Booklet Mark:	10	9	8	7	6	RE-Submit

Measurement in Two Systems

This booklet belongs to: Marissa Period 4

King Henry's Daughter Makes Delicious Chocolate Milk

LESSON #	DATE	QUESTIONS FROM NOTES	Questions that I find difficult
1	April 15/15	Pg. 1-20	31, 37, 45, 49, 59, 60, 67, 83, 87
2	April 22/15	Pg. 21-27	126
3 SA	April 23/15	Pg. 28-31	
4	April 27/15	Pg. 32-38	136, 159, 163, 171 ✓, 173, 179, 182
5	April 29/15	Pg. P-TEST	
6	April 30/15	Pg. TEST	
		Pg.	
		Pg.	
		Pg.	
		Pg.	
		REVIEW	
		TEST Thursday, April 30, 2015	

95

Your teacher has important instructions for you to write down below.

1m = 1760yds
1m = 5280ft
1yd = 3ft
1yd = 36in
1ft = 12in
1ton = 2000lbs
1lb = 16oz

MEASUREMENT	TOPICS
Solve problems that involve linear measurement using: • SI and imperial units of measure. • Estimation strategies. • Measurement strategies.	1.1 Provide referents for linear measurement.
	1.2 Compare SI and Imperial units of measure.
	1.3 Estimate a linear measure and explain the process.
	1.4 Justify the choice of units used for determining a linear measurement.
	1.5 Solve problems that involve linear measure using instruments available.
	1.6 Describe and explain a personal strategy used to determine a linear measurement.
Apply proportional reasoning to problems that involve conversions between SI and imperial measurement.	2.1 Use proportional reasoning to convert within or between SI and Imperial systems.
	2.2 Solve a problem that requires conversion between units.
	2.3 Verify using unit analysis, a conversion between units.
	2.4 Justify, using mental mathematics, the reasonableness of a solution to a conversion problem.
Solve problems, using SI and imperial measurement, that involve the surface area and volume of 3-D objects, including • Right cones • Right cylinders • Right prisms • Right pyramids • Spheres.	3.1 Sketch a diagram to represent a problem that involves surface area or volume.
	3.2 Determine the SA of a right cone, right prism, right pyramid, or sphere using an object or diagram.
	3.3 Determine the V of a right cone, right prism, right pyramid, or sphere using an object or diagram.
	3.4 Determine an unknown dimension of a right cone, right prism, right pyramid, or sphere given the SA or V and remaining dimensions.
	3.5 Solve a problem that involves SA or V.
	3.6Compare the formula/relationship between volumes of right cones and right cylinders or right prisms and right pyramids.

[C] Communication **[PS]** Problem Solving, **[CN]** Connections **[R]** Reasoning, **[ME]** Mental Mathematics **[T]** Technology, and Estimation, **[V]** Visualization

Key Terms

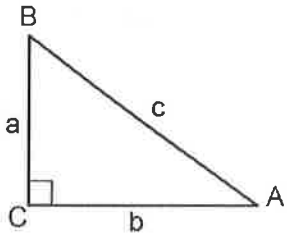
Term	Definition
Linear measurement.	
Dimension	
Length	
Width	
Height	
Radius	
Diameter	
Perimeter	
Linear foot	
Conversion factor	
Base of triangle	
Height of a triangle (altitude)	
2-dimensional	
Area	
Surface Area	
Square foot.	
Geometric net	
3-dimensional	
Base (or base area) of a figure	

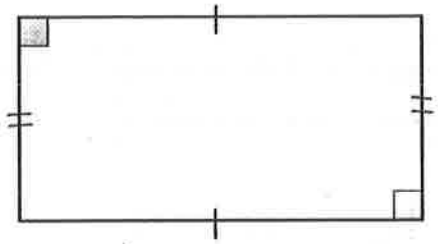
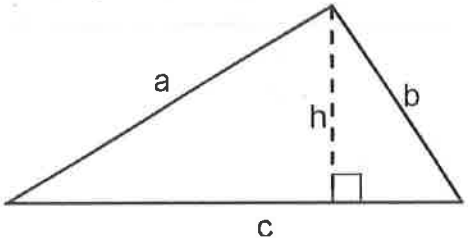
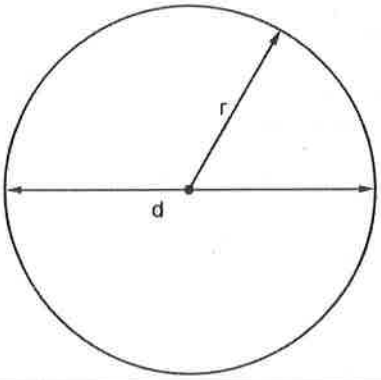
Term	Definition
Volume	
Cubic centimetres (cc or cm^3)	
Millilitre	
Litre	
Gallon	
Rectangle	
Square	
Parallelogram	
Trapezoid	
Circle	
Rectangular Prism (& Cube)	
Right Triangular Prism	
Pyramid (triangular, rectangular, square)	
Right Cone	
Right Cylinder	
Sphere	
Hemisphere	

Unit Conversions (as they may appear on an exam formula sheet)

	Common Imperial	Imperial and Metric	Metric
Length	$1\ mile = 1760\ yards$ $1\ mile = 5280\ feet$ $1\ yard = 3\ feet$ $1\ yard = 36\ inches$ $1\ foot = 12\ inches$	$1\ mile \approx 1.609\ km$ $1\ yard \approx 0.9144\ m$ $1\ foot \approx 0.3048\ m$ $1\ foot \approx 30.48\ cm$ $1\ inch \approx 2.54\ cm$	$1\ km = 1000\ m$ $1\ m = 100\ cm$ $1\ cm = 10\ mm$
Mass (Weight)	$1\ ton = 2000\ pounds$ $1\ pound = 16\ ounces$	$1\ pound \approx 0.454\ kg$ $1\ ounce \approx 28.35\ g$	$1\ t = 1000\ kg$ $1\ kg = 1000\ g$
Common Abbreviations	$mile = mi$ $yard = yd$ $ton = ton$ $feet = ft\ or\ '$ $inch = in\ or\ ''$ $pound = lb$ $ounce = oz$		$kilometre = km$ $metre = m$ $centimetre = cm$ $millimetre = mm$ $tonne\ (metric\ ton) = t$ $gram = g$

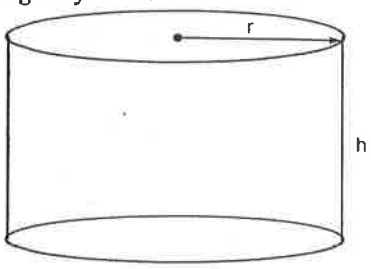
Formula

Triangles	Lines
Trigonometry: $sinA = \frac{opposite}{hypotenuse}$ $cosA = \frac{adjacent}{hypotenuse}$ $tanA = \frac{opposite}{adjacent}$  Pythagorean Theorem: $a^2 + b^2 = c^2$	The equation of a line: Slope-intercept form: $y = mx + b$ Standard Form: $Ax + By + C = 0$ Point-slope form: $y - y_1 = m(x - x_1)$ Slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

2-Dimensional Figure	Perimeter	Area
Rectangle 	$P = 2l + 2w$ or $P = 2(l + w)$	$A = lw$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$ or $A = \frac{1}{2}bh$
Circle 	$C = 2\pi r$ or $C = \pi d$	$A = \pi r^2$

3-Dimensional figures:

Right Cylinder:



$A_{top} = \pi r^2$

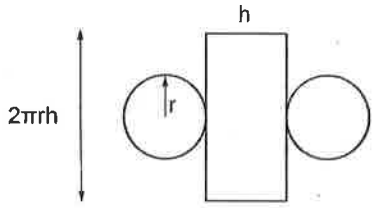
$A_{bottom} = \pi r^2$

$A_{side} = 2\pi rh$

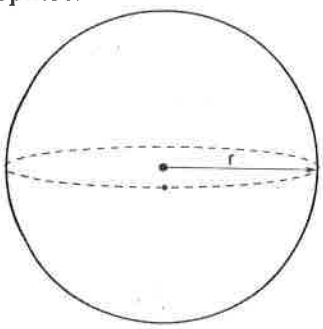
$SA_{total} = 2\pi r^2 + 2\pi rh$

$V = (Base\ Area)h$

Net:



Sphere:



Sphere:

$SA = 4\pi r^2$

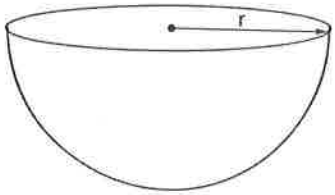
$V = \frac{4}{3}\pi r^3$

Hemisphere:

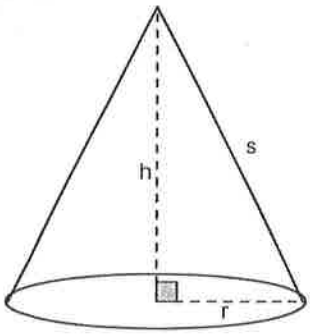
$SA = 3\pi r^2$

$V = \frac{2}{3}\pi r^3$

Hemisphere:



Cone:



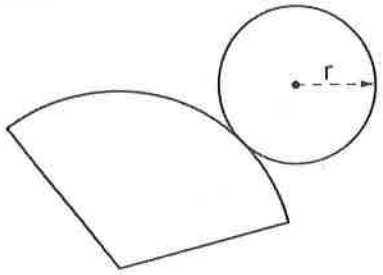
Side: $A = \pi rs$

Base: $A = \pi r^2$

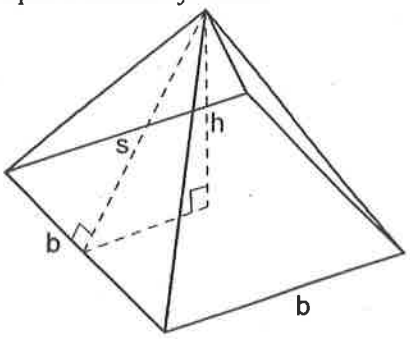
$SA = \pi r^2 + \pi rs$

$V = \frac{1}{3}(\pi r^2)h$

Net:



Square-Based Pyramid:



