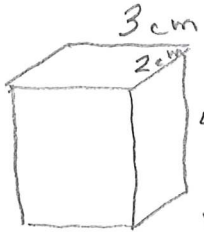


V = 3 x 2 x 4
= 24cm³

L = 3
W = 2
H = 4

Measuring Volume: Rectangular Prisms and Cylinders

1. Rectangular Prism ("box" shape)

V = L x W x H

Volume formula: V = l × w × h

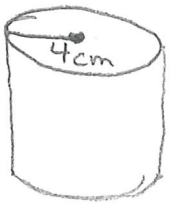
Step	What to do	Why it matters
1 Identify the three edges	Label length (l), width (w), and height (h).	All three are needed for the formula.
2 Measure each edge	Use the same unit (cm, m, etc.).	Mixing units will give the wrong answer.
3 Write the formula	V = l × w × h	Base area times height.
4 Substitute & multiply	Insert the numbers and multiply.	Shows how the numbers relate.
5 State the answer with units	Use cubic units (cm^3, m^3, ...).	Volume counts 3-D cubes.

Example A

A pencil case is 18 cm long, 7 cm wide, and 5 cm high.

V = 18 cm × 7 cm × 5 cm

V = 630 cm^3



A = πr²
3.14 x 4 x 4 = 50.24cm²

V = πr² x h
= 50.24 x 4
= 200.96 cm²

2. Cylinder

Volume formula: V = π × r^2 × h

Step	What to do	Why it matters
1 Find the radius (r)	Measure the diameter and divide by 2.	The formula needs the radius.
2 Find the height (h)	Measure the distance between the bases.	Height is the "stacking" length.
3 Write the formula	V = πr^2h	Base area (πr^2) × height.
4 Substitute	Keep an extra decimal place while calculating.	Reduces rounding error.
5 Calculate	Multiply r × r × π × h.	Follows order of operations.
6 State the answer with units	Use cubic units.	Matches measurement accuracy.

Example B

A can has a diameter of 6.8 cm and a height of 10 cm.

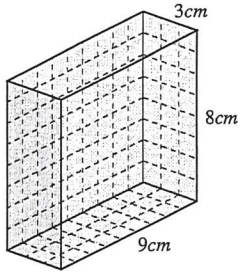
r = 6.8 cm ÷ 2 = 3.4 cm

V = π × $(3.4\ cm)^2$ × 10 cm ≈ 363 cm^3

Name: _____

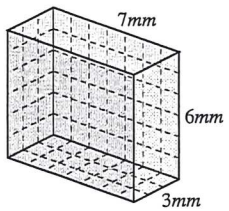
Volume and surface area of prisms (C)

Find the volume and surface area of each prism.



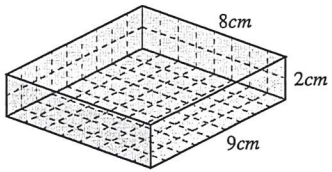
V: _____

SA: _____



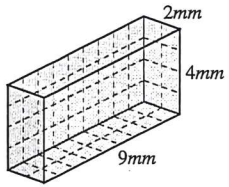
V: _____

SA: _____



V: _____

SA: _____



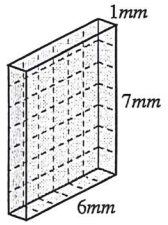
V: _____

SA: _____

V = L x W x H

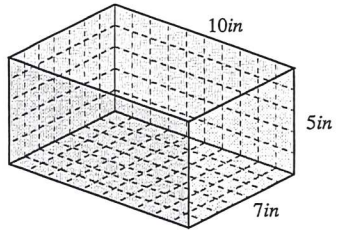
Volume and surface area of prisms (D)

Find the volume and surface area of each prism.



