End of the Year
Worksheets
Geometry PAP

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Period _______________

Teacher ____________
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Worksheet 1

Do the work on your own paper.

1. Sand is poured out of a container onto the beach and forms a right circular cone, the height of the cone is equal to the diameter of the cone. Given: radius = x.
   a. Find the volume of the cone in terms of x.
   b. If the volume is 144π cubic inches, find the height and radius of the conical pile.

2. A paper cup (which is in the shape of a right circular cone) is 6 inches deep and 6 inches across.
   Four inches of water is poured into the cup.
   a. Find the radius of the water.
   b. Find the volume of the water in terms of π.

3. A paper cup (which is in the shape of a right circular cone) is 12 inches deep and has a radius of 6 inches. Water is poured into the cup to a depth of x inches and has a radius of 4 inches.
   a. Find x.
   b. Find the volume of the water.

4. A balloon is in the shape of a sphere and has a volume of $\frac{9\pi}{16}$ ft³. What is the length of the radius in inches? What is the surface area of the balloon?

5. A snowball is in the shape of a sphere. The radius of the sphere is represented by x inches.
   a. Find the volume of the snowball in terms of x.
   b. Find the surface area in terms of x.
   c. If the volume of the snowball is 36π cu. in., what is the radius and surface area of the snowball?
   d. If the surface area of the snowball is 36π sq. in., what is the radius and the volume of the snowball?

6. A right cone with a radius of 6 cm. and a height of 10 cm. is intersected by a plane parallel to the base and 5 cm. above the base. Find the surface area and volume of the frustum.

7. A water reservoir is in the form of a right circular cone, the cone is 12 ft. deep and 12 ft. across the top. Water is collected in the cone to a depth of x ft. and has a radius of 3 ft.
   a. Find x.
   b. Find the volume of the water.

8. A balloon is formed by a cylinder with two hemispheres one on each end of the cylinder. The radii of the hemispheres are the same as the radius of the cylinder. The balloon is being inflated at a rate of 216π cu. cm. per min. At the instant the radius of the cylinder is 3 cm., the volume of the balloon is 144π cu. cm. and the radius of the cylinder is increasing at the rate of 2 cm. per min. At this instant what is the height of the cylinder?

9. The trough shown in the figure below is 5 ft. long and its vertical cross sections are inverted isosceles triangles with base of 2 ft. and a height of 3 ft. Water is being siphoned out of the trough at the rate of 2 cu. ft. per min. At any time t, let h be the depth and V be the volume of the water in the trough. Find the volume of water in the trough when it is full. What would be the volume of the water, if there was only 1 ft. of water in the trough?
10. A right circular cone has a height of 12 cm. and a base whose diameter is 10 cm. Another cone is placed inside the original cone so that its vertex is at the center of the base of the original cone and so that its base is parallel to the base of the original cone. Let \( x \) represent the radius of the inside cone and \( h \) represent the height of the inside cone.
   a. Express \( h \) in terms of \( x \).
   b. What is the radius of the inside cone if the height of the inside cone is 6 cm.?
   c. What is the height of the inside cone if the radius of the inside cone is 2.5 cm.?

11. A tent is in the shape of the figure below where \( \triangle ABC \) and \( \triangle PQR \) are congruent isosceles triangles, \( CBQR \) and \( CAPR \) are congruent rectangles, and \( ABQP \) is a rectangle. If \( AC = CB = PR = RQ = 13 \text{ ft.} \) and \( AB = PQ = 10 \text{ ft.} \) and \( BQ = AP = 20 \text{ ft.} \), find the following:
   a. the volume inside the tent.
   b. total surface area of the tent (assume all five sides of the tent are made of tent material).

12. The figure below represents a building. The ends of the roof are congruent isosceles triangles with leg length of 13 ft., the slanted part of the roof are congruent rectangles 13 ft. by 40 ft. The ends of the building are congruent rectangles 24 ft. wide and 10 ft. high. The sides of the building are congruent rectangles.
   a. Find the volume of the building.
   b. Find the total surface area of the building (excluding the floor).

13. A water trough that is 6 ft. deep, 4 ft. across and 12 ft. long has water in it to a depth of 4 ft. Find the volume of the water.

