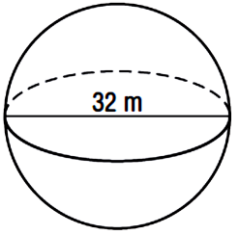
7.



32 m
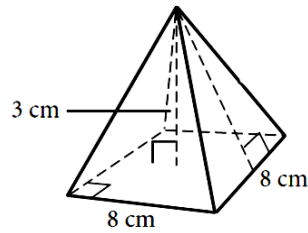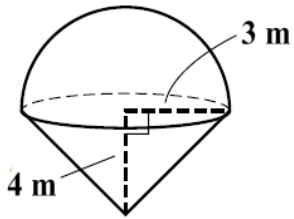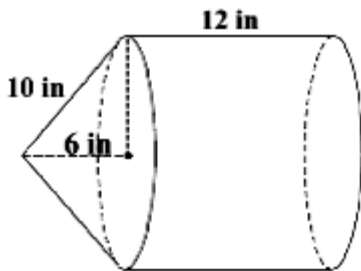
8.

What is the radius of a cylinder with a height of 6 centimeters and a volume of 54π cm³?

9. Find the volume and surface area. (Hint: You must first find the missing measurement.)



3 m

4 m

10. Find the volume and surface area. (Hint: You must first find the missing measurement.)



12 in

10 in

6 in

11. Sylvia has just discovered that the valve on her cement truck failed during the night and that all the contents ran out to form a giant cone of hardened cement.  To make an insurance claim, she needs to figure out how much cement is in the cone.  The circumference of its base is 44 feet, and it is 4 feet high.  Calculate the volume to nearest cubic foot.

12. You are producing 500 of these metal wedges, and you must electroplate them with a thin layer of high-conducting silver (surface area). The measurements shown are in centimeters. Find the total cost for silver, if silver plating costs $3 for every 200 square centimeters.  Assume each quadrilateral is a rectangle.