# Unit 3 Day 1 Notes

## Rationalizing the Denominator

- there should never be a radical in the denominator of your final answer.

Example:

① $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{3^2}} = \boxed{\frac{2\sqrt{3}}{3}}$

② $\frac{1}{\sqrt[3]{x^2}} \cdot \frac{\sqrt[3]{x}}{\sqrt[3]{x}} = \frac{\sqrt[3]{x}}{\sqrt[3]{x^2} \cdot \sqrt[3]{x}} = \frac{\sqrt[3]{x}}{\sqrt[3]{x^3}} = \boxed{\frac{\sqrt[3]{x}}{x}}$

③ $\sqrt[7]{\frac{1}{a^2}} = \frac{\sqrt[7]{1}}{\sqrt[7]{a^2}} = \frac{1}{\sqrt[7]{a^2}} \cdot \frac{\sqrt[7]{a^5}}{\sqrt[7]{a^5}} = \frac{\sqrt[7]{a^5}}{\sqrt[7]{a^7}} = \boxed{\frac{\sqrt[7]{a^5}}{a}}$

Key

# Group Activity: Conjecturing about Special Right Triangle Relationships

**Instructions:**

**You will need a pencil and a protractor**

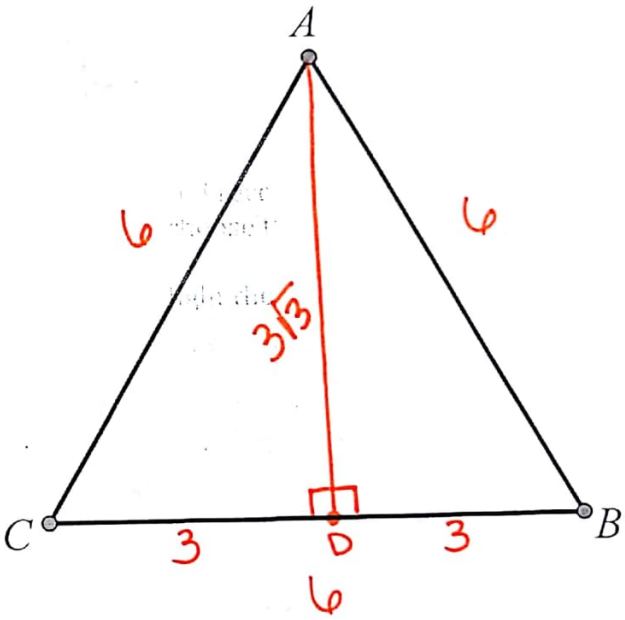
1. One at a time, the members of your group choose and record any even number between 6 and 30. No two members may choose the same number. Your number: 6
2. $\Delta ABC$ is an equilateral triangle. Within $\Delta ABC$, highlight the 30-60-90 triangle that has hypotenuse $\overline{AC}$, long leg $\overline{AD}$, and short leg $\overline{BD}$.
3. On the back of this page, ABCD is a square. Within ABCD, highlight $\Delta ABD$ and label its angle measures.
4. Use the number that your chose to label the sides of $\Delta ABC$ and square ABCD. Then solve for the missing parts.

