

Pre-Calculus Review Package. For students entering calculus at the Governor's School. To be completed over the summer. This package will prepare you for the Calculus Readiness Test scheduled for the first day of school.

I. Simplify. Show the work that leads to your answer.

1. $\frac{3x^2 + 10x + 8}{6x^2 + 17x + 10}$

2. $\frac{x^3 - 8}{x - 2}$

3. $\frac{5 - x}{x^2 - 25}$

4. $\frac{2x^2 + x - 12}{x^2 - 16}$

II. Fill in the blanks with the following identities.

1. Pythagorean: _____

2. Double Angles: $\cos 2x =$ _____ $\sin 2x =$ _____

III. Simplify each expression.

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

2. $\frac{\left(\frac{2}{x^2}\right)}{\left(\frac{10}{x^5}\right)}$

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

4. $\frac{2x}{x^2 - 6x + 9} - \frac{1}{x+1} - \frac{8}{x^2 - 2x - 3}$

IV. Solve each equation below for z.

1. $4x + 10yz = 0$

2. $y^2 + 3yz - 8z - 4x = 0$

3. Simplify: $x^{\frac{3}{2}} \left(x + x^{\frac{5}{2}} - x^2 \right)$

4. Find a rectangular coordinate equation for the parametrically-defined curve by eliminating the parameter:

$$\begin{aligned}x &= t^2 + 3 \\ y &= 2t\end{aligned}$$

VII. Expand and simplify.

1. $\sum_{n=0}^4 \frac{n^2}{2}$

2. $\sum_{n=1}^3 \frac{1}{n!}$

VIII. Simplify

1. $\frac{\sqrt{x}}{x}$

2. $e^{\ln 3}$

3. $e^{1+\ln x}$

4. $\ln 1$

5. $\ln e^7$

6. $\log_3 \left(\frac{1}{3} \right)$

7. $\log_{\frac{1}{2}} 8$

8. $\ln \left(\frac{1}{2} \right)$

9. $e^{3\ln x}$

10. $\frac{4xy^{-2}}{12x^{\frac{1}{3}}y^{-5}}$

11. $27^{\frac{2}{3}}$

12. $\left(5a^{\frac{2}{3}}\right)\left(4a^{\frac{2}{3}}\right)$

13. $\left(4a^{\frac{5}{3}}\right)^{\frac{3}{2}}$

14. $\frac{3(n+1)!}{5n!}$

IX. Using the point slope form $[y - y_1 = m(x - x_1)]$, write an equation for the line

1. with slope -2, containing the point (3, 4)

2. containing the points (1, -3) and (-5, 2)

3. with slope 0, containing the point (4, 2)

4. perpendicular to the line in problem #1, containing the point (3, 4)

X. Without a calculator, determine the exact value of each expression.

1. $\sin 0$

2. $\sin \frac{\pi}{2}$

3. $\sin \frac{7\pi}{4}$

4. $\cos \pi$

5. $\cos \frac{7\pi}{6}$

6. $\cos \frac{\pi}{3}$

7. $\tan \frac{5\pi}{4}$

8. $\tan \frac{\pi}{6}$

9. $\tan \frac{2\pi}{3}$

10. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

11. $\cos^{-1}\left(-\frac{1}{2}\right)$

12. $\text{Arc tan}(-1)$

13. $\cos\left(\sin^{-1}\left(\frac{1}{2}\right)\right)$

14. $\cos^{-1}\left(\tan\left(\frac{\pi}{4}\right)\right)$

15. $\sin\left(\text{Arc tan}\left(-\frac{3}{4}\right)\right)$

XI. For each function, determine its domain and range.

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

2. $g(x) = \sqrt{x^2-4}$

Domain: _____

Domain: _____

Range: _____

Range: _____

3. $h(x) = \sqrt{4-x^2}$

4. $k(x) = \sqrt{x^2+44}$

Domain: _____

Domain: _____

Range: _____

Range: _____

XII. Determine the coordinates of all points of intersection of:

1. $y = x^2 + 3x - 4$ and $y = 5x + 11$

2. $y = \cos x$ and $y = \sin x$ in the first quadrant.

