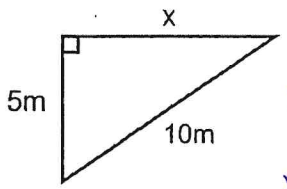
In this warm-up Mr. Smith has given you a mixture of problems from various units. We will still be reviewing these units, don't worry. But you should be able to work through these now with your seat partners.

SOH CAH TOA

1) Find the indicated side in the first triangle, and indicated angle in the second triangle.

a) Use PT



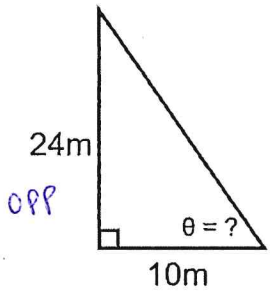
$x^2 = 10^2 - 5^2$

$x^2 = 100 - 25$

$x^2 = 75$

$x \doteq 8.7\text{m}$

b) Use $\tan\theta = \frac{opp}{adj}$



OPP

ADJ

$\tan\theta = 24/10$

$\tan\theta = 2.4$

$\theta = \tan^{-1}(2.4)$

$\theta = 67.4°$

2) Perform the following conversions. Mr. Smith has set the first one up for you, for the second, there are 2.54 cm in one inch.

a) 24 ft **to** in.

$$\frac{feet}{inches} = \frac{1}{12} = \frac{24}{x}$$

$x = 12 \times 24 \div 1$

$x = 288$ inches.

b) 72 inches to cm.

$$\frac{inches}{cm} = \frac{1}{2.54} = \frac{72}{x}$$

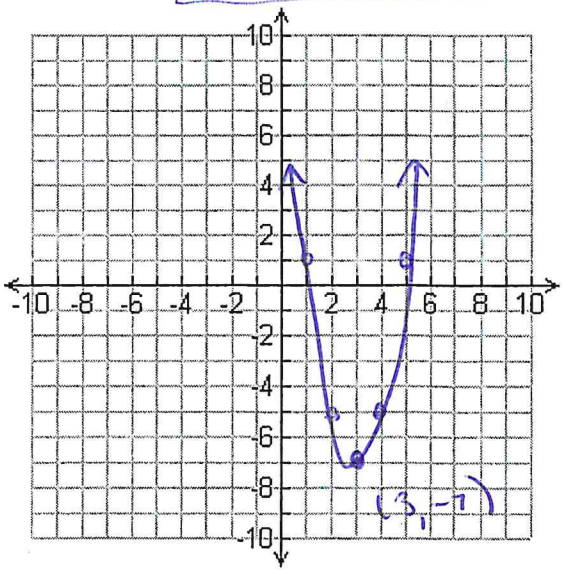
$x = 2.54 \times 72 \div 1$

$x = 182.88\text{cm}$

3) Sketch the parabola $y = 2(x-3)^2 - 7$

Vertex: (3, -7)

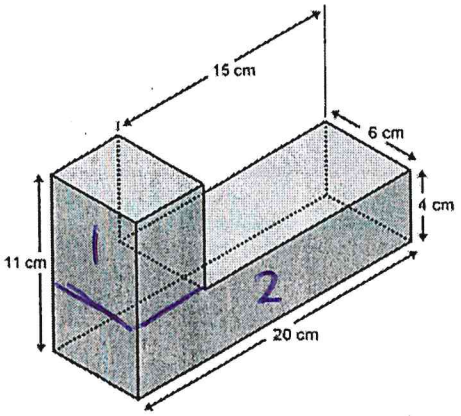
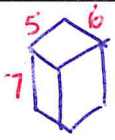
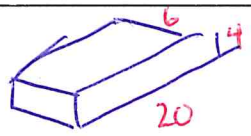
Step Pattern: 2, 6, 10



4) Solve the following linear system using elimination. You need to decide whether to add or subtract.

Linear System:	Add or Subtract
OPPOSITES $5x + 2y = 15$ ① $4x - 2y = 3$ ②	Add or Subtract
Do the Addition/Subtraction: $\frac{9x}{9} = \frac{18}{9}$ $x = 2$	**Sub into equation ① or ②** $5(2) + 2y = 15$ $10 + 2y = 15$ $-10 \quad -10$ $\frac{2y}{2} = \frac{5}{2}$ $y = 2.5$
Solution: (2 , 2.5)	

5) Find the volume of the following 3D shape. Redraw the basic 3D shapes in the provided spaces.

