10. Finish simplifying $\frac{2}{\sqrt{8}}$ in the two ways shown.

$$\frac{2}{\sqrt{8}} = \frac{2}{\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} = \frac{2\sqrt{8}}{8} = \frac{?}{?} = \frac{?}{?}$$

$$\frac{2}{\sqrt{8}} = \frac{2}{\sqrt{8}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{\sqrt{16}} = \frac{?}{?} = \frac{?}{?}$$

Simplify the radical expressions.

11. $6\sqrt{25}$ **12.** $5\sqrt{18}$ **13.** $\sqrt{\frac{1}{3}}$ **14.** $\frac{15}{\sqrt{3}}$

15. a. $\sqrt{4} \cdot \sqrt{9}$ **16. a.** $\sqrt{7} \cdot \sqrt{16}$ **17. a.** $\frac{\sqrt{4}}{\sqrt{9}}$ **18. a.** $\sqrt{\frac{5}{2}}$

b. $\sqrt{4 \cdot 9}$ **b.** $\sqrt{7 \cdot 16}$ **b.** $\sqrt{\frac{4}{9}}$ **b.** $\frac{\sqrt{5}}{\sqrt{2}}$

Written Exercises

Simplify the expressions.

A **1.** $\sqrt{49}$ **2.** $3\sqrt{64}$ **3.** $\frac{2}{5}\sqrt{9}$ **4.** $\frac{2}{5}\sqrt{25}$

5. $\sqrt{12}$ **6.** $\sqrt{50}$ **7.** $5\sqrt{28}$ **8.** $\frac{1}{2}\sqrt{300}$

9. $\sqrt{\frac{1}{2}}$ **10.** $\frac{1}{\sqrt{2}}$ **11.** $\sqrt{\frac{2}{27}}$ **12.** $6\sqrt{\frac{1}{3}}$

13. $\frac{18}{\sqrt{3}}$ **14.** $\frac{15}{\sqrt{30}}$ **15.** $\frac{3\sqrt{32}}{4}$ **16.** $\frac{5}{2\sqrt{10}}$

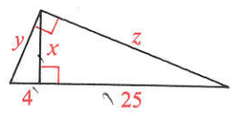
Find the geometric mean between the two numbers.

17. 2 and 8 **18.** 3 and 27 **19.** 13 and 25

20. 1 and 50 **21.** 6 and 10 **22.** $\frac{1}{10}$ and 2

Each diagram shows a right triangle with the altitude drawn to the hypotenuse. Find the values of x, y, and z.

B **23.**



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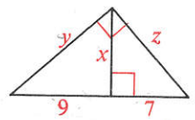

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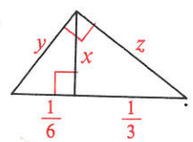

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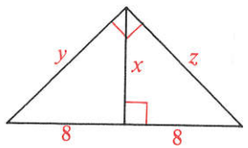

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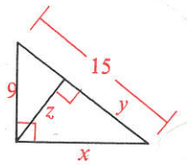

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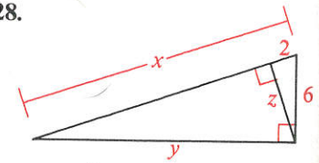
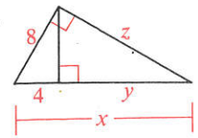


Find the values of x, y, and z.

29.



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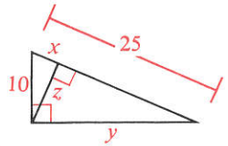

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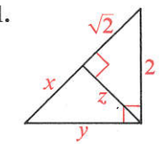
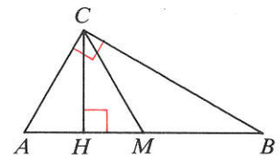


32. Prove Theorem 6–1.

C **33.** Prove: In a right triangle, the product of the hypotenuse and the length of the altitude drawn to the hypotenuse is equal to the product of the two legs.

34. The *arithmetic mean* between two numbers r and s is defined to be the number $\frac{r+s}{2}$.

a. $\overline{CM}$ is the median and $\overline{CH}$ is the altitude to the hypotenuse of right $\triangle ABC$. Show that CM is the arithmetic mean between AH and BH and that CH is the geometric mean between AH and BH. Then use the diagram to show that the arithmetic mean is greater than the geometric mean.



b. Show algebraically that the arithmetic mean between two different numbers r and s is greater than the geometric mean. (*Hint:* The geometric mean is $\sqrt{rs}$. Work backward from $\frac{r+s}{2} > \sqrt{rs}$ to $(r-s)^2 > 0$ and then reverse the steps.)

35. In this exercise p, q, r, s, and t are prime numbers, all different.

a. Note that the number 3 is the geometric mean between two different pairs of integers: 1 and 9, 3 and 3. The number 6 is the geometric mean between five different pairs of integers. List them.

b. The number pq is the geometric mean between five different pairs of integers. List them.

c. The number pqr is the geometric mean between ___?___ different pairs of integers. List them.

d. The number $pqrst$ is the geometric mean between ___?___ different pairs of integers. (You don't have to list them.)

Challenge

Start with a right triangle. Build a square on each side. Locate the center of the square on the longer leg. Through the center, draw a parallel to the hypotenuse and a perpendicular to the hypotenuse.

Cut out the pieces numbered 1–5. Can you arrange the five pieces to cover exactly the square built on the hypotenuse?