14. A grain silo is in the form of a right circular cylinder with a hemisphere on top. The hemisphere and cylinder both have a radius of 21 ft. and the cylinder is 48 ft. tall. The silo is full of grain and one cu. ft. of grain weighs 6 lbs. Find the number of pounds of grain to the nearest whole pound in the silo.

15. Square cake pans 20 cm on an edge and 6 cm deep are to be coated on the inside with a non-stick material. If the amount of non-stick material available covers 100 m\(^2\), how many pans can be coated?
16. A cylindrical hole with diameter 8 in. is cut through a cube 10 in. on a side. Find the surface area of this solid, shown to the right.

17. Assume the measurements in figure A are in centimeters. You are to produce 10,000 of these widgets and each must be electroplated with a thin layer of high conductive silver. Find the total silver cost if silver costs $1 for each 200 square centimeters.

18. Assume the measurements in figure B are in meters. Find the cost of painting the exterior of nine of these large cylindrical chemical storage containers with anti-rust sealant. The sealant costs $32 per gallon. Each gallon covers 18 square meters. The exterior bottoms are not to be painted. Use \( \frac{22}{7} \) for \( \pi \).

19. Assume the measurements in figure C are in feet. The three shaded regions are to be covered with asphalt shingles which cost $35 per bundle. Each bundle contains enough shingles to cover 100 square feet. The remaining vertical surfaces (three are trapezoids and one is a right triangle) are to be covered with wood stain at $15 per gallon. Each gallon covers 150 square feet. Find the total cost of the project.
2nd Worksheet
Do work on own paper. You may only graph on this sheet.

a) Graph and shade each region bounded by the lines, b) identify the shape, c) label the vertices, and d) find the area.

1. \( x = 0, y = 0, y = -x + 4 \)

2. \( y = 2x + 6, y = x, x = 5 \)

3. \( y = 3, x = -1, y = -2, x = 6 \)

4. \( y = 4, y = 7, -3x + y = -2, x + 2y = 20 \)

5. \( y = 2x + 3, x = 1, x = 4, y = 0 \)

6. \( x^2 + (y-1)^2 = 16 \)
7. \( y = x, y = -x, y = 4 \)

*8. \( y = 2x, y = 4, y = 0, 2x + 3y = 30 \)

*9. \(-x + 2y = 14, -x + 2y = 0, 2x + 3y = 21, 2x + 3y = 0\)

10. \((x - 3)^2 + (y - 4)^2 = 25\)

11. \( y = \frac{2}{5}x + 1, x = 5, y = 0 \)

*12. \( x^2 + y^2 = 64 \)
3rd Worksheet

Graph the following equations and find the area of the figure bounded by the lines. Name the type of figure, shade in each figure on the graph and label lines. All answers should be exact.

1) \[
\begin{align*}
x + y &= -8 \\
x - y &= -4 \\
y &= -7 \\
3x + y &= 8
\end{align*}
\]

2) \[
\begin{align*}
x &= -6 \\
x &= 8 \\
x - 2y &= -12 \\
x + y &= 9 \\
x - 2y &= 16 \\
x + 2y &= -20
\end{align*}
\]
3) \[\begin{align*}
2x - y &= -8 \\
y &= -7 \\
x + 3y &= -18 \\
3x + 2y &= 16
\end{align*}\]

4) \[\begin{align*}
3x - 4y &= -24 \\
3x - 4y &= 20 \\
x + 4y &= 24 \\
3x + 4y &= -20 \\
x &= 4 \\
x &= -4
\end{align*}\]

5) \[\begin{align*}
11x - 4y &= -16 \\
3x - 4y &= 16 \\
x + 4y &= 16
\end{align*}\]
6) \[
\begin{align*}
3x - 4y &= 0 \\
x - y &= 7 \\
y &= -5 \\
3x + 4y &= 0 \\
x + y &= -7
\end{align*}
\]

7) \[
\begin{align*}
x &= 4 \\
y &= 4 \\
2x - y &= -4 \\
x - 2y &= 4
\end{align*}
\]

8) \[
\begin{align*}
x &= 6 \\
2x - 3y &= -9 \\
2x - 3y &= 21 \\
x + y &= -7
\end{align*}
\]
9) \[
\begin{align*}
    x - y &= -7 \\
    3x - 2y &= 16 \\
    x + 2y &= 8 \\
    3x + 2y &= -16
\end{align*}
\]

