

**OCTOBER 18, 2017...continued**

**UNIT 3: SQUARE ROOTS AND  
SURFACE AREA**

**INTRODUCTION:  
ACTIVATING PRIOR  
KNOWLEDGE**

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MATH 9**



**WHAT'S THE POINT OF TODAY'S LESSON?**

**We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Numbers 4" OR "N4" and begin working on SCOs "N5" and "Space and Shape 2" OR "SS2" which state:**

**N4: "Explain and apply the order of operations, including exponents, with and without technology."**

**N5: "Determine the square root of positive rational numbers that are perfect squares."**

**SS2: "Determine the surface area of composite 3-D objects to solve problems."**



## What does **THAT** mean???

For this unit, SCO N4 means that we will learn how to find the square root (the number that was multiplied by itself) of numbers both with and without a calculator.

SCO N5 means that we will learn several ways to find the square root (the number that was multiplied by itself) of whole numbers, fractions and decimal numbers.

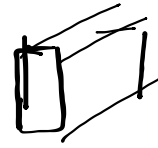
SCO SS2 means that we will stack two or more 3-D objects (right rectangular prisms, right triangular prisms, right cylinders) on top of each other. We will find the area of each face (side) of each object then add them all up to find the total surface area of the object. We will also have to subtract any overlapping sides from the total.



**Please turn to pages 4 and 5 of *Math Makes Sense 9 (MMS9)*.**

**What shapes and objects do you see?**

**What could you measure in these shapes and objects?**

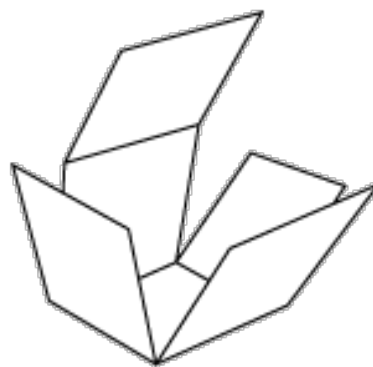
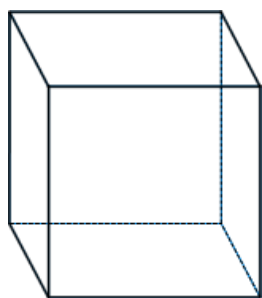


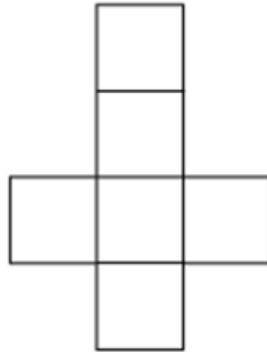
**Do you think that all of your measurements would be whole numbers?**

**How would you calculate the surface area of an object?**

**The surface area of an object can be found by calculating the area of each of its faces then adding them all together.**

**"NETS" can be useful in helping us calculate surface area:**

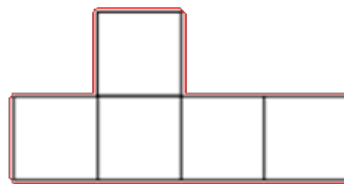




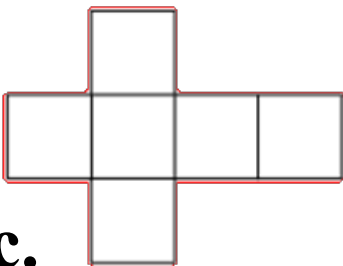
**Which of the following nets are for a cube?**



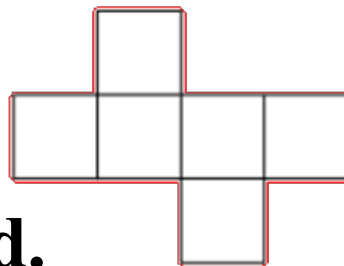
**a.**



**b.**



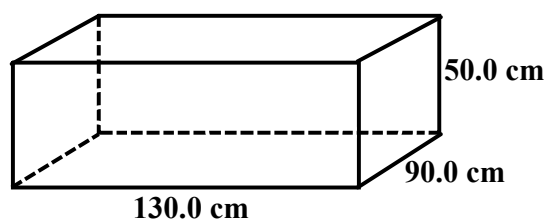
**c.**



**d.**

- a. This is not a net for a cube since it would not close.
- b. This is not a net for a cube since there are not enough faces.
- c. Yes.
- d. Yes.