3D Shape	Basic Shape 1	Basic Shape 2
Sketch:  	 $V = l \times w \times h$ $= 5 \times 6 \times 7$	 $V = l \times w \times h$ $= 20 \times 4 \times 6$
	Volume = $210\ cm^3$	Volume = $480\ cm^3$
Total Volume = $210 + 480 = 690\ cm^3$		

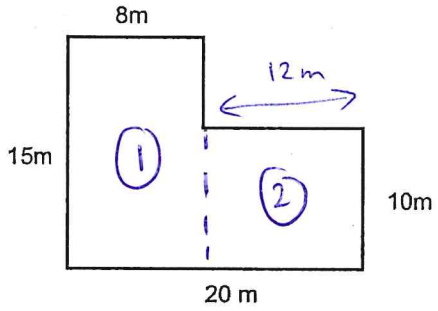
Review Note: Measurement | MFM2P

In this review note we are going to go over the basics regarding composite area and perimeter, surface area and volume. At this point you should be able to identify a basic 2D or 3D shape, and apply the correct formula for area, perimeter, volume, or surface area.

Example: **Calculate the area** of the following composite shape:

$A_1 = l \times w$
$= 15 \times 8$
$= 120 m^2$

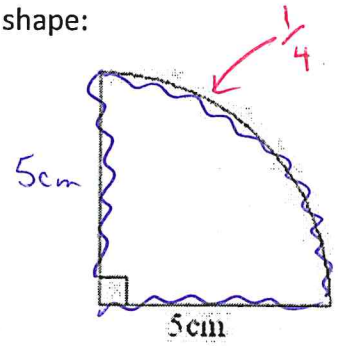
$A_2 = l \times w$
$= 10 \times 12$
$= 120 m^2$



$A_{TOTAL} = 120 + 120 = 240 m^2$

Example: **Calculate the perimeter** of the following composite shape:

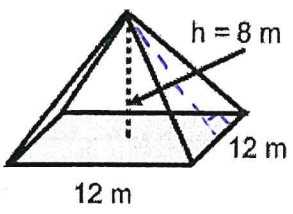
Curved section $= 2 \times \pi \times r \div 4$
$= 2 \times 3.14 \times 5 \div 4$
$= 7.85$ cm

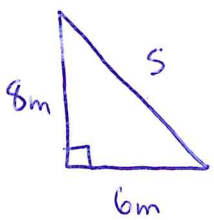


$P = 7.85 + 5 + 5 = 17.85$ cm

You may need the Pythagorean Theorem at times to find volume and/or surface area.

Example: Calculate the surface area of the following square based pyramid. Note that you will have to use Pythagorean Theorem to find the slant height.



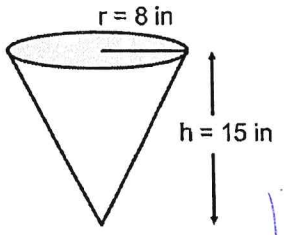


$s^2 = 8^2 + 6^2$
$s^2 = 64 + 36$
$s^2 = 100$
$s = 10$ m

$SA = b^2 + 2bs$
$= 12^2 + 2(12)(10)$
$= 144 + 240$
$= 384 m^2$

Examples: Calculate the volume of the following 3-D shapes.

a) Shape: Cone

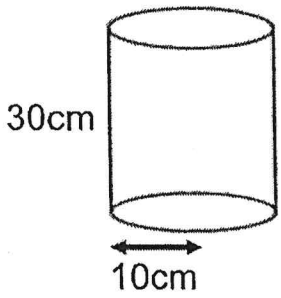


$V = \pi \times r^2 \times h \div 3$

$= 3.14 \times 8^2 \times 15 \div 3$

$= 1,004.8 \text{ in}^3$

b) Shape: Cylinder



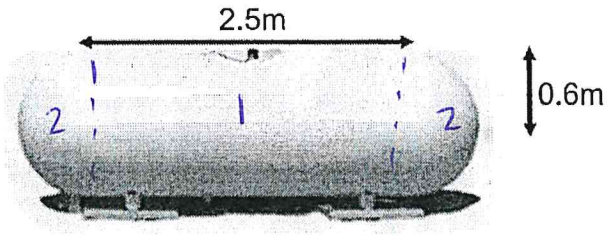
$V = \pi \times r^2 \times h$

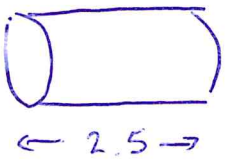
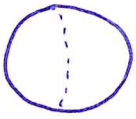
$= 3.14 \times 10^2 \times 30$

$= 9,420 \text{ cm}^3$

c) Determine the volume of this propane tank. It is cylindrical, with 2 half-spheres on the end.