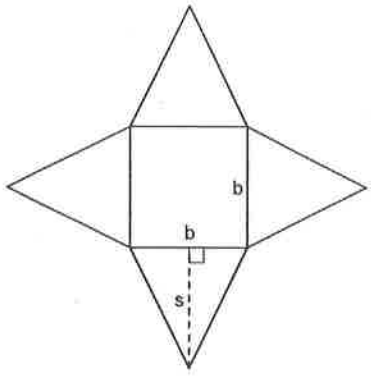
$A_{triangle} = \frac{1}{2}bs$

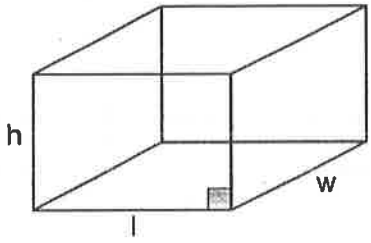
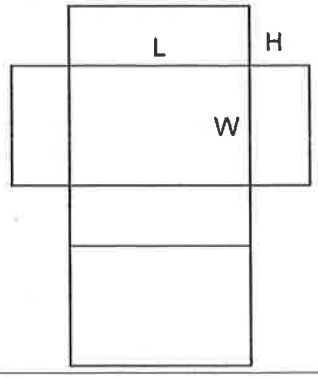
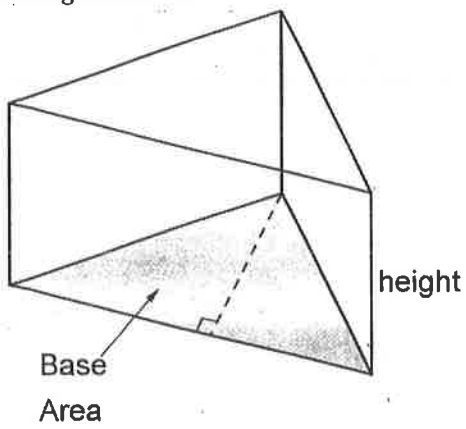
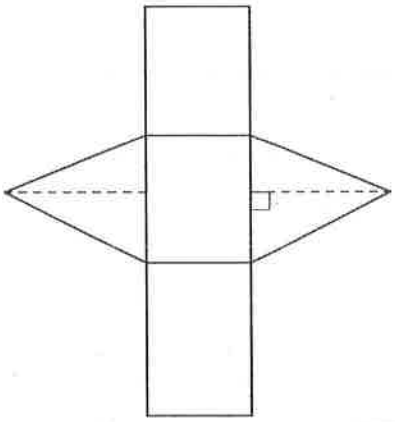
$A_{base} = b^2$

$SA = 2bs + b^2$

$V = \frac{1}{3}(base\ area)h$

Net:



Rectangular (Right) Prism:  	$SA = 2(hl + lw + hw)$ $V = lwh$ Or $V = (base\ area)h$	Net: 
Triangular Prism  	$SA = sum\ of\ all\ faces$ $V = (base\ area)h$	Net: 

Measurement in Two Systems.

The International System of Units (SI)
(Metric System)
Système International d'unités

History:

Formally called *System Internationale* but more commonly called THE METRIC SYSTEM.

Based on the **metre**. One meter is defined as the distance light travels in 1/299792458 of a second.

Prefixes:

Prefixes are added to the base units to be used with smaller or larger measurements.

tera
giga
mega
kilo
hecto
deca
BASE UNIT (metre/gram/litre)
deci
centi
milli
micro
nano
pico

The Imperial System of Units

History:

The system used by the British Empire and therefore many Commonwealth countries for many years.

To this day much daily work in trades is still done using the imperial system. Most technical work, however, uses the metric system.

Some useful conversions:

1 inch	=	2.54 cm
1 foot	=	30.5 cm (30.48)
1 yard	=	3 feet
1 yard	=	0.915 m
1 mile	=	1760 yards
1 mile	=	1.6 km
1 kg	=	2.2 lbs
1 litre	=	1.06 quarts (US)

1 gallon (US)= 3.79 litres

[1 gallon (UK)=4.55 litres]

The Imperial System of Units

UNIT	QUANTITY MEASURED (circle one)	REPRESENTATIVE EXAMPLE or REFERENT (a comparison you could use)	3 EXAMPLES OF OBJECTS YOU WOULD MEASURE USING THIS UNIT
INCH	MASS? VOLUME? (DISTANCE?)	she grew 5 inches over the summer	1. Height 2. Food/sandwiches 3. wood to build house
FOOT	MASS? VOLUME? (DISTANCE?)	The boy is 6ft tall.	1. Height 2. Houses 3. Length of pool
YARD	MASS? VOLUME? (DISTANCE?)	He ran 10 yards in the football game.	1. Football 2. Farming 3. soccer?
MILE	MASS? VOLUME? (DISTANCE?)	You drive 10 miles	1. Driving 2. Running 3. Travelling
GALLON	MASS? (VOLUME?) DISTANCE?	The large plastic jug of milk at the grocery store.	1. Gas 2. Drinks (e.g. milk) 3. pool

Converting Between Units Within the Imperial System

Conversion Factor: Multiplying or dividing by this number allows us to convert from one unit to another.

Eg. Convert 57 inches to feet.

$$57 \text{ inches} \times \frac{1 \text{ foot}}{12 \text{ inches}} = \frac{57}{12} \text{ feet}$$

$4\frac{9}{12} = 4\frac{3}{4}$ feet

Use the numbers in the table on page 5.

$$\frac{1 \text{ foot}}{12 \text{ inches}}$$

The unit on top is the one you are converting to!

One Unit Conversions

Convert the following. Answer in exact form (fraction or non-rounded decimal).

1. 3 yd. = 9 feet.
   $3 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} = 9 \text{ ft}$
2. 15 yd. = 45 feet.
   $\frac{15 \text{ yd}}{1} \times \frac{3 \text{ ft}}{1 \text{ yd}} = 45 \text{ ft}$
3. 12.5 yd. = 37.5 feet.
4. 12 ft. = 4 yards.
5. 2.25 ft. = 27 inches.
   $2.25 \text{ ft.} \times \frac{12 \text{ in}}{1 \text{ ft}} = 27 \text{ in}$
6. 136 ft. = $\frac{136}{3}$ yards.
7. 8 ft. = 96 inches.
   $\frac{8 \text{ ft}}{1} \times \frac{12 \text{ in}}{1 \text{ ft}} =$
8. 2.75 ft. = 33 inches.
   $\frac{2.75 \text{ ft}}{1} \times \frac{12 \text{ in}}{1 \text{ ft}} =$
9. 4.8 ft = 57.6 inches.
10. 36 in. = 3 feet.
    $\frac{36 \text{ in}}{1} \times \frac{1 \text{ ft}}{12 \text{ in}} = 3$
11. 140 in. = $\frac{35}{3}$ feet.
    $\frac{140}{12} = \frac{70}{6} = \frac{35}{3}$
12. 2016 in = 168 feet.
13. 2 mi. = 3520 yards.
    $2 \times 1760 = 3520$
14. 4.2 mi. = 22176 feet.
    $4.2 \times 5280 = 22176$
15. 1500 yd. = $\frac{75}{88}$ miles.
    $\frac{1500}{1760} \rightarrow \frac{150}{176} = \frac{75}{88}$
16. 5250 yd. = 189000 inches.
    $5250 \times 36 = 189000$
17. 160 oz. = 10 pounds.
    $160 \div 16 = 10$
18. 220oz. = 13.75 pounds.
    $\frac{220}{16} = \frac{55}{4} = 13.75$
19. 4 lb. = 64 ounces.
    $4 \times 16 = 64$
20. 2.25 lb. = 36 ounces.
    $2.25 \times 16 = 36$
21. 6000 lb. = 3 tons.
    $\frac{6000}{2000} = 3$
22. Mr.S placed 32 yard sticks end to end across his front yard. Find the width of his yard in feet.
    $\frac{32 \text{ yds}}{1} \quad \frac{3 \text{ ft}}{1 \text{ yd}} =$ 96 ft
23. Maisy can fit 8 blocks of butter in her backpack. Butter is sold in 1 pound blocks. How many ounces does Maisy carry?
    $\frac{8 \text{ lbs}}{1} \times \frac{16 \text{ oz}}{1 \text{ lb}} =$ 128 oz

24. Auntie Dee is making a frame for a photograph. The outer dimensions are 3 ft. by 5 ft. How many inches of frame must she purchase?

3ft + 5ft + 3ft + 5ft = 16 ft

$\frac{16\text{ ft}}{1} \times \frac{12\text{ in}}{1\text{ ft}} =$ 192 in.

25. Mr. J wants to update his living room with crown moulding. The room is rectangular and measures 180 in. by 260 in. Moulding is sold by the foot and costs $2.19 per linear foot. What is the cost of moulding required (not including any taxes)?

880 ft = $73\frac{1}{3}$ ft → 74 ft × $2.19 = $162.06

Convert each of the following measurements to the indicated units.

26. 140 feet to yards and feet.

Recall: 3 yd = 1 ft

$140\text{ ft} \times \frac{1\text{ yd}}{3\text{ ft}}$

$= \frac{140}{3}\text{ yd}$

$= 46\frac{2}{3}\text{ yd}$

140 ft = 46yd and 2 ft.

27. 256 feet to yards and feet.

$\frac{256\text{ ft}}{1} \times \frac{1\text{ yd}}{3\text{ ft}}$

$= 85\frac{1}{3}$ yd

$\frac{1}{3} \times \frac{3}{1} = 1$ ft

256 ft = 85yd and 1ft

28. 356 inches to yards, feet and inches

$\frac{356\text{ in}}{1} \quad \frac{1\text{ yd}}{36\text{ in}} = \frac{356}{36}\text{ in} = 9\frac{32}{36} = 9\frac{8}{9}\text{ yd}$

$\frac{8\text{ yd}}{9} \times \frac{3\text{ ft}}{1\text{ yd}} = \frac{8}{3}\text{ ft} = 2\frac{2}{3}\text{ ft}$

$\frac{2\text{ ft}}{3} \times \frac{12\text{ in}}{1\text{ ft}} = 8\text{ in}$

9yd, 2ft, 8in

29. 142 inches to feet and inches.

$\frac{142\text{ in}}{1} \times \frac{1\text{ ft}}{12\text{ in}} = \frac{71}{6}\text{ ft} = 11\frac{5}{6}\text{ ft}$

$\frac{5\text{ ft}}{6} \times \frac{12\text{ in}}{1\text{ ft}} = 10\text{ in}$

11 ft, 10 in.

30. 204 inches to yards and feet.

$\frac{204\text{ in}}{1} \times \frac{1\text{ yd}}{36\text{ in}} = \frac{17}{3}\text{ yd} = 5\frac{2}{3}\text{ yd}$

$\frac{2\text{ yd}}{3} \times \frac{3\text{ ft}}{1\text{ yd}} = 2\text{ ft}$

5 yd, 2 ft

31. 84260 ounces to tons, pounds and ounces.