XIII. Solve all the equations below for x , where x is a real number.

1. $x^2 + 3x - 4 = 14$

2. $\frac{x^4 - 1}{x^3} = 0$

3. $(x - 5)^2 - 9 = 0$

4. $2x^2 + 5x = 8$

5. $x^2 - 2x - 15 < 0$

6. $\frac{x - 3}{x - 1} \leq \frac{4}{x + 8}$

7. $12x^2 = 3x$

8. $\sin 2x = \cos x$

9. $|x - 3| < 7$

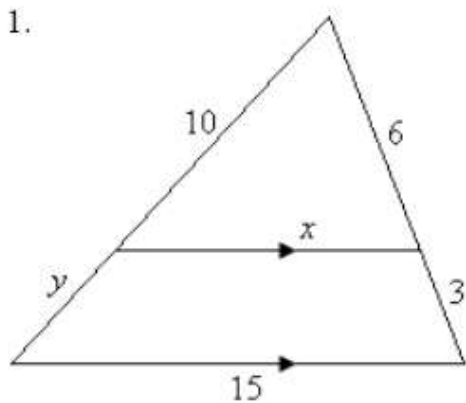
10. $(x + 1)^2(x - 2) + (x + 1)(x - 2)^2 = 0$

11. $27^{2x} = 9^{x-3}$

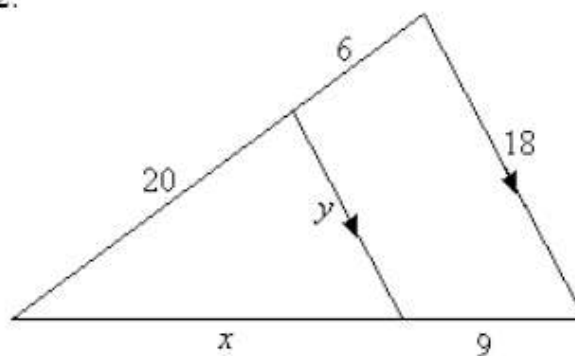
12. $\log x + \log(x - 3) = 1$

XIV. Solve for x and y in the triangles below.

1.



2.