Diagram:

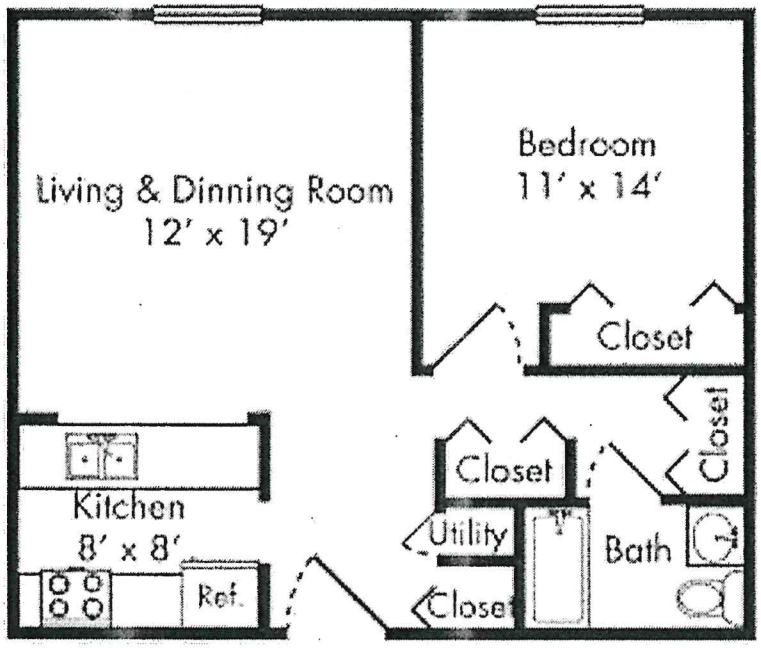


Basic Shape 1	Basic Shape 2
 $V = \pi \times r^2 \times h$ $= 3.14 \times 0.6^2 \times 2.5$	 $V = 4 \times \pi \times r^3 \div 3$ $= 4 \times 3.14 \times 0.6^3 \div 3$ OR $4 \times 3.14 \times 0.6 \times 0.6 \times 0.6 \div 3$
Volume = 2.83 m^3	Volume = 0.9 m^3
Total Volume $2.83 + 0.9 = 3.73 \text{ m}^3$	

SOLUTIONS

Measurement Review Questions and PT Prep | MFM2P

1) Consider this floor layout in an apartment. All measurements are in feet.



In addition, here are some additional dimensions:

- The bedroom closet is 2' by 7'
- All other closets are 2' by 3'
- The bathroom is 6' by 8'

a) New hardwood is going into the living room, bedroom, bedroom closet, and the two closets in the bedroom hallway. The hardwood costs $7.50 per square foot (including installation). Find the cost of this job:

×7.50

Room	Area (Ft^2)	Cost of Hardwood
Living and Dining Room	12 × 19 = 228	$1,710
Bedroom	11 × 14 = 154	$1,155
Bedroom Closet	2 × 7 = 14	$105.
Hallway Closet 1	2 × 3 = 6	$45
Hallway Closet 2	11	$45
	Total Cost	$3,060

b) New tile is going into the kitchen, bathroom, utility closet, and the closet by the main entrance. The tile costs $7.75 per square foot (including installation). Find the cost of this job:

×7.75

Room	Area (ft^2)	Cost of Hardwood
Kitchen	8 × 8 = 64	$496
Bathroom	6 × 8 = 48	$372
Utility Closet	2 × 3 = 6	$46.50
Entrance Closet	11	$46.50
	Total Cost	$961

c) Trim is being put along the baseboards in the living and dining room, and the bedroom. This costs $1.25 per foot. Find the cost of this job.