$\frac{84260\text{ oz}}{1} \times \frac{1\text{ lb}}{16\text{ oz}} = 5266\frac{1}{4}\text{ lb}$

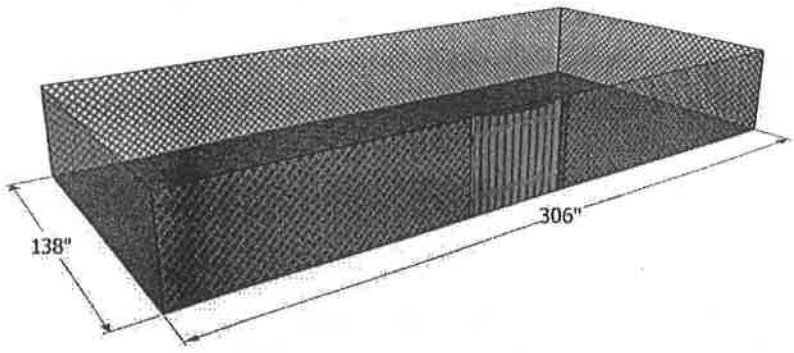
$\frac{21065\text{ lb}}{4} \times \frac{1\text{ ton}}{2000\text{ lb}} = 2\frac{1013}{1600}\text{ ton}$

$\frac{1013\text{ ton}}{1600} \times \frac{2000\text{ lb}}{1\text{ ton}} = 1266\frac{1}{4}\text{ lb}$

$\frac{1}{4}\text{ lb} \times \frac{16\text{ oz}}{1\text{ lb}} = 4\text{ oz}$

2 ton, 1266 lb, 4oz

32. Shelby the French Bull Dog needs an outdoor area to run. Ben plans on building her the pen below. The fencing material is sold by the linear foot but his measuring tape only shows inches. How many feet will he need to purchase?



888 inches

$\frac{888\text{ in}}{1} \times \frac{1\text{ ft}}{12\text{ in}}$

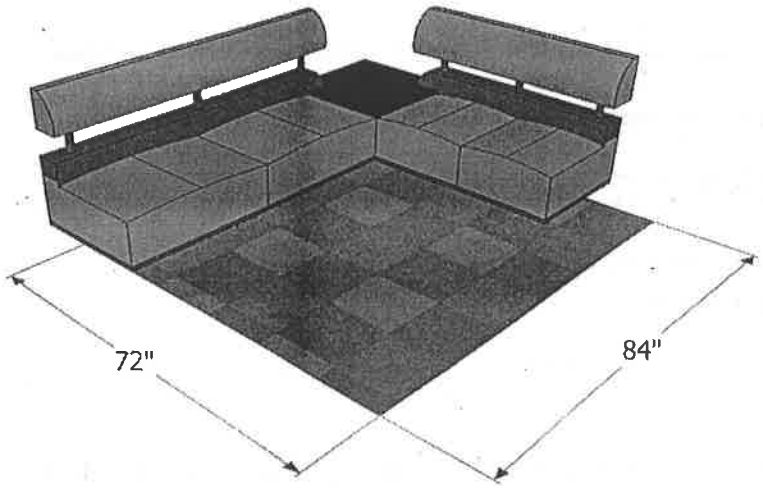
74ft

33. Convert your answer above to yards, feet and inches.

$\frac{74\text{ ft}}{1} \times \frac{1\text{ yd}}{3\text{ ft}} = 24\frac{2}{3}\text{ yd}$

$\frac{2\text{ yd}}{3} \times \frac{3\text{ ft}}{1\text{ yd}} = 2\text{ ft}$: 24 yd and 2 ft

34. What are the dimensions of the rectangular carpet below in feet?



$\frac{72\text{ in}}{1} \times \frac{1\text{ ft}}{12\text{ in}} = 6\text{ ft}$

$\frac{84\text{ in}}{1} \times \frac{1\text{ ft}}{12\text{ in}} = 7\text{ ft}$

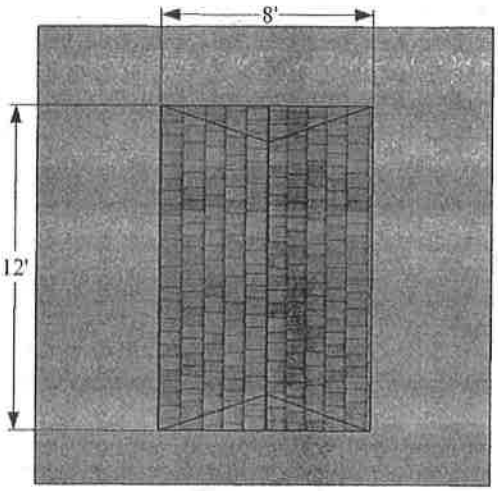
6' x 7'

35. If the carpet is sold for $4.25 per square foot, what is the cost of carpet required? Include 12% tax.

$6' \times 7' = 42' \times \$4.25 = \$178.50$

$\$178.50 \times 0.12 = \$21.42 \rightarrow \$178.50 + \$21.42 =$ **$199.92**

36. What is the perimeter of the garden shed in yards and feet?



$8' + 12' + 8' + 12' = 40'$

$\frac{40\text{ ft}}{1} \times \frac{1\text{ yd}}{3\text{ ft}} = 13\frac{1}{3}\text{ yd}$

$\frac{1\text{ yd}}{\frac{1}{3}} \times \frac{3\text{ ft}}{1\text{ yd}} = 1\text{ ft}$

13 yd and 1 ft

$\div 1/3$ $\div 1/3$

$\frac{1}{3} \times \text{total} = 96\text{ sq. ft}$

$\text{total} = 288\text{ sq. ft}$

37. The shed covers one-third of the area of the yard. How many square feet of sod (grass) are shown in the yard above?

$\frac{1}{3} = \frac{\text{Shed}}{\text{yard}}$ $\frac{2}{3} = \frac{\text{grass}}{\text{yard}}$

$12' \times 8' = 96\text{ sq ft} \rightarrow 96^{\text{sq ft}} \div (\tfrac{1}{3}) = 288^{\text{sq ft}} - 96^{\text{sq ft}} =$ **192 sq ft**

38. Sod-Warehouse sells sod by the roll. Each roll is 1 foot wide and 4 feet long. Each roll sells for $2.75. what is the cost (including 12% tax) to buy sod for the yard?

$192\text{ sq ft} \div 4\text{ sq ft} = 48 \times \$2.75 = \$132 \times 0.12 = \$15.84$

$\$132 + \$15.84 =$ **$147.84**

Two Unit Conversions {Be comfortable working in fraction form and always reduce.}

You will need to use TWO conversion factors. Simply follow the steps for one unit conversions, then repeat.

Eg. Convert 58 inches to yards.

① $58\ inches \times \frac{1\ foot}{12\ inches} = \frac{58}{12}\ feet$

② $\frac{58}{12}\ feet \times \frac{1\ yard}{3\ feet} = \frac{58}{36} yards$

$= 1\frac{22}{36}\ yards = 1\frac{11}{18}\ yards$

Conversion Factors:

Step ① $\frac{1\ foot}{12\ inches}$ Step ② $\frac{1\ yard}{3\ feet}$

The unit on top is the one you are converting to!

39. 6025 feet = $1\frac{745}{1056}$ miles

6025 feet $\times \frac{1\ yard}{3\ feet} = \frac{6025}{3}$ yards

$\frac{6025}{3}$ yards $\times \frac{1\ mile}{1760\ yards} = \frac{6025}{5280}$ miles

$1\frac{745}{5280} = 1\frac{149}{1056}\ miles$

40. 123450 feet = 23.38 miles

$\frac{123450\ ft}{1} \times \frac{1\ yd}{3\ ft} \times \frac{1\ mi}{1760\ yd}$

$= 23.38 miles$

41. $2\frac{1}{2}$ miles = 158400 inches.

$\frac{2.5\ mi}{1} \times \frac{1760\ yd}{1\ mi} \times \frac{3\ ft}{1\ yd} \times \frac{12\ in}{1\ ft}$

$= 158400 inches$

42. 3.25 yards = 117 inches

$\frac{3.25\ yd}{1} \times \frac{36\ in}{1\ yd}$

$= 117\ in$

43. $15\frac{2}{3}$ yards = 564 inches

$\frac{47}{3}$ yd $\times \frac{3\ ft}{1\ yd} \times \frac{12\ in}{1\ ft} = \frac{(47)(3)(12)}{3}$ inches

$= 564$ inches

Note:
I combined both steps into one equation here.

44. $24\frac{1}{3}$ yards = 876 inches

$\frac{73\ yd}{3} \times \frac{36\ in}{1\ yd} = 876\ in.$

45. A cabinet maker is using 1"x3" edge grain fir to make some cabinet doors. He purchased $42\frac{2}{3}$ yards on Craig's list. How many inches did he buy?

Convert $42\frac{2}{3}$ yd to in.

$\frac{128\ yd}{3} \times \frac{3\ ft}{1\ yd} \times \frac{12\ in}{1\ ft}$

$= 1536\ in.$

46. Gary is building picture frames to sell in a market. He has 75 yards of material and will make square frames with side lengths of 14 inches. How many frames can he make?

$\frac{75\ yd}{1} \times \frac{36\ in}{1\ yd} = 2700\ in \div 56 = 48$ frames

$14 \times 4 = 56$

Mr.J's measuring wheel clicks once for every yard it travels. On a walk to school, the wheel clicks 35200 times.

47. How many inches does he walk?

$35200 \times 36 = 1\,267\,200\ in$

48. How many miles?

$\frac{35200\ yd}{1} \times \frac{1\ mile}{1760\ yd} = 20$ miles

49. **A piece of paper is folded in half repeatedly. The paper has a thickness of $\frac{1}{250}$". How many yards thick will the paper be after 20 folds?

$\frac{1}{250} \times 2^{20} = 4194.30423\ in \times \frac{1\ ft}{12\ in} \times \frac{1\ yd}{3\ ft}$

$= 116.\ yd$

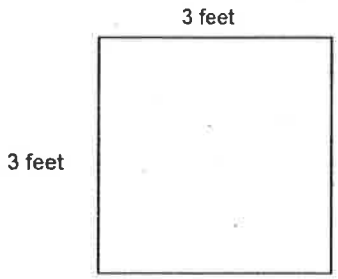
① $\frac{1}{250} \times 2 \quad 2 = 2^1$

② $\frac{1}{250} \times 4 \quad 4 = 2^2 \quad \frac{1}{250}" \times 2^{20}$

③ $\frac{1}{250} \times 8 \quad 8 = 2^3$

Conversions with Non-linear Measurements.

$\frac{144 in^2}{1 ft^2}$



50. How do you calculate the area of a square?

L x W

51. What is the area of the square to the left in square-feet?

3 ft x 3 ft = 9 ft²

52. What is the side length of the square in inches?

3 ft x 12 = 36 in

53. What is the area in square inches?

36 in x 36 in = 1296 sq in.

