Class Notes
(Test 12)

2nd 1/2 of Chapter 8 (8.5-8.8) Geometry

8.5 Triangles

To find perimeter: Add the 3 sides together.

To find area use: $A = \frac{1}{2} \times \text{base} \times \text{height}$ (or)
$A = .5 \times \text{base} \times \text{height}$

* The height must be perpendicular to the base.

ex) 21m 28m

$P = 21 + 28 + 21 \quad A = \frac{1}{2}bh$

$P = 75m \quad A = \frac{1}{2} \times 26 \times 20 \quad A = 260 \text{m}^2$

the measures of the angles of a triangle.

The sum of the measures of the 3 angles of a triangle is 180°
Given the measures of 2 of the angles you can find the 3rd angle.

1st) Add the number of degrees of the 2 given angles
2nd) Subtract that amount from 180°.

\[ \begin{align*}
\text{ex)} & \\
\triangle & \quad 110° \quad 180° \\
+40° & \quad \Rightarrow \quad -150° \\
150° & \quad \underline{30°}
\end{align*} \]

\[ \begin{align*}
\triangle & \quad 90° \quad 180° \\
+45° & \quad -135 \\
135° & \quad \underline{45°}
\end{align*} \]

Circles: Identify radius and diameter

- **Radius**: Distance from the Center of the circle out to a point on the circle.
- **Diameter**: Distance across the circle passing through the Center.

\[ 2r = d \]

\[ r = \frac{d}{2} \]
Given the radius of a circle, you can find the diameter by doubling it.

\[ 2(r) = d \]

\[ r = 6 \text{ in} \quad \text{so} \quad d = 2(6) \]
\[ d = 12 \text{ in} \]

Given the diameter, you can find the radius by cutting it in half.

\[ r = \frac{d}{2} \]
\[ r = \frac{20}{2} \quad r = 10 \text{ ft} \]

The circumference of a circle is the distance around the circle (its perimeter). To find it use the formula: \[ C = \pi d \]

The value we use for \( \pi \) is 3.14

**Example**

\[ C = \pi d \]
\[ C = 3.14 \times 10 \quad C = 31.4 \text{ yd} \quad (\text{use linear units - no exponent!}) \]

\[ C = \pi d \]
\[ r = 7 \text{ in so} \quad d = 14 \]
\[ C = 3.14 \times 14 \quad C = 43.96 \text{ in} \]
Area of a circle: Use the formula:

$$A = \pi r^2$$

ex)

\[
\begin{align*}
\text{A} &= 3.14 \times 4 \times 4 \\
\text{A} &= 3.14 \times 16 \\
\text{A} &= 50.24 \text{ in}^2
\end{align*}
\]

\[
\begin{align*}
\text{A} &= 3.14 \times 7 \times 7 \\
\text{A} &= 3.14 \times 49 \\
\text{A} &= 153.86 \text{ ft}^2
\end{align*}
\]

You can find the area of "portions" of a circle. For example:

- a half circle: use: $0.5\pi r^2$
- $\frac{1}{4}$ of a circle: use: $0.25\pi r^2$
- $\frac{3}{4}$ of a circle: use: $0.75\pi r^2$

Volume (You will get a formula sheet for these)

Volume is a measure of the space inside a solid shape. Volume is "3-dimensional".

# for volume we will use cubic units #
GEOMETRY FORMULAS

Rectangle
Perimeter: \( P = 2 \cdot l + 2 \cdot w \)
Area: \( A = l \cdot w \)

Square
Perimeter: \( P = 4 \cdot s \)
Area: \( A = s^2 \), which means \( s \cdot s \)

Parallelogram
Perimeter: Add the lengths of the sides.
Area: \( A = b \cdot h \)

Triangle
Perimeter: Add the lengths of the sides.
Area: \( A = \frac{1}{2} \cdot b \cdot h \)
or \( A = 0.5 \cdot b \cdot h \)

Trapezoid
Perimeter: Add the lengths of the sides.
Area: \( A = \frac{1}{2} \cdot h \cdot (b + B) \)
or \( A = 0.5 \cdot h \cdot (b + B) \)

Circle
diameter: \( d = 2 \cdot r \)
radius: \( r = \frac{d}{2} \)
Circumference: \( C = \pi \cdot d \)
\( \text{or} \ C = 2 \cdot \pi \cdot r \)
Area: \( A = \pi \cdot r^2 \), which means \( \pi \cdot r \cdot r \)
Area of a semicircle: \( A = \frac{\pi \cdot r^2}{2} \)
Use 3.14 as the approximate value of \( \pi \).