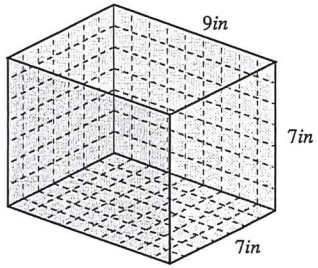
V: _____

SA: _____



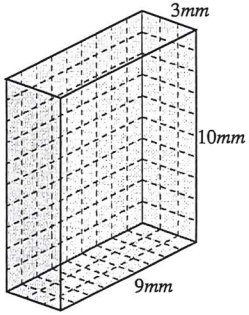
V: _____

SA: _____



V: _____

SA: _____



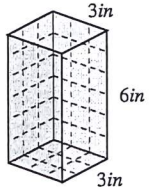
V: _____

SA: _____

V = L x W x h

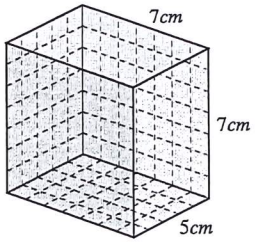
Volume and surface area of prisms (A)

Find the volume and surface area of each prism.



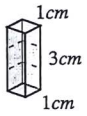
V: _____

SA: _____



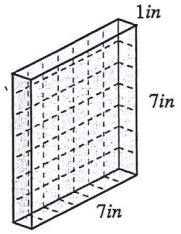
V: _____

SA: _____



V: _____

SA: _____

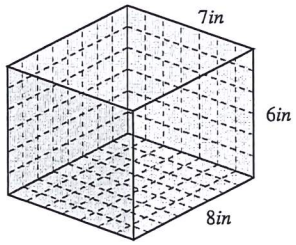


V: _____

SA: _____

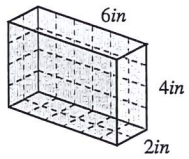
Volume and surface area of prisms (B)

Find the volume and surface area of each prism.



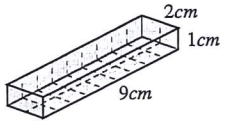
V: _____

SA: _____



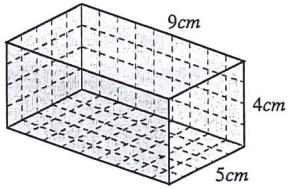
V: _____

SA: _____



V: _____

SA: _____



V: _____

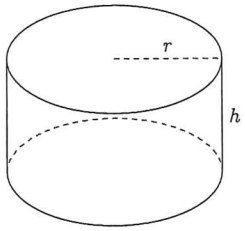
SA: _____

Area and Volume of Cylinders (C)

Calculate the surface area and volume for each cylinder.

Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.

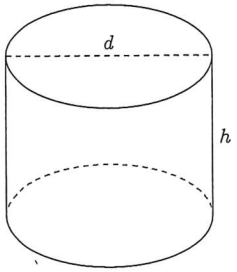


$r = 2.3$ nm $h = 2.4$ nm

Surface Area =

Volume =

2.

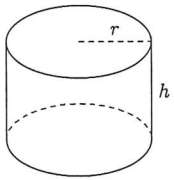


$d = 26.4$ yd $h = 20.4$ yd

Surface Area =

Volume =

3.

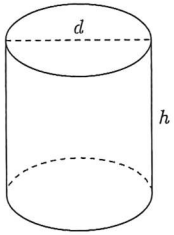


$r = 7.75$ m $h = 10.5$ m

Surface Area =

Volume =

4.



$d = 27.9$ yd $h = 29.7$ yd

Surface Area =

Volume =

$V = \pi r^2 \times h$

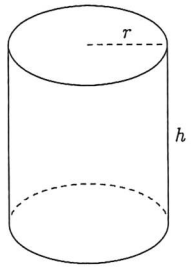
↑ Which is A of a Circle.

Area and Volume of Cylinders (D)

Calculate the surface area and volume for each cylinder.

Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.

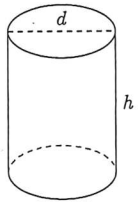


$r = 8.5$ nm $h = 19$ nm

Surface Area =

Volume =

2.

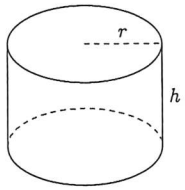


$d = 4.6$ in $h = 6$ in

Surface Area =

Volume =

3.

