8th Grade Assignment – Week #10

Individual Work

- Work through the problems in the new **Mensuration** unit: **Practice Sheet #1** (p24).
- **Pythagorean Theorem Test.** Things to keep in mind regarding the test:
  - The test is found at the end of this document.
  - The parent should give the test to the student – to be taken by the end of this week.
  - The student should not use notes or the workbook during the test.
  - The student should not see the test until he/she is ready to take it.
  - You should try to take the test within one hour, if possible.
  - After the student has completed the test, the parent should send a photo of the test to the tutor. The tutor should then indicate which problems are not correct, and then the student should correct those mistakes and send it back to the tutor.
  - Calculators should not be used, but the **tables** at the back of the workbook are permitted. (These tables are also included at the ed of the test.

Group Assignment:

- *For Tuesday:*
  (1) Work through Problems #2-5 on **Mensuration Group Sheet #1**.
  Important Note: Keep in mind that area is calculated in square units: ft^2, m^2, in^2, cm^2, etc.
  and that volume is calculated in cubic units: ft^3, m^3, in^3, cm^3, etc.
  (2) Find as many methods as you can for solving problem #5d from Practice Sheet #1 (p24).

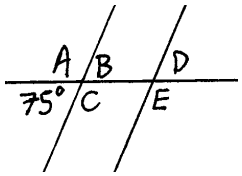
- *For Thursday:* **Deriving a formula for the Area of a Circle**
  Work through Problem #1 on **Mensuration Group Sheet #1**.
  Hint: It may be helpful to know that the circumference of any circle is π times greater than the diameter of the circle. This can be expressed either as $C = \pi D$ or $C = 2 \cdot \pi R$
  If you are successful at finding the desired formula, then you can use it to solve Problem #6.

Mensuration – Practice Sheet #1

Note: In this entire unit, you are allowed to use the *Table of Square Roots* found at the back of this book. However, you will need to use the square root algorithm to calculate the square roots of numbers greater than 100.

1) Find the variables.

a) (Two of the lines are parallel.)



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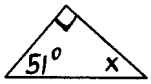

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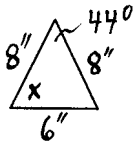
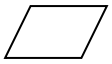
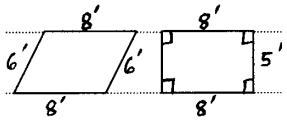


2) In this parallelogram, what is the sum of the measures of the four angles?



3) Calculate the area.

a)



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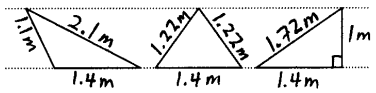


4) The four ratios of a circle are:

C:D ≈ 22:7

D:C ≈ 7:22

C:D ≈ 3.14:1

D:C ≈ 0.318:1

Answer each question using one of the above ratios.

a) What is the circumference of a circle that has a diameter of 35m?

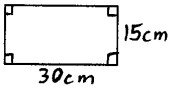
b) What is the circumference of a circle that has a diameter of 3m?

c) What is the diameter of a circle that has a circumference of 44m?

d) What is the diameter of a circle that has a circumference of 20m?

5) Calculate the area.

a)



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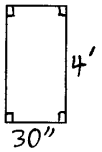

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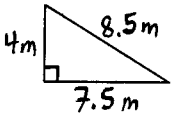

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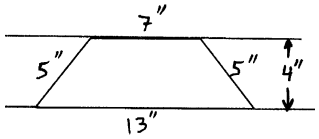

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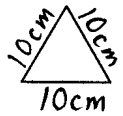


Mensuration – Group Sheet #1

1) **The Area of a Circle.**
With a compass, construct 3 circles that have a radius of about 2 inches. Shade-in the inside edge of each circle's circumference with a colored pencil. Cut the first circle into 4 equal-sized pie pieces, the second one into 8 pieces, and the third one into 16 pieces. In each case, put the pieces side-by-side alternating top and bottom. The first one should look like this: 

a) What happens as the circle is cut into more and more pieces?

b) What shape results from having the circle cut into infinitely many pie pieces?

c) What is the area of this final shape, and also, therefore, the area of the circle?

d) What is the formula for the area, A, of a circle, given just the radius, R?

2) **Calculating Volume.**
A room has a floor that measures 25 by 20 feet, and has a height of 8 feet.

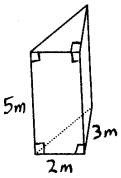
a) What is the area of the floor?

b) What is the volume of water needed to fill the room to a depth of 1 foot?

c) What is the volume of water needed to fill the room to a depth of 2 feet?

d) What is the volume of water needed to fill the room to the ceiling?