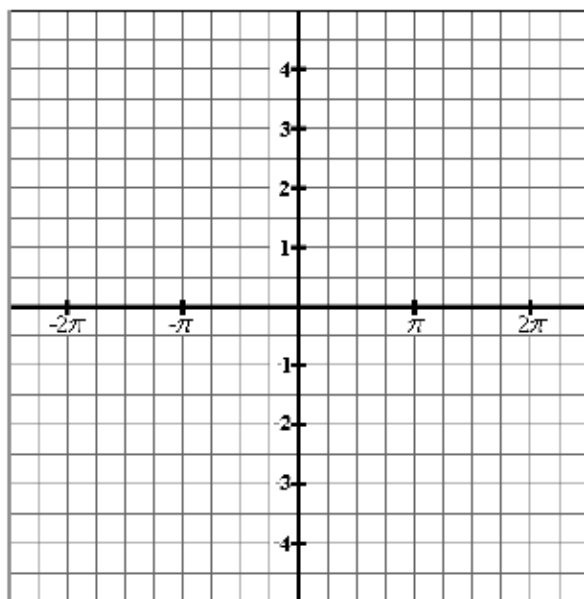


XV. Graph each equation. Give its domain and range. Scale all graphs by one unless a scale is provided.

1. $y = \sin x$

Domain: _____

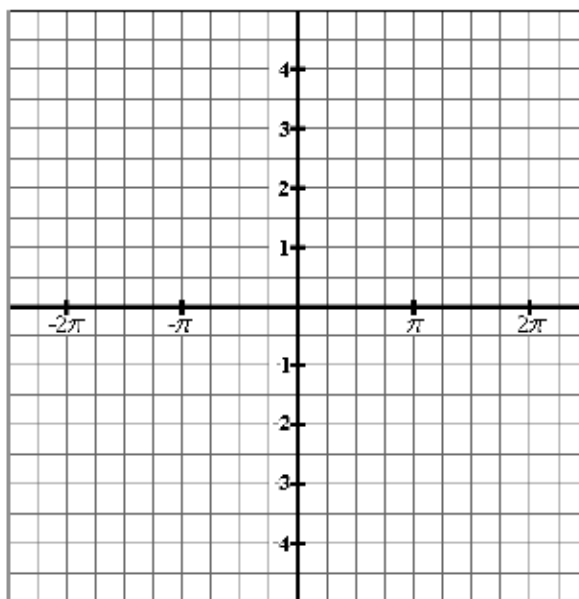
Range: _____



2. $y = \tan x$

Domain: _____

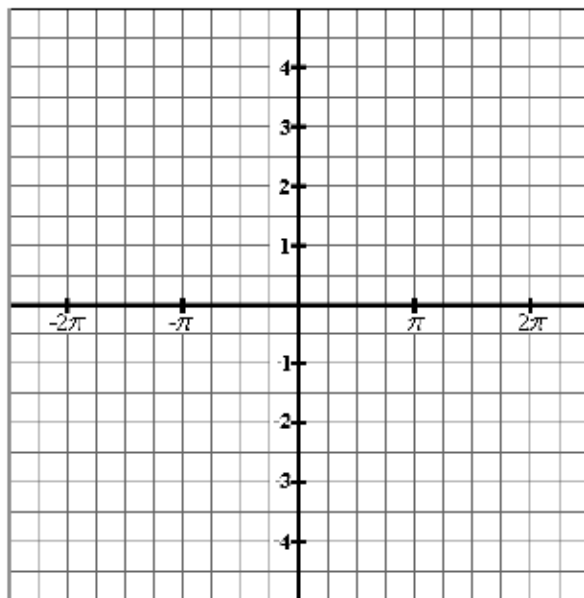
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3. $y = \cos x$

Domain: _____

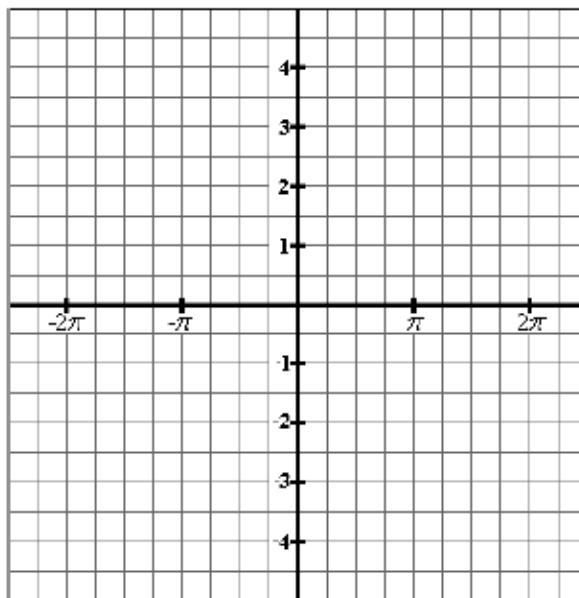
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4. $y = \sec x$

Domain: _____

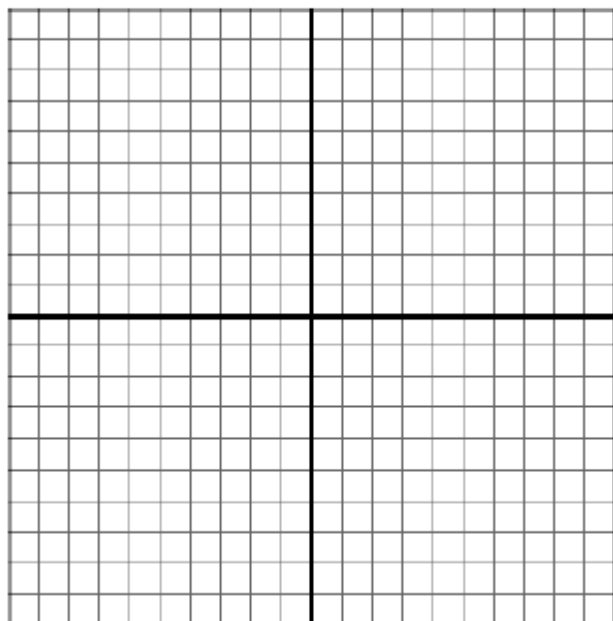
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5. $y = \frac{1}{x}$

