

*AP Calculus Summer Review Packet*  
*Princeville High School*  
*2009*

Name \_\_\_\_\_

The problems in this packet are designed to help you review topics that are important to your success in calculus. All work must be shown for each problem. The problems should be done correctly, not just tried. You are expected to get each problem correct. Use your notes from previous math courses to help you. The internet has many good sources for information on these topics.

Do not use your calculator to solve these problems. AP Calculus tests your knowledge of mathematics without using a calculator as well as with a calculator. After you have answered each question (especially the graphs) without using your calculator, you may use your calculator to check your work. If you use your calculator as a crutch, instead of a tool, and just copy from the screen, you will lose this valuable diagnostic help. Please study the correct graphs so that you will be able to work with them without needing your calculator.

You will be tested on the review material contained in this packet during the first week of school. Please spend an appropriate amount of time working on the problems before school begins so that you can be successful on the first test!

Additional copies of this review packet can be printed from the Princeville High School website at:

**Bring this completed packet with you on the first day of Calculus class!**

*Get ready for Calculus, an exciting adventure in learning mathematics!*

## Calculus Summer Review Packet

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

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II. Complete the following identities.

1.  $\sin^2 x + \cos^2 x = \underline{\hspace{2cm}}$

2.  $1 + \tan^2 x = \underline{\hspace{2cm}}$

3.  $\cot^2 x + 1 = \underline{\hspace{2cm}}$

4.  $\cos 2x = \underline{\hspace{2cm}}$

5.  $\sin 2x = \underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$

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III. Simplify each expression.

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

2.  $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$

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

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

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IV. Solve for z.

1.  $4x + 10yz = 0$

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

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- 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.  $(f+h)(1) = \underline{\hspace{2cm}}$
  2.  $(k-g)(5) = \underline{\hspace{2cm}}$
  3.  $(f \circ h)(3) = \underline{\hspace{2cm}}$
  4.  $(g \circ k)(3) = \underline{\hspace{2cm}}$
  5.  $f^{-1}(x) = \underline{\hspace{2cm}}$
  6.  $k^{-1}(x) = \underline{\hspace{2cm}}$
  7.  $\frac{1}{f(x)} = \underline{\hspace{2cm}}$
  8.  $(kg)(x) = \underline{\hspace{2cm}}$

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V. Miscellaneous: Follow the directions for each problem.

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

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

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3. Evaluate  $f(x+h)$  if  $f(x) = x^2 - 2x$

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VI. 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.  $\log_{-2} 8$

8.  $\ln \frac{1}{2}$

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

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

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

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

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

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

1. with slope of -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)

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

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

2.  $\vec{w} - \vec{v}$

3. length of  $\vec{w}$

4. the unit vector for  $\vec{v}$

IX. Without a calculator (as for the entire packet), determine the value of each expression.

1.  $\sin 0$

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

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

4.  $\cos \pi$

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

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

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

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

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

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

11.  $\sin^{-1}\left(\sin \frac{7\pi}{6}\right)$

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

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X. For each function, determine the 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: \_\_\_\_\_

XI. 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

XII. Solve all 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.  $2x^2 + 5x = 8$

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

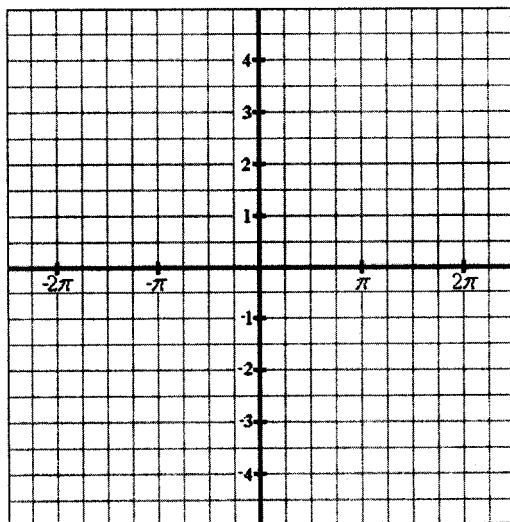
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XIII. Graph each equation. Give its domain and range. Scale all graphs by one unless a scale is provided.

