Chapter 8 - Test review

1. Find the geometric mean between 20 and 5.
   \[ \sqrt{20 \cdot 5} = \sqrt{100} = 10 \]

2. Find \( x \) in \( \triangle ABC \).
   \[ X = \sqrt{4 \cdot 16} = \sqrt{4} \cdot \sqrt{16} = 2 \cdot 4 = 8 \]

3. Find \( x \) in \( \triangle PQR \).
   \[ x^2 + 12^2 = 25^2 + 14^2 = x^2 \]
   \[ x^2 = 169 \]
   \[ x = \sqrt{169} = 13 \]

4. Find \( x \) in \( \triangle STU \).
   \[ x^2 + 15^2 = 17^2 \]
   \[ x^2 = 289 - 225 = 64 \]
   \[ x = \sqrt{64} = 8 \]

5. Find \( x \) in \( \triangle DEF \).
   This is an isosceles right triangle. Therefore, it is a 45°-45°-90° triangle. Therefore, the legs of the hypotenuse are \( \sqrt{2} \). So, \( x = 6 \sqrt{2} \).

6. Find \( y \) in \( \triangle XYZ \).
   The hypotenuse of a 45°-45°-90° triangle is \( \sqrt{2} \). Therefore, to get the leg, divide the hypotenuse by \( \sqrt{2} \). So, \( y = 6 \sqrt{2} \).

7. The length of the sides of a square is 10 meters. Find the length of the diagonals of the square.
   The diagonal of a square is the hypotenuse of a 45°-45°-90° triangle. Therefore, the diagonal \( = \sqrt{2} \times 10 = 10 \sqrt{2} \).

8. Find \( x \) in \( \triangle HJK \).
   \[ x = 2 \cdot 5 = 10 \]

9. Find \( x \) in \( \triangle ABC \).
   \[ AB = \frac{50}{2} = 25 \]. Therefore, \( x = 25 \sqrt{3} \).
   Because in 30°-60°-90° triangle, the long leg = short leg \( \cdot \frac{\sqrt{3}}{2} \).

10. Find \( x \) to the nearest tenth.
    \[ \frac{x}{20} = \sin 67° \]
    \[ x = 20 \times \sin 67° \approx 18.41 \]

11. Find the measure of the angle of elevation of the Sun when a pole 25 feet tall casts a shadow 42 feet long.
    Use \( \tan \) because \( \tan \) is what is available.
    \[ \tan x = \frac{25}{42} \]
    \[ x = \tan^{-1}(\frac{25}{42}) \approx 30.76° \]

12. Which is the angle of depression in the figure at the right?
    \[ \text{(A) } \angle AOT \quad \text{(B) } \angle AOB \quad \text{(C) } \angle TOB \quad \text{(D) } \angle BTO \]

13. Find the geometric mean between 7 and 12.
    \[ \sqrt{7 \cdot 12} = \sqrt{84} = \sqrt{4 \cdot 21} = 2 \sqrt{21} \]

14. In \( \triangle PQR \), \( PS = 4 \) and \( QS = 6 \). Find \( PS \).
    Missing the picture.
15. Find $y$.

16. Find the length of the hypotenuse of a right triangle with legs that measure 5 and 7.

17. Find $x$.

18. Which set of measures could represent the lengths of the sides of a right triangle?
   - A 9, 40, 41
   - B 8, 30, 3
   - C 7, 8, 15
   - D $\sqrt{2}, \sqrt{3}, \sqrt{5}$

19. Find $c$.

20. Find the perimeter of a square if the length of its diagonal is 12 inches.

21. Find $x$.

22. Find $x$ to the nearest tenth.

23. Find $x$ to the nearest degree.

24. If a 20-foot ladder makes a $65^\circ$ angle with the ground, how many feet up a wall will it reach?

25. A ship’s sonar finds that the angle of depression to a wreck on the bottom of the ocean is $12.5^\circ$. If a point on the ocean floor is 60 meters directly below the ship, how many meters is it from that point on the ocean floor to the wreck? Round your answer to the nearest tenth.

26. Find the angle of elevation of the sun if a building 100 feet tall casts a shadow 150 feet long. Round to the nearest degree.

27. Sarah stands on the ground and sights the top of a steep cliff at a $60^\circ$ angle of elevation. She then steps back 50 meters and sights the top of the steep cliff at a $30^\circ$ angle. If Sarah is 1.8 meters tall, how tall is the steep cliff to the nearest meter?

\[
\tan 60^\circ = \frac{y}{x} \quad \Rightarrow \quad x = y \tan 60^\circ \\
\tan 30^\circ = \frac{x}{y+50} \quad \Rightarrow \quad x = (y+50) \tan 30^\circ \\
\Rightarrow \quad y \tan 60^\circ = y \tan 30^\circ + 50 \tan 30^\circ \\
- y \tan 30^\circ \quad \Rightarrow \quad y \tan 60^\circ - y \tan 30^\circ = 50 \tan 30^\circ \\
\]
27. CONTINUED

\[ y = \frac{50 + \tan 30^\circ}{(\tan 60^\circ + \tan 30^\circ)} = 25 \]

SOLVE FOR X

\[ x = y \tan 60^\circ = 25 \tan 60^\circ = 43.3 \]

STEEP CLIFF + SARA'S HEIGHT

\[ = 43.3 + 1.8 = 45.1 \]