Domain: _____

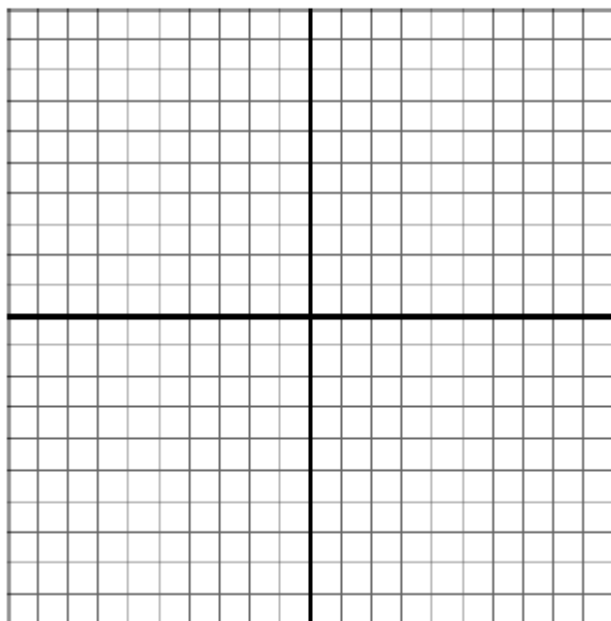
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6. $y = \begin{cases} x^2 & x < 0 \\ x+2 & 0 \leq x \leq 3 \\ 4 & x > 3 \end{cases}$

Domain: _____

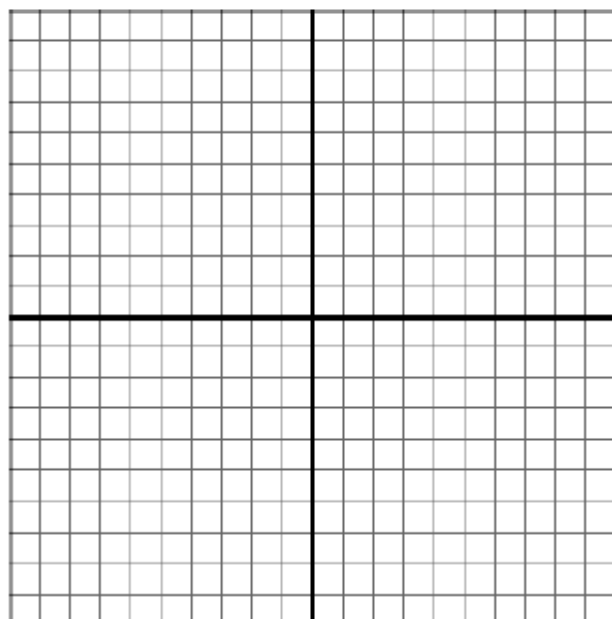
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7. $y = \sqrt{x}$

Domain: _____

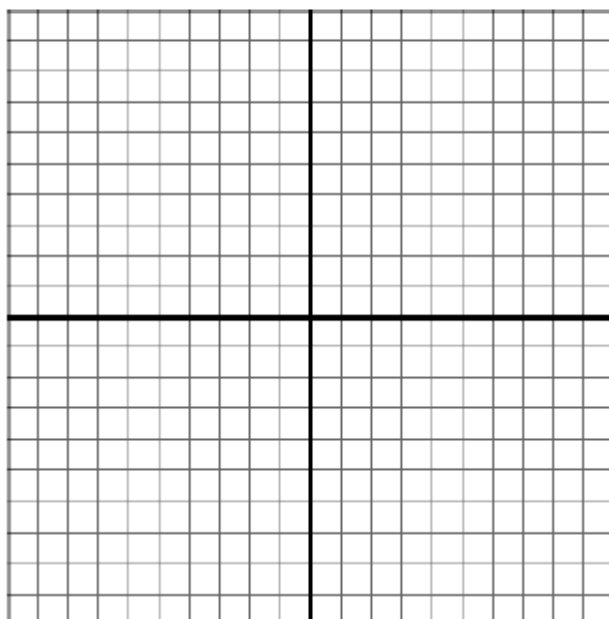
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8. $y = \sqrt[3]{x}$

