

Name: _____ Math Teacher Last Year: _____

AP Calculus Summer Review

This packet is a review of the entering objectives for AP Calculus and is due the day of your first math class of the year. Have a great summer.

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: $\cos 2x =$ _____ $\sin 2x =$ _____

$\cos 2x =$ _____

$\cos 2x =$ _____

$\tan 2x =$ _____

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

V. If $f(x) = \{(3,5), (2,4), (1,7)\}$ $g(x) = \sqrt{x-3}$ $h(x) = \{(3,2), (4,3), (1,6)\}$ $k(x) = x^2 + 5$
determine each of the following:

1. $(f + h)(1)$

2. $(k - g)(5)$

3. $(f \circ h)(3)$

4. $(g \circ k)(7)$

5. $f^{-1}(x)$

6. $k^{-1}(x)$

7. $\frac{1}{f(x)}$

8. $(kg)(x)$

VI. Miscellaneous: Follow the directions for each problem..

1. Evaluate $\frac{f(x+h) - f(x)}{h}$ and simplify if $f(x) = x^2 - 2x$

2. Expand $(x + y)^3$

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

4. Eliminate the parameter, t , and write a rectangular equation for $x = t^2 + 3$
 $y = 2t$

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. Given the vectors $\vec{a} = -2\vec{i} + 5\vec{j}$ and $\vec{b} = 3\vec{i} + 4\vec{j}$, determine

1. $\frac{1}{2}\vec{a}$

2. $\vec{b} - \vec{a}$

3. $|\vec{b}|$

4. $\vec{a} \cdot \vec{b}$

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

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

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

Domain: _____

Range: _____

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

Domain: _____

Range: _____

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

Domain: _____

Range: _____

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

Domain: _____

Range: _____

XIII. 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.

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

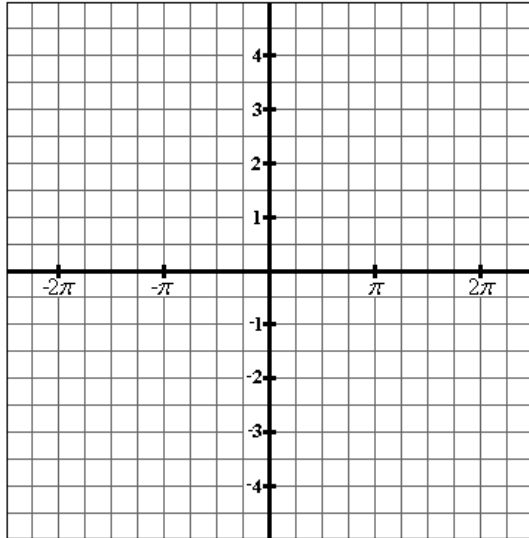
12. $\log x + \log(x-3) = 1$

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

1. $y = \sin x$

Domain: _____

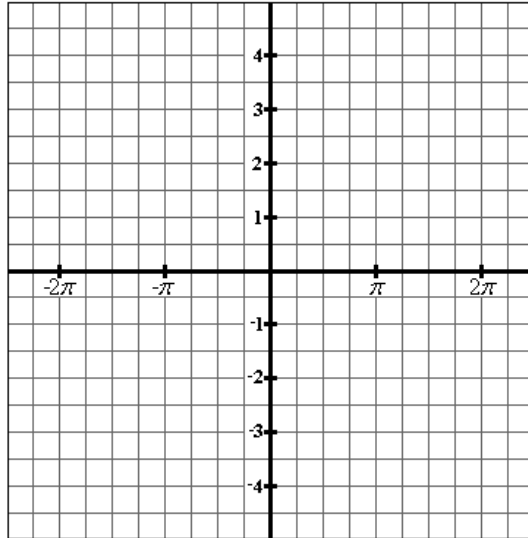
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2. $y = \csc x$