×1.25

Room	Perimeter (ft)	Cost of crown molding
Living and Dining Room	12+12+19+19 = 62	$77.50
Bedroom	11+11+14+14 = 50	$62.50
	Total Cost	$140

d) What is the total cost of all of these jobs? Include 13% for sales tax.

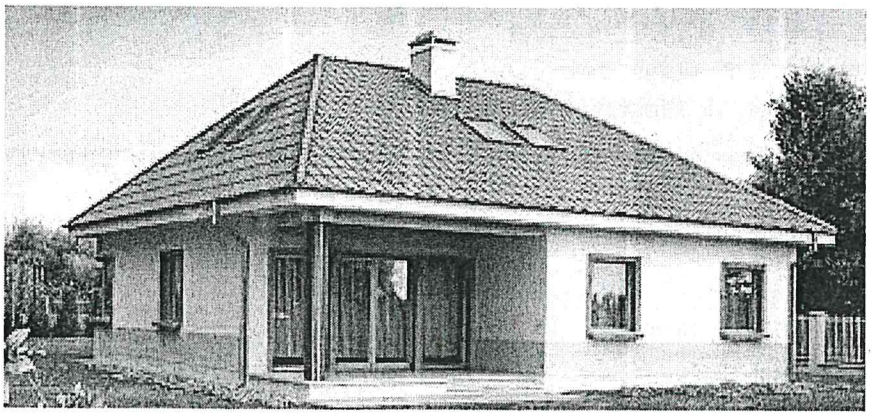
3,060 + 961 + 140

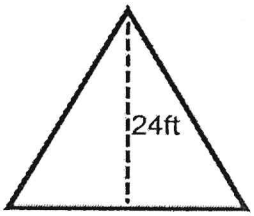
= $4,161 × 1.13

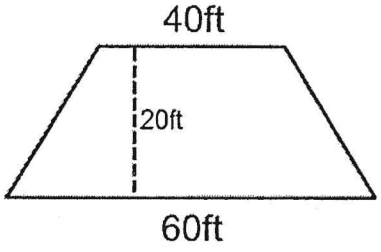
= $4,701.93 total

2) You are pricing out a new roof for your home. You have a "hipped roof" diagrammed below. Find the total area of your roof using the table below.

Visual of Roof:







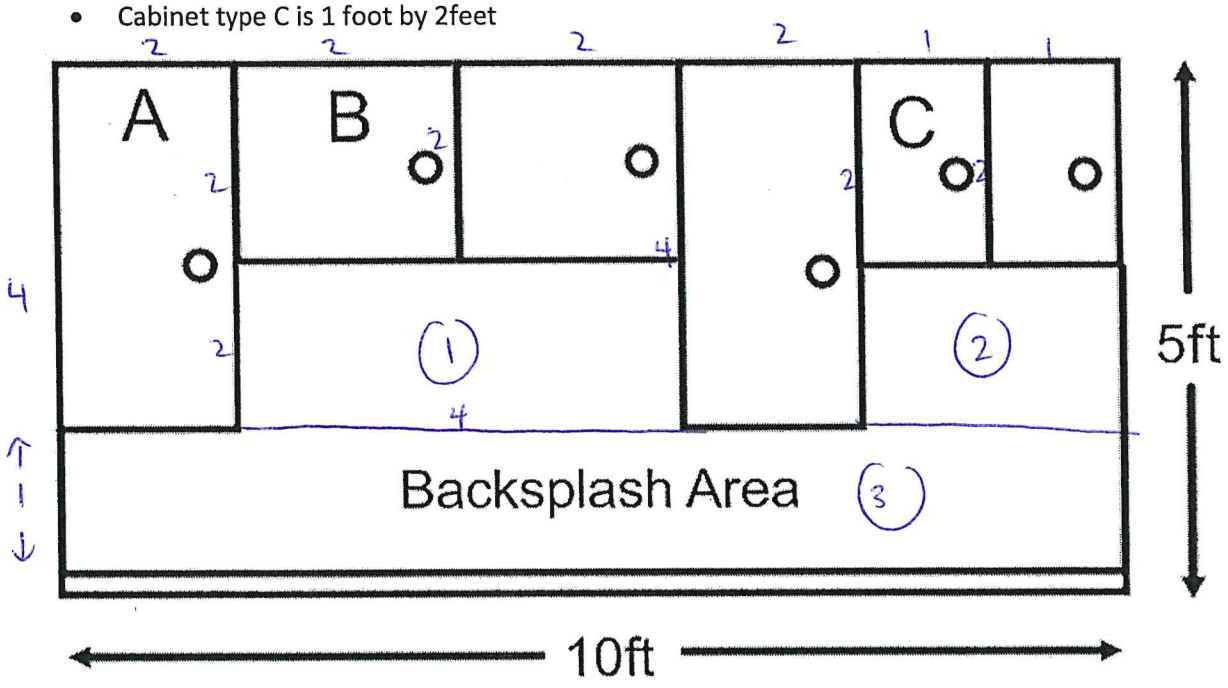
Area of Triangle Portion (calculations)	Area of Trapezoid Portion (calculations)
$A = b \times h \div 2$ $= 30 \times 24 \div 2$	$A = (a+b) \times h \div 2$ $= (40+60) \times 20 \div 2$ $= 1000$
Area = $360\ ft^2$	Area = $1000\ ft^2$
Total Area (2 triangles + 2 trapezoids) = $2 \times 360 + 2 \times 1000 = 2,720\ ft^2$	