54. To convert the area of a figure from square feet to square inches, what calculations must you perform?

$\frac{9 ft^2}{1} \times \frac{12 inches}{1 ft} \times \frac{12 inches}{1 ft} = 1296 in^2$

★ Multiply by $(12)^2$ ★

55. A rectangular plot of land has dimensions of 0.5 miles by 0.4 miles. What is the area in ft²?

0.5 x 0.4 miles = 0.2 miles²

$\frac{1 miles^2}{5} \times \frac{5280 ft}{1 mile} \times \frac{5280 ft}{1 mile}$

= 5575680 ft²

56. To convert the area of a figure from square miles to square feet, what calculations must you perform?

★ Multiply by $(5280)^2$ ★

57. A pizza has an area of 1.5 ft². If the pizza is to be sliced into six equal slices, how many square inches is each slice?

$\frac{3 ft^2}{2} \times \frac{12 in}{1 ft} \times \frac{12 in}{1 ft} = \frac{216 in^2}{6}$

= 36 in²

58. A circular carpet has an area of 100π ft² (approximately 314 ft²). What is the length of the radius in inches?

$A = \pi r^2$

$A = \pi r^2$

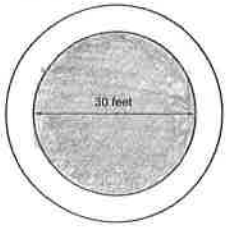
$\frac{100\pi}{\pi} = \frac{\pi r^2}{\pi}$

$100\pi ft^2$

$10 ft^2 = r^2$; $r = 10 ft$

$\frac{10 ft}{1} \times \frac{12 in}{1 ft} = 120 in$

59. The cross-section of a concrete underground pipe is shown below. Calculate the area of the inner (open) part of the pipe to the nearest in².



$A = \pi r^2$

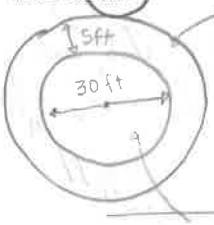
$A = \pi (15)^2$

$A = 225\pi = 706.8583471$

$\times (12)^2$

= 101 788.5 in²

60. The pipe in the previous question has concrete walls that are 5 feet thick. Calculate the cross-sectional area of concrete to the nearest in².



r = 20 ft

$A = \pi r^2$

$A = \pi (20)^2$

$A = 1256.637061 ft^2$

$A = \pi r^2$

$A = \pi (15)^2$

$A = 706.8583471 ft^2$

$A_T - A_i = 549.8 ft^2$

$\frac{549.7787944 ft^2}{1} \times \frac{144 in^2}{1 ft^2}$

= 79 168 in²

✓

The International System of Units (SI)

UNIT	QUANTITY MEASURED	REPRESENTATIVE EXAMPLE	3 EXAMPLES OF OBJECTS YOU WOULD MEASURE USING THIS UNIT
Milligram	(MASS?) VOLUME? DISTANCE?	ONE GRAIN OF SALT	1. grain of sugar 2. grain of sand 3. medication
Gram	(MASS?) VOLUME? DISTANCE?	ONE PAPER CLIP	1. mushroom 2. letter 3. piece of cheese
Kilogram	(MASS?) VOLUME? DISTANCE?	ONE PINEAPPLE	1. big delivery box 2. cement 3. luggage
Millilitre	MASS? (VOLUME?) DISTANCE?	$\approx \frac{1}{3}$ or $\frac{1}{2}$ TSP.	1. drop of water 2. eye drop 3. drop of food dye
Litre	MASS? (VOLUME?) DISTANCE?	ONE BOTTLE OF POP	1. carton of milk 2. pitcher of juice 3. shampoo
Millimetre	MASS? (VOLUME?) DISTANCE?	LENGTH OF FINGERNAIL	1. thickness of paper clip 2. thickness of iphone 5® 3. width of Twizzler®
Centimetre	MASS? VOLUME? (DISTANCE?)	LENGTH OF FINGER	1. length of pencil 2. length of hair 3. thickness of arm
Metre	MASS? VOLUME? (DISTANCE?)	TRACK RACES	1. distance from desk to board 2. height of giraffe 3. length of car
Kilometre	MASS? VOLUME? (DISTANCE?)	FROM HOUSE TO SCHOOL	1. from Victoria to L.A. 2. from house to mall 3. airplane ride (distance travelled)

Converting Between Units in the Metric System (SI)

Conversion Factor: Multiplying or dividing by this number allows us to convert from one unit to another.

Eg. Convert 230 mm to cm.

$$230\ mm \times \frac{1\ cm}{10\ mm} = 23\ cm$$

Use the numbers in the table on page 5.

$$\frac{1\ cm}{10\ mm}$$

The unit on top is the one you are converting to!

Metric conversions can be made by moving the decimal left or right. Imperial conversions cannot

One Unit Conversions

Convert the following. Answer to the nearest tenth when necessary.

61. 1250 mm = 125 cm

$1250\ mm \times \frac{1\ cm}{10\ mm} = 125\ cm$

Or...simply move the decimal one place to the left.

62. 37.25 m = 0.4 cm

63. 0.8 cm = 8 mm.

64. 138 m = 138 000 mm

65. 1508 cm = 15.1 m

66. 3.28 cm = 32.8 mm

67. A circle has a radius of 10 cm. Find the circumference of the circle in millimetres.

$C = 2\pi r$

$C = 2\pi(10)$

$C = 62.83185\ cm$

$\times 10$

$= 628.3\ mm$

not squared??

68. A farmer builds a fence around a rectangular sheep pen. The pen is 5 metres long and 7 metres wide. What is the perimeter of the pen in centimetres?

$5 + 7 + 5 + 7 = 24\ m$

$24m \times 100 = 2400\ cm$

69. Find the height of a triangle with a base of 12 cm and an area of 75 cm². Answer in millimetres.

$A\Delta = \frac{bh}{2}$ $\quad 2\left(\frac{12cm\,h}{2}\right) = (75cm^2)2$

$\frac{12cm\,h}{12cm} = \frac{150cm^2}{12cm}$

$h = 12.5cm \times 10$

$125\ mm$

Two (or three) Unit Conversions

Use two conversion factors to make necessary conversions. Round to the nearest tenth of a unit if necessary.

70. Convert 3.45 m to mm.

3450 mm

71. Convert 12.357 km to m.

12357 m

72. Convert 176 mm to m.

0.176 m

0.2 m

73. Convert 1.365 km to mm.

1 365 000 mm

74. Convert $17\frac{1}{5}$ m to mm.

17.2 × 100 × 10

= 17200 mm

75. Convert $\frac{3}{4}$ km to cm.

0.75 × 1000 × 100

75 000 cm

76. The poliovirus is about 30 **nanometers** in diameter. That is 0.000 000 030 m. How many millimetres in diameter is the virus.

0.00003 mm

77. The Great Wall of Ming Dynasty in China has been measured to be 8851.8 km long. Approximately how many centimetres is this?

885 180 000 cm

78. A standard volleyball court is 18 m long and 9 m wide. Find the area in square millimetres.

18 m = 18000 mm

9 m = 9000 mm

18000 mm × 9000 mm

= 162 000 000 mm²

79. 2 m + 30 cm + 4 mm

2000 mm + 300 mm + 4 mm

= 2304 mm

80. 1.35 km + 125 m + 40 cm

1350 m + 125 m + 0.4 m

= 1475.4 m

81. 1.35 km + 125 m + 120 mm

135 000 cm + 12 500 m + 12 cm

= 147512 cm

Unit Conversion **between** Systems

One-Step Conversions:

Use the table on page 5. Write the conversion factors as a ratio (watch the units!).

Convert each of the following. Round to the nearest tenth.

82. 50 mi= 80.5 km

Use : $\frac{1.609\ km}{1\ mi}$ (from reference page)

$$50\ mi \times \frac{1.609\ km}{1\ mi} = 80.45\ km$$

$$\cong 80.5\ km$$

83. 185 lb = 84.1 kg

$\frac{185\ lb}{1} \times \frac{1\ kg}{2.2\ lb} = 84.1$

84.0?

84. 150 m= 163.9 yd

$\frac{150\ m}{1} \times \frac{1\ yd}{0.915\ m} = 163.9\ yd$

85. 72 in= 182.9 cm

$\frac{72\ in}{1} \times \frac{2.54\ cm}{1\ in}$

182.88 cm

86. *42 oz* = 1190.7 *g*

$\frac{42\ oz}{1} \times \frac{28.35\ g}{1\ oz}$

1190.7g

87. 1245 km= 778.1 mi

$\frac{1245\ km}{1} \times \frac{1\ mile}{1.6\ km}$

778.125 miles

??

Two-Step or Three-Step Conversions:

Convert each of the following. Round to the nearest tenth.

88. 42km= 137824.7 ft

① Convert from km→mi
② Convert from mi → ft

$$42km \times \frac{1\ mi}{1.609km} \times \frac{5280\ ft}{1mi}$$

$$\cong 137824.7\ ft$$

89. 54m = 2126.0 in

$54m \times 100 = 5400cm$

$\frac{5400\ cm}{1} \times \frac{1\ in}{2.54\ cm}$

2125.98 in

2126.0 in

90. 1250 g= 2.8 lb

$1250g \div 1000 = 1.25kg$

$\frac{1.25\ kg}{1} \times \frac{2.2\ lb}{1\ kg} = 2.75\ lb$

91. Answer the question above using a different conversion strategy.

$42 \times 1000 = 42000\ m$

$\frac{42000\ m}{1} \times \frac{1\ ft}{0.3048\ m}$

137795.3 ft

92. 4.25km = 167322.8 in

$4.25km = 425000cm$

$\frac{425000\ cm}{1} \times \frac{1\ in}{2.54\ cm}$

167322.8in

93. 1.3 tons = 1181.8 kg

$1.3 \times 2000 = 2600\ lbs$

$\frac{2600\ lb}{1} \times \frac{1\ kg}{2.2\ lb}$

1181.8 kg

Convert the following. Exact answers or round to the nearest hundredth when necessary.

94. *12 lbs 3 oz* = 5.53 *kg*

① Convert 3 oz to lbs.