Domain: _____

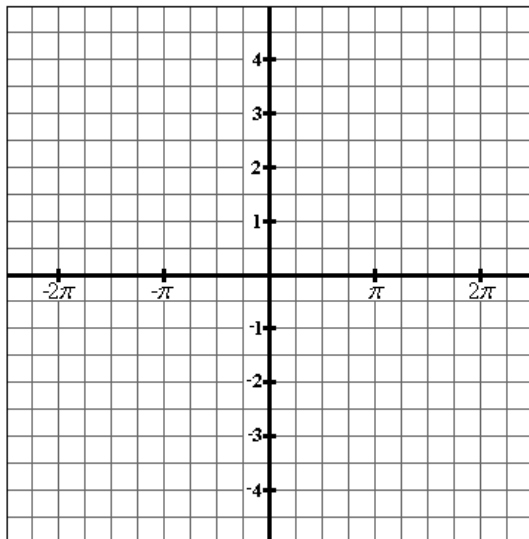
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3. $y = \cos x$

Domain: _____

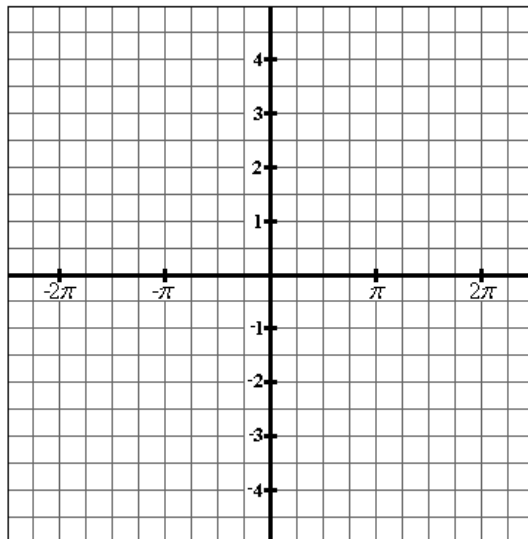
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4. $y = \sec x$

Domain: _____

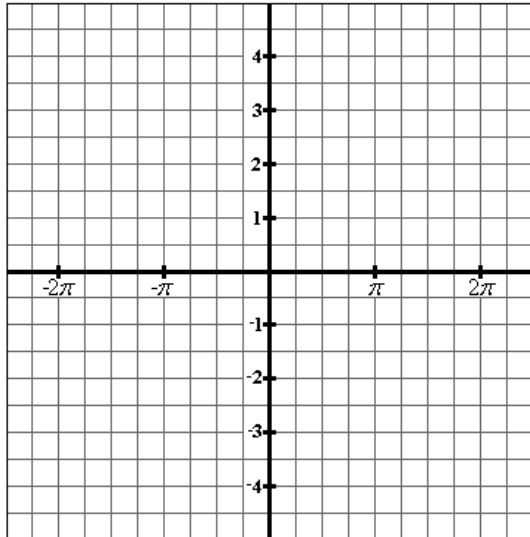
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5. $y = \tan x$

Domain: _____

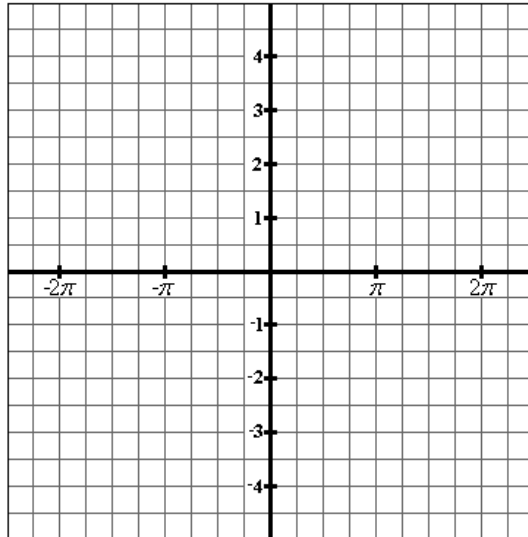
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6. $y = \cot x$

