Math 11 Essentials Intro to Geometry

1.   Exponents are numbers located to the upper right of a number that tell you how many factors of that number you have. For example, 5^3 means there are two factors of 5 or $(5)(5)(5) = 125$. Calculate each of the following:

a) 4^2 b) 10^2 c) 7^3 d) 12^4 e) 2^5

2.   Since $5^2 = 25$, then $\sqrt{25} = 5$. $\sqrt{25}$ means the positive square root of 25 or which number when multiplied by itself gives you 25? Answer 5. Find the square root of each of the following"

a) $\sqrt{4}$ b) $\sqrt{144}$ c) $\sqrt{169}$ d) $\sqrt{36}$ e) $\sqrt{64}$

f) $\sqrt{100}$ g) $\sqrt{16}$ h) $\sqrt{81}$ i) $\sqrt{1}$ j) $\sqrt{9}$

k) $\sqrt{121}$ l) $\sqrt{49}$ m) $\sqrt{25}$ n) $\sqrt{196}$ o) $\sqrt{225}$

3. π (pi) is used in many formulas. $\pi = 3.14$. You can use 3.14 when calculations involve π or you can use the π key on your calculator. Calculate the following:

a) $(\pi)(52)$ b) $(0.25)(\pi)$ c) $\pi (5^2)$ d) $(2)(\pi)(10)$

e) π^2 f) π^3 g) $\sqrt{\pi}$ h) $\dfrac{\pi}{2}$

4.   To solve an equation you will often have to get the unknown object by itself on one side of the equal side. To do this you will have to get rid of anything else on that side of the equal sign by creating zero. To create 0 you will have to add or subtract a number to make zero. For example, if you have 4 on one side of the equal sign you would have to subtract 4 to make zero. If you had -6 you would have to add 6 to make zero. What would you add or subtract to the following to make zero?

a) 9 b) 18 c) -10 d) -52 e) 800

f) ½ g) 0.5 h) -5.6 i) -84 j) 156

Math 11 Essentials Assignment   Name _____

1.   Using your knowledge of exponents, square roots and the number π, complete the following:

   a) 12^2 b) 1.25^3 c) 0.84^5 d) π^3 e) $\dfrac{\pi}{3}$

   f) 5^4 g) $\sqrt{89}$ h) $\dfrac{\sqrt{\pi}}{2}$ i) $\dfrac{4^2}{2}$ j) $(\sqrt{\pi})^2$

   k) 2.2^5 l) $\dfrac{6}{\pi}$ m) $\dfrac{10}{\sqrt{4}}$ n) 1^8 o) 0^{15}

2.   You learned that exponents represent how many factors of a number you have. For example,
      $5^4 = (5)(5)(5)(5)$. Using this knowledge, write the expression below as a number with an exponent.

   a) $(2)(2)(2)$ b) $(16)(16)(16)(16)(16)$ c) $(\tfrac{1}{2})(\tfrac{1}{2})(\tfrac{1}{2})(\tfrac{1}{2})$

   d) $(0.75)(0.75)(0.75)(0.75)(0.75)(0.75)$ e) $(\pi)(\pi)(\pi)(\pi)(\pi)$

3.   Solve the equations below to find the unknown.

   a) $r + 5 = 14$ b) $d - 18 = 80$ c) $14 + k = 30$ d) $s - 2 = 1$

   e) $f - 5 = -10$ f) $w - 7 = -2$ g) $a + 4 = -2$ h) $2 + x = 0$

   i) $e - 15 = -5$ j) $y + 11 = 30$ k) $p + 4 = -8$ m) $c - 0 = 4$

4.   Write an equation for each problem. Then solve the equation.

a) A number minus 61 is 28.   b) A number increased by 4 is 17.

c) A number divided by 4 is 3.   d) A number diminished by 12 is -5.

e) 70 divided by a number is 10.   f) A number plus 40 is 96.

5.   78 people are trying out for the football team. 47 will pass the first round of try-outs. How many will not pass in the first round?

6.   At the Millville Animal Hospital it costs $40 dollars to perform an x-ray on a dog that weighs greater than 35 pounds, and $25 dollars for a dog that weighs less than 35 pounds. What would be the total cost to perform x-rays on a group of dogs that had the following weights (in pounds): 38,12, 42, 24?

7.   Mr. Bloop likes to hit fly balls to his nephew on Saturday afternoons. His nephew catches about two out of every five fly balls hit to him. If Mr. Bloop hits 50 fly balls, how many will he probably catch?

8.   Bob is earning money by shovelling snow. He shovels one driveway and makes $12 and another and makes $8. There is a shirt that costs $30 that Bob wants. How much more money does he need to make before he can buy the shirt?

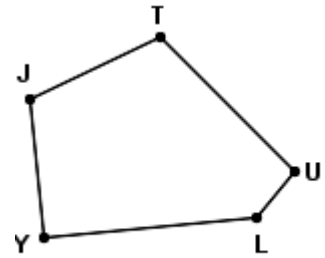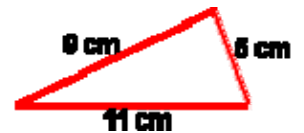9.   Find the perimeter of each shape by using a centimetre ruler.

a)   b)   G   c)   T

Q   X   Y   J
                                                                                    U
S   R

        C   Y   L
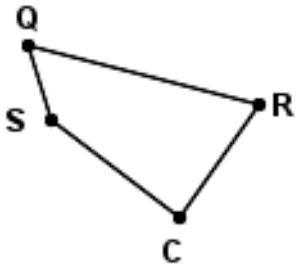
10.
    Find the perimeter of a triangle with sides measuring 5 centimetres, 9   9 cm   5 cm
    centimetres and 11 centimetres.
                                                                                    11 cm

11.
    A rectangle has a length of 8 centimetres and a width of 3 centimetres. Find the
    perimeter.   3 cm
                                                                                    8 cm

12.   Find the perimeter of a square with each side measuring 2 inches.
                                                                                    2 in

13.
    Find the perimeter of an equilateral triangle with each side measuring 4 centimetres.

                                                                                    4 cm

14.   A playing card has a length of 10 centimetres and a width of 5 centimeters. What is its perimeter?

15.   The perimeter of a square is 200 centimetres. What is the length of each side?

16.   A square garden has a side of 22 meters. How many meters of fence are needed to enclose the garden?

Solving for Squared Variables
Solve for the unknown variable. Round to two decimal places!

1. $x^2 = 9$ 5. $s^2 = 50$ 9. $h^2 = 89$

        x = _____   s = _____   h = _____

2. $x^2 = 25$ 6. $r^2 = 74$ 10. $k^2 = 512$

        x = _____   r = _____   k = _____

3. $a^2 = 100$ 7. $w^2 = 200$ 11. $y^2 = 320$

        a = _____   w = _____   y = _____

4. $f^2 = 64$ 8. $x^2 = 800$ 12. $m^2 = 24$

        f = _____   x = _____   m = _____

13.   A square has an area of 100m^2. What is the length of the sides?

14.   The science lab is replacing the flooring. They know that the lab is square and that the old flooring was 250 ft^2. What are the dimensions of the lab?

Solving for Squared Variables
Solve for the unknown variable. Round to two decimal places!

