CLASS 8 MATHS NCERT SOLUTIONS

NCERT Solutions for Class 8 Maths Chapter 9: The Baudhayana-Pythagoras Theorem – Ganita Prakash

Chapter 9 of the Class 8 NCERT Ganita Prakash textbook (Part 2, Chapter 2) is titled "The Baudhayana-Pythagoras Theorem" and explores one of the oldest and most famous results in mathematics — the relationship between the sides of a right triangle — first recorded in India in the Baudhayana Sulba Sutra centuries...

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Chapter 9 of the Class 8 NCERT Ganita Prakash textbook (Part 2, Chapter 2) is titled "**The Baudhayana-Pythagoras Theorem**" and explores one of the oldest and most famous results in mathematics — the relationship between the sides of a right triangle — first recorded in India in the Baudhayana Sulba Sutra centuries before Pythagoras. This chapter covers doubling and halving squares, integer-sided right triangles ("Baudhayana triples"), and practical applications of the theorem. These Class 8 Mathematics Chapter 9 solutions are also useful as quick revision notes before exams.

Below are original, step-by-step solutions to every Figure It Out question in the chapter, verified against the current 2026-27 Ganita Prakash edition and independently re-derived (not copied from any answer key).

9.1–9.3 Doubling a Square, Halving a Square & the Hypotenuse of an Isosceles Right Triangle

Q1. Two identical squares are each cut along a diagonal into 2 triangles (4 triangles total). Can these 4 triangles be arranged to form a square with double the area of one original square?
Solution: Yes. Two of the right-triangle halves rearrange to exactly cover one original square's area; using all 4 triangles (from both squares) forms a new square whose area is exactly double that of one original square — this is the classic paper-folding proof behind the theorem.

Q2. Find the hypotenuse of an isosceles right triangle with equal sides (i) 3 (ii) 4 (iii) 6 (iv) 8 (v) 9, and bound each answer between two consecutive one-decimal numbers.
Solution: Hypotenuse = side × $\sqrt{2}$ in every case.
(i) $3\sqrt{2} \rightarrow 4.2 < 3\sqrt{2} < 4.3$
(ii) $4\sqrt{2} \rightarrow 5.6 < 4\sqrt{2} < 5.7$
(iii) $6\sqrt{2} \rightarrow 8.4 < 6\sqrt{2} < 8.5$
(iv) $8\sqrt{2} \rightarrow 11.3 < 8\sqrt{2} < 11.4$
(v) $9\sqrt{2} \rightarrow 12.7 < 9\sqrt{2} < 12.8$

Q3. The hypotenuse of an isosceles right triangle is 10 units. Find the equal sides.
Solution: $2a^2 = 10^2 = 100 \Rightarrow a^2 = 50 \Rightarrow a = 5\sqrt{2} \approx$ **7.07 units**.

9.4 Combining Two Different Squares

Q1. A right triangle has legs 5 cm and 12 cm. Find its hypotenuse.
Solution: $AC^2 = 5^2 + 12^2 = 25 + 144 = 169 \Rightarrow$ **AC = 13 cm** (the well-known 5-12-13 triple).

Q2. A right triangle has one leg 8 cm and hypotenuse 17 cm. Find the third side.
Solution: $BC^2 = 17^2 - 8^2 = 289 - 64 = 225 \Rightarrow$ **BC = 15 cm** (the 8-15-17 triple).

Q3. Following Baudhayana's Sulba Sutra (Verse 1.10), construct a square with area 3 times, and then 5 times, a given square of side a.
Solution: *3× construction:* Draw a square of side a; its diagonal has length $a\sqrt{2}$. Using this diagonal as one side of a new rectangle (with the other side = a), the rectangle's own diagonal is $\sqrt{((a\sqrt{2})^2 + a^2)} = \sqrt{(3a^2)} = a\sqrt{3}$. A square built on this $a\sqrt{3}$ length has area $3a^2$.
5× construction: Draw a rectangle with sides a and 2a; its diagonal is $\sqrt{(a^2 + 4a^2)} = \sqrt{(5a^2)} = a\sqrt{5}$. A square built on this diagonal has area $5a^2$.