$3\ oz \times \frac{1\ lb}{16\ oz} = 0.1875\ lb$

②Add: $12 + 0.1875 = 12.1875\ lb$

③ $12.1875\ lb \times \frac{0.454\ kg}{1\ lb} = 5.53\ kg$

95. *2 lbs 14 oz* = _____ *kg*

$\frac{2\text{lbs}}{1} \times \frac{16\text{oz}}{1\text{lb}} = 32\text{oz} + 14\text{oz} = 46\text{oz}$

$\frac{46\text{oz}}{1} \times \frac{28.35\text{g}}{1\text{oz}} \times \frac{1\text{kg}}{1000\text{g}}$

1.30 kg

96. *7 lbs 8 oz* = _____ *g*

$\frac{7\text{lbs}}{1} \times \frac{16\text{oz}}{1\text{lb}} = 112\text{oz} + 8\text{oz} = 120\text{oz}$

$\frac{120\text{oz}}{1} \times \frac{28.35\text{g}}{1\text{oz}}$

3402 g

(' feet (" = inches)

97. 12'6" = _____ m

$\frac{12\text{ft}}{1} \times \frac{12\text{in}}{1\text{ft}} = 144\text{in}$

144in + 6in = 150in

$\frac{150\text{in}}{1} \times \frac{2.54\text{cm}}{1\text{in}} = 381\text{cm}$

$\frac{381\text{cm}}{1} \times \frac{1\text{m}}{100\text{cm}} = 3.81\text{m}$

98. 8 yd 3' = 8.23 m

1ft = 0.3048m

$\frac{8\text{yd}}{1} \times \frac{3\text{ft}}{1\text{yd}} = 24\text{ft} + 3\text{ft} = 27\text{ft}$

$\frac{27\text{ft}}{1} \times \frac{0.3048\text{m}}{1\text{ft}} = 8.23\text{m}$

99. 14m 28 cm= _____ yd

$\frac{14\text{m}}{1} \times \frac{100\text{cm}}{1\text{m}} = 1400\text{cm} + 28\text{cm}$

$\frac{1428\text{cm}}{1} \times \frac{1\text{ft}}{30.48\text{cm}}$

$= \frac{46.85039370\text{ft}}{1} \times \frac{1\text{yd}}{3\text{ft}}$

= 15.62 yd

100. Answer the question above using a different conversion strategy.

n/a

101. Answer the question above using a different conversion strategy.

n/a

102. Answer the question above using a different conversion strategy.

n/a

103. A pizza has a circumference of 5 feet 3 inches. Find the diameter in centimetres.

$\frac{5\text{ft}}{1} \times \frac{12\text{in}}{1\text{ft}} = 60\text{in} + 3\text{in} = 63\text{in}$

$\frac{2\pi r}{\pi} = \frac{63}{\pi}$

$2r = d$

$d = 20.05352283\text{in} \times 2.54$

d = 50.9 cm

★don't use 3.14, use π★

104. A volleyball has a diameter of 2 feet 2 inches. Find the circumference of the ball at its widest point. Answer to the nearest inch.

2ft × 12 = 24in + 2 = 26in

26in ÷ 2 = 13in

$C = 2\pi r \rightarrow C = 2\pi(13)$

C = 82 in

105. Mr. J needs 2m, 41 cm and 3 mm of edge grain fir to make each of his cabinet doors. How many linear feet does he need to make his 8 doors?

2m = 200cm

41cm = 41cm

3mm = 0.3cm

200 + 41 + 0.3 = 241.3 cm

241.3cm × 8 = 1930.4cm

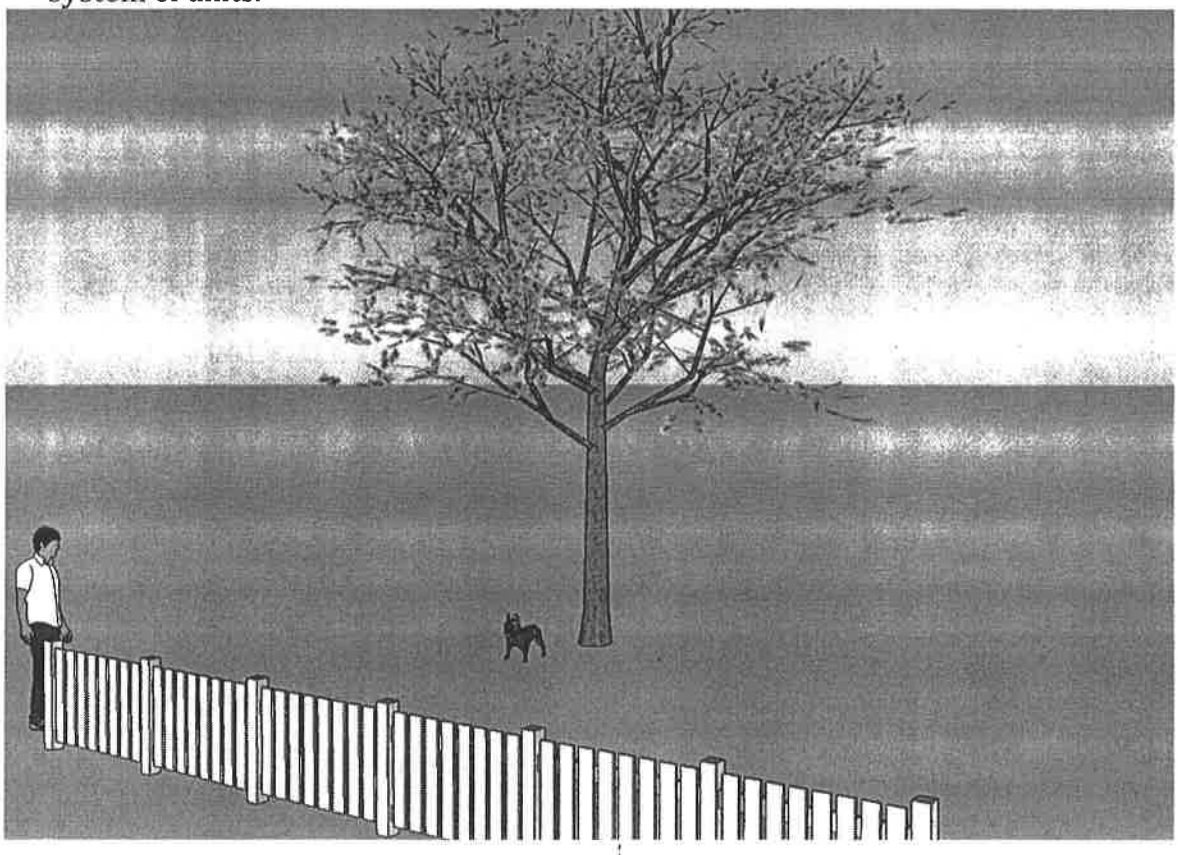
$\frac{1930.4\text{cm}}{1} \times \frac{1\text{ft}}{30.48\text{cm}}$

63.33ft

★don't round until end★

Estimation

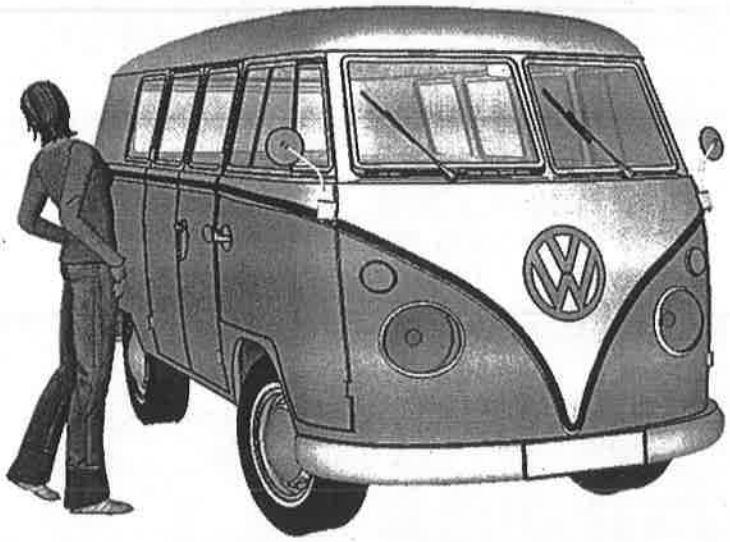
106. For the list following the diagram, estimate a *reasonable* measurement for each system of units.



The International System of Units (SI)	The Imperial System of Units
Height of man: 1.5 - 2 m	Height of man: 6 ft
Height of dog: 30 cm	Height of dog: 12 in
Height of fence: 1 m	Height of fence: 39 in
Length of fence: 8 m	Length of fence: 26.3 ft
Height of tree: 20m	Height of tree: 65.8 ft
Circumference of tree base: 50 cm	Circumference of tree base: 19.7in
Width of fence post: 2mm	Width of fence post: 0.08 in
Distance from man to dog: 3m	Distance from man to dog: 9.9 ft

Estimation

107. For the list following the diagram, estimate a *reasonable* measurement for each system of units.



The International System of Units (SI)	The Imperial System of Units
Height of woman 1.5m 12.7cm	Height of woman: 5ft 5 in
Length of van: 3 m	Length of van: 9.9 ft
Height of van: 1.5 m	Height of van: 5 ft
Perimeter of one front window: 210 cm	Perimeter of one front window: 82.7 in
Circumference of tire: 280 cm	Circumference of tire: 110 in.
Diameter of VW symbol: 8 cm	Diameter of VW symbol: 3 in.

Tools of Measurement:

You are probably aware of the more common tools of measurement such as:
ruler, tape measure, scale, measuring cups/spoons

108. Using resources available to you, research and describe the following tools.

a. Calipers: (outside or inside)
Measure external and internal (small) lengths

b. Trundle Wheel:
(Q110) distance

c. Micrometer:
(Q112) thickness

d. Clinometer:
Measuring ∠ (angle) of indination.

109. Describe two methods you could use to measure the circumference of a concrete pillar.

1) use calipers
2) use micrometer

110. tool Trundle wheel

111. tool Calipers

112. tool Micrometer

111. tool n/a

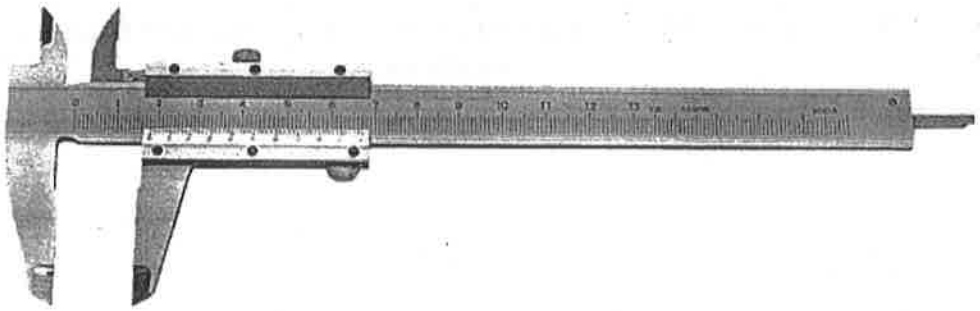
Tools for Measurement

Fill in the table below for tools used for measurement.