10) \[
\begin{align*}
    x - y &= -6 \\
    2x - y &= 1 \\
    x + y &= 2 \\
    2x + y &= -9
\end{align*}
\]

11) \[
\begin{align*}
    x - y &= -4 \\
    2x - y &= 8 \\
    2x + 5y &= 20 \\
    y &= -8 \\
    x + y &= -10
\end{align*}
\]
12) \[
\begin{align*}
\begin{cases}
x - y &= -10 \\
x - y &= 2 \\
x + y &= 10 \\
y &= -8 \\
x &= -9
\end{cases}
\end{align*}
\]

13) \[
\begin{align*}
\begin{cases}
y &= 5 \\
x &= 6 \\
2x + 3y &= -12 \\
x - y &= -6
\end{cases}
\end{align*}
\]

14) \[
\begin{align*}
\begin{cases}
3x - y &= -9 \\
x - y &= 7 \\
9x + 7y &= 63 \\
x - 5y &= 35
\end{cases}
\end{align*}
\]
4th Worksheet

Only graph on this paper, show all other work on your own sheet of paper.

Find the indicated measurements.

1. Graph the following lines: \( y = 4, x = 1, 3x + 5y = 38 \).
   a. What type of figure is formed?
   b. Find the area of the region bounded by the three lines.
   c. Rotate the region about \( y = 4 \). What type of solid is formed?
   d. Find the LA, SA, and V of the solid formed.
   e. Rotate the region about \( x = 1 \). What type of solid is formed?
   f. Find the LA, SA, and V of the solid formed.
2. Graph the following lines: $y = 6$, $x = 1$, $y = 2$, $x = 5$.
   a. What type of figure is formed?
   b. Find the area of the region bounded by the four lines.
   c. Rotate the region about $y = 6$. What type of solid is formed?
   d. Find the LA, SA, and V of the solid formed.
   e. Rotate the region about $x = 5$. What type of solid is formed?
   f. Find the LA, SA, and V of the solid formed.
   g. Rotate the region about the y-axis. Describe the solid formed.
   h. Find the volume and surface area of the solid formed.
   i. Rotate the region about the x-axis. Describe the solid formed.
   j. Find the volume and surface area of the solid formed.
3. Graph the following lines: \( y = 0, \ x = 6, \ y = \frac{2}{3} x + 2 \)

a. What type of figure is formed?

b. Find the area of the region bounded by the three lines.

c. Rotate the region about \( y = 0 \). What type of solid is formed?

d. Find the LA, SA, and V of the solid formed.

e. Graph the line \( x = 0 \). What type of figure is formed?

f. Find the area of the region bounded by \( x = 0, \ y = 0, \ y = \frac{2}{3} x + 2, \ x = 6 \).

g. Rotate the region about \( y = 0 \). What type of solid is formed?

h. Find the LA, SA, and V of the solid formed.
5th Worksheet

Directions
1. Graph and shade the given region.
2. Rotate the region about the given line.
3. Name the solid formed.
4. Find the volume of the solid formed.

region

1. region: \( y = -3x + 9, y = 0, x = 0 \)  
   axis of revolution: \( x = 0 \)

2. region: \( y = -3x + 9, y = 0, x = 0 \)  
   axis of revolution: \( y = 0 \)

3. Region \( y = -3x + 9, y = 0, x = 0, y = 3 \)  
   Axis of Revolution: \( x = 0 \)

4. Region: \( y = -3x + 9, y = 0, x = 0, x = 2 \)  
   Axis of Revolution: \( y = 0 \)
5. Region: \( x^2 + y^2 = 9 \)  
Axis of Revolution: \( y = 0 \)

6. Region: \( y = 4, x = 3, y = 0, x = 0 \)  
Axis of Revolution: \( y = 0 \)

7. Region: \( y = 4, x = 3, y = 0, x = 0 \)  
Axis of Revolution: \( x = 0 \)

8. Region: \( y = x, x = 5, y = 0 \)  
Axis of Revolution: \( x = 0 \)

9. Region: \( y = 2x + 3, x = 0, x = 4, y = 0 \)  
Axis of Revolution: \( x = 4 \)

10. Region: \( y = 2x + 3, x = 0, x = 4, y = 0 \)  
Axis of Revolution: \( y = 0 \)
11. Region: $x = y$, $y = 0$, $x = -4$
   Axis of Revolution: $y = 0$