1. $x^2 = 9$ 5. $s^2 = 50$ 9. $h^2 = 89$

        x = _____   s = _____   h = _____

2. $x^2 = 25$ 6. $r^2 = 74$ 10. $k^2 = 512$

        x = _____   r = _____   k = _____

3. $a^2 = 100$ 7. $w^2 = 200$ 11. $y^2 = 320$

        a = _____   w = _____   y = _____

4. $f^2 = 64$ 8. $x^2 = 800$ 12. $m^2 = 24$

        f = _____   x = _____   m = ___

13.   A square has an area of 100m^2. What is the length of the sides?

14.   The science lab is replacing the flooring. They know that the lab is square and that the old flooring was 250 ft^2. What are the dimensions of the lab?

1.   If a right triangle has sides a = 4 and b = 12, what is the length of the hypotenuse? Draw a rough sketch and show your work.

2.   If s = 9 and t = 11, then r = _____.
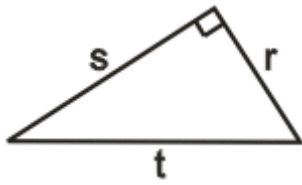
3.   If a = 17 and b = 13, find c.
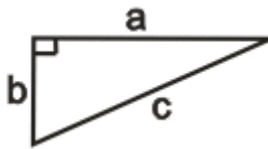
4.   A rectangle has a diagonal measuring 18cm and a width of 10cm.

     a) Find the length of the rectangle.

     b) Find the area and the perimeter of the rectangle.

5.   Find the length of a diagonal of a square with perimeter of 16.

6.   Could the following lengths represent the sides of a right-angled triangle? Show calculations to justify your answer.

                 2.5 cm.   2 cm.   1.5 cm.

7.   Jennifer leans a 4m ladder against a building. The top of the ladder is 2.5m from the ground. How far is the bottom of the ladder from the building? Draw a rough sketch to support your work.

8.   A 14m power pole is damaged during a wind storm, causing it to lean against the top of a tree. The tree is 10m high. How far is the base of the pole from the base of the tree? Draw a sketch.

9.   Sue and Andrew start on separate cycling trails from the same starting point. Sue heads south and bikes 13km, while Andrew heads east and bikes 9km. How far are they from each other?

START●————————————ANDREW

SUE
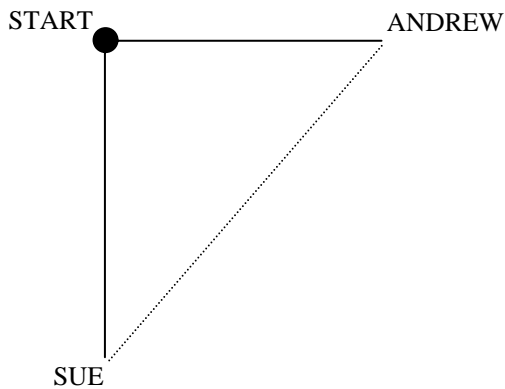
10.   Find the length of AD.
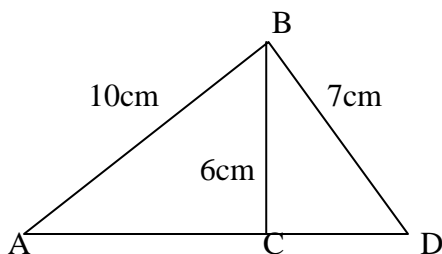
The Pythagorean Theorem

Draw a sketch of the triangle and find the missing length for each right triangle.

1. $a =$ _____
   $b = 8$
   h = 13
	2. $a =$ _____
	   $b = 24$
	   h = 30
		3. $a = 9$
		   $b = 40$
		   h = _____

4. $a = 22$
   $b =$ _____
   h = 40
	5. $a = 70$
	   $b =$ _____
	   h = 100
		6. $a = 14$
		   $b = 20$
		   h = _____

7. $a = 9$
   $b =$ _____
   h = 12
	8. $a =$ _____
	   $b = 35$
	   h = 37
		9. $a = 24$
		   $b =$ _____
		   h = 42

10. $a =$ _____
   $b = 7$
   h = 10
	11. $a = 4$
	   $b = 11$
	   h = _____
		12. $a = 18$
		   $b = 24$
		   h = _____

13. $a = 2$
   $b =$ _____
   h = 20
	14. $a =$ _____
	   $b = 15$
	   h = 80
		15. $a =$ _____
		   $b = 15$
		   h = 100

16. $a = 2$
   $b = 24$
   h = _____
	17. $a = 7$
	   $b = 14$
	   h = _____
		18. $a = 8$
		   $b =$ _____
		   h = 17

Lesson 2: Pythagorean Theorem

Selected Content Standards

Benchmarks Addressed*:*
G-5-M *Making and testing conjectures about geometric shapes and their properties*

G-7-M *Demonstrating the connection of geometry to the other strands and to real-life situations (e.g., applications of the Pythagorean Theorem)*

GLEs Addressed:
Grade 8
31. Use area to justify the Pythagorean theorem and apply the Pythagorean theorem and its converse in real-life problems (G-5-M) (G-7-M)

Lesson Focus
In this lesson, students will develop skills in use of the Pythagorean theorem. It includes the following aspects:
- Developing the concept of the Pythagorean theorem
- Using the Pythagorean theorem to complete indirect measurement.

GEE 21 Connection
The skills that will be addressed in this lesson include the following:
- Understand the origin of the Pythagorean theorem
- Demonstrate the use of the Pythagorean theorem

Translating Content Standards into Instruction

A. It is important that students understand why $a^2 + b^2 = c^2$
   1. Start with the addition of positive numbers. Remind students that distance is always a positive number and that the Pythagorean theorem deals with the distance from one point to another. Show students how each addend in the addition problem is smaller than the sum.

   $$2+3=5 \qquad 7+6=13 \quad 9+10=19$$

   2. Each leg is smaller than the hypotenuse; thus, when thinking of the formula

a^2	+	b^2	=	c^2
one can think of it as				
(leg)²	+	(leg)²	=	(hypotenuse)²
One can also express it in terms of small, medium, and large				
(small side)²	+	(medium side)²	=	(large side)²

3. Using the puzzle provided in **Student Worksheet 1,** measure the sides of the small square and the sides of the large square. Label the sides of one square as *a* and the other as *b*. The square whose sides have length *a* will be referred to as square A. The square whose sides have length *b* will be referred to as square B. From the measurements compute the area of each square. Be sure students recognize that the shape between the square forms a right triangle.
4. Have the students cut out the squares and cut along the dark lines inside the large square. There should be 5 pieces, if cut properly.
5. Have the students assemble all pieces into one square. Be sure they have a cover sheet to cover their puzzles, when complete. Do not end the project until all students have assembled a new square.
6. Discuss with the students that if the area of the square A is a^2 and the area of the square B is b^2, then the areas of the new square with side length *c* should be c^2 since it was assembled from the pieces of squares A and B. Measure the new square to determine if this is so. Remind students that their ruler measurements are approximations, so answers may not be exact.
7. Then write the equation:
    area of square A + area of square B = area of square C.
8. Show students the formula will NOT work unless you square the sides. This can be done by drawing a right triangle, measuring each leg, and then measuring the hypotenuse. The sum of the legs alone will not equal the hypotenuse.
9. Then remind students of the previous demonstration where the sides of the triangle were squares that added up to the same area as the large square.

B. Students should learn to manipulate the Pythagorean theorem no matter what information is given them. Use **Teacher Blackline #2** to demonstrate the following concepts.
   1. Encourage students to always begin by writing the formula $a^2 + b^2 = c^2$, then substitute the values given.
   2. Solve various problems for *a*, *b*, and *c*. Explain that while *a* and *b* are interchangeable, *c* must always be the longest side (the hypotenuse).
   3. When solving for *a*, *b* or *c* in the formula, students need to be reminded that the last step will be finding the square root. Be sure students are aware of the square root key on the calculator and how to use it. This function varies by manufacturer.
   4. Use **Student Worksheet 2** for practice and application problems.

