# To all students entering 11th Math SL/HL Analysis classes.

In order to keep our current math skills sharp, please complete this summer review packet. Use your previous class notes and work, websites such as Khan Academy and IXL and other math reference books for guides. Please complete before the first day of school in August 2022.

Show all work, graphs and solutions clearly on a **<u>separate</u>** sheet of paper. Your work should be numbered and organized so it is easy to read. Solutions are not provided with this packet.

Have a good summer!

CDS Mathematics Department

# 11ᵗʰ **Math SL Analysis & HL Analysis**
# **Summer Review Packet  2022**
### **DUE on the FIRST day of SCHOOL**

| Topic | Extra Help on Khan Academy |
|---|---|
| Factoring | https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-strategy/v/strategy-in-factoring-quadratics-1 |
| Index Laws | https://www.khanacademy.org/math/algebra2/exponential-growth-and-decay-alg-2/equivalent-forms-of-exponential-expressions/v/simplifying-an-exponential-expression |
| Radical Operations | https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/adding-and-simplifying-radicals |
| Complex numbers | https://www.khanacademy.org/math/precalculus/imaginary-and-complex-numbers/multiplying-complex-numbers/a/multiplying-complex-numbers |
| Solving Quadratics | https://www.khanacademy.org/math/algebra/quadratics |
| Solving Rational Equations | https://www.khanacademy.org/math/algebra2/rational-expressions-equations-and-functions/solving-rational-equations/v/equations-with-two-rational-expressions |
| Systems of Equations | https://www.khanacademy.org/math/algebra/systems-of-linear-equations |
| Graph Transformations | https://www.khanacademy.org/math/algebra2/manipulating-functions/stretching-functions/v/shifting-and-reflecting-functions |
| Exponential Functions | https://www.khanacademy.org/math/algebra2/exponential-and-logarithmic-functions/graphs-of-exponential-functions/v/transforming-exponential-graphs |
| Right Triangle Trig | https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles |

## I. BASICS:

1. Simplify the expression: $(2-20i)+(14-7i)$.

2. Simplify the expression: $(7+9i)(8-10i)$.

3. Simplify the expression: $\dfrac{3}{6+7i}$.

4. Simplify $\sqrt{25x^{20}y^{14}}$.

5. In an alternating-current circuit, the voltage $E$ is given by $E = IZ$, where $I$ is the current (in A) and $Z$ is the impedance (in $\Omega$). Each of these can be represented by complex numbers. Find the complex number representation for $I$ if $E = 62+32i$ volts and $Z = 1200-560i$ ohms.

6. Simplify the expression $\sqrt[5]{\dfrac{243}{32}}$.

7. Find $f(t+7)$ for $f(x) = 2x^2 - 9x + 8$.

8. Divide using long division: $\left(6x^6 - 3x^5 + 15x^4 - 21x^3 + 15x^2 - 3x - 5\right) \div \left(-3x + 3\right)$.

9. Find $\left(x^3 + 5x^2 - 16x - 80\right) \div \left(x+4\right)$ by using synthetic division or long division.

10. Expand and simplify $(2x-3y)(x+5y) - (x-y)^2$.

11. Simplify $\dfrac{x^2 - 9}{x^3 + 7x^2 + 12x}$.

12. If $\dfrac{2x-5y}{x-6y} = \dfrac{3}{4}$, find the value of $\dfrac{x}{y}$.

13. Make $y$ the subject of the formula $\dfrac{1}{x} + \dfrac{1}{\sqrt{y}} = \dfrac{1}{z}$.

14. Given that $\dfrac{ax-5y}{\_\_} = \dfrac{2}{\_\_}$, express $a$ in terms of $x$ and $y$.

15. Simplify $\sqrt{2}+1+\dfrac{1}{1+\sqrt{2}}$

## II. SOLVE:

1. Solve $x^2 - 2x = 24$ by completing the square.

2. Find the exact solution $x^2 - 5x = 36$ by using the Quadratic Formula.

3. Solve the system of equations by using substitution.

$$6r + 7s = -1$$
$$2r + 4s = -12$$

4. Solve the system of equations by using elimination.

$$-3p - 9q = -63$$
$$-8p - 6q = -60$$

5. Solve for $x$: $\sqrt{9x - 3} + 1 = 20$.

6. Solve for $x$: $\sqrt{4x + 1} + 2 = \sqrt{8x + 7}$.

7. Solve for $x$: $5x^3 - 7x^2 - 19x - 15 = 0$.

8. Solve for $x$: $\dfrac{4}{x-4} - \dfrac{7}{x+5} = \dfrac{66}{x^2 + x - 20}$.

9. Solve for $x$: $(2x + 3)(x + 8) \geq 0$.

10. Solve for $y$: $\dfrac{2y+1}{5} - \dfrac{2+7y}{15} > \dfrac{2}{3}$.

11. Given that $x = \dfrac{12+y}{4-y}$, solve the following:

   a) If $y = -2$, calculate the value of $x$, giving your answer as a fraction in its lowest terms.
   b) Express $y$ in terms of $x$.

12. Solve the following equations:

   a) $3x^2 + 3 = 10x$             b) $(5x - 2)^2 - 9x^2 = 0$

13. The sides of an equilateral triangle are $(2y+3)$ cm, $(x+2)$ cm, and $(x+y-1)$ cm. Find the perimeter of the triangle.

