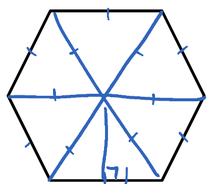
Name________________
Date________________

5.2 Multiplying & Dividing Radicals

***Investigate* – p. 282**

A: Regular Hexagons & Equilateral Triangles

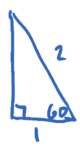
1. Divide a regular hexagon into 6 equilateral triangles:



interior angles = $120°$ each

2. If perimeter = 12cm, find distance between parallel sides
   a. Pythagoras
   b. Trigonometry

a.



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

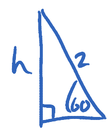
$1^2 + b^2 = 2^2$

$b^2 = 3$

$b = \sqrt{3}$

$\therefore$ dist $= 2\sqrt{3}$

b.



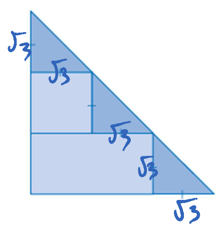
$\sin 60° = \frac{h}{2}$

$\frac{\sqrt{3}}{2} = \frac{h}{2}$

$\therefore h = \sqrt{3}$

dist $= 2\sqrt{3}$

B: Isosceles Right Triangles and Rectangles



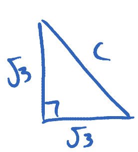
6. If the legs of the congruent isosceles triangles is $\sqrt{3}$, determine the dimensions of the two rectangles.

Small : $\sqrt{3} \times \sqrt{3}$ large : $\sqrt{3} \times 2\sqrt{3}$

7. Find the exact length of the hypotenuse of the large triangle

   a. Individually
   b. Single Triangle

a.



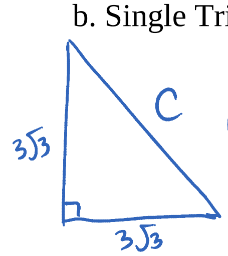
$a^2 + b^2 = c^2$

$3 + 3 = c^2$

$c = \sqrt{6}$

$\therefore 3\sqrt{6}$

b.



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

$(3\sqrt{3})^2 + (3\sqrt{3})^2 = C^2$

$27 + 27 = C^2$

$C = \sqrt{54}$

$C = 3\sqrt{6}$

<u>Link the Ideas</u> – p. 284

When multiplying radicals, multiply the Coefficients and multiply the radicands.

e.g. $\left(2\sqrt{7}\right)\left(4\sqrt{75}\right)=$ $8\sqrt{525}$

$= 8\sqrt{25}\sqrt{21}$

$= 40\sqrt{21}$

→it may be easier to simplify first !

e.g. $\left(2\sqrt{7}\right)\left(4\sqrt{75}\right)=$ $\left(2\sqrt{7}\right)\left(4\sqrt{25}\sqrt{3}\right)$

$=\left(2\sqrt{7}\right)\left(20\sqrt{3}\right) \longrightarrow 40\sqrt{21}$

<u>Example 1:</u> p. 284 - multiply, then simplify completely

a) $\left(-3\sqrt{2x}\right)\left(4\sqrt{6}\right)=$ $-12\sqrt{12x}$

$= -12\sqrt{4}\sqrt{3x}$

$= -24\sqrt{3x}$

b) $\left(7\sqrt{3}\right)\left(5\sqrt{5}-6\sqrt{3}\right)=$

$35\sqrt{15} - 42\sqrt{9}$

$35\sqrt{15} - 126$

c) $\left(8\sqrt{2}-5\right)\left(9\sqrt{5}+6\sqrt{10}\right)=$

$72\sqrt{10} + 48\sqrt{20} - 45\sqrt{5} - 30\sqrt{10}$

$42\sqrt{10} + 48\sqrt{4}\sqrt{5} - 45\sqrt{5}$

$42\sqrt{10} + 96\sqrt{5} - 45\sqrt{5}$

$42\sqrt{10} + 51\sqrt{5}$

d) $9\sqrt[3]{2w}\left(\sqrt[3]{4w}+7\sqrt[3]{28}\right)=$

$9\sqrt[3]{8w^2} + 63\sqrt[3]{56w}$

$18\sqrt[3]{w^2} + 126\sqrt[3]{7w}$

When dividing radicals, divide the coefficients and then divide the radicands.

Example 2: Divide, then simplify completely:

a) $\frac{\sqrt{80}}{\sqrt{5}} = \sqrt{16}$

$= 4$

b) $\frac{-24\sqrt{40}}{16\sqrt{4}} = \frac{-3\sqrt{10}}{2}$

b) $\frac{\sqrt{99}}{2\sqrt{11}} = \frac{\sqrt{9}}{2}$

$= 3/2$

d) $\frac{(-8\sqrt{6})(\sqrt{7})}{6\sqrt{21}} =$

$\frac{-8\sqrt{42}}{6\sqrt{21}}$

$= \frac{-4\sqrt{2}}{3}$

e) $\frac{\sqrt[3]{56}}{5\sqrt[3]{7}} = \frac{\sqrt[3]{8}}{5}$

$= 2/5$

f) $\frac{2\sqrt[4]{64}}{4\sqrt[4]{2}} = \frac{1\sqrt[4]{32}}{2}$

$= \frac{\sqrt[4]{16}\sqrt[4]{2}}{2}$

$= \frac{2 \cdot \sqrt[4]{2}}{2}$

$= \sqrt[4]{2}$

Assignment: p. 289 # 1-4, 6, 16, 22