Sources of Evidence about Student Learning

A. Have students solve equations to determine the lengths of all sides of right triangles.
B. Have students "square up" four pieces of the wood using precise measurements on the diagonal.

C. Given a variety of triangles, determine which are right triangles, using the Pythagorean theorem.

GEE 21 Connection

See attachment at the end of this unit for sample questions related to the GEE 21.

Attributes of Student Work at the "Got-It" level

Students recognize that the distance from home plate to 2nd base is the hypotenuse of a right triangle and can determine that distance on a baseball field knowing the length of a baseline. They can also determine the length of a baseline given the hypotenuse.

In the puzzle shown, name the dark shape between the two squares. While it is obviously a triangle, we cannot be sure it is a right triangle. Notice the location of each square in relation to the triangle. What part of the triangle is also part of square 1? What part of the triangle is also part of square 2? Cut out each square and the triangle. Then cut along the dark lines on square 2. You should now have 6 pieces. Put the triangle aside. Reassemble the 5 remaining pieces into a new square. When you have accomplished this task, cover your new square with a piece of paper and wait for the entire class to finish.

1

2
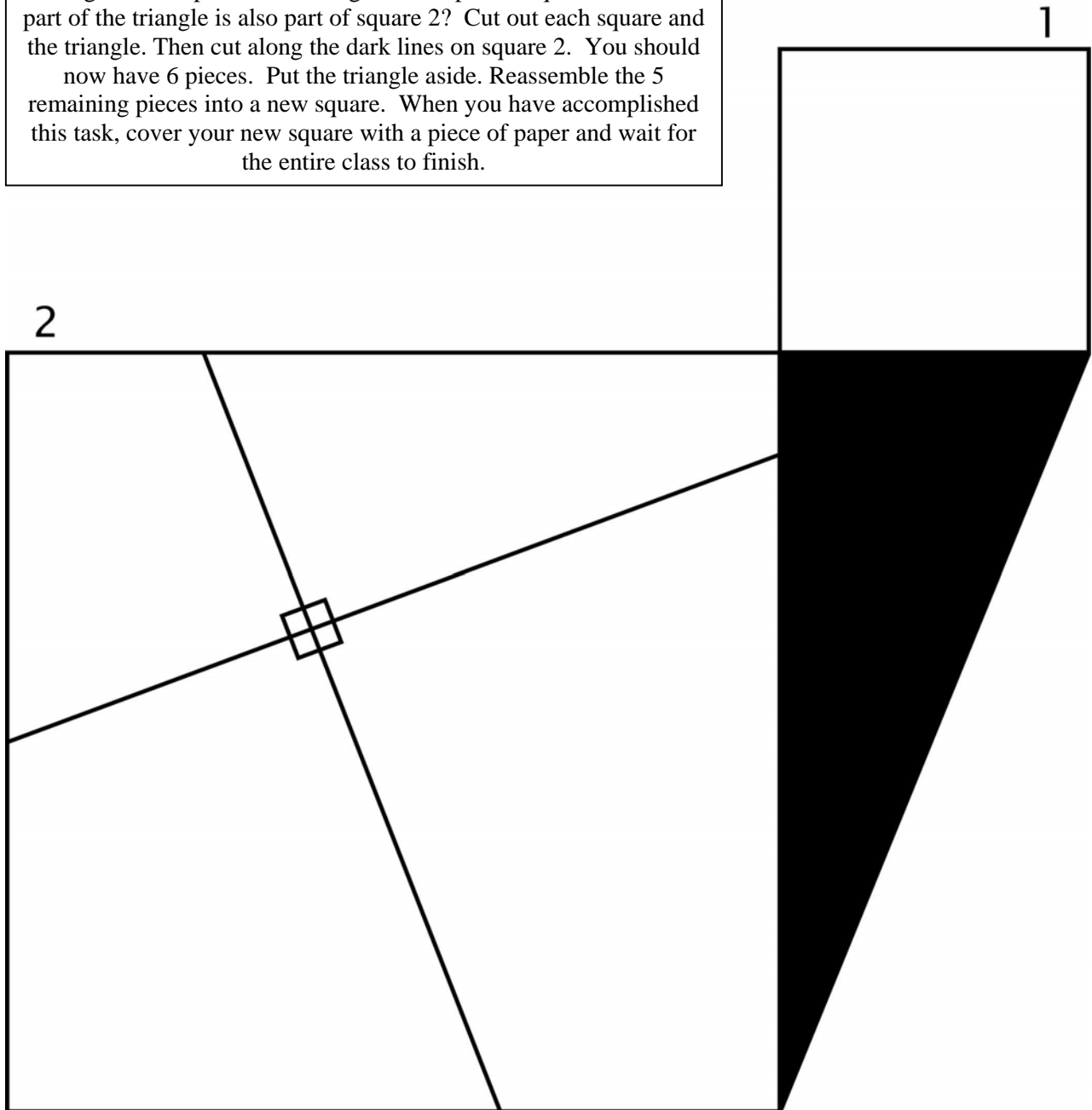
1) If one leg of a right triangle is 12 and the other leg is 16, what is the length of the hypotenuse in this right triangle?

2) Find the missing measure if a and b are the legs of the right triangle and c is the hypotenuse, with $a = 11$ and $c = 61$.

3) The measures of three sides of a triangle are given. Determine whether a triangle with sides 9, 40 and 41 is a right triangle. Explain your answer.

4) Find the missing side of the triangle.
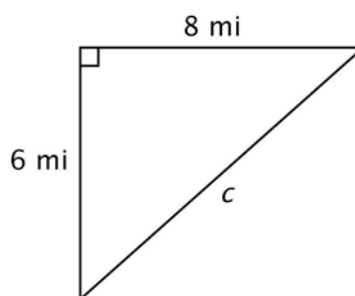
5) A telephone pole support cable attaches to the pole 20 feet high. If the cable is 25 feet long, how far from the bottom of the pole does the cable attach to the ground?
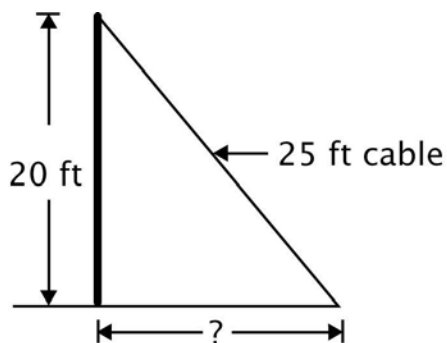
1) Find the length of the hypotenuse of a right triangle, if one leg is 15 and the other leg is 8.

2) The legs of a right triangle have lengths a and b. The hypotenuse has length c. Find the unknown length for each triangle.
   (a) $b = 18$, $c = 82$ (b) $a = 12$, $c = 37$

3) The measures of three sides of a triangle are 9, 16, and 20. Determine whether the triangle is a right triangle. Explain your answer.

4) The size of a television screen is given by the length of the diagonal of the screen. What size is a television screen that is 21.6 inches wide and 16.2 inches high?

5) If the diagonal of a rectangle measures 60 inches and one side measures 48 inches, what is the length of the other side of the rectangle?

6) A disabled ship radios to shore for help. The Coast Guard determines that the ship is 16 miles east and 43 miles north of the station. What is the direct distance between the ship and the Coast Guard station? Round answer to the nearest whole number.

7) Find the missing side of the triangle.