1.  $y = \sin x$

Domain: \_\_\_\_\_

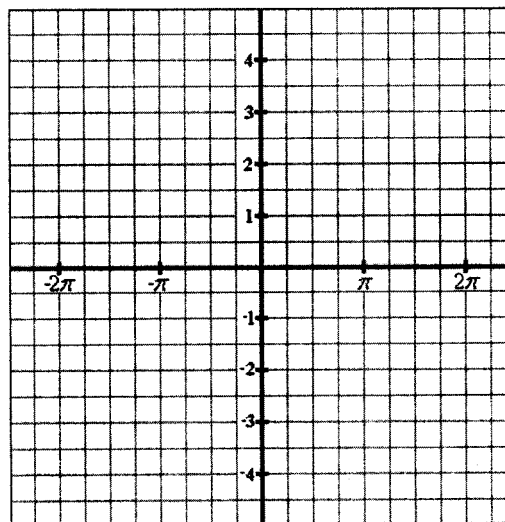
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2.  $y = \csc x$

Domain: \_\_\_\_\_

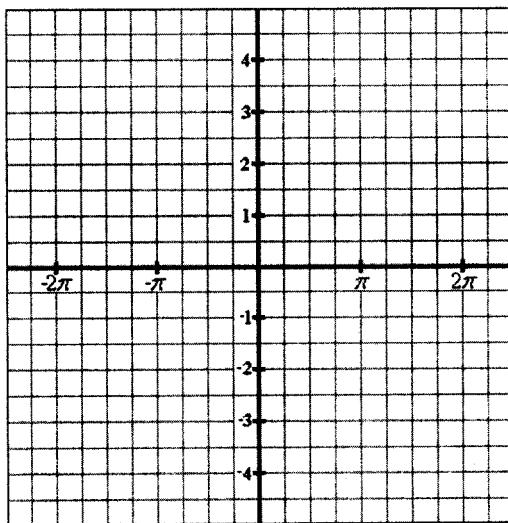
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3.  $y = \cos x$

Domain: \_\_\_\_\_

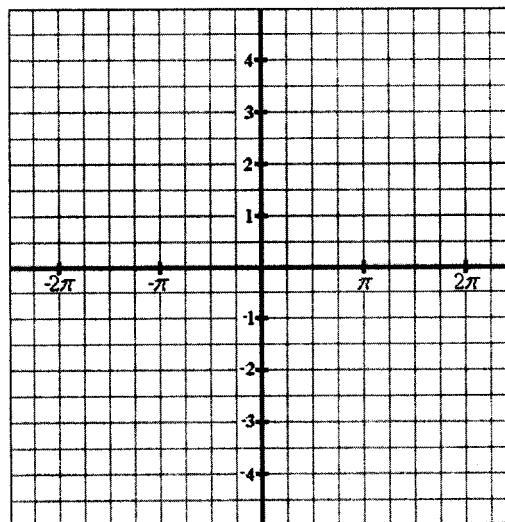
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4.  $y = \sec x$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

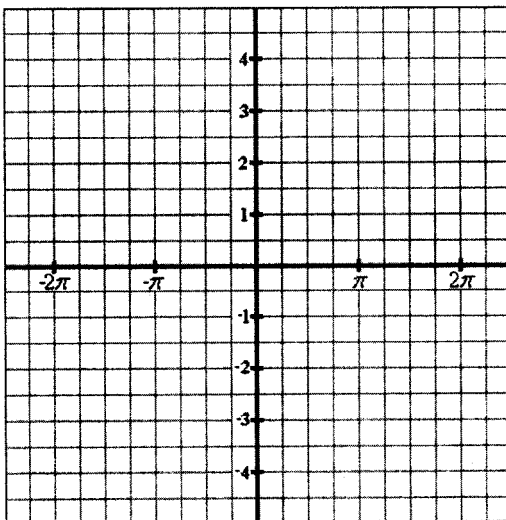


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5.  $y = \tan x$

Domain: \_\_\_\_\_

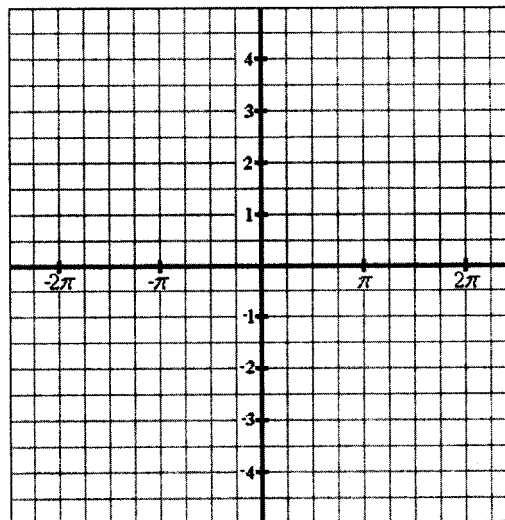
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6.  $y = \cot x$

Domain: \_\_\_\_\_

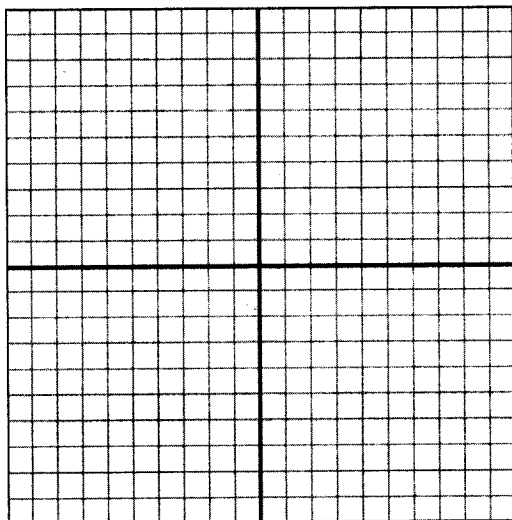
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7.  $y = \sqrt{x}$

