Working with geometric means may involve working with radicals. Radicals should always be written in **simplest form.** This means writing them so that

1. No perfect square factor other than 1 is under the radical sign.
2. No fraction is under the radical sign.
3. No fraction has a radical in its denominator.

Example 3 Simplify: **a.** $5\sqrt{18}$ **b.** $\sqrt{\frac{3}{2}}$ **c.** $\frac{15}{\sqrt{5}}$

Solution **a.** Since $18 = 9 \cdot 2$, there is a perfect square factor, 9, under the radical sign.

$$5\sqrt{18} = 5 \cdot \sqrt{9 \cdot 2} = 5 \cdot \sqrt{9} \cdot \sqrt{2} = 5 \cdot 3 \cdot \sqrt{2} = 15\sqrt{2}$$

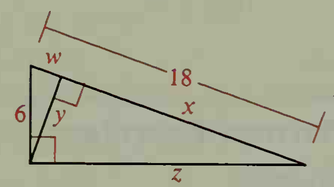
b. There is a fraction, $\frac{3}{2}$, under the radical sign.

$$\sqrt{\frac{3}{2}} = \sqrt{\frac{3}{2} \cdot \frac{2}{2}} = \sqrt{\frac{6}{4}} = \frac{\sqrt{6}}{\sqrt{4}} = \frac{\sqrt{6}}{2}$$

c. There is a radical in the denominator of the fraction.

$$\frac{15}{\sqrt{5}} = \frac{15}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{15\sqrt{5}}{5} = 3\sqrt{5}$$

Example 4 Find the values of w, x, y, and z.



Solution

$\frac{18}{6} = \frac{6}{w}$ (Cor. 2)
$18w = 36$
$w = 2$

Then $x = 18 - 2 = 16$.

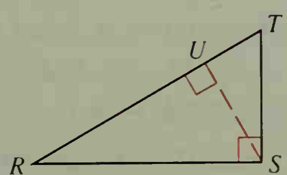
$\frac{16}{y} = \frac{y}{2}$ (Cor. 1)
$y^2 = 16 \cdot 2$
$y = \sqrt{16 \cdot 2}$
$y = \sqrt{16} \cdot \sqrt{2}$
$y = 4\sqrt{2}$

$\frac{18}{z} = \frac{z}{16}$ (Cor. 2)
$z^2 = 16 \cdot 18$
$z = \sqrt{16 \cdot 18}$
$z = \sqrt{16 \cdot 9 \cdot 2}$
$z = 4 \cdot 3 \cdot \sqrt{2} = 12\sqrt{2}$

Classroom Exercises

Use the diagram to complete each statement.

1. If $m\angle R = 30$, then $m\angle RSU = \underline{\ ?\ }$, $m\angle TSU = \underline{\ ?\ }$, and $m\angle T = \underline{\ ?\ }$.
2. If $m\angle R = k$, then $m\angle RSU = \underline{\ ?\ }$, $m\angle TSU = \underline{\ ?\ }$, and $m\angle T = \underline{\ ?\ }$.
3. $\triangle RST \sim \triangle\underline{\ ?\ } \sim \triangle\underline{\ ?\ }$
4. $\triangle RSU \sim \triangle\underline{\ ?\ } \sim \triangle\underline{\ ?\ }$



Exs. 1–4