Ex.: Find the surface area of the **rectangular right prism** below.



top/bottom	sides	front/back
$A = b \times h \times 2$ $= 130 \times 90 \times 2$ $= 23\,400 \text{ cm}^2$	$A = b \times h \times 2$ $= 90 \times 50 \times 2$ $= 9\,000 \text{ cm}^2$	$A = b \times h \times 2$ $= 130 \times 50 \times 2$ $= 13\,000 \text{ cm}^2$

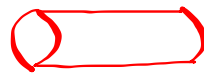
$$\begin{aligned} A_{\text{total}} &= A_{\text{top/bottom}} + A_{\text{sides}} + A_{\text{front/back}} \\ &= 23\,400 + 9\,000 + 13\,000 \\ &= 45\,400 \text{ cm}^2 \end{aligned}$$

**The surface area of the rectangular right prism on the previous slide is:**

$$45\,400 \text{ cm}^2$$

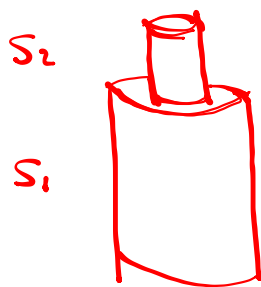
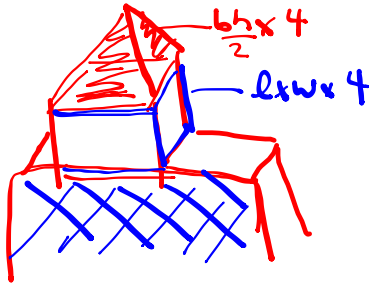
**On pages 4 and 5 of *MMS9*, are any objects made up of more than one object?**

Cylinder



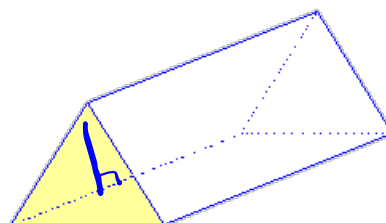
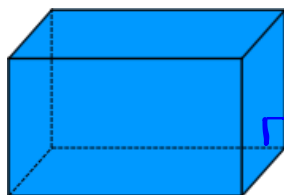
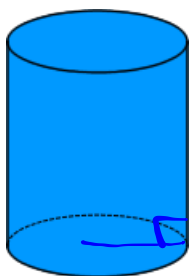
rectangle + 2 circles

# In this unit, you will determine the surface areas of composite objects.





**In grade 9, we will only work with composite objects made up of right cylinders, right rectangular prisms, and right triangular prisms.**



## **UNIT 3 VOCABULARY:**

### **1. PERFECT SQUARE:**

**a number that is the square of a number; for example, 16 is a perfect square because  $16 = 4 \times 4$ .**

### **2. NON-PERFECT SQUARE:**

**a fraction or a decimal that is not a perfect square.**

### **3. COMPOSITE OBJECT:**

**the result of combining two or more objects to make a new object.**

**In this unit, you will also be using your knowledge of perfect squares and square roots to solve problems involving the Pythagorean Theorem.**

**We discussed that 16 is a perfect square; what is the square root of 16?**

**Does anyone remember the Pythagorean Theorem?**



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

long side

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

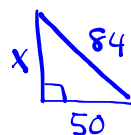
short side

Examples



$$\begin{aligned} c^2 &= a^2 + b^2 \\ x^2 &= 3^2 + 4^2 \\ &= 9 + 16 \\ &= 25 \\ x &= \sqrt{25} \\ &= 5 \end{aligned}$$

②



$$\begin{aligned} a^2 &= c^2 - b^2 \\ x^2 &= 84^2 - 50^2 \\ &= 7056 - 2500 \\ &= 4556 \\ x &= \sqrt{4556} \\ &= 67.5 \end{aligned}$$