12 yd   9 yd   *c*
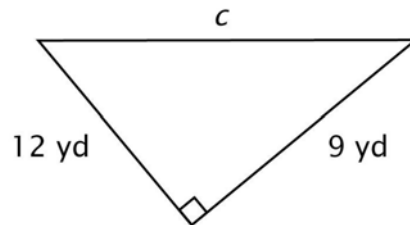
8) Tara leaned a 17 foot ladder against the house. The bottom of the ladder is 8 feet from the house. How high up the side of the house is the top of the ladder?

17 ft

8 ft
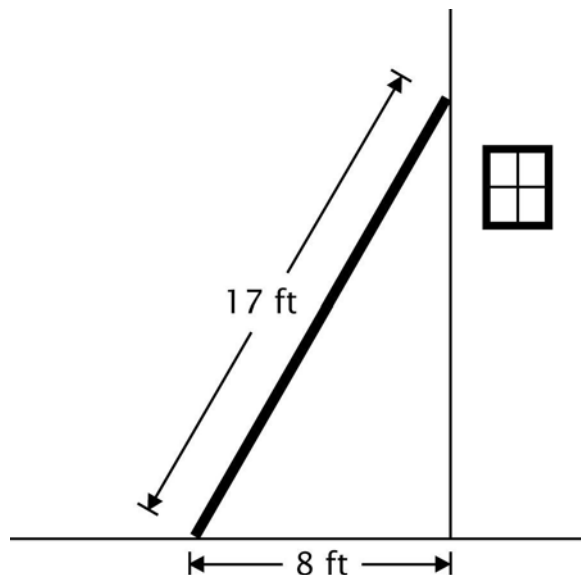
Teacher Blackline #1

1) c = 20
2) b = 60
3) yes; The square of one leg, 9, plus the square of the other leg, 40, is equal to the square of the hypotenuse, 41.
4) 10 mi
5) 15 ft

Student Worksheet #2

1) 17
2) (a) a = 80 (b) b= 35
3) no; The sum of the square of the leg, 9, and the square of the other leg, 16, is 337. The square of the hypotenuse, 20, is 400. For this to be a right triangle the two sums must be equal.
4) 27
5) 36 in
6) approximately 46 miles
7) 15 yd
8) 15 ft

Math 11 Essentials In-Class Assignment   *Name* _____

<u>Area Formulas</u>
Rectangle: Area = (Length) (Width)
Square: Area = (Side Length) ²
Triangle: Area = (Base)(Height) ÷ 2
Circle: Area = π r ²
<u>Circumference</u>*:* Circumference = π d

1.   Find the distance (perimeter or circumference) around the outside of each shape.

22cm

8cm

13m

4m

11m

50ft

48ft

52ft

a) _____   b) _____   c) _____

14.5 in

3cm

20ft
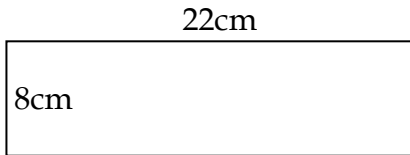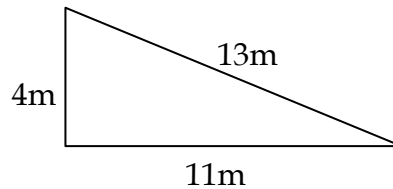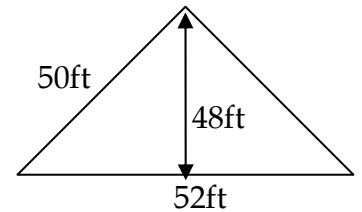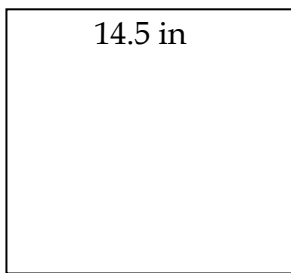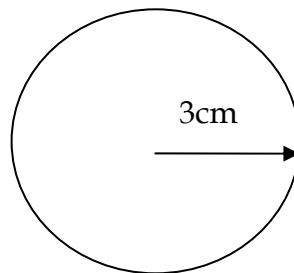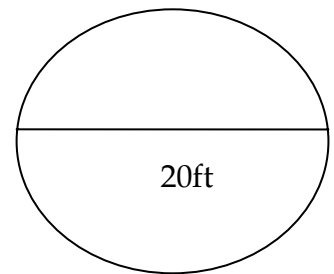
d) _____   e) _____   f) _____

2.   Find the area of each of the shapes above.

a) _____   b) _____   c) _____

d) _____   e) _____   f) _____

3.   Marlon wants to replace the baseboard in his rectangular living room which measures 14 feet by 18 feet.

a) How much baseboard will Marlon need?

b) If baseboard costs $0.75/foot, how much will replacing it cost Marlon?

c) If the baseboard sells in pieces 8 feet long, how many pieces will Marlon need?

4.   Sunna decides to build an odd shaped bathroom shown below.
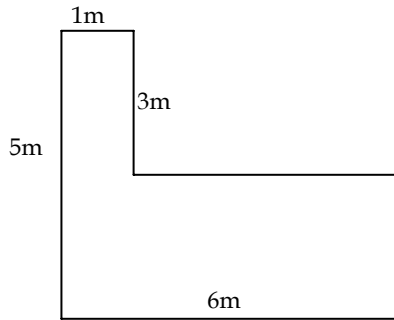
a) Find the area of Sunna's bathroom.

b) It costs $2 for each 1m² tile to cover the floor. How much will it cost Sunna to tile her new bathroom?

5.   If the perimeter of an equilateral triangle is 18 cm, what is the length of one of its sides?

6.   Bob has a problem. He knows that the length of his rectangular garden is 10m and the area is 250m² but he doesn't know the width. Find the width of Bob's garden.

7.   A farmer is given 100m of fencing to build a rectangular pen for her cows. What are two different size (length by width) pens that she could build using the 100m of fencing?

PERIMETER and COIN PROBLEMS
ELEMENTARY ALGEBRA - MAT 0024
Professor Howard Sorkin

PERIMETER PROBLEMS

1. If the perimeter of an equilateral (all sides equal) triangle is 27 inches, find a side of the triangle.

2. Each of the equal sides of an isosceles (two sides equal) triangle is 5 times the third side. The perimeter of the triangle is 121 inches. Find the sides of the triangle.

3. The length of a rectangle is 3 times its width. The perimeter of the rectangle is 32 feet. Find the dimensions of the rectangle.

4. The length of a rectangle is 6 times its width. The perimeter of the rectangle is 98 feet. Find the dimensions of the rectangle.

5. The length of a rectangle is 4 times its width. The perimeter of the rectangle is 90 feet. Find the dimensions of the rectangle.

6. The second side of a triangle is 5 inches less than the first side. The third side is 12 inches more than the first side. The perimeter of the triangle is 40 inches. Find each side of the triangle.

7. The lengths of the sides of a triangle are represented by three consecutive even integers. If the perimeter of the triangle is 72 feet, find the lengths of its sides.

8. The length of a rectangle is 4 inches more than its width. The perimeter is 96 inches. Find the dimensions of the rectangle.

9. The length of a rectangle exceeds the width by 9 inches. The perimeter of the rectangle is 86 inches. Find the dimensions of the rectangle.

10. The length of a rectangle exceeds the width by 5 inches. The perimeter of the rectangle is 102 inches. Find the dimensions of the rectangle.

11. The width of a rectangle is 4 inches less than its length. The perimeter is 112 inches. Find the length and the width of the rectangle.

12. The perimeter of a rectangular plot of land is 312 feet. If the length is 6 feet more than 5 times the width, what are the dimensions?