$AB =$ 6

$AD =$ $3\sqrt{3}$

$BD =$ 3

All answers in simplest radical form




**Show work here:**

$3^2 + b^2 = 6^2$

$9 + b^2 = 36$

$-9 \quad -9$

$\sqrt{b^2} = \sqrt{27}$

$b = \sqrt{27}$

$3 \cdot 9$

$3 \cdot 3$

$b = 3\sqrt{3}$

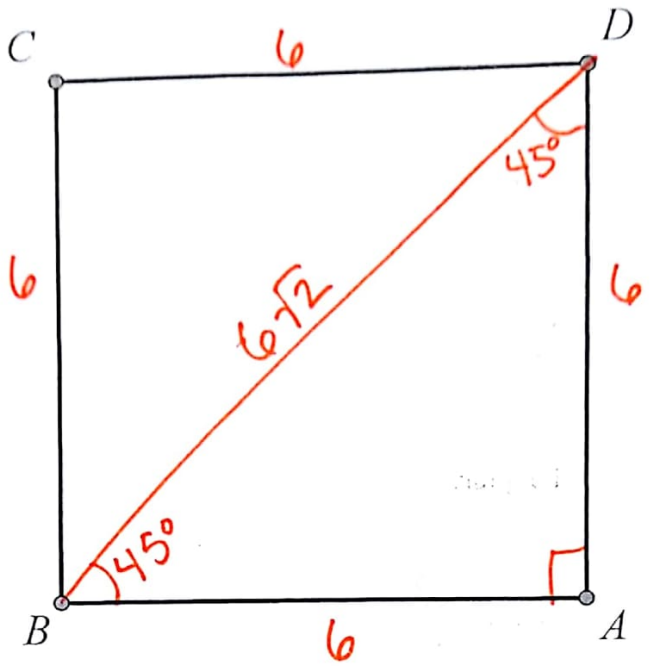
Group Activity: Conjecturing about Special Right Triangle Relationships

$AB =$ 6

$AD =$ 6

$BD =$ $6\sqrt{2}$

All answers in simplest radical form




**Show work here:**

$6^2 + 6^2 = c^2$

$36 + 36 = c^2$

$72 = c^2$

$\sqrt{72} = c$

12 4

4 3 3 2

2 2

$6\sqrt{2} = c$

Group Activity: Conjecturing about Special Right Triangle Relationships

| Compilation of Group Findings | | | | | | |
|---|---|---|---|---|---|---|
| | 30-60-90 Triangles | | | 45-45-90 Triangles | | |
| | *AB* | *AD* | *BD* | *AB* | *AD* | *BD* |
| S1 | | | | | | |
| S2 | | | | | | |
| S3 | | | | | | |
| S4 | | | | | | |

For this next part, your group of four will split into two groups of two. In each pair, **take turns** explaining how you would complete the three conjectures below. Explain the reasoning process that led to the conjecture. The non-explaining partner will re-state what has been said and either agree or disagree with it.

**Conjectures:**

1. In 30-60-90 triangles, the hypotenuse is always $\sqrt{3}$ times the short leg.
2. In 30-60-90 triangles, the long leg is always two times the short leg.
3. In 45-45-90 triangles, the hypotenuse is always $\sqrt{2}$ times the legs.

**Read and Discuss (in pairs).**
Our conjectures above are based on **specific** cases of 30-60-90 and 45-45-90 triangles. Although these conjectures may be true for all of the cases you've observed thus far, this does not prove that the conjectures are true for *all* possible cases. (What if, for example, the conjectures are only true when AB is an even number?) In order to prove that the conjectures are true for all possible cases, we will need to look at the ***general*** case for each of these types of triangle. We will begin examining the general cases on the next page.

Group Activity: Conjecturing about Special Right Triangle Relationships

**The general case of the 30-60-90 triangle**

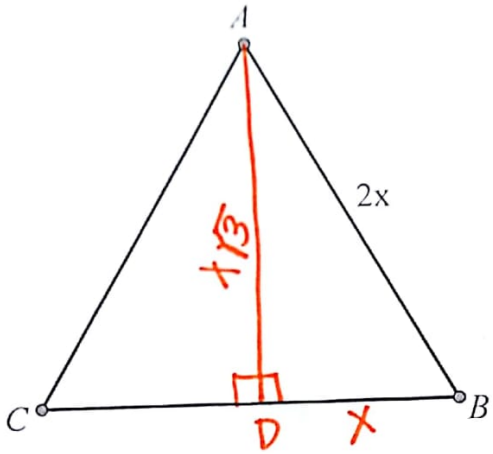
Show work to express the values of *AD* and *BD* in simplest radical form.

*AB* = 2x

*AD* = x√3

*BD* = x

All answers in simplest radical form




**The general case of the 45-45-90 triangle**

Show work to express the values of *AD* and *BD* in simplest radical form.

*AB* = x

*AD* = x

*BD* = x√2

All answers in simplest radical form