Measurement Practice

Mr. Merrick · Math 10 · October 8, 2025

Rounding and Place Value

Goal: Round numbers to the place indicated and recognize how place value affects rounding.

1. Complete the table by rounding each number to the specified place.

Number	Ones	Tens	Hundreds	Tenths	Hundredths	1st Decimal
2,481.739	2,482	2,480	2,500	2,481.7	2,481.74	2,481.7
$\frac{191}{8}$	24	20	0	23.9	23.88	23.9
-406.505	-407	-410	-400	-406.5	-406.51	-406.5
$\sqrt{3900}$	62	60	100	62.4	62.45	62.4

2. Round each number to the place indicated.

   a) 75.9086 to the nearest tenth 75.9

   b) -252.781 to the nearest hundredth -252.78

   c) $\sqrt{8650}$ to the nearest integer 93

   d) 8.426 to one decimal place 8.4

Scientific Notation (Applied)

Goal: Express very large or small numbers in scientific notation and standard form.

1. Write each number in scientific notation.

   a) 903 450 000 9.0345×10^{8}

   b) 0.000 006 91 6.91×10^{-6}

2. Convert each to standard form.

   a) 3.7×10^{5} 370,000

   b) 6.02×10^{-3} 0.00602

3. Quick estimates (geometry).

   a) $\dfrac{9.37 \times 10^{6}}{1.19 \times 10^{-3}} \approx 7.87 \times 10^{9}$

   b) $(3.39 \times 10^{-8})(1.28 \times 10^{6}) \approx 4.34 \times 10^{-2}$

Measuring Devices and Precision

1. Match each measurement to a sensible referent.

Measurement	Referent
(i) 1 inch	Thickness of a credit card
(ii) 1 metre	Height of a doorway
(iii) 1 foot	Width of a large mug
(iv) 1 mm	Length of an adult shoe
(v) 2 m	Height of a door handle
(vi) 10 cm	Width of a thumb joint

(i) width of a thumb joint; (ii) height of a door handle; (iii) length of an adult shoe; (iv) thickness of a credit card; (v) height of a doorway; (vi) width of a large mug.

2. Choose the most sensible instrument or unit.

   a) Diameter of a wire
   A. ruler
   B. vernier caliper
   C. trundle wheel
   D. micrometer D

   b) Width of a gopher hole
   A. micrometer
   B. vernier caliper
   C. ruler
   D. tape D

c) Distance along a street
A. cm
B. m
C. trundle wheel
D. in C

d) Laptop screen width
A. mm
B. m
C. inch
D. mile C

3. Report each value to an appropriate number of significant digits.
   a) Ruler marked to mm: 12.347 cm 12.35 cm
   b) Vernier caliper (0.02 mm): 18.902 mm 18.90 mm
   c) Micrometer (0.01 mm): 2.5387 mm 2.54 mm

Conversions (SI and Imperial)

1. Convert each quantity as indicated.

   a) 3 ft 11 in → in 47 in
   b) 7 yd 1 ft → ft 22 ft
   c) 2 mi 325 yd → yd 3,845 yd
   d) 75 in → ft and in 6 ft 3 in
   e) 82 ft → yd and ft 27 yd 1 ft
   f) 18,480 ft → mi and ft 3 mi 2,640 ft
   g) 4 yd 2 ft 6 in → in 174 in
   h) 100 in → yd, ft, in 2 yd 2 ft 4 in

2. Use proportional reasoning or unit analysis.
   a) 2.3 mi → in 145,728 in
   b) 200,000 in → mi (nearest hundredth) 3.16 mi
3. The Olympic marathon is 26 mi 385 yd. Convert to:
   a) yards 46,145 yd
   b) feet 138,435 ft
   c) inches 1,661,220 in
4. Fill in each conversion (4 decimal places).
   a) 1 yd = 0.9144 m
   b) 1 mi = 1.6093 km
   c) 1 m = 3.2808 ft
   d) 1 m = 1.0936 yd
   e) 1 km = 0.6214 mi
5. 3 yd 7 in equals A. 43 B. 115 C. 133 D. 307 B
6. Convert the following:
   a) 85 km/h → mph ≈ 53 mph
   b) 510 mph → km/h ≈ 821 km/h
7. Map scale 1:2,000,000. Cities are 600 km apart. Find the map distance.
   A. 1.2 cm B. 3 cm C. 12 cm D. 30 cm D

Square and Cubic Unit Conversions

1. Convert each (use scientific notation where appropriate).

   a) 53 m^2 = 5.3×10^5 cm^2
   b) 1326 mm^2 = 1.326×10^{-3} m^2
   c) 890,000 mm^2 = 0.89 m^2
   d) 0.611 km^2 = 6.11×10^5 m^2
   e) 78 cm^3 = 7.8×10^4 mm^3
   f) 0.00358 cm^2 = 3.58×10^5 μm^2
   g) 92,400 m^3 = 9.24×10^{-5} km^3
   h) 0.07 m^3 = 7.0×10^7 mm^3