13. The perimeter of a rectangular garden is 150 feet. Find its dimensions if the length is 5 feet less than three times the width.

14. The perimeter of a rectangular tennis court is 272 feet. If the length of the court exceeds twice its width by 10 feet, find its dimensions.

Answers:

1. 9 in.	2. 11 in., 55 in., 55 in.	3. W = 4, L = 12	4. W = 7, L = 42	5. W = 9, L = 36
6. 6, 11, 23	7. 22, 24, 26	8. W = 22, L = 26	9. W = 17, L = 26	10. W = 23, L = 28
11. W = 26, L = 30	12. W = 25, L = 131	13. W = 20, L = 55	14. W = 42, L = 94	

COIN PROBLEMS

1. Joan has 3 times as many quarters as dimes. In all she has $1.70. How many coins of each type does she have?

2. Ken has 5 times as many dimes as nickels. In all he has $2.20. How many coins of each type does he have?

3. Dan has twice as many nickels as pennies and 5 times as many dimes as pennies. In all he has $1.22. How many coins of each type does he have?

4. Monica has three times as many nickels as pennies and twice as many quarters as nickels. In all she has $3.32. How many coins of each type does she have?

5. Mitch has $4.55 in dimes and quarters. He has 7 more quarters than dimes. Find the number he has of each coin.

6. Sue has $1.45 in nickels and dimes. The number of dimes exceeds the number of nickels by 4. Find the number she has of each kind.

7. Constance has $2.80 in quarters and dimes. The number of quarters exceeds three times the number of dimes by 1. Find the number she has of each kind.

8. Dawn deposited $5.30 in nickels, quarters, and dimes in her savings account. The number of dimes exceeded the number of nickels by 3, and the number of quarters was 20 less than the number of nickels. Find the number of each kind of coin she deposited.

9. A purse containing $4.80 in quarters and dimes has, in all, 30 coins. How many of each kind are there?

10. A purse contains $1.15 in nickels and dimes. There are 20 coins in all. How many of each kind are there?

11. In John's bank, there is $1.17 in pennies, nickels, and dimes. In all there are 25 coins. If there are twice as many nickels as pennies, find how many of each kind there are.

12. Cathleen counted her money and found that her 35 coins which were nickels, dimes, and quarters were worth $5.55. The number of dimes exceeded the number of nickels by 5. How many coins of each kind did she have?

Answers:

1. 2 D, 6 Q	2. 4 N, 20 D	3. 2 P, 4 N, 10 D	4. 2 P, 6 N, 12 Q	5. 8 D, 15 Q	6. 7 N, 11 D
7. 3 D, 10 Q	8. 25 N, 28 D, 5 Q	9. 18 D, 12 Q	10. 17 N, 3 D	11. 7 P, 14 N, 4 D	12. 7 N, 12 D, 16 Q

Math 11 Essentials
-- TEST --
Chapter 8 -- Measurement and 2D Design
Name:_____

_____

Part "A" -- Short Answer _____(10 Points)
Read each of the following questions carefully. Use scrap paper to determine your answer and place the answer, ONLY, in the space provided.

1. _____ What is the measure of the diameter of a circle is the radius is 6.5 cm?

2. _____ A package of border contains 8 strips, each 1 m in length. How many packages should I buy to cover a length of 35 m?

3. _____ Calculate the measure of side "c" in this triangle?

4. _____ The scale on a map is 1 cm = 5 km. What distance in km does 6 cm represent?

5. _____ A photo measures 5 inches by 7 inches. If I triple the dimensions, what are the measures of the new length and width?

6. _____ What is the perimeter of this room?

7. _____ Evaluate: $13.6^2 + 3.0^2$

8. _____ Using the scale 1 cm = 25 km, calculate the distance from C to D.

9. _____ A 12 m long room is reduced on a diagram to 12 cm. What is the scale for this diagram?

10. _____ What is the cost for baseboard needed for this room is the price for baseboard is $2.15/m.

Read each of the following questions carefully. Choose and answer 4 of the
following 5 questions. Answer each part of the question chosen. SHOW ALL
WORK ON LOOSE-LEAF PAPER to earn FULL MARKS for your work.
Remember to use appropriate units of measure.

1.   (a) Brandon is making a kite with the dimensions shown.
        What length of wood is needed for the support indicated?
        (Report your answer with 2 decimal places.)

        (b) Calculate the perimeter and area of the following figure.

2.   (a) Calculate the perimeter and area of the following figure.

        (b) Tyler is building a garage on a floor that measures 18 feet by 24 feet.
        •   Calculate the length of the diagonal of the rectangular floor.
        •   Tyler measures the length of the diagonal to be $29\frac{1}{2}$ feet. Are the
            angles at the corners of the garage right angles? Explain.

3.   (a) Find the measure of the unknown side.

       (b) Jillian and Robyn are going to redecorate an L-shaped room in their
       apartment. They want to lay pre-finished hardwood on the floors and
       install new baseboards all around. Determine the amount of both
       materials required.

4.   A new house is built on a lot that measures 68
       feet by 40 feet. The house measures 30 feet
       by 25 feet. It has a driveway measuring 15 feet
       by 12 feet.
       (a) Calculate the area of the yard.
       (b) Sod comes in strips that measure 1.5 feet
       by 6 feet. How many pieces of sod are required
       to cover the entire yard?

5. The following map shows a portion of Southern Ontario. The scale used for this map is **1 cm represents 7 km**.

(a) How many kilometers does 1 cm on the map represent?

(b) Calculate the actual distances represented by these distances on the road map.
   * 2 cm = _____ km
   * 0.5 cm = _____ km

(c) Use the map to estimate the driving distances between these locations.

Math 11 Essentials Rectangular Prisms

Fill in the missing values for a <u>rectangular prism</u>.

1.			2.			3.		
	length	12		length	5		length	18
	width	1		width	_____		width	_____
	height	14		height	1		height	5
	surface area	_____		surface area	129.4		surface area	_____
	volume	_____		volume	_____		volume	900

4.			5.			6.		
	length	7		length	14		length	_____
	width	12		width	_____		width	3
	height	_____		height	14		height	7
	surface area	_____		surface area	_____		surface area	62
	volume	1092		volume	392		volume	_____

7.			8.			9.		
	length	_____		length	13.5		length	11
	width	6		width	5		width	9
	height	11		height	_____		height	_____
	surface area	_____		surface area	_____		surface area	_____
	volume	500		volume	500		volume	1188

10.			11.			12.		
	length	4		length	6.7		length	12
	width	_____		width	12.39		width	10
	height	1		height	_____		height	_____
	surface area	108		surface area	292.02		surface area	_____
	volume	_____		volume	_____		volume	1700

13.			14.			15.		
	length	_____		length	2.5		length	14
	width	5		width	11.8		width	8
	height	10		height	7		height	_____
	surface area	_____		surface area	_____		surface area	_____
	volume	200		volume	_____		volume	560

Math 11 Essentials – Surface Area Practice

Find the surface area of the following rectangular prisms.