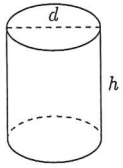


$r = 6.6$ yd $h = 8.8$ yd

Surface Area =

Volume =

4.



$d = 10$ cm $h = 12$ cm

Surface Area =

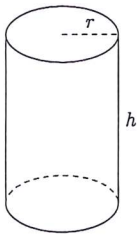
Volume =

Area and Volume of Cylinders (A)

Calculate the surface area and volume for each cylinder.

Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.

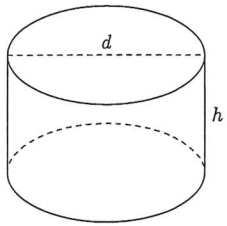


$r = 1.2$ km $h = 3.6$ km

Surface Area =

Volume =

2.

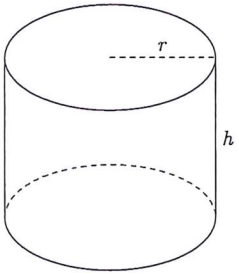


$d = 12.6$ cm $h = 7.5$ cm

Surface Area =

Volume =

3.

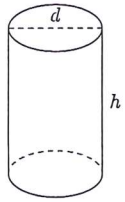


$r = 18$ ft $h = 27.2$ ft

Surface Area =

Volume =

4.



$d = 12$ m $h = 18.6$ m

Surface Area =

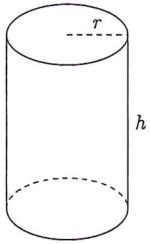
Volume =

Area and Volume of Cylinders (B)

Calculate the surface area and volume for each cylinder.

Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.

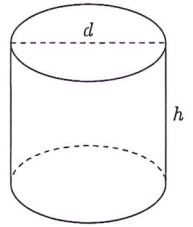


$r = 9.1$ mm $h = 25.9$ mm

Surface Area =

Volume =

2.

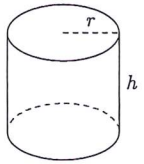


$d = 16.5$ cm $h = 15$ cm

Surface Area =

Volume =

3.

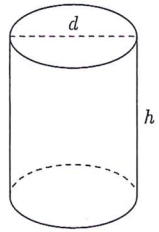


$r = 7.2$ mm $h = 12.6$ mm

Surface Area =

Volume =

4.



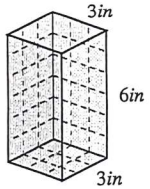
$d = 24.3$ nm $h = 30.6$ nm

Surface Area =

Volume =

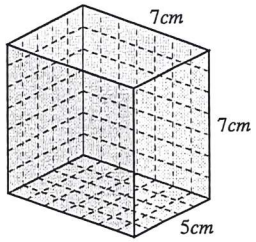
Volume and surface area of prisms (A) Answers

Find the volume and surface area of each prism.



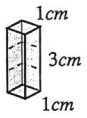
V: $3in \times 3 \times 6in = 54in^3$

SA: $2 \times (9 + 18 + 18)in = 90in^2$



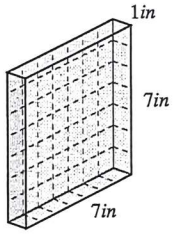
V: $5cm \times 7 \times 7cm = 245cm^3$

SA: $2 \times (35 + 49 + 35)cm = 238cm^2$



V: $1cm \times 1 \times 3cm = 3cm^3$

SA: $2 \times (1 + 3 + 3)cm = 14cm^2$

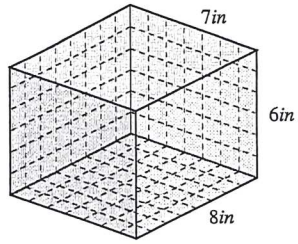


V: $7in \times 1 \times 7in = 49in^3$

SA: $2 \times (7 + 7 + 49)in = 126in^2$

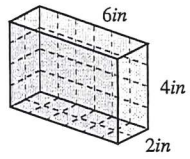
Volume and surface area of prisms (B) Answers

Find the volume and surface area of each prism.