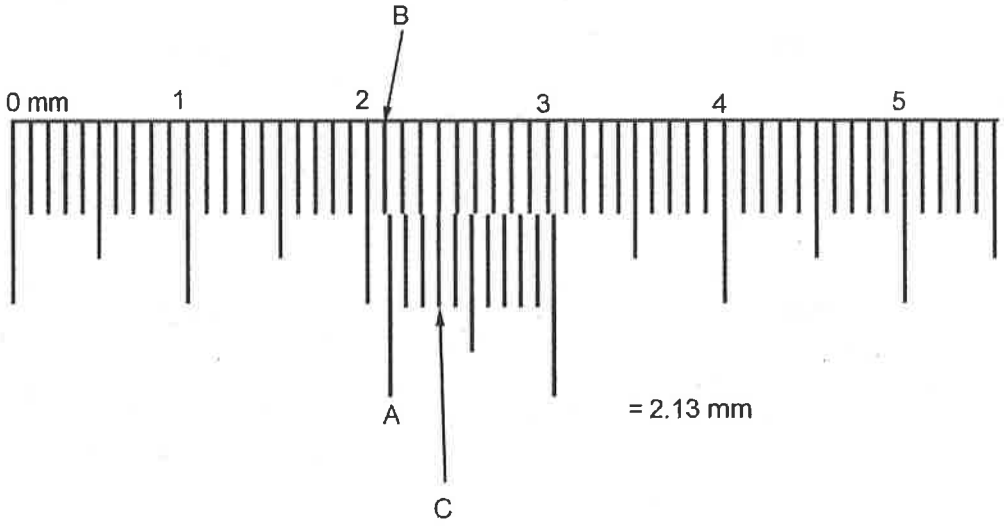
TOOL	TYPE OF MEASURE	POSSIBLE UNITS OF MEASURE	3 EXAMPLES OF USE
113. RULER	Distance	cm, mm, in.	- measuring arm length - measure hair length - interior design.
114. Trundle wheel	Distance	cm, in	- track - baseball (dist. from home to mound) - length of field
115. flasks/ beakers	Volume	mL, L	- compounds, etc. - potion - drinks
116. measuring cups	Volume	g	- dry ingredients (flour) - liquid - chocolate chips
117. balance Scale	Mass	lbs, g, kg	- money - ingredients - paper
118. electronic Scale	Mass	lbs, g, kg	- people (weight) - animals - food
119. VERNIER CALIPERS	distance	mm	- water bottle - pot hole - sharpener
120. ERLENMEYER FLASK	volume	mL, L	- mix chemicals - store chemicals - measuring out elements
121. MICROMETER	distance	fraction of m.	- thickness of metal of space shuttle - thickness of plastic on waterbottle - thickness of paper.

√

Vernier Calipers:



There are two scales (like sliding rulers).
Upper (main) scale allows us to read the measurement to the nearest tenth.
The lower (vernier) scale allows us to read the measurement to the nearest hundredth.



To read the Vernier Calipers:

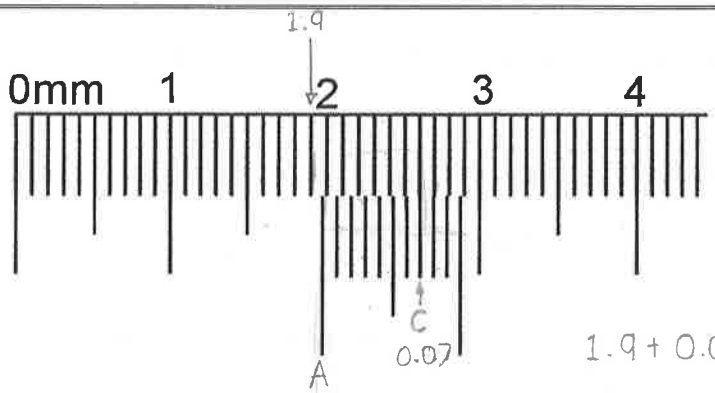
1) Read the Upper Scale. Find the measurement to the immediate left of MARK A.
   In the example above, The upper scale reads 2.1mm MARK B
2) Find the line in the lower scale that is best aligned with the top scale.
   The 3rd line matches best. This means 0.03 mm. MARK C
3) Put the two readings together to get a measurement of 2.13mm.

122. Observe the image at the top of this page. Why does the tool have two different sets of jaws?

To measure from one side to the other (which is how you measure diameter- which is what the tool measures)

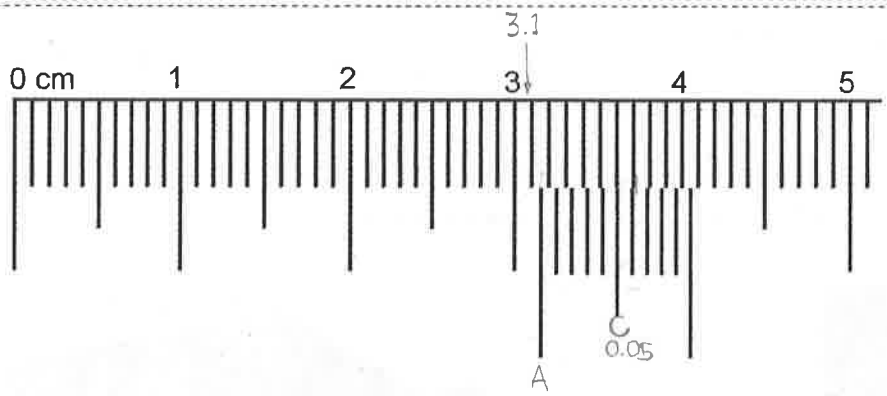
Read the following Vernier measurements to the nearest hundredth of a unit.

123.



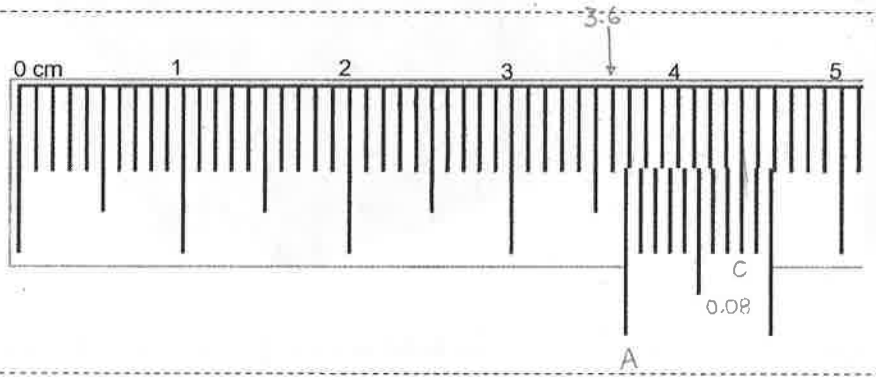
1.9 + 0.07 = 1.97 mm

124.



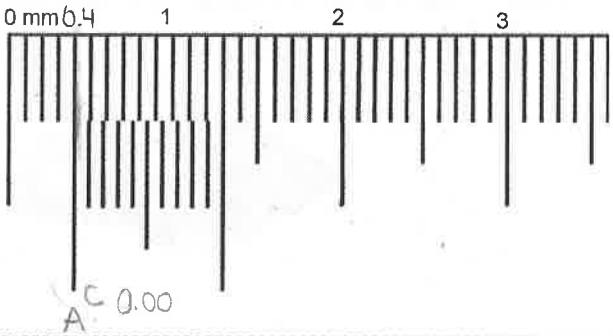
3.1 + 0.05 = 3.15 mm

125.



3.6 + 0.08 = 3.68 mm

126.



0.4 + 0.00 = 0.40 mm

Geometry of 3-D figures.

Familiarize yourself with the shapes, names and formulas at the beginning of this booklet.

Using the **reference page** at the beginning of this unit.

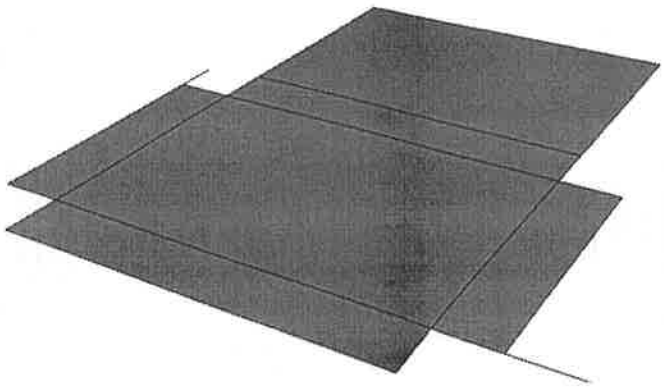
- Choose the right formula.
- Fill in all known values into the formula.
- Calculate (remember BEDMAS).

Surface Area

Area is the **two-dimensional** size of a surface. Consider the area that this booklet is covering on the surface below it (unless you are on a computer of course).

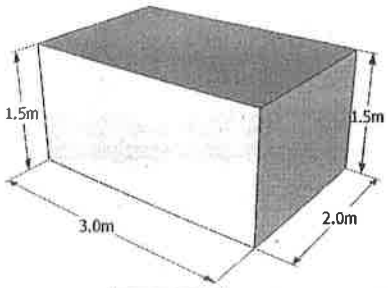
The **surface area** of a solid is the total area of its exposed surfaces.

Consider a common cereal box. If you unfolded the sides, top, bottom, front and back...how much area on your desk would it cover? That would be the surface area of the box.



127. Refer to page 5 to answer the following question.

Find the surface area of the rectangular prism below to the nearest square metre.



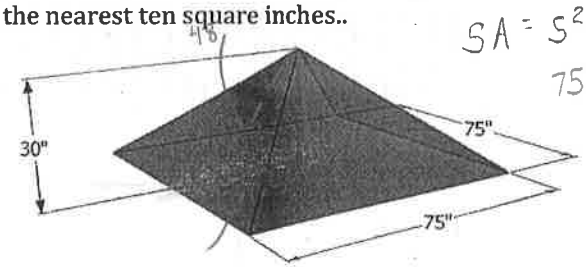
$2 \times$ [3m] $\times$ 1.5m $= 9m^2$

$2 \times$ [2m] $\times$ 1.5 m $= 6m^2$

$9 + 6 + 12 = 27m^2$

128. Refer to page 5 to answer the following question.

Find the surface area of the square pyramid below to the nearest ten square inches..