1.

a = 64.3 in

b = 34 in

c = 35 in
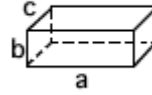
2.
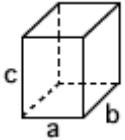
a = 11.4 km

b = 12.1 km

c = 33.6 km

3.

a = 37 cm

b = 14 cm

c = 22 cm

4.

a = 44 cm

b = 45 cm

c = 44 cm

5.

a = 53 cm

b = 23 cm

c = 34 cm

6.

a = 9.2 cm

b = 3.3 cm

c = 7.5 cm

7.
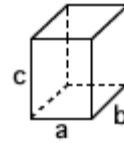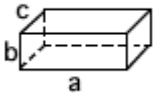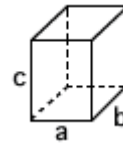
a = 26 mm

b = 29 mm

c = 34 mm

Math 11 Essentials Surface Area Practice

1. Find the surface area of the following rectangular prisms.

a)

6cm
8cm
7cm

b)

4m
13m
5m

c)

3ft
5ft
18ft

d)

22''
18''
28''

e)

52m
4.8m
6m
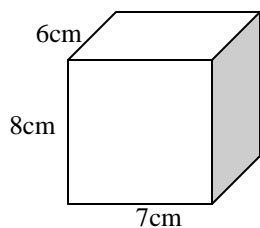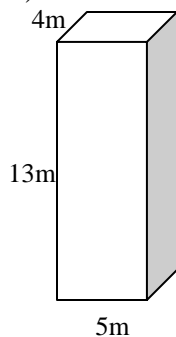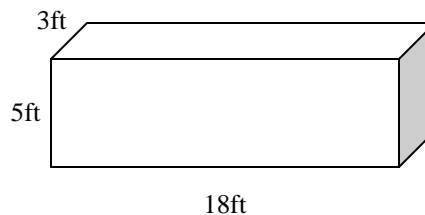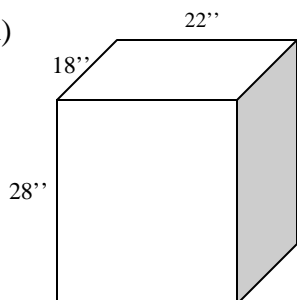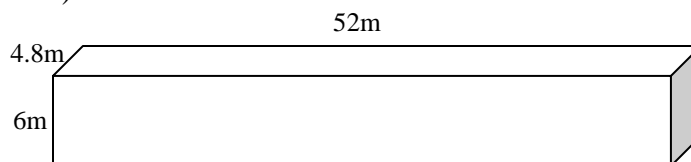
2. a) A rectangular prism shaped toy box has the dimensions 2m x 1.5m x 1.75m. The toy box has to be painted. How much paint is required to paint this toy box?

b) If paint comes in containers which cover 5 m^2, how many containers of paint will be needed?

c) If paint costs $21.50/ 5$m^2$, how much will it cost to paint the toy box?

d) How would the amount of paint and cost change, if you had to paint the inside of the box as well?

3. Colleen is wrapping a microwave for a wedding gift. The box measures 70cm by 30cm by 50cm. She has a sheet of paper measuring 100 00cm^2. Is this a big enough sheet to wrap the present? If not, how much more would she need? Show work to support your answer.

Math 11 Essentials

- *Find the surface area of the cylinders below.*
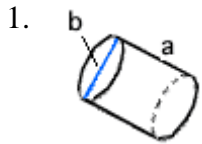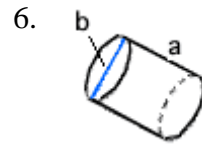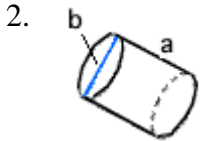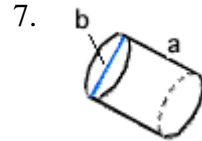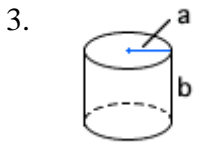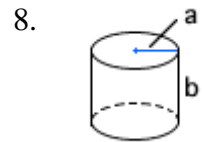
1.

a = 17 m
b = 62 m

2.

a = 18 in
b = 8 in

3.

a = 3 mm
b = 19.2 mm

4.

a = 10 ft
b = 25 ft

5.

a = 8.1 ft
b = 18.7 ft

6.

a = 10 m
b = 32 m

7.

a = 20 in
b = 16 in

8.

a = 4 m
b = 20 m

9.

a = 13 ft
b = 17 ft

10.

a = 8.5ft
b = 19.1 ft

11.

a = 50 cm
b = 55 cm

Math 11 Essentials Assignment   Name _____
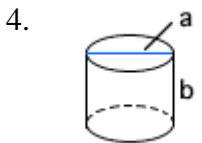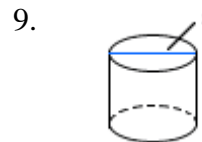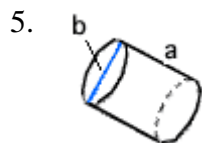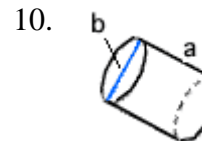
1.   Find the surface area and volume of the following rectangular prisms.

a)   b)   c)

2m
1.5m
13m

1ft
1.75ft
9.2 ft

3cm
8cm
5cm
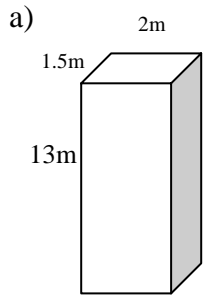
Surface Area _____   Surface Area _____   Surface Area _____
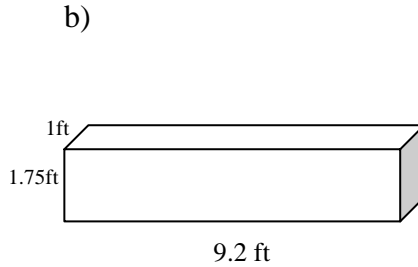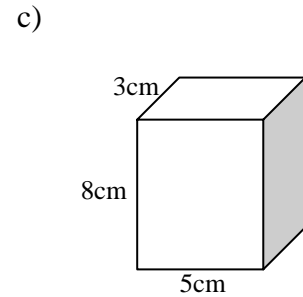
Volume _____   Volume _____   Volume _____

2. Find the missing values for a rectangular prism.

a) Length = 5 m   b) Length = _____   c) Length = 10 cm
   Width = 4 m   Width = 20 ft   Width = _____
   Height = 10 m   Height = 6 ft   Height = 8 cm
   Surface Area = _____   Surface Area = _____   Surface Area = 400 cm^2
   Volume = _____   Volume = 3600 ft^3 Volume =_____

3.   Flooring is usually measured in square feet or 1 ft by 1 ft squares. How could you express this
       in square inches?

4.   a) Ashley wants to build a rectangular flower bed that measures 2.5m x 3m x 0.5m. How many
       cubic metres of soil will she need to fill the flower bed?
       b) Soil comes in bags that hold 0.5 m^3, how many bags will Ashley need to fill her new flower
       bed?
       c) If each bag of soil cost $5.79, how much will it cost o fill the flower bed?

5.   Ms. Best has a rectangular shaped seat on her bench that she wants to cover with fabric. The
       dimensions of the seat are 4 ft x 2 ft x 0.75 ft.

       a) How much fabric will it take to cover the seat of Ms. Best's bench?
       b) Ms. Best usually makes a few mistakes when she cuts the fabric so she decides to buy 5%
       extra to be sure she has enough. How much should she buy?
       c) If fabric costs $10/ ft^2, how much will it cost to cover the sofa?