3) Given this triangular prism…

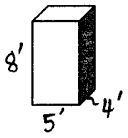


a) What is the area of the triangular floor?

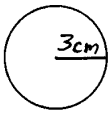
b) What is the volume of the whole prism?

4) By looking at the volumes calculated in the previous two problems, give a formula that can be used to calculate the volume, V, of a solid that has the same top and bottom.

5) Use the above formula to calculate the volume of this box.



6) Use the formula from #1d to calculate the area of this circle.

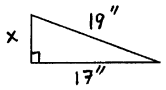


7) A box measures 2' x 2' x 8'. It fits perfectly in the corner of a room such that its top is on the ceiling of the room. If the square top of the box slides along the ceiling, thereby stretching the sides of the box (which are flexible), what happens to the volume of the box?

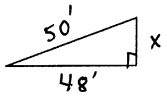
Pythagorean Theorem – Test Name:_____

1) Find X by using any method. Leave answers as square roots.

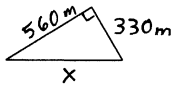
a)



b)



2) Find X by using a Pythagorean triple. Be sure to show your work.



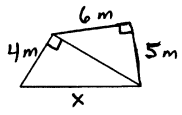
3) Use the square root algorithm to calculate $\sqrt{617}$. Round your answer to 3 significant digits. Go as far as you can for extra credit!

4) Determine whether each triangle is obtuse, right or acute, given its three sides a, b, c.

a) a = 2; b = 3; c = 4

b) a = 11; b = 7; c = 13

5) Find X.



Challenge Problem!

- Given that the angles at B and C are equal, find the distance from A to B.

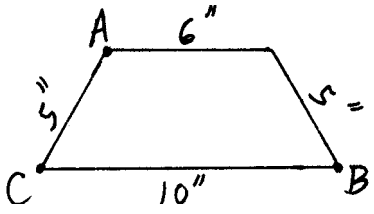


Table of Squares

$1^2 = 1$	$21^2 = 441$	$41^2 = 1681$	$61^2 = 3721$
$2^2 = 4$	$22^2 = 484$	$42^2 = 1764$	$62^2 = 3844$
$3^2 = 9$	$23^2 = 529$	$43^2 = 1849$	$63^2 = 3969$
$4^2 = 16$	$24^2 = 576$	$44^2 = 1936$	$64^2 = 4096$
$5^2 = 25$	$25^2 = 625$	$45^2 = 2025$	$65^2 = 4225$
$6^2 = 36$	$26^2 = 676$	$46^2 = 2116$	$66^2 = 4356$
$7^2 = 49$	$27^2 = 729$	$47^2 = 2209$	$67^2 = 4489$
$8^2 = 64$	$28^2 = 784$	$48^2 = 2304$	$68^2 = 4624$
$9^2 = 81$	$29^2 = 841$	$49^2 = 2401$	$69^2 = 4761$
$10^2 = 100$	$30^2 = 900$	$50^2 = 2500$	$70^2 = 4900$
$11^2 = 121$	$31^2 = 961$	$51^2 = 2601$	$71^2 = 5041$
$12^2 = 144$	$32^2 = 1024$	$52^2 = 2704$	$72^2 = 5184$
$13^2 = 169$	$33^2 = 1089$	$53^2 = 2809$	$73^2 = 5329$
$14^2 = 196$	$34^2 = 1156$	$54^2 = 2916$	$74^2 = 5476$
$15^2 = 225$	$35^2 = 1225$	$55^2 = 3025$	$75^2 = 5625$
$16^2 = 256$	$36^2 = 1296$	$56^2 = 3136$	$76^2 = 5776$
$17^2 = 289$	$37^2 = 1369$	$57^2 = 3249$	$77^2 = 5929$
$18^2 = 324$	$38^2 = 1444$	$58^2 = 3364$	$78^2 = 6084$
$19^2 = 361$	$39^2 = 1521$	$59^2 = 3481$	$79^2 = 6241$
$20^2 = 400$	$40^2 = 1600$	$60^2 = 3600$	$80^2 = 6400$

Pythagorean Triples

3,4,5
5,12,13
8,15,17
7,24,25
20,21,29
12,35,37
9,40,41
28,45,53
11,60,61
16,63,65
33,56,65
48,55,73
13,84,85
36,77,85
39,80,89
65,72,97