2. Imperial areas and volumes.
   a) 720 in^2 to ft^2 5.0 ft^2
   b) 0.5 mi^2 to yd^2 1,548,800 yd^2
   c) 8,145 ft^2 to yd^2 905 yd^2
   d) 4.2 ft^2 to in^2 604.8 in^2

Surface Area and Volume of Prisms & Cylinders

1. **Unit conversions (volumes).** Convert each to the indicated unit. State a sensible unit and round appropriately.

   a) Convert 1049 cm^3 to litres. 1.049 L
   b) Convert 4.7 L to cm^3. 4,700 cm^3
   c) Convert 686.5 m^3 to litres. 686,500 L
   d) Convert 20,000 L to m^3. 20.0 m^3
   e) Convert 75 US gal to litres. $\approx$ 283.9 L
   f) Convert 901 L to UK gal. $\approx$ 198.3 gal

2. **Right prisms (total surface area & volume).** For each prism below, find the *total surface area* and the *volume*. Round to the nearest 0.1 (unit shown).
   a) Rectangular prism with dimensions $20.4 \times 21.2 \times 5.1$ mm.
   $SA \approx 1289.3$ mm^2, $V \approx \mathbf{2205.6}$ mm^3
   b) Right triangular prism with leg lengths 7 m and 6 m (right angle between legs), and length 24 m.
   $SA \approx 575.3$ m^2, $V = 504$ m^3
   c) Trapezoidal prism with trapezoid bases 14 ft and 12.5 ft, height 7.5 ft; prism length 12.5 ft.
   (First find A_{base} of the trapezoid.)
   $A_{\text{base}} = 99.4$ ft^2, $V \approx \mathbf{1242.2}$ ft^3

3. **Cylinder (total surface area & volume).** A cylinder has diameter 14.6 in and height 16.8 in. Find the *total surface area* and the *volume*.
   $SA \approx \mathbf{1105.4}$ in^2, $V \approx \mathbf{2812.6}$ in^3

4. **Cube (edge length).** A cube has volume 0.512 L. What is the *edge length* in centimetres?
   8 cm

5. **Cylinder base area.** A marmalade jar is a right cylinder with volume 528 cm^3 and height 5.3 cm. What is the *area of the circular base* (nearest 0.1 cm^2)?
   ≈ 99.6 cm^2

6. **Cylinder diameter.** A pop can is a right cylinder with volume 355 mL and height 12.0 cm. What is the *diameter* (nearest 0.1 cm)?
   $\approx$ 6.1 cm

Cones and Pyramids

1. **Cone (surface area).** A right circular cone has radius $r = 7$ cm and vertical height 24 cm. Find the *total surface area*, including the base, in terms of π.
   A. 49π B. 175π C. 217π D. 224π **D** ($\ell = 25$, so $\pi r^2 + \pi r\ell = 49\pi + 175\pi$)

2. **Triangular pyramid (volume).** A right pyramid has an equilateral triangular base of side 10 m and pyramid height 12 m. What is the *volume*?
   A. $300\sqrt{3}$ B. $100\sqrt{3}$ C. 600 D. 200 **B** ($V = \frac{1}{3}A_{\triangle}h = \frac{1}{3}(\frac{\sqrt{3}}{4}10^2)12$)

3. **Pup tent (length).** A tent is a triangular prism with entrance (triangle) area 16 ft^2 and interior volume 8.15 m^3 (about 288 ft^3). What is the *length of the tent* to the nearest foot?
   18 ft