### III. GRAPH:

1. Use the graph of $f$ to describe the transformation that results in the graph of $g$. Then sketch the graphs of $g$ and $f$.

    $f(x) = x^2$ , $g(x) = 3(x-2)^2 -1$

2. For the following, identify the parent function and then graph using transformations. State the domain, range, and asymptotes if applicable.

    a)   $y = \frac{1}{2}x - 3$

    b)   $y = -3(x-1)^2$

    c)   $y = \dfrac{1}{x+2} - 3$

    d)   $y = \sqrt{x+1} + 2$

    e)   $y = -\dfrac{1}{2}x^3$

    f)   $y = \left| -x \right| + 1$

    g)   $y = 2^x$

    h)   $y = \log_2 (x-2)$

## IV. EXPONENTIAL AND LOGARITHMIC FUNCTIONS:

1. Evaluate the expression $\log_5 \dfrac{1}{25}$.

2. Evaluate the expression $\log_3 243$.

3. Evaluate the expression $6^{\log_6 1.5}$.

4. Evaluate the expression $\log 100000$.

5. Solve the equation for $x$: $32^{x-1} = 16^{x+4}$.

6. Solve the equation for $x$: $\log_7 \left( x^2 + 11 \right) = \log_7 15$.

7. Solve the equation for $y$: $\ln\left( -y + 4 \right) - \ln\left( y + 3 \right) = \ln\left( -3y + 1 \right)$.

8. Solve $\log_6 x = 2$.

9. Expand the expression: $\log_6 \dfrac{2x + 6}{\sqrt[5]{3 - 3x}}$.

10. Solve the equation for $x$: $2.9^x = 9.7$ .

## V. GEOMETRY & TRIGONOMETRIC FUNCTIONS AND EQUATIONS:

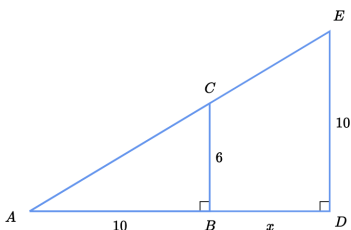1. Find the values for sine, cosine, and tangent for angle $\theta$, when $AC = 26$ and $BC = 24$.
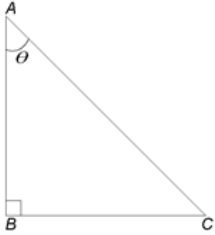
2. If $g = 35.4$ and , find *the measure of angle F*. Round to the nearest tenth.
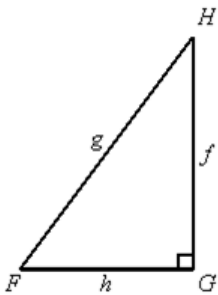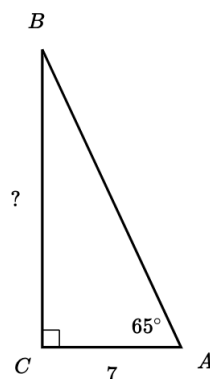
3. Find the area of a sector with a central angle of $170°$ and a radius of 17 millimeters. Round to the nearest tenth.

4. For a circle of radius 3 feet, find the arc length $s$ subtended (intercepted) by a central angle of $21°$.
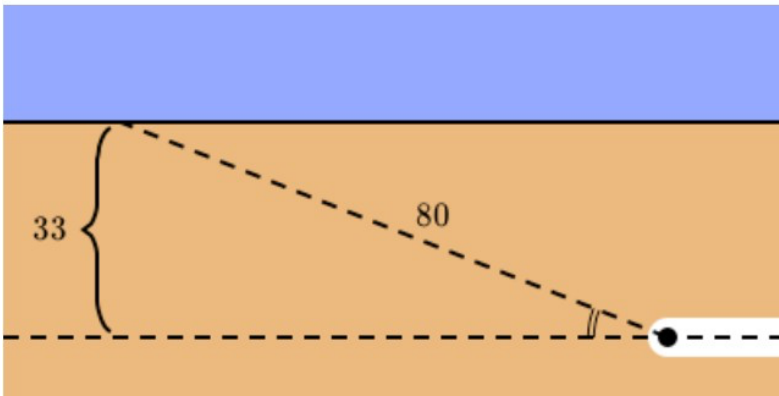
5. Find x

6. Find BC.

**7.**

Bugs Bunny was $33$ meters below ground, digging his way toward Pismo Beach, when he realized he wanted to be above ground. He turned and dug through the dirt diagonally for $80$ meters until he was above ground.

**What is the angle of elevation,** *in degrees,* **of Bugs Bunny's climb?**
*Round your final answer to the nearest tenth.*

[          ] °



**8.**

Archimedes went to sleep beside a big rock. He wanted to get up at $8$ AM, but the alarm clock was yet to be invented! He decided to sleep at the spot where the rock's shadow should end when it's $8$ AM so as to be awakened by the direct sunlight.

Archimedes knew that at $8$ AM, the sunlight reaches the ground at an angle of $43°$. The rock beside which he slept was $7$ meters tall.

**How far from the rock did Archimedes go to sleep?**
*Round your final answer to the nearest hundredth.*

[          ] meters