Domain: _____

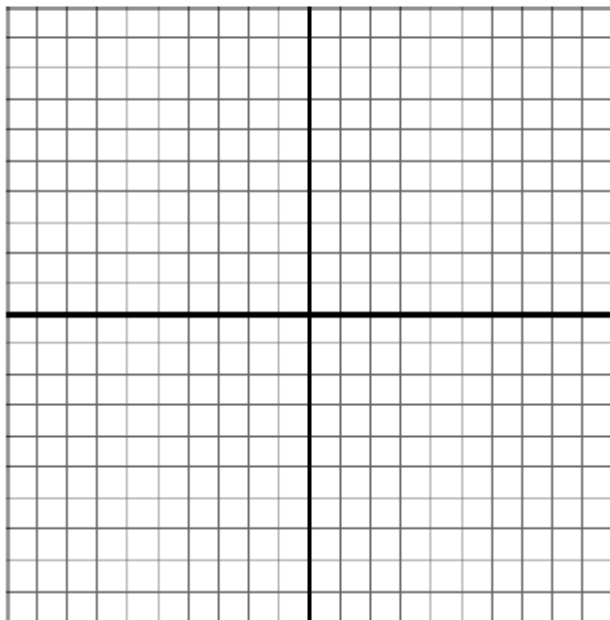
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9. $y = |x + 3| - 2$

Domain: _____

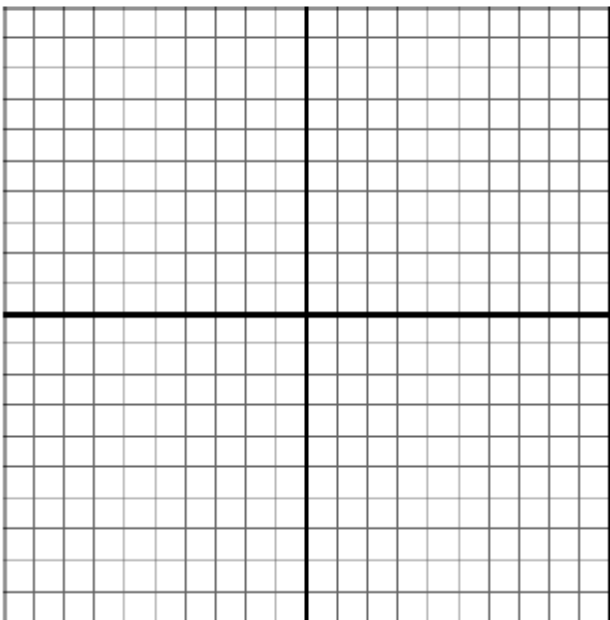
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10. $y = e^x$

Domain: _____

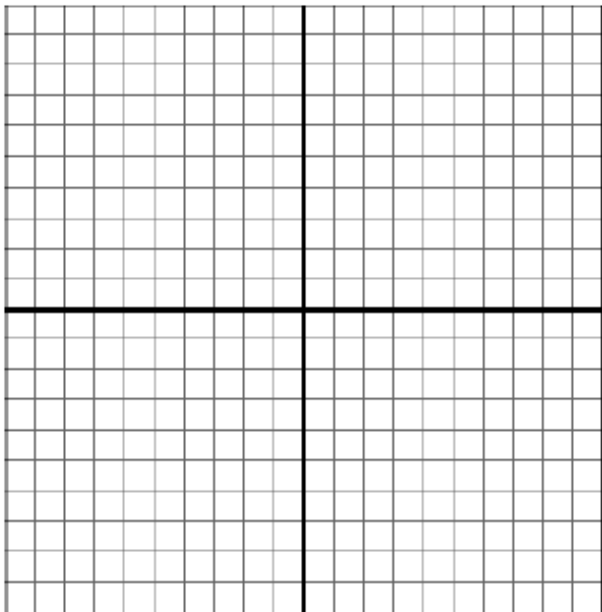
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11. $y = \ln x$