Domain: _____

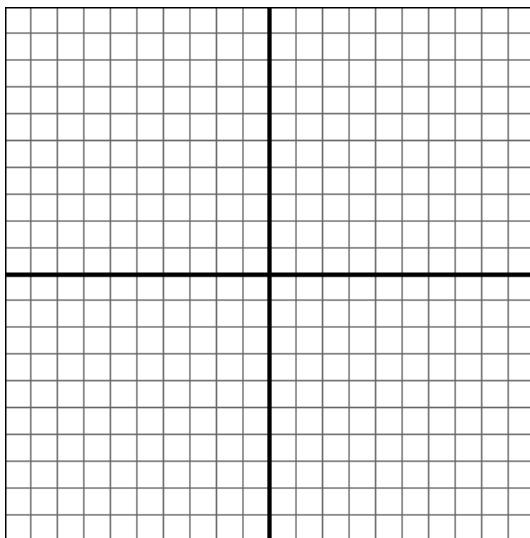
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7. $y = \sqrt{x}$

Domain: _____

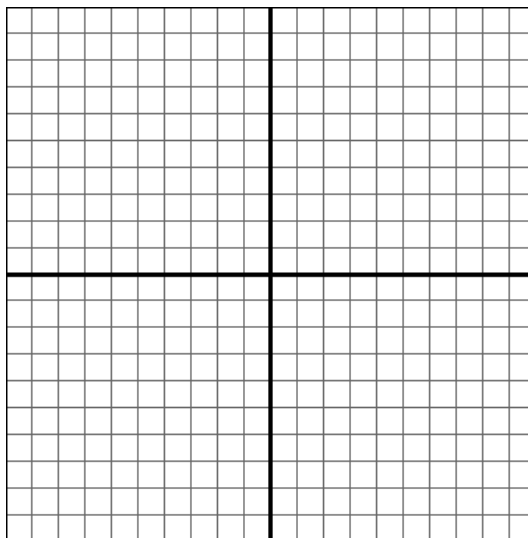
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8. $y = \sqrt[3]{x}$

Domain: _____

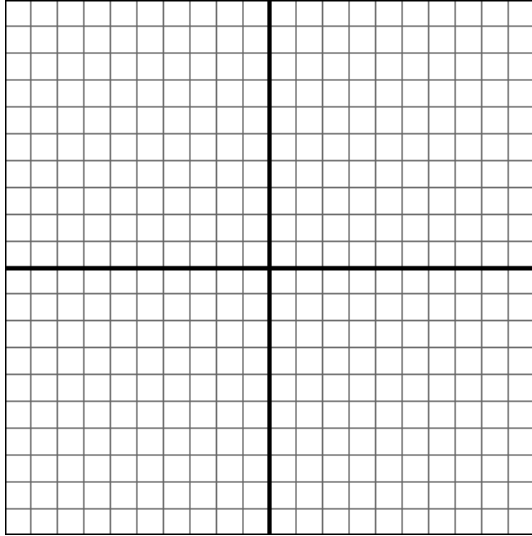
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9. $y = |x + 3| - 2$

Domain: _____

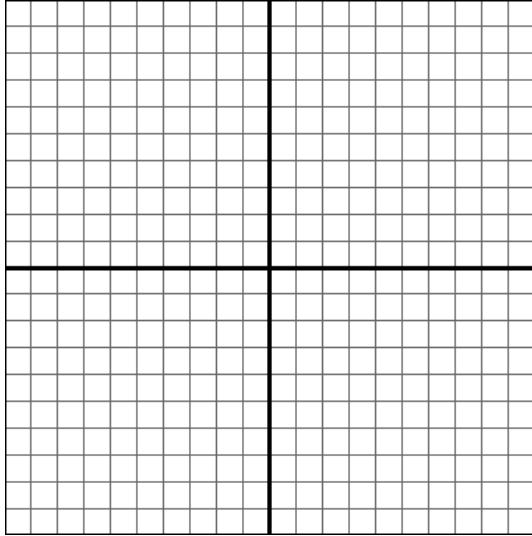
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10. $y = e^x$