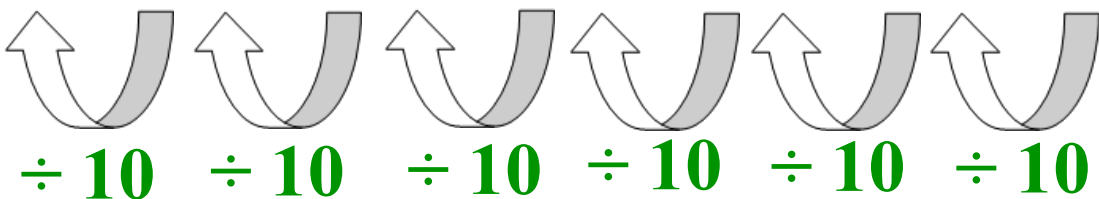
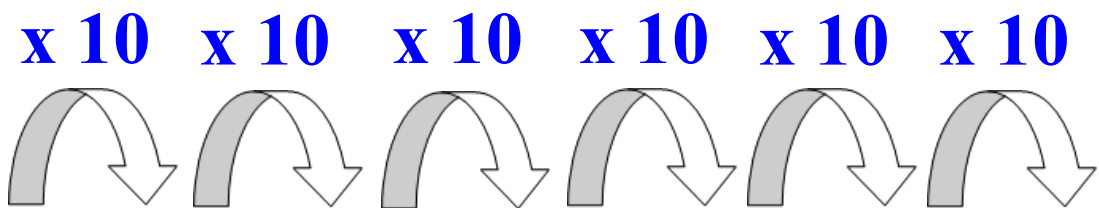
**You only need to remember 6 formulas for this unit which you already knew before grade 9:**

- 1. Area of a rectangle/square:  $b \times h$**
- 2. Area of a triangle:  $(b \times h) / 2$**
- 3. Area of a circle:  $\pi r^2$**
- 4. Circumference of a circle:  $2\pi r$  OR  $\pi d$**
- 5. The Pythagorean Theorem:  $a^2 + b^2 = c^2$**
- 6. Area of a cylinder:  $2\pi r^2 + 2\pi rh$**

**Before we start new material, let's "activate your prior knowledge" with a couple of sheets ("Masters 1.22a and 1.22b"). This is to be completed as homework if you do not finish in class. We need to review conversions prior to starting for "Check 2" on pg 1.22b.**

# UNIT PREFIXES:

		distance	mass	volume
<b>k</b>	: <b>kilo</b>	km	kg	kl
<b>h</b>	: <b>hecto</b>	hm	hg	hl
<b>da</b>	: <b>deca</b>	dam	dag	dal
<b>d</b>	: <b>deci</b>	meters dm	grams dg	litres dl
<b>c</b>	: <b>centi</b>	cm	cg	cl
<b>m</b>	: <b>milli</b>	mm	mg	ml



$$10.015 \times 10 = 100.15$$

$$625.382 \text{ hm} = 62538.2 \text{ m}$$

$$8954.789 \text{ cm} = 8.954789 \text{ dam}$$

$$15.2 \text{ m} = 15200 \text{ mm}$$

$$15.2 \overset{15.15}{\curvearrowright} 15.24$$

$$15.20$$

## **CONCEPT REINFORCEMENT:**

*"Activating Prior Knowledge" worksheets:*

"Master 1.22a": #1 and #2 (grid paper attached)

"Master 1.22b": #1 and #2

## **SOLUTIONS: (Masters 1.22a)**

**Check:**

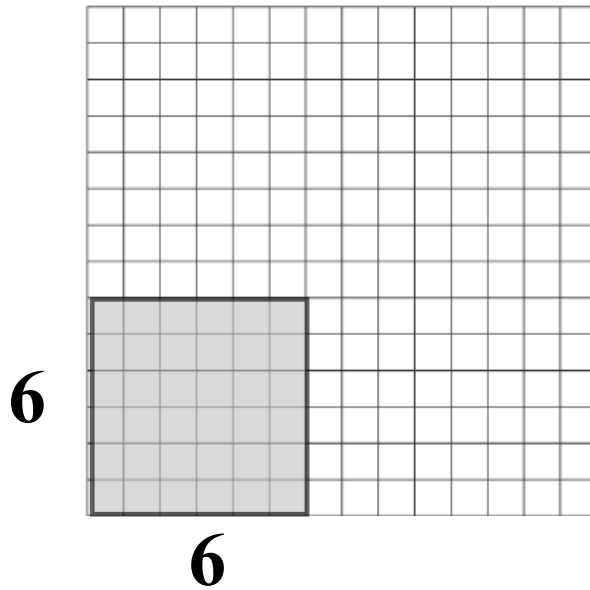
**1. a)    ii) 36    iii) 49    v) 144**