_____
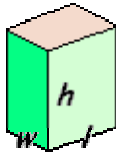

1.   Find the volume and surface area of each of the following. Show
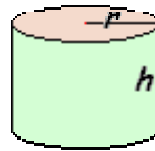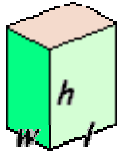   all calculations to support your answers.

a)
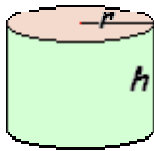
b)

c)

length =7cm
radius =5cm   width =19cm   radius =6 ft
height = 19cm   height = 6cm   height = 9ft

d)
                     e)   f)
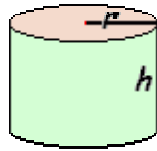
length =3m   length =1ft
width =14m   diameter =12inches   width =8ft
height = 16m   height = 4inches   height = 4ft
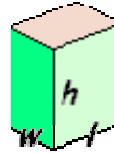
2.   A model car is constructed using a scale of 1:24.
      (a) Is this an enlargement or a reduction of the actual object?
      (b) A measurement on the model of the car is 2 inches. What is the
      measurement of the actual car?
      (c) What would the model measurement be for an actual
      measurement of 3.5 feet on the car?

3.   "Round" bales of hay are cylindrical with a diameter of 150 cm and a
      height of 120 cm. Small "square" bales of hay are rectangular
      prisms measuring 95 cm by 40 cm by 35 cm. How many square
      bales would be needed to feed as many animals as one round bale?
      Explain.

4.   A bedroom measures 3 m by 4 m by 2.5 m.

(a) If doors and windows take up 6 m^2, how much wallpaper is needed to paper the walls?

(b) If a roll of wallpaper covers approximately 2.8 m^2, how many rolls of wallpaper are needed for the room?

(c) Calculate the cost of baseboard at $1.80/m. (Remember that the width of the doorway is 1.8 m)

(d) Carpet is to be put in the room and costs $41.40/ m^2. Find the cost of the carpet.

Part "A" -- Short Answer   8 Points

Read each of the following questions carefully. Place the answer ONLY in the space provided.

1. _____   The radius of a circular base of a cylinder is 5 cm. What is the measure of the diameter?

2. _____   A model car uses a scale of 1 inch = 28 inches to the actual car. What is the actual measure of the car's bumper if the model's bumper measures 0.75 inches?

3. _____   In the space provided, draw the "net" of a cylinder.

4. _____   A cereal box measures 6 cm by 22 cm by 48 cm. How much cardboard is needed to build the box?

5. _____   For the cereal box in #4, what is the cost of the cardboard needed to build the box if recycled cardboard sells for $1.16/cm^2.

6. _____   The volume of a can is 355 cm^3. How many milliliters is this?

7. _____   A model of a chair uses the scale 1 cm = 15 cm. The height of the seat of a chair is 60 cm. How high is the seat of the model chair?

8. _____   How many times larger is the volume of the second prism than the first?

Answer each of the following questions. Place your answer in the space provided. Show all work to earn full marks for your answers.

1. A rectangular flower bed measures 3 yards by 2 yards. The bed must be dug out and filled with topsoil to a depth, or height, of 0.25 yard. Topsoil is delivered for $72 per cubic yard. **6 Points**

   (a) Calculate the volume of topsoil required to fill the flower bed.

   (b) Calculate the cost of the topsoil delivered.

2.   A cylindrical foot stool has a radius of 21 cm and a height of 38 cm. **6 Points**

   (a) Calculate the amount of material used to cover the foot stool. The foot stool does not use material on its bottom.

   (b) If leather material costs $64.23 /cm^2, what is the cost of covering the foot stool?

3.	The CN Tower is a cylinder shape with a base with a diameter of 66.6 m and a height of 433.33 m. If you build a scale model where the scale is 1:50, or 1 m represents 50 m, the base of the model would have a diameter of 1.33 m. What height of a room would you need for displaying the model? **5 Points**

4.	Which container has the greater volume? How much greater? **8 Points**

5.   Kyle and Brandon are building a water garden. The pond is circular and
      1.5 m in diameter. It will be filled with water to a depth, or height, of 0.5m.
      11 Points

      (a) Calculate the volume of water in the pond. Report you answer with
          two decimal places.

      (b) Kyle and Brandon plan to stock the pond with goldfish. One
          goldfish requires about 0.125 m^3 of living space. About how many
          goldfish can the guys put in the pond?

      (c) The pond requires a liner that must cover the bottom and the side.
          Calculate the cost of the liner is the charge is $14.76/m^2.

1.   Find the surface area of the prisms below. Show your work in the space below. (10 pts)

a)   15cm
10cm
40cm

b)   75m
80m

c)   20''
52''

d)   100'
15'
25'

e)   12km
16km
14km
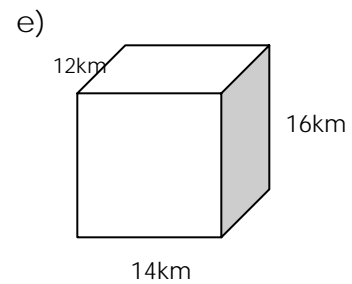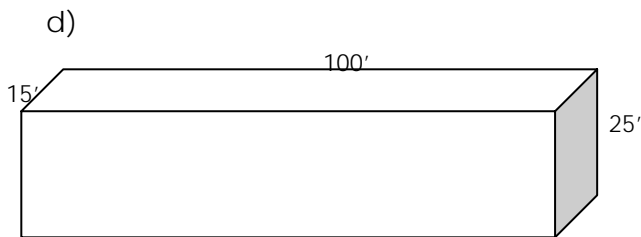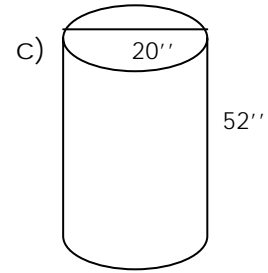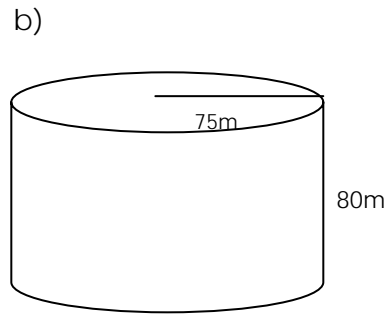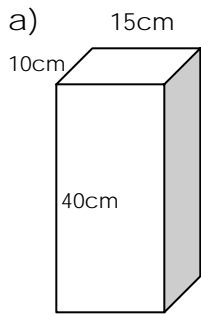
a)

b)

c)

d)   e)

2.   a) Sally is trying to wrap a CD for her brother for his birthday. The CD measures 0.5 cm by 14 cm by 12.5 cm. How much paper will Sally need? (2 pts)

b) If wrapping paper comes in packages of 300 cm². How many packages will Sally need? (1 pt)

c) The packages of wrapping paper costs $2.75 per package. At the last moment Sally notices gift bags that cost $4. 99. Is it cheaper to wrap the CD or put it in a gift bag? Explain your answer. (1 pt)

3.   A rectangular prism has a surface area of 300 m². It has a height of 5m and a length of 10m. What is the width of the rectangular prism? (3 pts)

4.   Find the volume of the prism below. (6 pts)

a)

40m

25m

30m

b)

4ft

4.5 ft

c)

12 mm

16mm
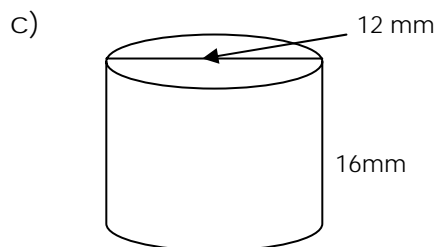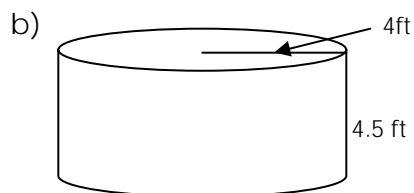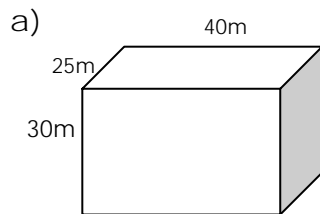
5.   A can of soup has a base with are area of 85 cm² and a height of 10 cm. How much soup does the can hold? (2 pts)

6. A rectangular prism has a volume of 2400 mm^2 and a height of 48 mm. What is the area of the base of the prism? (2 pts)

7. A cylindrical water glass has a diameter of 8 cm and volume of 400 cm^3. What is the height of the glass? (2 pt)

8. Ken is hired to build a straight road that connects the highway to an airport. The road will be 4 m wide, 0.25 m thick and 3 km long. How many cubic metres (m^3) of pavement will Ken need to build his road? (Hint: remember to work in all the same units) (3 pts)

Bonus
A grain silo holds 50 000m^3 of grain. The silo is 60 m tall. What is the radius of the silo?