Surface Area and Volume of Spheres

1. **Sphere/hemisphere practice (nearest tenth).** For each, find the requested quantity.
   a) A soccer ball has diameter 21 cm. Find the *surface area*. 1385.4 cm^2
   b) A spherical ornament has radius 12 in. Find the *volume*. 7238.2 in^3
   c) Earth has diameter 12,756 km. Find the *volume* and *surface area* in scientific notation. 1.1×10^{12} km^3, 5.1×10^8 km^2
   d) A hemisphere has radius 4.2 ft. Find the *volume* and the *curved + base surface area*. 155.2 ft^3, 166.3 ft^2
2. **Composite container (volume).** A roll-on deodorant container consists of a cylinder ($r = 3.1$ cm, $h = 7.3$ cm) with a hemispherical cavity removed below the ball. Find the *total internal volume* in mL. ≈ 158 mL
3. **Solve for radius; then evaluate.** Solve $V = \frac{4}{3}\pi r^3$ for r. Then, for a beach ball with volume $V = 50{,}965$ cm^3, find the *radius*. $r = \sqrt[3]{\frac{3V}{4\pi}}$, $r \approx 23.0$ cm
4. **Composite solid (volume & surface area).** A thermometer bulb and stem are modeled by: a sphere ($d = 0.35$ cm), a cylinder ($d = 0.35$ cm, length 10.3 cm), and a hemisphere ($r = 0.15$ cm). Find the *total volume* and *exterior surface area*. $V \approx \mathbf{1.02}$ cm^3, $S \approx \mathbf{11.85}$ cm^2
5. **Manufacturing cost (surface area).** A pencil case end-cap is a hemisphere of diameter 20 cm. For 500 caps, fabric costs \$0.04 per 100 cm^2 and each zipper costs \$0.05. Find the *surface area per cap* and the *total cost*. SA ≈ 628.3 cm^2, total cost $\approx$ \$150.66
6. **From volume to surface area.** Jupiter's volume is 1.53×10^{15} km^3. Estimate its *surface area*. $\approx 6.42 \times 10^{10}$ km^2
7. **From surface area to volume.** A size 7 basketball has surface area $S = 277.6$ in^2. Find its *volume*. ≈ 434.9 in^3
8. **Sphere in a cube (SA & packing).** A silver sphere fits snugly in a cube of volume 1728 cm^3. Find the *sphere's surface area* and the *volume of bubble-wrap* needed to fill the extra space. $S_{\text{sphere}} \approx 452$ cm^2, wrap $\approx \mathbf{823}$ cm^3
9. **Multiple choice (capacity match).** A single ice-cream scoop has volume 65 mL. Which *cone diameter* best matches this scoop size?
   A. 2.5 cm B. 4 cm C. 5 **cm** D. 6 cm **C**
10. **Multiple choice (reverse SA→d).** A sphere has surface area $S = 255$ m^2. What is the *diameter* (nearest 0.1 m)?
    A. 28.3 B. 14.2 C. 9.0 D. 4.5 **C**
11. **Multiple choice (volume).** A sphere has radius 15 mm. What is its *volume* (in mm^3)?
    A. 225π B. 900π C. 4500π D. 14137π **C**
12. **Displacement (new depth).** A cylindrical jar of diameter 7 cm contains water to a depth of 5 cm. A solid sphere of diameter 3 cm is dropped in and rests on the bottom. What is the *new water depth*? ≈ 5.4 cm
13. **Equal volumes in two spheres.** Sphere A (diameter 12 cm) is 80% full of water. Sphere B is 20% full with the *same* water volume as A. What is the *diameter of B*? ≈ 19.0 cm
14. **Boiler (composite volume).** A boiler consists of a right circular cylinder with two hemispherical ends. The total length is 14 m and the diameter is 6 m. Find the *total internal volume*. ≈ 339 m^3

Mixed Measurement Applications

1. Usain Bolt ran 100 m in 9.58 s. What is his average speed, to the nearest 0.1 km/h? 37.6 km/h
2. A fish tank measures $78.2 \times 42.5 \times 25.2$ cm. A medicine is dosed at 3 drops per 10 L of water. How many drops are needed for this tank? ≈ 25
3. A rectangular floor is 6 yd by 4.5 yd and is tiled with square tiles of side $13\frac{1}{2}$ in. How many tiles are needed to cover the floor? 192
4. To the nearest millilitre, how many millilitres are in one UK pint? 568

Additional Practice: Prisms/Cylinders

5. A cylindrical jar of marmalade has volume 528 cm^3 and height 5.3 cm. What is the area of the circular base, to the nearest 0.1 cm^2?
   $A = \dfrac{V}{h} = \dfrac{528}{5.3} \approx \mathbf{99.6}\ \text{cm}^{\mathbf{2}}$
6. A pop can has volume 355 mL and height 12.0 cm. What is the diameter, to the nearest 0.1 cm?
   $V = \pi r^2 h \Rightarrow r = \sqrt{\dfrac{355}{\pi \cdot 12}} \approx 3.07$ cm, so $d \approx \mathbf{6.1}$ cm
7. A truck box is an open-top rectangular prism measuring 11 ft by 7 ft by 4 ft.
   a) Which of the following is the volume of gravel the box can hold when full?
   A. 0.03 m^3 B. 8.7 m^3 C. 20.5 m^3 D. 308.0 m^3 B
   b) Before attachment, all inside and outside faces (with the top open) are to be primed. What is the total area to be primed, to the nearest 0.1 m^2?
   $2[(11 \cdot 7) + (2 \cdot 11 \cdot 4) + (2 \cdot 7 \cdot 4)] = 442\ \text{ft}^2 \approx \mathbf{41.1}\ \text{m}^{\mathbf{2}}$
8. Designers change only the height so the same box will hold 10 m^3. With $L = 11$ ft and $W = 7$ ft unchanged, what is the new height written as a ft b in (nearest inch), and what is $a + b$?
   $h = \dfrac{10}{3.3528 \cdot 2.1336} \approx 4.59$ ft ≈ 4 ft 7 in $\Rightarrow \mathbf{a + b = 11}$
9. While in England, Bob buys a pint of milk. To the nearest millilitre, how many millilitres are in a UK pint? **568 mL**