b) The cost for metal roofing is $9.00 per square foot (installed). How much is this new roof going to cost?

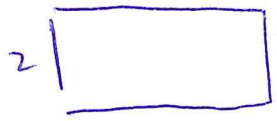
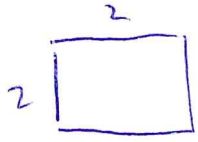
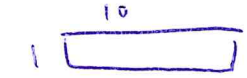
$2,720 \times 9 = \$24,480$ (before tax)

3) Mr. Smith is putting up a backsplash in his kitchen. The wall where the backsplash is going looks something like below. The wall itself is 5 feet by 10 feet. In addition, the 3 cabinet sizes are listed below:

- Cabinet type A is 2 feet by 4 feet
- Cabinet type B is 2 feet by 2 feet
- Cabinet type C is 1 foot by 2feet



Determine the area of the backsplash wall:

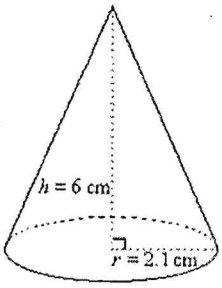
Shape 1:	Shape 2:	Shape 3:
 $A = l \times w$ $= 4 \times 2$	 $A = l \times w$ $= 2 \times 2$	 $A = l \times w$ $= 1 \times 10$
Area = $8\ ft^2$	Area = $4\ ft^2$	Area = $10\ ft^2$
Total Area = $8 + 4 + 10 = 22\ ft^2$		

Measurement Review Questions and PT Prep | MFM2P

3D Questions:

1) Find the **volume** of the following solids.

a)

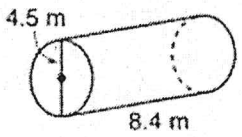


$V = \pi \times r^2 \times h \div 3$

$= 3.14 \times 2.1^2 \times 6 \div 3$

$= 27.7\ cm^3$

b)

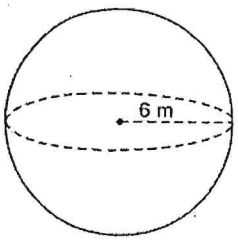


$V = \pi \times r^2 \times h$

$= 3.14 \times 4.5^2 \times 8.4$

$= 534.1\ m^3$

c)

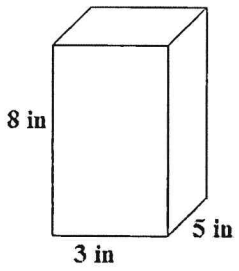


$V = 4 \times \pi \times r^3 \div 3$

$= 4 \times 3.14 \times 6^3 \div 3$

$= 904.32\ m^3$

d)

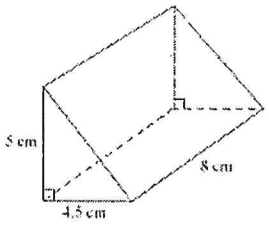


$V = l \times w \times h$

$= 8 \times 3 \times 5$

$= 120\ in^3$

e)