$SA = s^2 + 4\frac{bh}{2}$

$75^2 + 4\frac{(75)(48)}{2}$

$= 12825 in^2$

37.5 ($\frac{1}{2}$ of 75")

$a^2 + b^2 = c^2$

$37.5^2 + 30^2 = c^2$

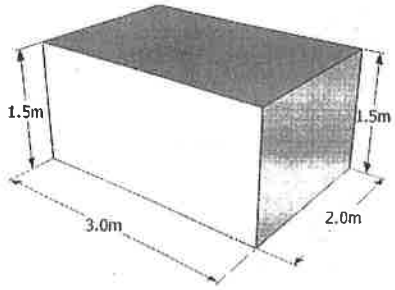
$2306.25 = c^2$

$c = 48.02343178$

$12825 in^2 \times \frac{1 ft}{12 in} \times \frac{1 ft}{12 in}$

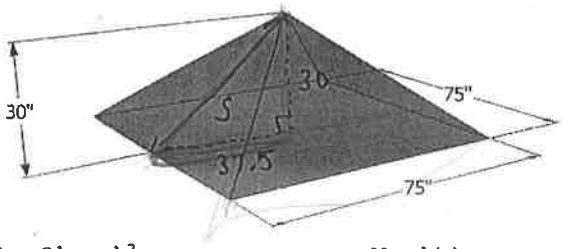
$89.0625 ft^2$

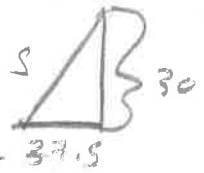
Find the surface area of the rectangular prism below to the nearest square metre.



$SA = 2(hl + lw + hw)$
$SA = 2[(1.5 \times 3) + (3 \times 2) + (1.5 \times 2)]$
$SA = 2[4.5 + 6 + 3]$
$SA = 27\ m^2$

Find the surface area of the square pyramid below to the nearest ten square inches..

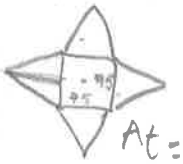




$A = 2bs + b^2$
$A = 2(75)(s) + (75)^2$

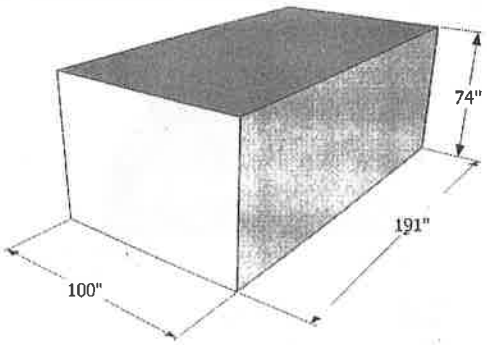
Need 's'
Use $a^2 + b^2 = c^2$
$37.5^2 + 30^2 = s^2$
$s = 48.0$

$A = 2(75)(48.0) + (75)^2$
$A \cong 12830$ sq in



Calculate the surface area of the following figures. Answers should be given as indicated.

129. Nearest square inch.



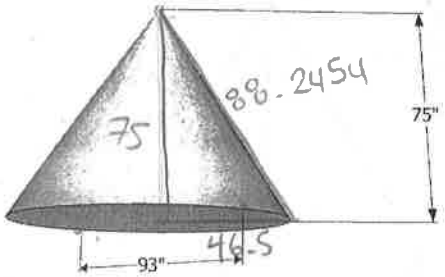
2 × 100 × 74 = 14800 in²

2 × 191 × 74 = 28268 in²

2 × 191 × 100 = 38200 in²

= 81268 in²

130. Nearest square inch.



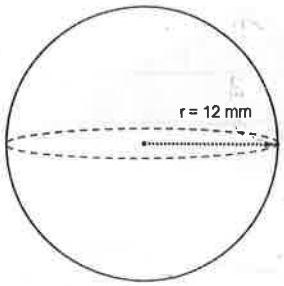
$A = \pi r^2 + \pi rs$

$A = \pi(46.5)^2 + \pi(46.5)(88.24539648)$

A = 19 684 sq in

Calculate the surface area of the following figures. Answers should be given as indicated.

131. Nearest square millimetre.



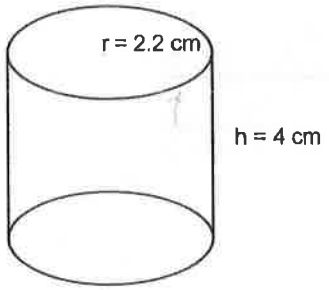
$SA = 4\pi r^2$

$SA = 4\pi(12)^2$

$SA = 1809.557368$ sq mm

SA: 1810 sq mm

132. Nearest square centimetre.



$SA = 2\pi r^2 + 2\pi rh$

$SA = 2\pi(2.2)^2 + 2\pi(2.2)(4)$

$SA = 85.70264759$ sq cm

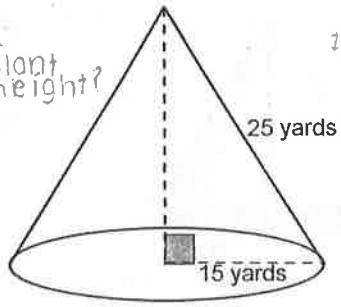
SA = 86 sq cm

133. Nearest square foot.

(circle) (cone wrapper)

$SA = \pi r^2 + \pi rs$

(s = slant height?)



1 yd = 3 ft

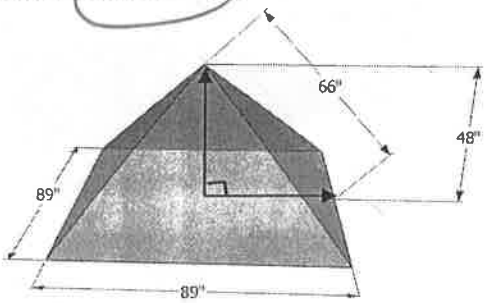
$1\text{ yd}^2 = 9\text{ ft}^2$

$SA = \pi(15)^2 + \pi(15)(25)$

$SA = 1884.955592$ sq yd $\times 9$

$SA = 16964.6$ sq ft → 16965 sq ft

134. Nearest square foot.



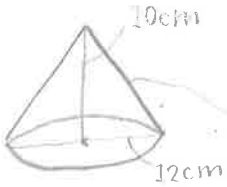
$SA = 2bs + b^2$

$SA = 2(89)(66) + 89^2$

$= 19669$ sq in $\div 144$

$= 136.5902778 =$ 137 sq ft

135. Calculate the surface area of a cone with a height of 10 cm and a base diameter of 12 cm. Answer to the nearest square centimetre.



$SA = \pi r^2 + \pi rs$

$s = a^2 + b^2 = c^2$

$10^2 + 6^2 = c^2$

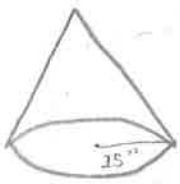
$136 = c^2 \rightarrow c = 11.66190379$ cm

$SA = \pi(6)^2 + \pi(6)(11.66190379)$

SA: 333 cm²

136. A cone has a base radius of 15 inches and a surface area of 1650 square inches. Find the slant height of the cone to the nearest inch.

$SA = 1650$ in²



$SA = \pi r^2 + \pi rs$

$1650\text{ in}^2 = \pi(15\text{ in})^2 + \pi(15\text{ in})s$

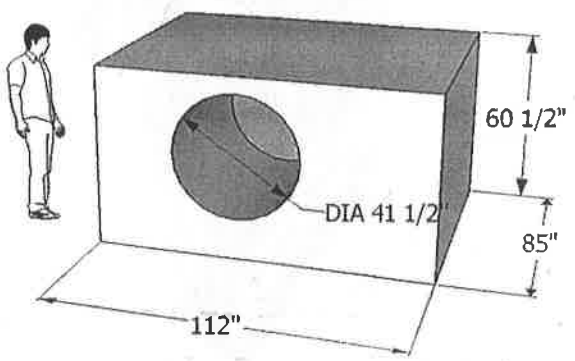
$1650\text{ in}^2 = \pi 225\text{ in}^2 + \pi(15)s$

$1650\text{ in}^2 = 706.8583471\text{ in}^2 + \pi(15)s$

$\frac{943\text{ in}^2}{\pi(15)} = \frac{\pi(15)s}{\pi(15)}$

20 in = s

137. Frank needs to find the surface area of the playground equipment below so he can estimate how much paint to buy. Explain the process he should use (he will not paint the bottom).



Explain 2 ends = 2(60.5)(85) =

1 top = 112(85) =

front + back = 2(112)(60.5) − 2π (20.75)² =

cylinder wrapper = 2π(20.75)(85) =

138. Find the surface area of the figure to the left to the nearest square inch.

2 ends = 10285 in²

1 top = 9520 in²

f + b = 10846.69603 in²

CW = 11081.96809

total = 41733.65839 in²

41734 sq in

139. One quart of paint (a small can) covers 87.5 sq ft. How many quarts will Frank need to buy?

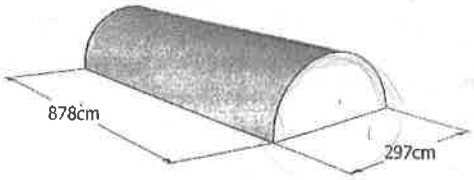
half of dia.

41734 sq in ÷ 144

= 289.8194444 ÷ 87.5

= 3.312 → 4 quarts

140. Find the surface area of the concrete curb below (all surfaces). Answer to the nearest square centimetre.



bottom = (878)(297) = 260766 cm²

circle = πr² → π(148.5)² = 69279.1866 cm²

C = 2πr = 2π(148.5) = 933.0530181 ÷ 2

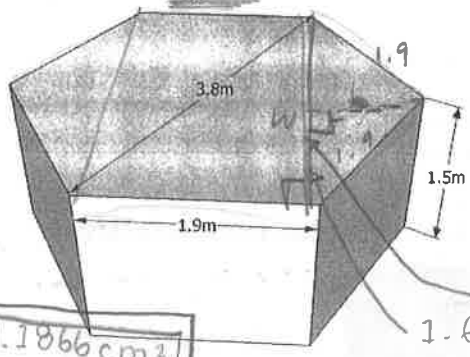
= 466.5265091

466.5265091 × 878 = 409610.275

SA = 739655.4616 sq cm

SA = 739655 sq cm

141. Calculate the surface area of the hexagonal prism (regular) to the nearest square metre.



$c^2 - b^2 = a^2$

$3.8^2 - 1.9^2 = a^2$

$\sqrt{10.83} = \sqrt{a^2}$

3.290896534 = a

1.645448267

6× 1.9m × 2.5m = 17.1m²

2× 1.9m × 3.290896534 = 12.50540683

$c^2 - b^2 = a^2$ → $1.9^2 - 1.645448267^2 = a^2$

$a^2 = 0.9025$ → $a = 0.95$

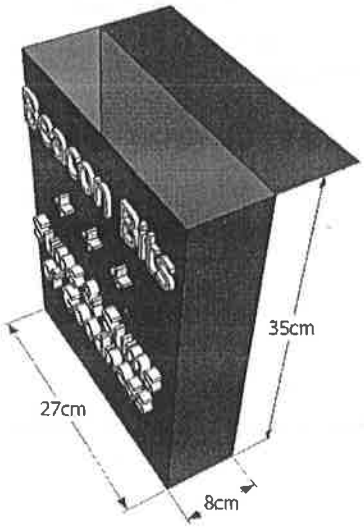
4× 0.95m × 1.645448267m = 6.252703415m

SA = 36m²

Volume

Volume is the amount of 3-dimensional space that a figure occupies or contains.