Domain: _____

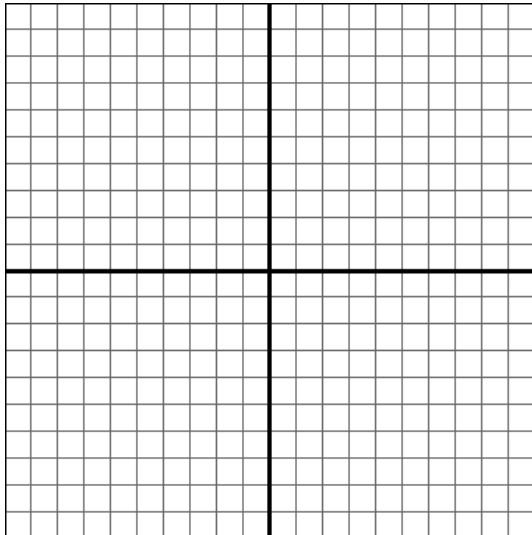
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11. $y = \ln x$

Domain: _____

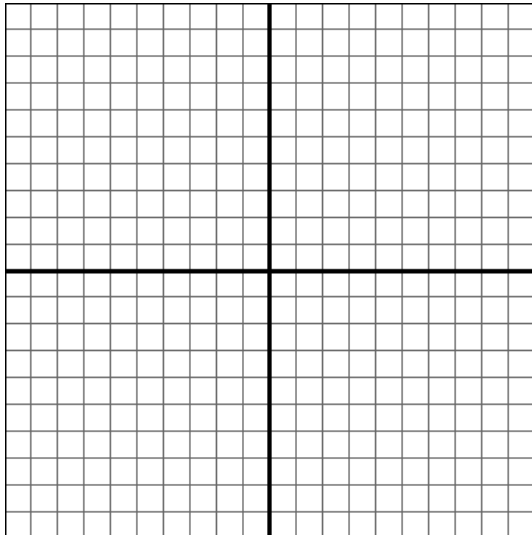
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12. $x^2 + y^2 = 25$

Domain: _____

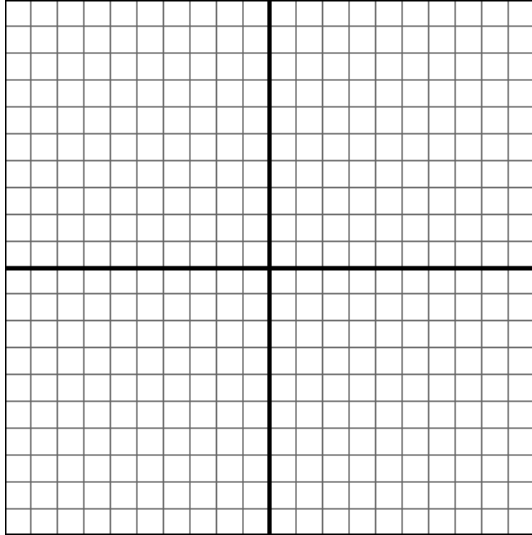
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13. $y = \frac{1}{x}$

Domain: _____

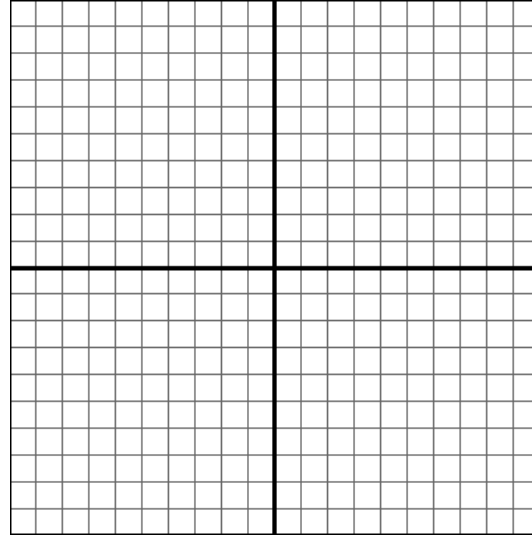
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14. $y = \begin{cases} x^2 & x < 0 \\ x+2 & 0 \leq x \leq 3 \\ 4 & x > 3 \end{cases}$

Domain: _____

Range: _____



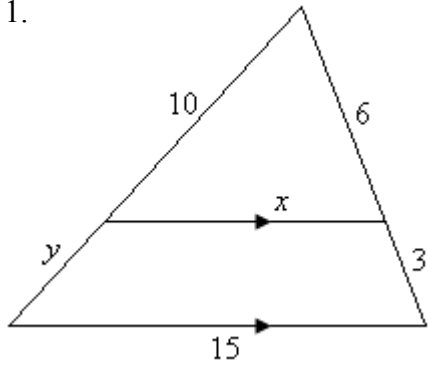
XVI. Decompose into partial fractions.