Math 11 Essentials Test #2   Name _____
* Show all your work on these sheets.

1.   Perform the following operations (round to two decimal places): (6pts)

a) $(4)^2 =$ _____   b) $(0.5)^1 =$ _____   c) $\sqrt{9} =$ _____

d) $\pi^3 =$ _____   e) $\dfrac{\pi}{3} =$ _____   f) $(0.25)^5 =$ _____

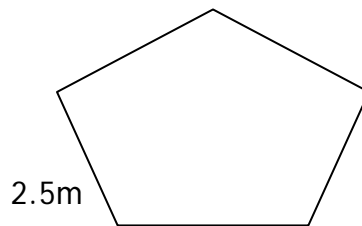2.   Write the following expressions as exponents: (2 pts)
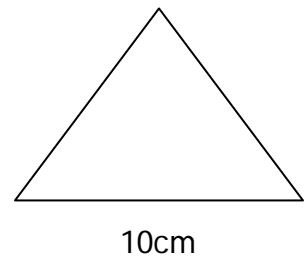
a) $(12)(12)(12)(12) =$ _____   b) $\pi =$ _____

3.   Find the perimeter of the following regular polygons. (5 pts)

3 ft   2.5m   10cm

a) _____   b) _____   c) _____

25mm   40cm
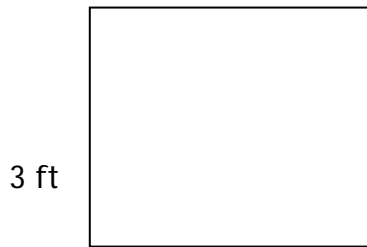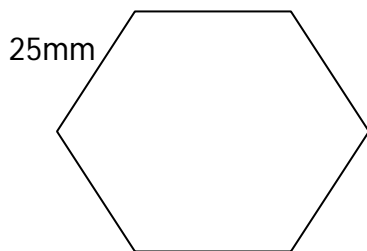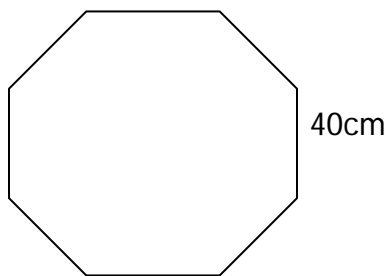
d) _____   e) _____

4.   Find the area of the shapes below. (4 pts)

12cm [rectangle]
20.5 cm

[semicircle] 14 cm

9 cm 7 cm [triangle]
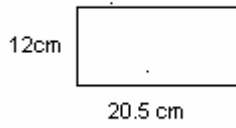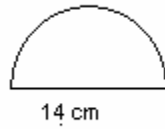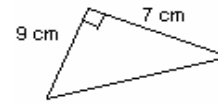
a) _____   b) _____   c) _____

5.   Find the perimeter and area of the following figure. (3 pts)

12cm

15.5cm

18cm

3.5cm
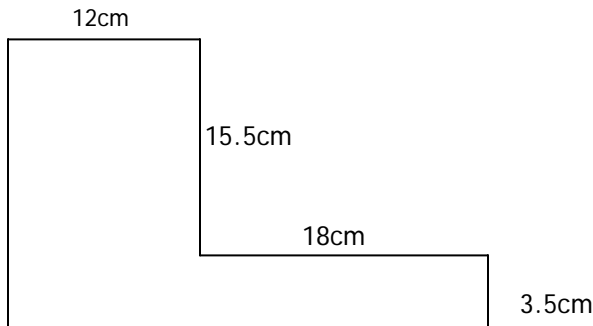
6.   Find the area of the shaded region. Show all your work. (4 pts)

20cm [circle inscribed in square]

8m
5m
7m [rectangle inside circle]
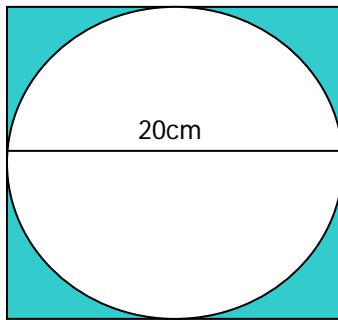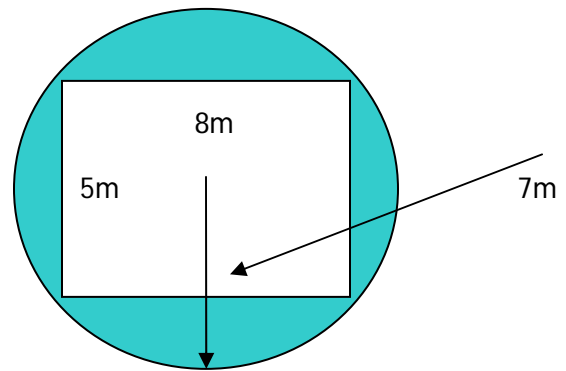
a) _____   b) _____

7.   A rectangle has a length of 50cm and a width of 30cm. Find the perimeter. (2 pts)

8.   The perimeter of an equilateral triangle is 300m. What is the length of one side? (1 pt)

9.   Kim goes to Subway on a regular basis. 3 out of 4 times that she goes, she orders a cold-cut sub. If she goes to Subway 400 times how many times do you expect her to get a cold-cut sub? (2 pts)

10.   Lenny is building a rectangular stage and he has 420 ft^2. He knows that the width of the rectangle is 21 ft but he doesn't know the length. Find the length of the rectangle. (1 pt)

11.   Bobby hires a company to build a new L-shaped kitchen shown below.
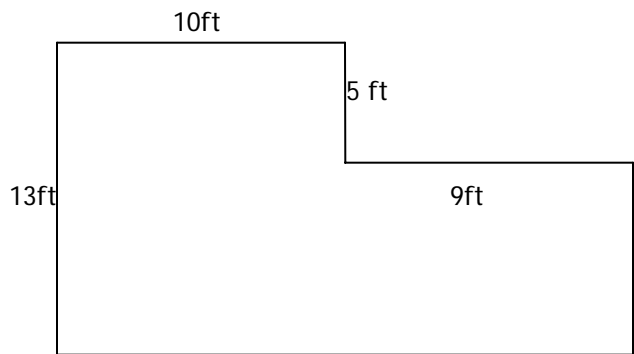
a) How many ft^2 of hardwood flooring will Bobby need for his new kitchen? (2 pts)

b) Hardwood flooring cost $5.50/ ft^2. What will it cost for the flooring? (1 pt)

c) Hardwood flooring comes in bundles if 100 ft^2. How many bundles are needed for this kitchen? (2 pts)

d) The company that Bobby hired charges $20/hour. It will take them 10 hours to lay the flooring. What is the total cost of this job? (2 pts)