12. Region: $x = y$, $y = 0$, $x = -4$
   Axis of Revolution: $x = 0$

*13. Region: $x = y$, $y = 0$, $x = -4$
   Axis of Revolution: $y = x$
6th Worksheet
Find the volume and surface area of the solid generated by revolving the region bounded by the graphs of the equations about the indicated line.

1. \(x = 0, \ y = 0, \ x = 4, \ y = 3\)

a. the \(x\)-axis  \hspace{1cm} b. the \(y\)-axis  \hspace{1cm} c. the line \(y = -3\) \hspace{1cm} d. the line \(x = 6\)

SA:_________________ \hspace{1cm} _______________ \hspace{1cm} _______________ \hspace{1cm} _______________

Vol:_________________ \hspace{1cm} _______________ \hspace{1cm} _______________ \hspace{1cm} _______________

2. \(y = 2x + 2, \ x = 0, \ y = 0, \ x = 2\)

a. the \(y\)-axis  \hspace{1cm} b. the \(x\)-axis  \hspace{1cm} c.\* the line \(x = 4\) \hspace{1cm} d. the line \(x = 2\)

SA:_________________ \hspace{1cm} _______________ \hspace{1cm} _______________ \hspace{1cm} _______________

Vol:_________________ \hspace{1cm} _______________ \hspace{1cm} _______________ \hspace{1cm} _______________
*3. \( y = -x + 6, \ y = x, \ y = 0 \)

Graph the following. Name the figure, find the surface area, and volume after revolving around the given line.

\[ \begin{array}{cccc}
\text{a. the } y\text{-axis} & \text{b. the } x\text{-axis} & \text{c. the line } y = 3 & \text{d. the line } y = -3 \\
\end{array} \]

SA: \______________ \______________ \______________ \______________
Vol: \______________ \______________ \______________ \______________

*4. \( y = 2x + 4, \ \frac{1}{2}x - 2, \ y = 4, \ x = 4 \) \quad \text{Revolve around } y = x - 4

SA: \______________ \quad \text{Vol: } \______________
5. \( y = -x + 6, \ x = 3, \ y = 0 \) 

Revolve around \( x = 0 \)

\[
\begin{align*}
\text{SA: } & \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \quad \ \Quad
\[
\begin{align*}
2) \quad & \begin{cases}
y = \frac{3}{4} x \\
y = \frac{3}{4} x - 6 \\
y = -\frac{3}{4} x + 6 \\
y = -\frac{3}{4} x \\
\end{cases} \\
& \text{Revolve around } x = 0
\end{align*}
\]

\[
\begin{align*}
3) \quad & \begin{cases}
y = x + 3 \\
y = x - 3 \\
y = -x + 9 \\
x = 0 \\
\end{cases} \\
& \text{Revolve around } x = 0
\end{align*}
\]
4) \[
\begin{align*}
  y &= 2x + 2 \\
  y &= 2x - 3 \\
  y &= -\frac{1}{2}x + 7 \\
  x &= 0
\end{align*}
\] Revolve around \( x = 0 \)