Right Triangle
hypotenuse = \( \sqrt{(\text{leg})^2 + (\text{leg})^2} \)
leg = \( \sqrt{(\text{hypotenuse})^2 - (\text{leg})^2} \)

Rectangular Solid
Volume: \( V = l \cdot w \cdot h \)

Cylinder
Volume: \( V = \pi \cdot r^2 \cdot h \)
\( \text{or} \ V = \pi \cdot r \cdot r \cdot h \)
Use 3.14 as the approximate value of \( \pi \).

Cone
Volume: \( V = \frac{1}{3} \cdot B \cdot h \)
\( \text{or} \ V = \frac{B \cdot h}{3} \)
\( B \) is area of the circular base or \( \pi \cdot r^2 \).

Pyramid
Volume: \( V = \frac{1}{3} \cdot B \cdot h \)
\( \text{or} \ V = \frac{B \cdot h}{3} \)
\( B \) is area of the base.

Sphere
Volume: \( V = \frac{4}{3} \cdot \pi \cdot r^3 \)
\( \text{or} \ V = \frac{4 \cdot \pi \cdot r \cdot r \cdot r}{3} \)
Use 3.14 as the approximate value of \( \pi \).

Hemisphere
Volume: \( V = \frac{2}{3} \cdot \pi \cdot r^3 \)
\( \text{or} \ V = \frac{2 \cdot \pi \cdot r \cdot r \cdot r \cdot r}{3} \)
Ex 1) Find the volume of a box that has dimensions: 4 ft by 2 ft by 3 ft.

\[ V = L \times W \times H \]
\[ V = 4 \text{ ft} \times 2 \text{ ft} \times 3 \text{ ft} = \boxed{24 \text{ ft}^3} \]

2) Find the volume of a perfect cube with sides of 6 ft,

\[ V = S \times S \times S \]
\[ V = 6 \text{ ft} \times 6 \text{ ft} \times 6 \text{ ft} = \boxed{216 \text{ ft}^3} \]

3) Find the volume of a cylinder with a radius of 3 in. and a height of 15 in.

\[ V = \pi r^2 h \]
\[ V = 3.14 \times 3 \text{ in} \times 3 \text{ in} \times 15 \text{ in} \]
\[ V = \boxed{423.9 \text{ in}^3} \]

4) Find the volume of a cone with a radius of 4 cm and a height of 6 cm.

\[ V = \frac{\pi r^2 h}{3} \]
\[ V = \frac{3.14 \times 4 \text{ cm} \times 4 \text{ cm} \times 6 \text{ cm}}{3} \]
\[ V = \boxed{100.48 \text{ cm}^3} \]
5) Find the volume of a square pyramid with base edges of 5 ft and a height of 9 ft.

\[ V = \frac{s^2h}{3} \]

\[ V = \frac{5 \times 5 \times 9}{3} = \frac{75}{3} \text{ ft}^3 \]

6) Find the volume of a sphere with a radius of 3 m.

\[ V = \frac{4\pi r^3}{3} \]

\[ V = \frac{4 \times 3.14 \times 3 \times 3 \times 3}{3} = \frac{113.04}{3} \text{ m}^3 \]

* Remember \( \pi \) is only used with formulas involving objects with circles. 
  i.e.: cylinder, cone, and sphere.

8.8 Find the missing length in a right triangle. (You will get a square root chart.)

We will only be working with perfect squares. (A number that has a whole number as its square root.) For example, 16 is a perfect square because \( \sqrt{16} = 4 \). * You have to know your perfect squares up to 100.
In a right triangle, the 2 sides that form a right angle are called the "legs" of the triangle. The side across from the right angle is called the hypotenuse. It is always the longest side.

If given the legs, use:

\[ \sqrt{\text{leg}^2 + \text{leg}^2} \]

If given the hypotenuse and a leg, use:

\[ \sqrt{\text{(hypotenuse)}^2 - \text{leg}^2} \]

ex) \[
\sin \theta = \frac{\sqrt{\text{leg}^2 + \text{leg}^2}}{\text{hypotenuse}} = \frac{\sqrt{5^2 + 12^2}}{\text{hypotenuse}} = \frac{\sqrt{25 + 144}}{\text{hypotenuse}} = \frac{\sqrt{169}}{\text{hypotenuse}} = \frac{13}{\text{hypotenuse}} \]

(use linear units)

ex) \[
\sqrt{\text{hyp}^2 - \text{leg}^2} = \sqrt{5^2 - 4^2} = \sqrt{25 - 16} = \sqrt{9} = 3 \text{ cm} \]