Consider the cereal box. The "amount" of Beacon Bits that fit inside the box is its volume. This is often refered to as the **capacity** of a container.

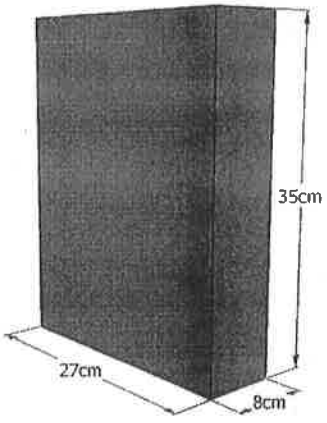


142. **Challenge**:
If each Beacon Bit is a cube 1 cm by 1 cm by 1cm, how many Bits would fit in the box?
Start by finding out how many would fit in the bottom layer.

$V = 35 \times 27 \times 8 = 7560\,cm^3$ (box)
$V = 1 \times 1 \times 1 = 1\,cm^3$ (Beacon Bit)
$7560\,cm^3 \div 1\,cm^3 =$ 7560 Beacon Bits

143. Refer to page 5 to answer the following question. $l \times w \times h$

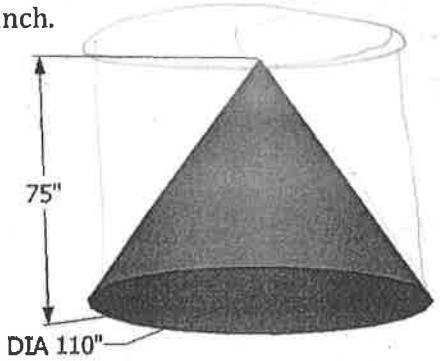
Find the volume of the box to the nearest cm^3.



$V = 27 \times 35 \times 8$
$V =$ $7560\,cm^3$

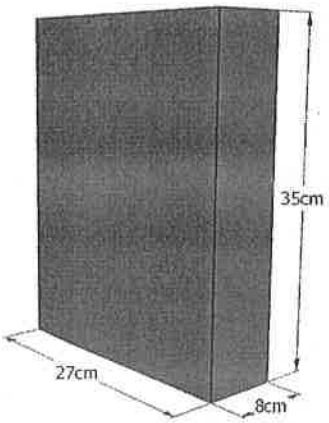
144. Refer to page 5 to answer the following question. $\frac{\pi r^2 h}{3}$

Find the volume of the cone to the nearest cubic inch.



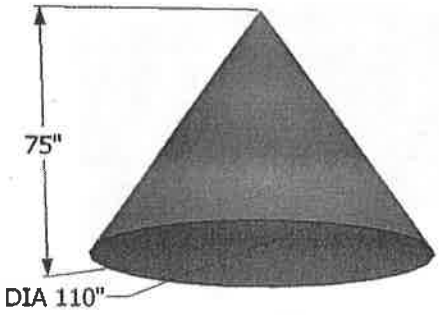
$V = \frac{\pi r^2 h}{3}$
$V = \frac{\pi (55)^2 (75)}{3}$
$V =$ $237583\,in^3$

Find the volume of the box to the nearest cm^3.



$V = lwh$
$V = (27)(8)(35)$
$V = 7560\ cm^3$

Find the volume of the cone to the nearest cubic inch.



$$V = \frac{1}{3}(\pi r^2)h$$
$$V = \frac{\pi(55)^2(75)}{3}$$
$$V = \frac{226875\pi}{3} = 75625\pi \cong 237583\ sq\ in$$

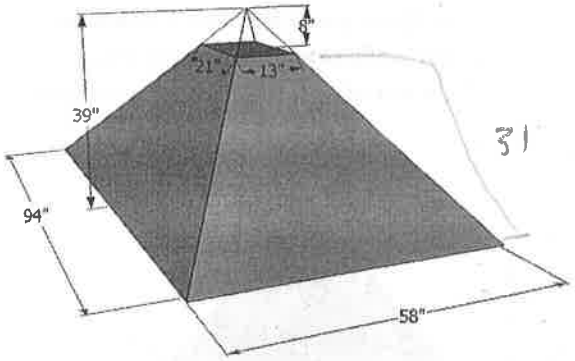
145. Using the formula for the volume of a rectangular prism, $V = lwh$, explain why the units for volume are "cubed".

B/c it is units (L) x units (w) x unit (h), and units x units x units makes units^3

146. Refer to page 5. Compare the formulas to calculate volume of right prisms, right cylinders, and triangular prisms. What do they all have in common?

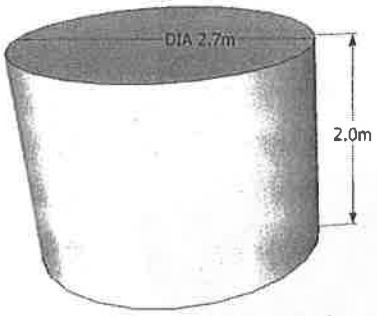
They are all base area x height [V = (Base area)h]

147. Timothy is building a garden water fountain in the shape of a "truncated" square pyramid. Describe **how** you would find the volume of concrete required to build this fountain.



Find volume of big square based pyramid ($V = \frac{1}{3}(94 \times 58)(39)$) then subtract cut out square-based pyramid ($V = \frac{1}{3}(21 \times 13)(8)$).

148. Find the volume to the nearest tenth of metre.

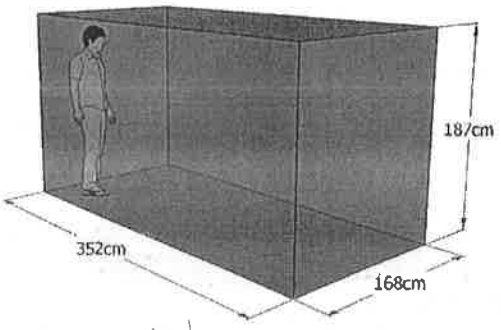


★not $2\pi r^2$ b/c not SA★

$V = (\text{Base Area})h$
$V = (\pi r^2)(h)$
$V = \pi(1.35)^2(2)$
$V = 11.45110522\ m^3$
$V = 11.5\ m^3$

Calculate the volume of the following figures. Answers should be given as indicated.

149. Cubic centimetres.

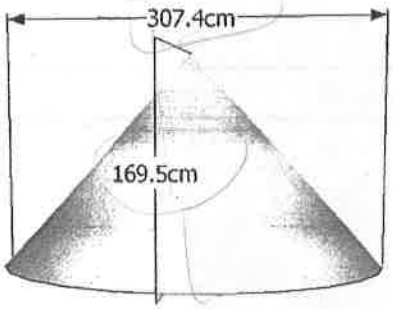


$V = l \times w \times h$

$V = 352 \times 168 \times 187$

$V =$ 11 058 432 cm^3

150. Cubic centimetres.

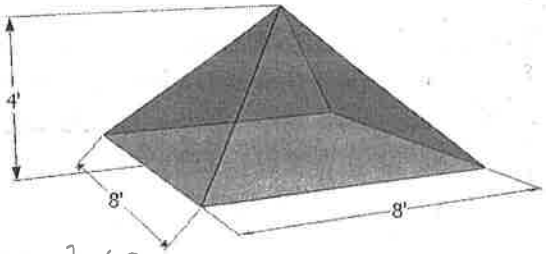


$V = \frac{1}{3}(\pi r^2)h$

$V = \frac{1}{3}(\pi \times 153.7^2)(169.5)$

$V =$ 4193 205 cm^3

151. Cubic feet.

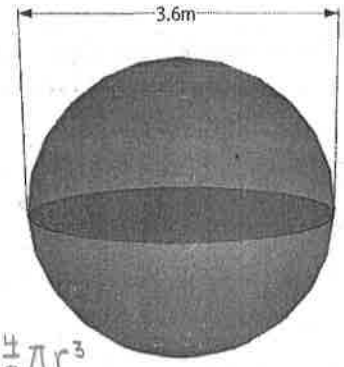


$V = \frac{1}{3}$ (Base Area) h

$V = \frac{1}{3}(8 \times 8)(4)$

$V =$ 85 ft^3

152. Cubic metres.

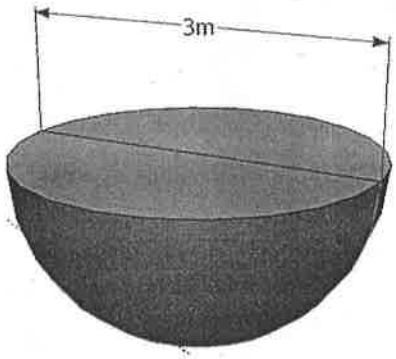


$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(1.8)^3 \rightarrow V =$ 24 m^3

Answer says 24.4 m^3

153. Nearest tenth of a cubic metre.

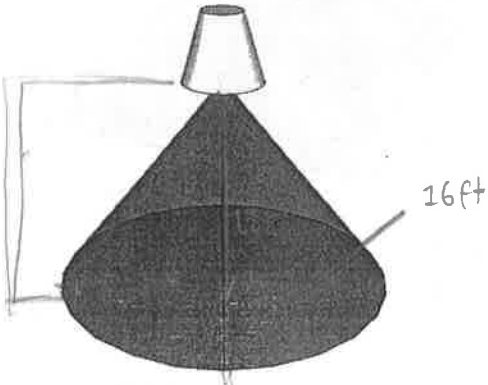


$V = \frac{2}{3}\pi r^3$

$V = \frac{2}{3}\pi(1.5)^3$

$V =$ 7.1 m^3

154. A spray nozzle produces a cone-shaped spray pattern. Find the volume of the cone if the nozzle is 12 feet above the ground and produces a circle with a diameter of 16 feet. (Nearest cubic foot)



$V = \frac{1}{3}(\pi r^2)h$

$V = \frac{1}{3}(\pi \times 8^2)(12)$

$V =$ 804 ft^3