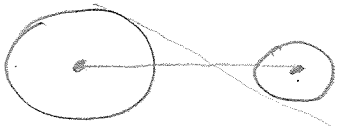
NOTES
Day 2

Geometry (H)
Section 9.2 - Common Tangents

Last class we learned about theorems related to tangents. Today we will define and use common tangents.

A line that is tangent to each of two coplanar circles is called a **common tangent.**

Common internal tangent – DOES intersect the segment joining the centers of the 2 circles.



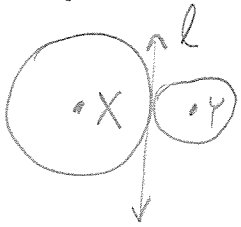
← common internal tangent

Common external tangent – does NOT intersect...

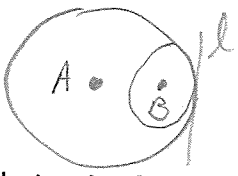
A circle can be tangent to a line, but it can also be tangent to another circle.

Tangent circles – intersect in exactly one point
- they may be externally or internally tangent
- tangent to same line at same point.

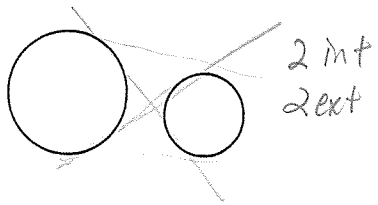
Externally tangent circles



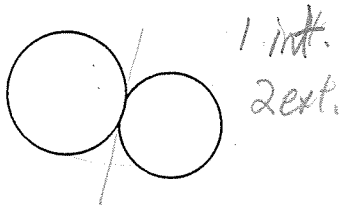
Internally tangent circles
– when one circle lies inside the oth



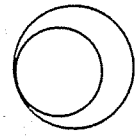
State the number of external tangents and internal tangents that exist for each pair of circles. Sketch them.



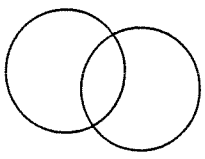
2 int
2 ext



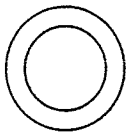
1 int.
2 ext.



ext.
1 tangent
0 int.



2 ext
0 int.



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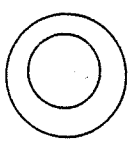

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* Similar Δs concepts are used often to find unknown lengths in problems with tangents

Let's try some examples using these new terms.

1. $\overline{RT}$ is a common tangent. QS = 7, ST = 24, RT = 48.
Find PR, QT and PT.

$\frac{24}{48} = \frac{7}{x}$

$x = 14$

PR = 14

$7^2 + 24^2 = y^2$

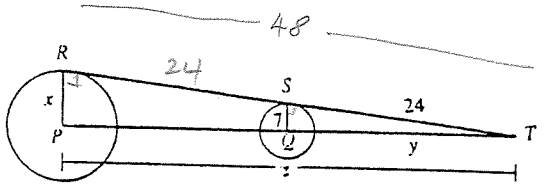
$49 + 576 = y^2$

$625 = y^2$

$25 = y$

QT = 25

PT = 50



2. $\overline{AB}$ is a common external tangent. DC = 13.
Find AB.

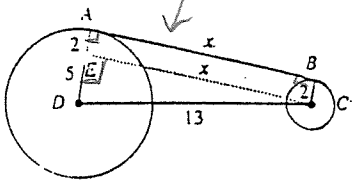
rectangle: a [P] w/ right ∠s.

$5^2 + x^2 = 13^2$

$x^2 = 144$

$x = 12$

AB = 12



3. Circles A, B and C are tangent circles. AB = 8, BC = 13, AC = 11.
Find the radii of the three circles.

$8 - x + 11 - x = 13$

$19 - 2x = 13$

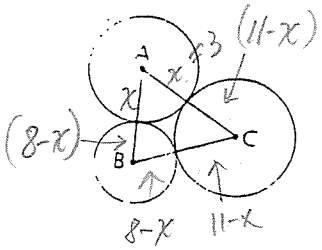
$6 = 2x$

$3 = x$

Circle A r = 3

B r = 5

C r = 8



4. Given: $\odot E$ and $\odot F$, with $\overline{AC}$ tangent at B and C. DE = 10, FB = 4.
Find AB.

$6^2 + x^2 = 14^2$

$x^2 = 196 - 36$

$x^2 = 160$

$x = 4\sqrt{10}$

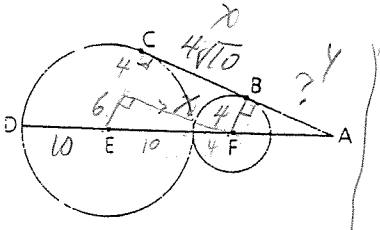
$\frac{y}{y + 4\sqrt{10}} = \frac{4}{10}$

$5y = 2y + 8\sqrt{10}$

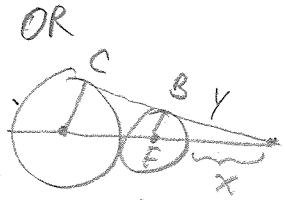
$3y = 8\sqrt{10}$

$y = \frac{8\sqrt{10}}{3}$

$AB = \frac{8\sqrt{10}}{3}$



OR



Use similar Δs & Pythag. Thm.

$\frac{4}{10} = \frac{4+x}{18+x}$

$x = \frac{16}{3}$

$4^2 + y^2 = \left(\frac{28}{3}\right)^2$