Domain: _____

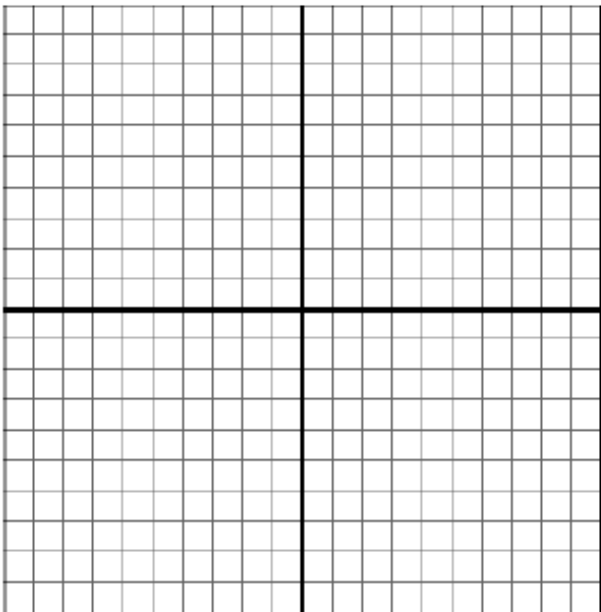
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12. $x^2 + y^2 = 25$

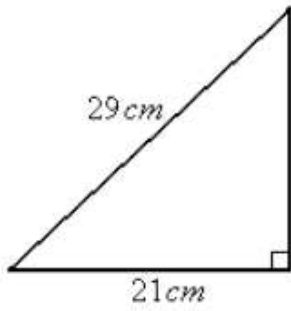
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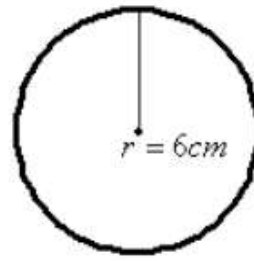


XVI. Find the area of the figures below.

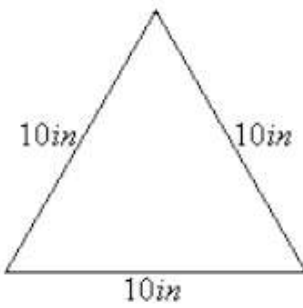
1.



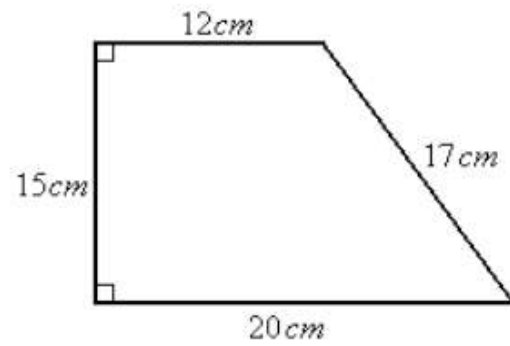
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3.

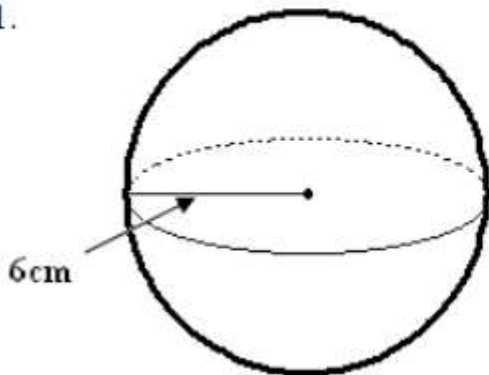


4.



XVII. Find the volume of the solids below.

1.



2.