**b)    see grid paper**

# Check:

1. b)

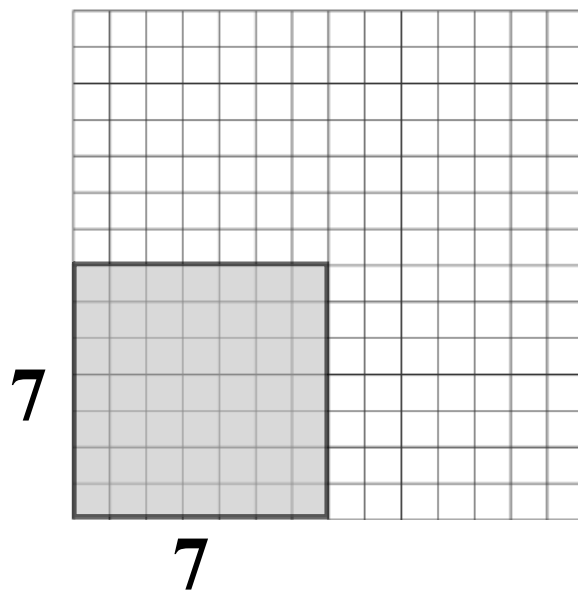
ii) 36



# Check:

1. b)

iii) 49

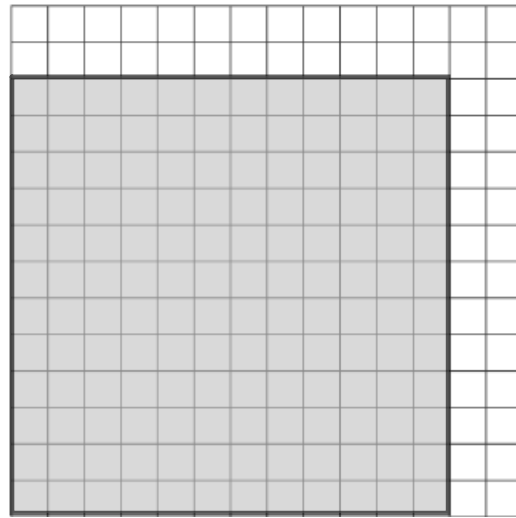


## Check:

1. b)

v) 144

12



12

## Check:

2. a) 1 (= 1 x 1)

4 (= 2 x 2)

9 (= 3 x 3)

I know that these are perfect squares because they can be written as the product of two equal factors; in other words, they are the result of multiplying the same number by itself.

**Check:**

**2. b) 2 (= 1 x 2)**

**6 (= 1 x 6 or 2 x 3)**

**12(= 1 x 12, 2 x 6, or 3 x 4)**

**I know that these are not perfect squares because they cannot be written as the product of two equal factors; in other words, they are not the result of multiplying the same number by itself.**

**SOLUTIONS:  
(Masters 1.22b)**

**Check:**

**1. a) SA = 2lh + 2lw + 2wh**  
**= 2(3)(8) + 2(3)(2) + 2(2)(8)**  
**= 48 + 12 + 32**  
**= 92 cm<sup>2</sup>**



# **SOLUTIONS: (Masters 1.22b)**

**Check:**

**1. b)**

$$SA = bl + al + hl + 2\left(\frac{bh}{2}\right)$$

$$SA = 4(20) + 5(20) + 3(20) + 2\left(\frac{4 \times 3}{2}\right)$$

$$SA = 80 + 100 + 60 + 12$$

$$SA = 252 \text{ cm}^2$$

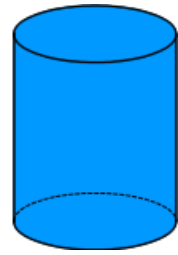
**Check:**

**2. This question requires an answer in square metres ( $\text{m}^2$ ); therefore, we need to convert cm to m:**

$$12 \text{ cm} = 0.12 \text{ m}$$

$$15 \text{ cm} = 0.15 \text{ m}$$

# Check:



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

$$SA = 2\pi(0.12)^2 + 2\pi(0.12)(0.15)$$

$$SA = 2\pi(0.0144) + 2\pi(0.018)$$

$$SA = 0.0905 + 0.1131$$

$$SA = 0.2036$$

$$SA = 0.2 \text{ m}^2$$