5) \[
\begin{align*}
  y &= 2x + 5 \\
  y &= x - 2 \\
  x &= -2 \\
  x &= 1
\end{align*}
\] Revolve around \( x = -2 \)
6. \[
\begin{align*}
y &= 2x + 5 \\
y &= x - 2 \\
x &= -2 \\
x &= 1
\end{align*}
\]
Revolve around \( x = 1 \)
7) \[
\begin{align*}
    y &= -2x + 6 \\
    y &= -2x \\
    x &= 3 \\
    x &= 0
\end{align*}
\]
Revolve around \( x = -3 \)
Worksheet 1 Answers
1) \( \frac{2}{3} \pi x^3 \)  
   a. \( r = 6, h = 12 \) 
   b. \( V = \frac{16}{3} \pi \text{ in}^3 \) 
2) a. \( r = 2 \)  
   b. \( V = \frac{128}{3} \pi \text{ in}^3 \) 
3) a. \( x = 8 \)  
   b. \( V = 32 \text{ in} \) 
   c. \( r = 3 \text{ SA} = 36 \pi \) 
   d. \( r = 3 \text{ V} = 36 \pi \text{ in}^3 \) 
4) \( r = .75 \text{ ft or } 9 \text{ in} \)  
   \( \text{SA} = \frac{9}{4} \pi \text{ ft}^2 \text{ or } 324 \pi \text{ in}^2 \) 
5) a. \( V = \frac{4}{3} \pi x^3 \)  
   b. \( \text{SA} = 4 \pi x^2 \text{ in}^2 \) 
   c. \( r = 3 \text{ SA} = 36 \pi \) 
   d. \( r = 3 \text{ V} = 36 \pi \text{ in}^3 \) 
6) \( V = 105 \pi \)  
   \( \text{SA} = 45 \pi + 9 \pi \sqrt{34} \) 
7) a. \( x = 6 \text{ ft} \) 
   b. \( V = 18 \pi \text{ ft}^3 \) 
8) 12 cm 
9) full \( 15 \text{ ft}^3 \)  
   at 1 ft \( V = \frac{5}{3} \text{ ft}^3 \) 
10) a. \( h = -\frac{12}{5} x + 12 \)  
    b. \( \frac{5}{2} \)  
    c. 6 
11) a. \( 1200 \text{ ft}^3 \) 
    b. \( 840 \text{ ft}^2 \) 
12) a. \( 12,000 \text{ ft}^3 \) 
    b. \( 2440 \text{ ft}^2 \) 
13) \( 64 \text{ ft}^3 \) 
14) \( V = 27,342 \pi \text{ ft}^3 \)  
   grain \( 515,385 \text{ lbs} \) 
*15) 1136 pans 
*16) \( 600 + 48 \pi \approx 750.796 \text{ in}^2 \) 
17) Fig A $3000.00 
18) Fig B. $4160.00 
19) Fig C. $350.00 

Worksheet 2 Answers
1) Right Triangle, \( A = 8 \), points: 
2) Triangle, \( A = \frac{27}{2} \), points: 
3) Rectangle, \( A = 35 \), points: 
4) Trapezoid, \( A = \frac{39}{2} \), points: 
5) Trapezoid, \( A = 24 \), points: 
6) Circle, \( A = 16 \pi \), points: 
7) Isosceles Triangle, \( A = 16 \), points: 
8) Trapezoid, \( A = 44 \), points: 
9) Parallelogram, \( A = 42 \), points: 
10) Circle, \( A = 25 \pi \), points: 
11) Right Triangle, \( A = \frac{45}{4} = 11.25 \), points: 
12) Circle, \( A = 64 \pi \), points: Center \((0,0)\) 

Worksheet 3 Answers
1) Quadrilateral, \( A = 71 \) 
2) Hexagon, \( A = 161 \) 
3) Quadrilateral, \( A = 115.5 \) 
4) Hexagon, \( A = 64 \) 
5) Triangle, \( A = 48 \) 
6) Pentagon, \( A = 24 \) 
7) Kite, \( A = 32 \) 
8) Trapezoid, \( A = 90 \) 
9) Quadrilateral, \( A = 78 \) 
10) Kite, \( A = 27 \) 
11) Pentagon, \( A = 77 \) 
12) Pentagon, \( A = 139.5 \) 
13) Quadrilateral, \( A = 95.5 \) 
14) Quadrilateral, \( A = 96 \)
Worksheet 4 Answers
1)  a. Triangle
   b. \( A = \frac{15}{2} \)
   c. Cone
   d. \( LA = 3\pi \sqrt{34}, \ SA = 9\pi + 3\pi \sqrt{34}, \ V = 15\pi \)
   e. Cone
   f. \( LA = 5\pi \sqrt{34}, \ SA = 25\pi + 5\pi \sqrt{34}, \ V = 25\pi \)
2)  a. Square
   b. \( A = 16 \)
   c. Cylinder
   d. \( LA = 32\pi, \ SA = 64\pi, \ V = 64\pi \)
   e. Cylinder
   f. \( LA = 32\pi, \ SA = 64\pi, \ V = 64\pi \)
   g. Cylinder with a hole
   h. \( SA = 96\pi, \ V = 96\pi \)
   i. Cylinder with a hole
   j. \( SA = 128\pi, \ V = 128\pi \)
3)  a. Right Triangle
   b. \( A = 27 \)
   c. Cone
   d. \( LA = 18\pi \sqrt{13}, \ SA = 36\pi + 18\pi \sqrt{13}, \ V = 108\pi \)
   e. Trapezoid
   f. \( A = 24 \)
   g. Frustum
   h. \( LA = 16\pi \sqrt{13}, \ SA = 40\pi + 16\pi \sqrt{13}, \ V = 104\pi \)

