

CLASS 8

MATHS

EXTRA QUESTIONS

Extra Questions for Class 8 Maths Chapter 9: The Baudhayana-Pythagoras Theorem – HOTS

Original HOTS-level (Higher Order Thinking Skills) practice questions for Class 8 Maths Chapter 9 (The Baudhayana-Pythagoras Theorem), genuinely harder than the textbook exercise, using fresh numbers not found in the NCERT book. Full worked solutions included.

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Q1 (Ladder problem). A 15 m ladder rests against a wall, its foot 9 m from the wall's base. How high up the wall does it reach?

Solution: $\text{height}^2 = 15^2 - 9^2 = 225 - 81 = 144 \Rightarrow \text{height} = 12 \text{ m}.$

Q2 (Generating a triple, Euclid-style). Using $m = 3$, $n = 2$, generate a Pythagorean triple via $a = m^2 - n^2$, $b = 2mn$, $c = m^2 + n^2$.

Solution: $a = 9 - 4 = 5$, $b = 12$, $c = 13 \Rightarrow (5, 12, 13)$. Check: $25 + 144 = 169 = 13^2$. ✓

Q3 (Assertion–Reason). Assertion (A): (9, 12, 15) is a primitive Pythagorean triple. Reason (R): A triple is primitive if the HCF of the three numbers is 1.

Solution: $\text{HCF}(9, 12, 15) = 3 \neq 1$, so (9, 12, 15) is **not** primitive — it's $3 \times (3, 4, 5)$. **Assertion is false;**

Reason is true (R correctly defines primitivity, it's just that the triple in A fails that test).

Q4 (Reverse problem). A rectangle has diagonal 25 cm and one side 24 cm. Find its perimeter.

Solution: Other side² = $25^2 - 24^2 = 625 - 576 = 49 \Rightarrow$ other side = 7 cm. Perimeter = $2(24 + 7) = 62 \text{ cm}.$

Q5 (Multi-step, sliding ladder). A 17 m ladder leans against a wall reaching 15 m up. If the foot of the ladder is pulled out by 7 m, how far down the wall does the top slide?

Solution: Initial foot distance = $\sqrt{(17^2 - 15^2)} = \sqrt{64} = 8 \text{ m}$. New foot distance = $8 + 7 = 15 \text{ m}$. New height = $\sqrt{(17^2 - 15^2)} = \sqrt{64} = 8 \text{ m}$. The top slides down from 15 m to 8 m — a drop of **7 m**.

Q6 (Spot the error). A student claims that doubling all three sides of a right triangle also doubles its area. Check this claim.

Solution: Original area = $\frac{1}{2}ab$. Doubled sides: $\frac{1}{2}(2a)(2b) = 4 \times (\frac{1}{2}ab)$, i.e. **4 times** the original area, not 2 times. The student's claim is **false**.

Q7 (Lattice grid extension). Can a square of area 10 square units be drawn on a lattice/dot grid? If yes, give the vector.

Solution: $10 = 1^2 + 3^2 = 1 + 9$. **Yes** — use the vector (1, 3).

Q8 (Proof, similar triangles). Prove that dropping an altitude from the right angle to the hypotenuse of a right triangle divides it into two smaller triangles, each similar to the original.

Solution: Let $\triangle ABC$ be right-angled at A, with altitude AD drawn to hypotenuse BC. In $\triangle ABD$ and $\triangle CBA$: $\angle ADB = \angle BAC = 90^\circ$, and $\angle B$ is common to both, so $\triangle ABD \sim \triangle CBA$ (AA similarity). By the same reasoning with $\angle C$ common, $\triangle ACD \sim \triangle BCA$. Hence **all three triangles — $\triangle ABD$, $\triangle ACD$ and $\triangle ABC$ — are similar to one another.**

Q9 (Integer hypotenuse). A right triangle has integer hypotenuse 25 units. List every possible pair of positive integer legs.

Solution: Need $a^2 + b^2 = 625$ with positive integers $a \leq b$. $7^2 + 24^2 = 49 + 576 = 625$ ✓. $15^2 + 20^2 = 225 + 400 = 625$ ✓. So the pairs are **(7, 24)** — a primitive triple — and **(15, 20)**, which is $5 \times (3, 4, 5)$.

Q10 (Real-world application). A rectangular TV screen advertised as “50 inches” (measured along its diagonal) has a width-to-height ratio of 16:9. Find its actual width and height, to 1 decimal place.

Solution: Let width = $16k$, height = $9k$. Diagonal² = $(16k)^2 + (9k)^2 = 337k^2 = 50^2 = 2500 \Rightarrow k^2 = 2500/337 \approx$

$7.418 \Rightarrow k \approx 2.724$. Width = $16k \approx \mathbf{43.6 \text{ in}}$; Height = $9k \approx \mathbf{24.5 \text{ in}}$.

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