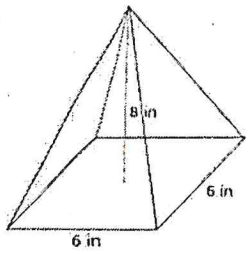


$V = b \times l \times h \div 2$

$= 4.5 \times 5 \times 8 \div 2$

$= 90\ cm^3$

f)



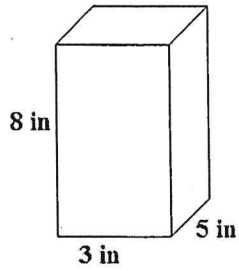
$V = b^2 \times h \div 3$

$= 6^2 \times 8 \div 3$

$= 128\ in^3$

2) Find the **surface area** of the following solids.

a)



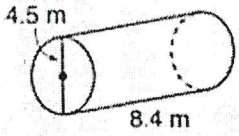
$SA = 2(l \times w + w \times h + l \times h)$

$= 2(8 \times 3 + 3 \times 5 + 8 \times 5)$

$= 2(79)$

$= 158\ in^2$

b) Note: 4.5m is the radius here



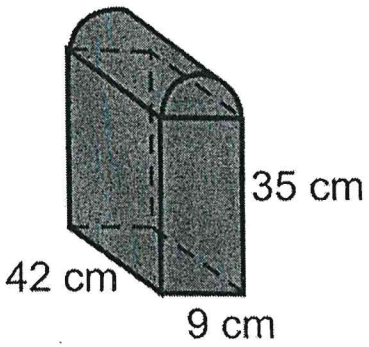
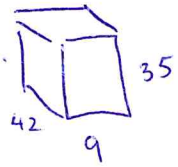
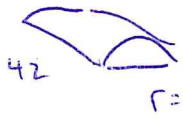
$SA = 2 \times \pi \times r^2 + 2 \times \pi \times r \times h$

$= 2 \times 3.14 \times 4.5^2 + 2 \times 3.14 \times 4.5 \times 8.4$

$= 127.17 + 237.38$

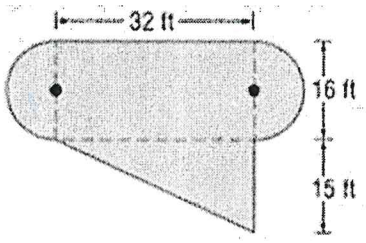
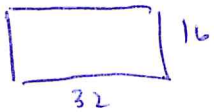
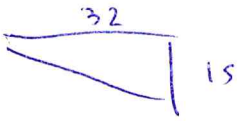
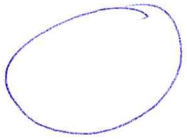
$= 364.55\ m^2$

3) Find the volume of the following 3D shape.

3D shape	Basic Shape 1	Basic Shape 2
Sketch: 	 $V = l \times w \times h$ $= 9 \times 42 \times 35$	 $V = \pi \times r^2 \times h \div 3$ $= 3.14 \times 4.5^2 \times 42 \div 3$ $=$
	Volume = $13,230\ cm^3$	Volume = $890.19\ cm^3$
Total Volume = $14,120.19\ m^3$		

4) The dimensions of an irregularly shaped pool are shown in the diagram below.

a) Find the area of the pool surface:

Diagram of Pool Surface		
		
Basic Shape #1	**Basic Shape #2**	**Basic Shape #3**
 $A = l \times w$ $= 32 \times 16$	 $A = b \times h \div 2$ $= 32 \times 15 \div 2$	 $r = 8$ ft $A = \pi \times r^2$ $= 3.14 \times 8^2$
Area = $512\ ft^2$	Area = $240 ft^2$	$200.96\ ft^2$
Total Area = $512 + 240 + 200.96 = 952.96\ ft^2$		

b) The pool is 6 feet deep. Use the formula: $V_{prism} = Area\ of\ Base \times Height\ of\ Prism$ to find the volume of the entire pool.

$= 952.96 \times 6$

$= 5,717.76\ ft^3$

c) Your backyard hose can pump out 1.2 feet^3 of water every minute. How many minutes will it take to fill your pool?

$$\frac{5,717.76\ ft^3}{1.2\ ft^3/min} = 4,764.8 \text{ minutes OR } 79.4 \text{ hours!}$$