Worksheet 5 Answers
1)  Cone, \( V = 27\pi \)
2)  Cone, \( V = 81\pi \)
3)  Frustum, \( V = 19\pi \)
4)  Frustum, \( V = 78\pi \)
5)  Sphere, \( V = 36\pi \)
6)  Cylinder, \( V = 48\pi \)
7)  Cylinder, \( V = 36\pi \)
8) Cylinder with cone removed, \( V = \frac{250}{3}\pi \)
9) Cone on top of cylinder, \( V = \frac{272}{3}\pi \)

Worksheet 6 Answers
1)  a. Cylinder, \( SA = 42\pi \), \( V = 36\pi \)
   b. Cylinder, \( SA = 56\pi \), \( V = 48\pi \)
   c. Cylinder with a hole, \( SA = 126\pi \), \( V = 108\pi \)
   d. Cylinder with a hole, \( SA = 112\pi \), \( V = 96\pi \)
2)  a. Cylinder & cone removed,
\[
SA = 28\pi + 4\pi \sqrt{5}, \ V = \frac{56\pi}{3}
\]
   b. Frustum, \( SA = 40\pi + 16\pi \sqrt{5}, \ V = \frac{104\pi}{3} \)
   c. Cylinder & a frustum on top with cylinder removed, \( SA = 52\pi + 12\pi \sqrt{5}, \ V = \frac{136\pi}{3} \)
   d. Cone on top of cylinder,
\[
SA = 12\pi + 4\pi \sqrt{5}, \ V = \frac{40}{3}\pi
\]
3)  a. Frustum with cone removed,
\[
SA = 36\pi + 36\pi \sqrt{2}, \ V = 54\pi
\]
   b. Back to back cones, \( SA = 18\pi \sqrt{2}, \ V = 18\pi \)
   c. Cylinder with 2 cones removed,
\[
SA = 36\pi + 18\pi \sqrt{2}, \ V = 36\pi
\]
   d. Back to Back frustums with cylinder removed, \( SA = 36\pi + 54\pi \sqrt{2}, \ V = 72\pi \)
4)  Back to Back different frustums, with different cones removed,
\[
SA = 32\pi \sqrt{10} + 32\pi \sqrt{2}, \ V = 128\pi \sqrt{2}
\]
5) Frustum with a cylinder removed,
\[
SA = 45\pi + 27\pi \sqrt{2}, \ V = 36\pi
\]
Worksheet 7 Answers

1) Cylinder with 2 different cones removed, \( SA = 80\pi + 8\pi\sqrt{13} + 16\pi\sqrt{2} \), \( V = \frac{320}{3}\pi \)

2) Back to back frustums with cone removed, \( SA = 160\pi \), \( V = 192\pi \)

3) Frustum with cone removed with a cone on bottom, \( SA = 72\pi\sqrt{2} \), \( V = 126\pi \)

4) Frustum with cone removed with a cone on bottom, \( SA = 26\pi\sqrt{5} \), \( V = \frac{140\pi}{3} \)

5) Cylinder with cone on bottom with cone removed from top, \( SA = 48\pi + 9\pi\sqrt{2} + 9\pi\sqrt{5} \), \( V = 63\pi \)

6) Cylinder with cone on top and cone removed from bottom, \( SA = 30\pi + 9\pi\sqrt{2} + 9\pi\sqrt{5} \), \( V = 54\pi \)

7) Cylinder with frustum removed with frustum on top and cylinder removed, \( SA = 108\pi + 54\pi\sqrt{5} \), \( V = 162\pi \)