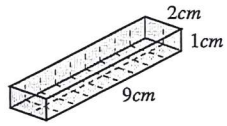
V: $8in \times 7 \times 6in = 336in^3$

SA: $2 \times (56 + 42 + 48)in = 292in^2$



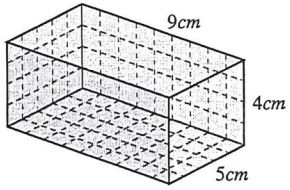
V: $2in \times 6 \times 4in = 48in^3$

SA: $2 \times (12 + 24 + 8)in = 88in^2$



V: $9cm \times 2 \times 1cm = 18cm^3$

SA: $2 \times (18 + 2 + 9)cm = 58cm^2$

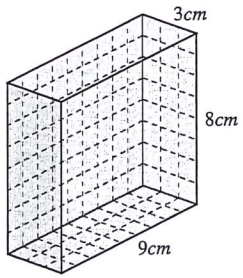


V: $5cm \times 9 \times 4cm = 180cm^3$

SA: $2 \times (45 + 36 + 20)cm = 202cm^2$

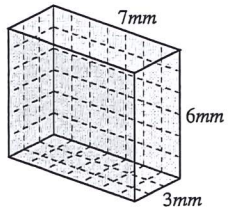
Volume and surface area of prisms (C) Answers

Find the volume and surface area of each prism.



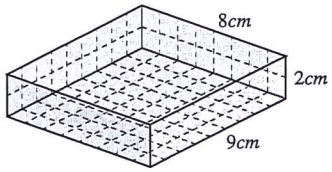
V: $9cm \times 3 \times 8cm = 216cm^3$

SA: $2 \times (27 + 24 + 72)cm = 246cm^2$



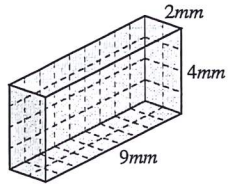
V: $3mm \times 7 \times 6mm = 126mm^3$

SA: $2 \times (21 + 42 + 18)mm = 162mm^2$



V: $9cm \times 8 \times 2cm = 144cm^3$

SA: $2 \times (72 + 16 + 18)cm = 212cm^2$

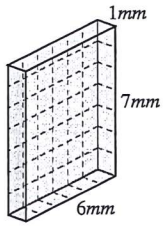


V: $9mm \times 2 \times 4mm = 72mm^3$

SA: $2 \times (18 + 8 + 36)mm = 124mm^2$

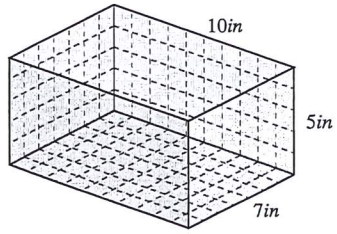
Volume and surface area of prisms (D) Answers

Find the volume and surface area of each prism.



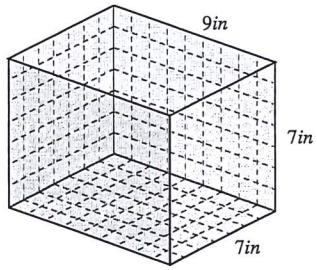
V: $6mm \times 1 \times 7mm = 42mm^3$

SA: $2 \times (6 + 7 + 42)mm = 110mm^2$



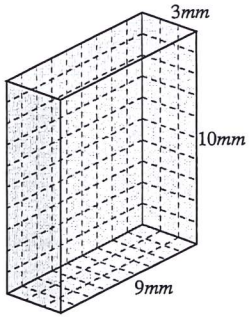
V: $7in \times 10 \times 5in = 350in^3$

SA: $2 \times (70 + 50 + 35)in = 310in^2$



V: $7in \times 9 \times 7in = 441in^3$

SA: $2 \times (63 + 63 + 49)in = 350in^2$



V: $9mm \times 3 \times 10mm = 270mm^3$

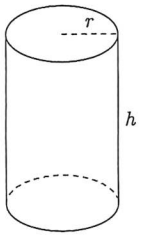
SA: $2 \times (27 + 30 + 90)mm = 294mm^2$

Area and Volume of Cylinders (A) Answers

Calculate the surface area and volume for each cylinder.

Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.

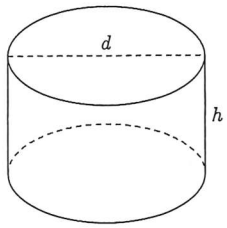


$r = 1.2$ km $h = 3.6$ km

Surface Area $= 36.19$ km^2

Volume $= 16.29$ km^3

2.

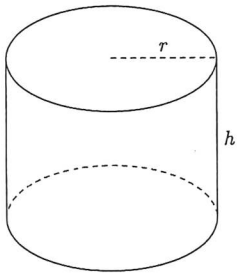


$d = 12.6$ cm $h = 7.5$ cm

Surface Area $= 546.26$ cm^2

Volume $= 935.17$ cm^3

3.

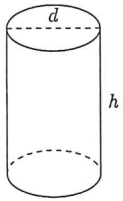


$r = 18$ ft $h = 27.2$ ft

Surface Area $= 5112$ ft^2

Volume $= 27{,}686.23$ ft^3

4.



$d = 12$ m $h = 18.6$ m

Surface Area $= 927.4$ m^2

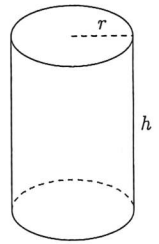
Volume $= 2103.61$ m^3

Area and Volume of Cylinders (B) Answers

Calculate the surface area and volume for each cylinder.

Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.

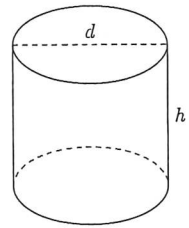


$r = 9.1$ mm $h = 25.9$ mm

Surface Area $= 2001.19$ mm^2

Volume $= 6738.02$ mm^3

2.

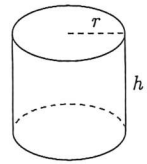


$d = 16.5$ cm $h = 15$ cm

Surface Area $= 1205.19$ cm^2

Volume $= 3207.37$ cm^3

3.

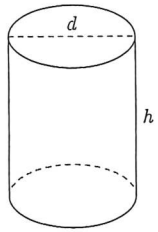


$r = 7.2$ mm $h = 12.6$ mm

Surface Area $= 895.73$ mm^2

Volume $= 2052.04$ mm^3

4.



$d = 24.3$ nm $h = 30.6$ nm

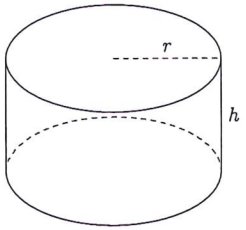
Surface Area $= 3263.56$ nm^2

Volume $= 14{,}191.35$ nm^3

Area and Volume of Cylinders (C) Answers

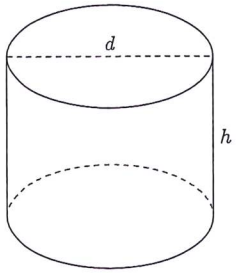
Calculate the surface area and volume for each cylinder.
Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.



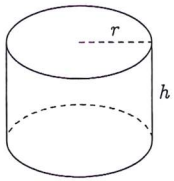
$r = 2.3$ nm $h = 2.4$ nm
Surface Area $= 67.92$ nm^2
Volume $= 39.89$ nm^3

2.



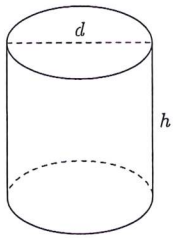
$d = 26.4$ yd $h = 20.4$ yd
Surface Area $= 2786.72$ yd^2
Volume $= 11{,}166.78$ yd^3

3.



$r = 7.75$ m $h = 10.5$ m
Surface Area $= 888.68$ m^2
Volume $= 1981.27$ m^3

4.