1. $\frac{4x + 34}{x^2 - 5x - 24}$

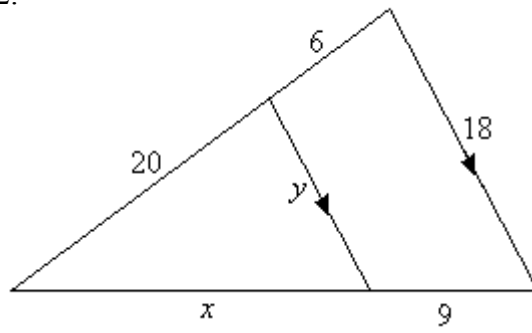
2. $\frac{5x^3 - x^2 + 8x - 55}{x^4 + 5x^3 + 11x^2}$

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

1.

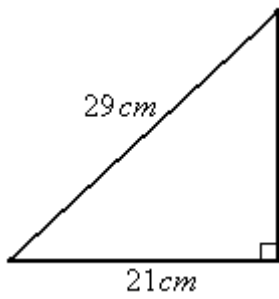


2.

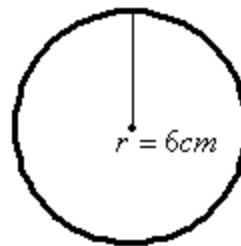


XVIII. Find the area of the figures below.

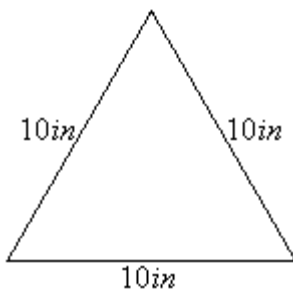
1.



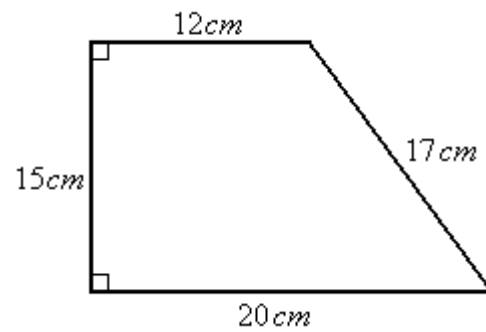
2.



3.

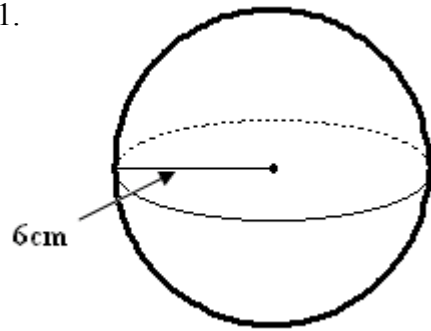


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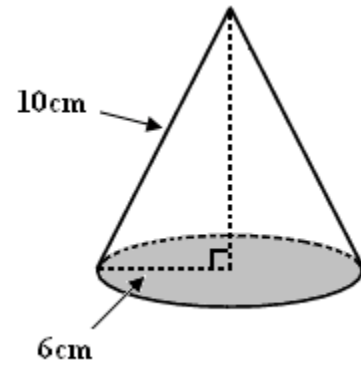


XIX. Find the volume of the solids below.

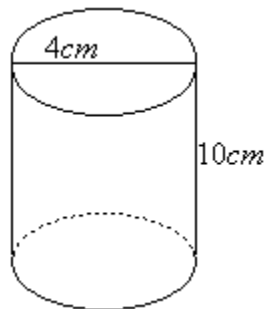
1.



2.



3.



4.