Table of Square Roots

$\sqrt{1} = 1.000$	$\sqrt{21} = 4.583$	$\sqrt{41} = 6.403$	$\sqrt{61} = 7.810$	$\sqrt{81} = 9.000$
$\sqrt{2} = 1.414$	$\sqrt{22} = 4.690$	$\sqrt{42} = 6.481$	$\sqrt{62} = 7.874$	$\sqrt{82} = 9.055$
$\sqrt{3} = 1.732$	$\sqrt{23} = 4.796$	$\sqrt{43} = 6.557$	$\sqrt{63} = 7.937$	$\sqrt{83} = 9.110$
$\sqrt{4} = 2.000$	$\sqrt{24} = 4.899$	$\sqrt{44} = 6.633$	$\sqrt{64} = 8.000$	$\sqrt{84} = 9.165$
$\sqrt{5} = 2.236$	$\sqrt{25} = 5.000$	$\sqrt{45} = 6.708$	$\sqrt{65} = 8.062$	$\sqrt{85} = 9.220$
$\sqrt{6} = 2.449$	$\sqrt{26} = 5.099$	$\sqrt{46} = 6.782$	$\sqrt{66} = 8.124$	$\sqrt{86} = 9.274$
$\sqrt{7} = 2.646$	$\sqrt{27} = 5.196$	$\sqrt{47} = 6.856$	$\sqrt{67} = 8.185$	$\sqrt{87} = 9.327$
$\sqrt{8} = 2.828$	$\sqrt{28} = 5.292$	$\sqrt{48} = 6.928$	$\sqrt{68} = 8.246$	$\sqrt{88} = 9.381$
$\sqrt{9} = 3.000$	$\sqrt{29} = 5.385$	$\sqrt{49} = 7.000$	$\sqrt{69} = 8.307$	$\sqrt{89} = 9.434$
$\sqrt{10} = 3.162$	$\sqrt{30} = 5.477$	$\sqrt{50} = 7.071$	$\sqrt{70} = 8.367$	$\sqrt{90} = 9.487$
$\sqrt{11} = 3.317$	$\sqrt{31} = 5.568$	$\sqrt{51} = 7.141$	$\sqrt{71} = 8.426$	$\sqrt{91} = 9.539$
$\sqrt{12} = 3.464$	$\sqrt{32} = 5.657$	$\sqrt{52} = 7.211$	$\sqrt{72} = 8.485$	$\sqrt{92} = 9.592$
$\sqrt{13} = 3.606$	$\sqrt{33} = 5.745$	$\sqrt{53} = 7.280$	$\sqrt{73} = 8.544$	$\sqrt{93} = 9.644$
$\sqrt{14} = 3.742$	$\sqrt{34} = 5.831$	$\sqrt{54} = 7.348$	$\sqrt{74} = 8.602$	$\sqrt{94} = 9.695$
$\sqrt{15} = 3.873$	$\sqrt{35} = 5.916$	$\sqrt{55} = 7.416$	$\sqrt{75} = 8.660$	$\sqrt{95} = 9.747$
$\sqrt{16} = 4.000$	$\sqrt{36} = 6.000$	$\sqrt{56} = 7.483$	$\sqrt{76} = 8.718$	$\sqrt{96} = 9.798$
$\sqrt{17} = 4.123$	$\sqrt{37} = 6.083$	$\sqrt{57} = 7.550$	$\sqrt{77} = 8.775$	$\sqrt{97} = 9.849$
$\sqrt{18} = 4.243$	$\sqrt{38} = 6.164$	$\sqrt{58} = 7.616$	$\sqrt{78} = 8.832$	$\sqrt{98} = 9.899$
$\sqrt{19} = 4.359$	$\sqrt{39} = 6.245$	$\sqrt{59} = 7.681$	$\sqrt{79} = 8.888$	$\sqrt{99} = 9.950$
$\sqrt{20} = 4.472$	$\sqrt{40} = 6.325$	$\sqrt{60} = 7.746$	$\sqrt{80} = 8.944$	$\sqrt{100} = 10.000$

Note: If there are ending zeroes inside the square root, then you can remove an even number of zeroes from inside, which will result in half as many zeroes (or moving the decimal place half as many places) in your answer.

Examples:

With $\sqrt{25000000}$ we remove 6 zeroes, then adding 3 zeroes to $\sqrt{25}$, gives an answer of 5000.

With $\sqrt{60000}$ we remove 4 zeroes. Since $\sqrt{6}$ is 2.449, we move 2 decimal places to get 244.9.

With $\sqrt{600000}$ we remove 4 zeroes. Since $\sqrt{60}$ is 7.746, we move 2 decimal places to get 774.6.

Note: This table should not be used if, after removing an <u>even</u> number of zeroes, there are more than two digits inside the square root. For example, it *can* be used for $\sqrt{58000000}$, but *cannot* be used for $\sqrt{58700}$ or for $\sqrt{580}$ or for $\sqrt{5800000}$.