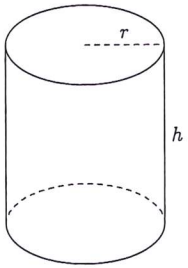


$d = 27.9$ yd $h = 29.7$ yd
Surface Area $= 3825.94$ yd^2
Volume $= 18{,}157.44$ yd^3

Area and Volume of Cylinders (D) Answers

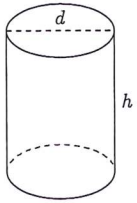
Calculate the surface area and volume for each cylinder.
Surface Area $= (\pi r^2 \times 2) + (\pi d \times h)$ Volume $= \pi r^2 \times h$ $d = 2r$

1.



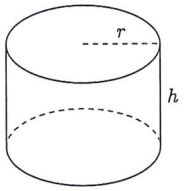
$r = 8.5$ nm $h = 19$ nm
Surface Area $= 1468.69$ nm^2
Volume $= 4312.62$ nm^3

2.



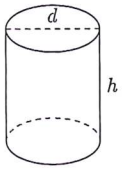
$d = 4.6$ in $h = 6$ in
Surface Area $= 119.95$ in^2
Volume $= 99.71$ in^3

3.



$r = 6.6$ yd $h = 8.8$ yd
Surface Area $= 638.62$ yd^2
Volume $= 1204.26$ yd^3

4.



$d = 10$ cm $h = 12$ cm
Surface Area $= 534.07$ cm^2
Volume $= 942.48$ cm^3

Name:

Volume of Cylinders and Rectangular Prisms

Complete your work on a lined sheet of paper and submit your worksheet with this page.

Volume of Cylinders – Questions

1. A cylinder has a radius of **3 cm** and a height of **10 cm**.
2. A cylinder has a radius of **5 cm** and a height of **12 cm**.
3. A cylinder has a radius of **2 cm** and a height of **8 cm**.
4. A cylinder has a radius of **7 cm** and a height of **6 cm**.
5. A cylinder has a radius of **4.5 cm** and a height of **9.5 cm**.
6. A cylinder has a radius of **6 cm** and a height of **15 cm**.
7. A cylinder has a radius of **8 cm** and a height of **11 cm**.
8. A cylinder has a radius of **2.5 cm** and a height of **7 cm**.
9. A cylinder has a radius of **9 cm** and a height of **13 cm**.
10. A cylinder has a radius of **3.5 cm** and a height of **14 cm**.
11. A cylinder has a radius of **4 cm** and a height of **5 cm**.
12. A cylinder has a radius of **5.5 cm** and a height of **9 cm**.
13. A cylinder has a radius of **6.5 cm** and a height of **8.5 cm**.
14. A cylinder has a radius of **1.8 cm** and a height of **12.5 cm**.
15. A cylinder has a radius of **7.2 cm** and a height of **10 cm**.
16. A cylinder has a radius of **2.25 cm** and a height of **7.5 cm**.
17. A cylinder has a radius of **4.75 cm** and a height of **6.25 cm**.
18. A cylinder has a radius of **3.25 cm** and a height of **11.5 cm**.
19. A cylinder has a radius of **8.5 cm** and a height of **9.8 cm**.
20. A cylinder has a radius of **6.8 cm** and a height of **13.2 cm**.

Volume of Rectangular Prisms – Questions

1. A prism measures **5 cm × 4 cm × 12 cm**.
2. A prism measures **7.5 cm × 6 cm × 5 cm**.
3. A prism measures **4 cm × 2.5 cm × 6.5 cm**.
4. A prism measures **9 cm × 7.5 cm × 4 cm**.
5. A prism measures **6.25 cm × 3.4 cm × 9 cm**.
6. A prism measures **11 cm × 4 cm × 8 cm**.
7. A prism measures **3.6 cm × 4.8 cm × 7.2 cm**.
8. A prism measures **8.2 cm × 6.1 cm × 3.4 cm**.
9. A prism measures **10 cm × 5 cm × 6 cm**.
10. A prism measures **4.5 cm × 2 cm × 5.5 cm**.
11. A prism measures **5.5 cm × 3.5 cm × 9.5 cm**.
12. A prism measures **12 cm × 4.5 cm × 3.3 cm**.
13. A prism measures **7 cm × 2.8 cm × 4.6 cm**.
14. A prism measures **6.75 cm × 3.25 cm × 8.1 cm**.
15. A prism measures **9.5 cm × 4.1 cm × 2.5 cm**.
16. A prism measures **3 cm × 3.6 cm × 10 cm**.