Domain: \_\_\_\_\_

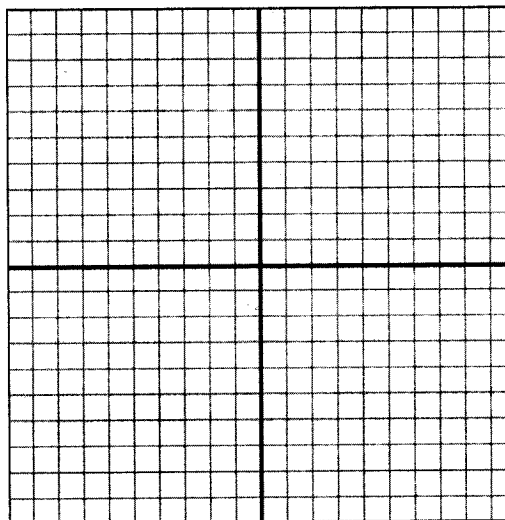
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8.  $y = \sqrt[3]{x}$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

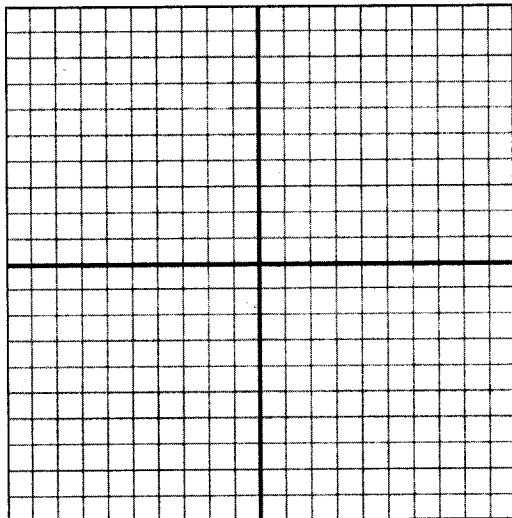


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9.  $y = |x + 3| - 2$

Domain: \_\_\_\_\_

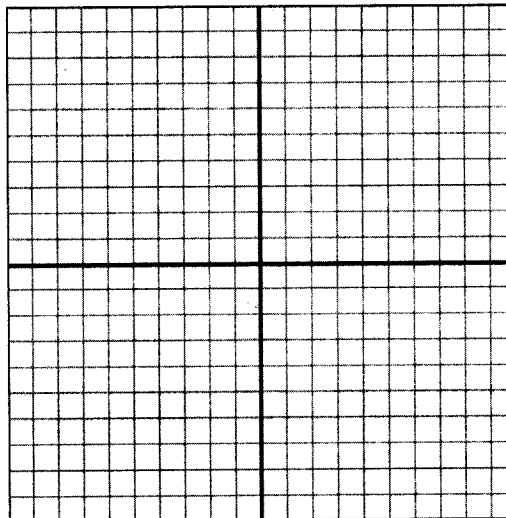
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10.  $y = e^x$

Domain: \_\_\_\_\_

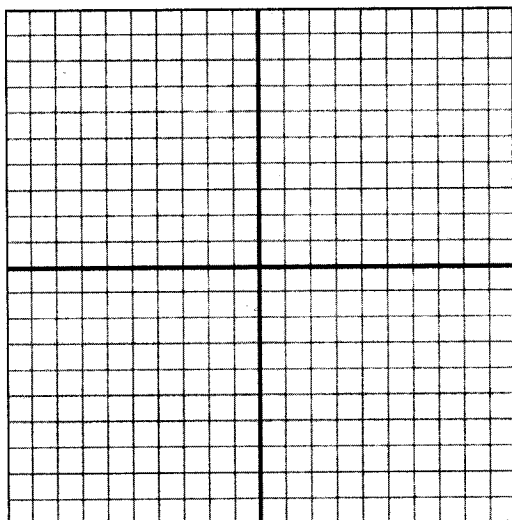
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11.  $y = \ln x$