Name:

17. A prism measures **13 cm × 5.2 cm × 4.7 cm.**
18. A prism measures **7.25 cm × 4.75 cm × 6.8 cm.**
19. A prism measures **5.8 cm × 3.9 cm × 5.4 cm.**
20. A prism measures **8 cm × 6.5 cm × 4.2 cm.**

Advanced Challenge Section

A. Cylinders with Diameter Given

#	Diameter (d)	Height (h)	Task
1	9 cm	12 cm	Find the volume.
2	14 cm	10 cm	Find the volume.
3	5.2 cm	7.5 cm	Find the volume.

B. Cylinders with Circumference Given

#	Circumference (C)	Height (h)	
4	**31.4 cm**	**11 cm**	**Find the volume.**
5	**47.1 cm**	**6 cm**	**Find the volume.**
6	**15.7 cm**	**20 cm**	**Find the volume.**

C. Reverse Problems – Rectangular Prisms
For each prism, the volume is given. List at least three different sets of whole-number edge lengths (ℓ × w × h) that will work.

#	Volume (V)
1	120 cm^3
2	210 cm^3
3	96 cm^3
4	180 cm^3
5	168 cm^3

Name:

Answer Key

Answer Key
Note: Volumes are rounded to two decimal places.

Cylinders

1. 282.60 cm^3
2. 942.00 cm^3
3. 100.48 cm^3
4. 923.16 cm^3
5. 604.06 cm^3
6. 1 694.40 cm^3
7. 2 211.68 cm^3
8. 137.44 cm^3
9. 3 307.38 cm^3
10. 539.00 cm^3
11. 251.20 cm^3
12. 852.79 cm^3
13. 1 130.13 cm^3
14. 127.15 cm^3
15. 1 628.93 cm^3
16. 119.06 cm^3
17. 442.33 cm^3
18. 381.55 cm^3
19. 2 219.61 cm^3
20. 1 907.61 cm^3

Rectangular Prisms

1. 240.00 cm^3
2. 225.00 cm^3
3. 65.00 cm^3
4. 270.00 cm^3
5. 191.25 cm^3
6. 352.00 cm^3
7. 124.42 cm^3
8. 169.78 cm^3
9. 300.00 cm^3
10. 49.50 cm^3
11. 182.88 cm^3
12. 178.20 cm^3
13. 90.16 cm^3
14. 177.00 cm^3
15. 97.38 cm^3
16. 108.00 cm^3
17. 318.64 cm^3
18. 234.55 cm^3
19. 122.18 cm^3
20. 218.40 cm^3

Advanced

21. A. Cylinders (Diameter)

#	Volume (rounded)
1	763.02 cm^3
2	1 538.60 cm^3
3	159.20 cm^3

22. B. Cylinders (Circumference)

#	Volume (rounded)
4	863.50 cm^3
5	1 059.45 cm^3
6	392.50 cm^3

23. C. Rectangular Prisms – Sample Solutions

24. ***(Any three valid sets earn full marks.)***

#	Possible Edge Lengths		
1	4 × 5 × 6	3 × 4 × 10	2 × 6 × 10
2	5 × 6 × 7	3 × 5 × 14	2 × 7 × 15
3	4 × 4 × 6	3 × 4 × 8	2 × 6 × 8
4	5 × 6 × 6	3 × 6 × 10	4 × 5 × 9
5	4 × 7 × 6	3 × 7 × 8	2 × 6 × 14