Domain: \_\_\_\_\_

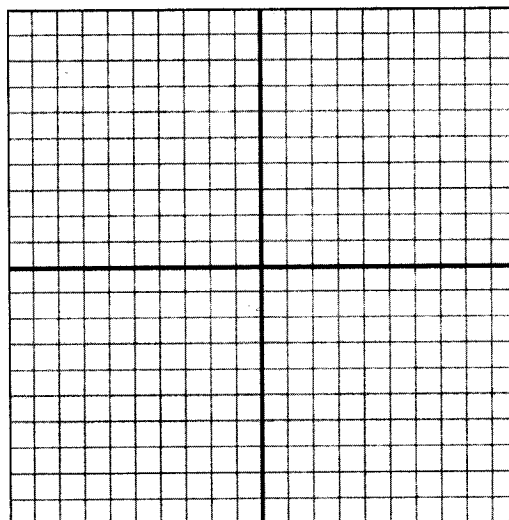
Range: \_\_\_\_\_



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

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

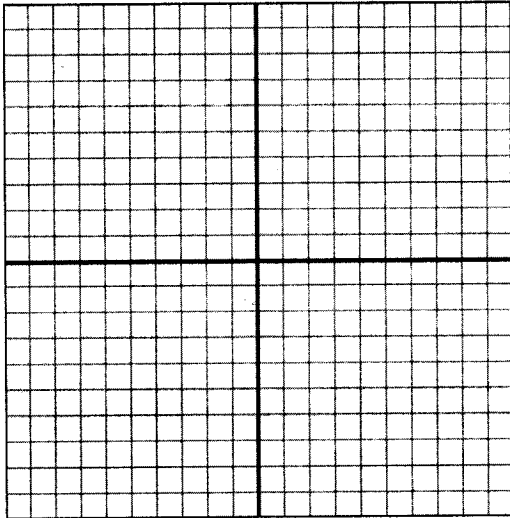


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13.  $y = \frac{1}{x}$

Domain: \_\_\_\_\_

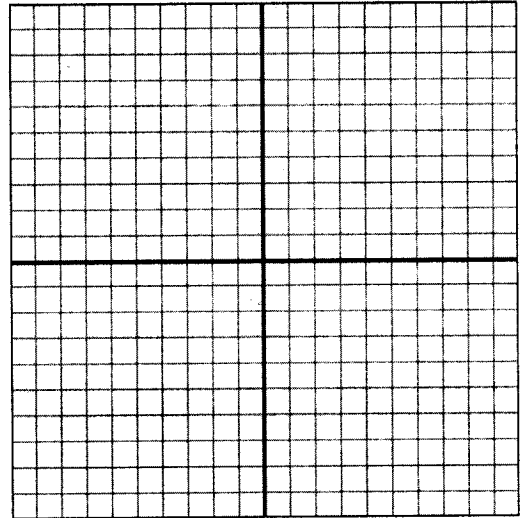
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14.  $y = \begin{cases} x^2 & x < 0 \\ x+2 & 0 \leq x \leq 3 \\ 4 & x > 3 \end{cases}$

Domain: \_\_\_\_\_

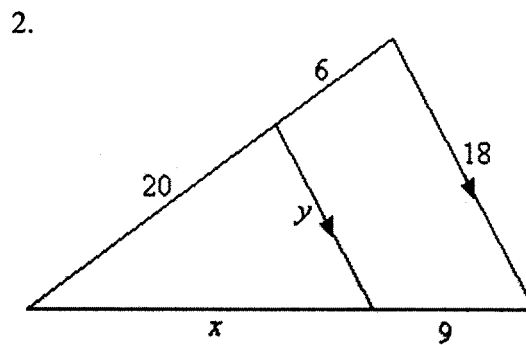
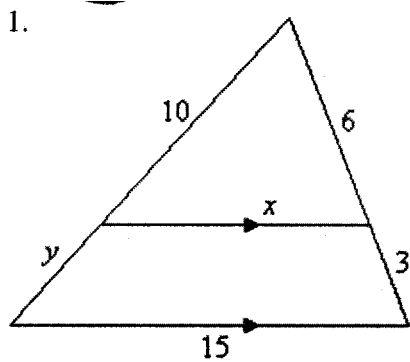
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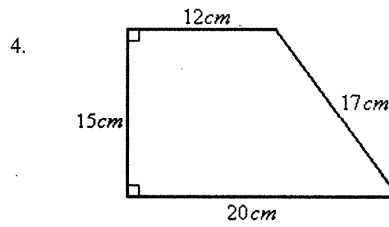
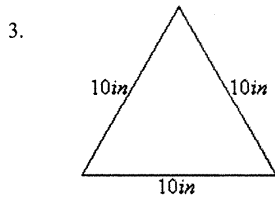
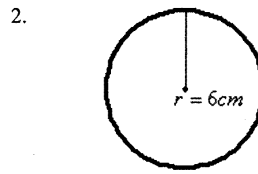
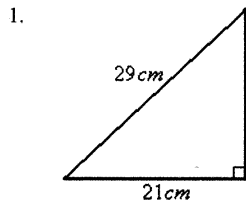
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XIV. Solve for  $x$  and  $y$  in the triangles below.



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XV. Find the area of the figures below.



XVI. Find the volume of the solids below.