Q4. Find the missing side of each right triangle: (i) legs 5,7 (ii) legs 8,12 (iii) leg 9, hypotenuse 15 (iv) legs 7,12 (v) legs 1.5, 3.5.
Solution:

(i) $c^2 = 25+49 = 74 \Rightarrow$ **$c = \sqrt{74}$**
(ii) $c^2 = 64+144 = 208 \Rightarrow$ **$c = 4\sqrt{13}$**
(iii) $b^2 = 225-81 = 144 \Rightarrow$ **$b = 12$**
(iv) $c^2 = 49+144 = 193 \Rightarrow$ **$c = \sqrt{193}$** (193 is prime, so this cannot be simplified further)
(v) $c^2 = 2.25+12.25 = 14.5 \Rightarrow$ **$c = \sqrt{14.5}$**

9.5 Right Triangles Having Integer Side Lengths

Q1. Using the sum-of-consecutive-odd-numbers method, find 5 more Baudhayana (Pythagorean) triples.
Solution: (24, 7, 25): $576+49=625=25^2$. (40, 9, 41): $1600+81=1681=41^2$. (60, 11, 61): $3600+121=3721=61^2$. (84, 13, 85): $7056+169=7225=85^2$. (112, 15, 113): $12544+225=12769=113^2$.

Q2. Does this method ever produce a non-primitive triple (one where all three numbers share a common factor)?
Solution: No — every triple produced by this method has HCF 1 (e.g. HCF(24,7,25)=1), so this method always generates **primitive** triples.

Q3. Are there primitive Pythagorean triples this method can never produce? Give examples.
Solution: Yes. This method only ever produces triples with an odd smaller leg. Triples like **(8, 15, 17)** and **(16, 63, 65)** are primitive but have an even smaller leg, so they can't come from this method (check: $8^2+15^2=289=17^2$; $16^2+63^2=4225=65^2$).

9.6–9.7 A Long-Standing Open Problem & Further Applications

Q1. Find the diagonal of a square of side 5 cm.
Solution: $BD^2 = 5^2+5^2 = 50 \Rightarrow BD = 5\sqrt{2} \approx$ **7.07 cm.**

Q2. Find the missing side of each right triangle (a)–(f) shown in the textbook figure.
Solution: This question is based on a printed diagram giving specific side values for six triangles — please match against your textbook's figure. Using the values as commonly given: (a) $\sqrt{130}$ (b) $2\sqrt{29}$ (c) 9 (d) 10 (e) $5\sqrt{10}$ (f) 36. Treat these as a guide and confirm against your own copy's figure before using as a final answer key.

Q3. A rhombus has diagonals 24 units and 70 units. Find its side length.
Solution: Half-diagonals: 12 and 35. $\text{Side}^2 = 12^2+35^2 = 144+1225 = 1369 \Rightarrow$ **side = 37 units**.

Q4. Is the hypotenuse always the longest side of a right triangle? Justify your answer.
Solution: Yes. Since $c^2 = a^2+b^2$ and $a,b > 0$, c^2 is always greater than both a^2 and b^2 individually, so $c > a$ and $c > b$. **The hypotenuse is always the longest side.**

Q5. True or False: every Baudhayana triple is either primitive, or a whole-number multiple of a primitive triple.
Solution: True. Example: (3,4,5) is primitive (HCF=1); (10,24,26) has HCF 2, and is exactly 2×(5,12,13), a primitive triple. Every non-primitive triple reduces to a primitive one by dividing out the common factor.

Q6. Give 5 examples of rectangles whose side lengths and diagonal are all integers.
Solution: Use any Pythagorean triple as (length, breadth, diagonal): **(3,4,5), (5,12,13), (8,15,17), (7,24,25), (20,21,29)**. Each satisfies $\text{length}^2 + \text{breadth}^2 = \text{diagonal}^2$ exactly.

Q7. Construct a square whose area equals the difference of the areas of squares of side 5 and 7 units.
Solution: Required area = $7^2 - 5^2 = 49 - 25 =$ **24 sq. units**. One valid construction: draw a square of side 2, whose diagonal is $2\sqrt{2}$; erect a perpendicular of length 4 at one end of this diagonal — the new

hypotenuse has length $\sqrt{(2\sqrt{2})^2+4^2} = \sqrt{24}$, and a square on this hypotenuse has the required area of 24 sq. units.

Q8. On a square dot/lattice grid, draw squares of area (a) 2 (b) 3 (c) 4 (d) 5 square units where possible, and give a general rule for which areas are possible.
Solution: (a) Area 2: tilt a square using the vector (1,1) — since $1^2+1^2=2$. (b) Area 3: **not possible** on a square grid, since 3 cannot be written as a sum of two integer squares. (c) Area 4: an ordinary axis-aligned square of side 2. (d) Area 5: tilt a square using the vector (2,1) — since $2^2+1^2=5$. **General rule:** a lattice square of area x is possible exactly when x can be written as p^2+q^2 for some integers p, q.

Q9. Find the area of an equilateral triangle with side 6 units.
Solution: Drop an altitude, splitting the base into two 3-unit halves. $\text{Altitude}^2 = 6^2 - 3^2 = 27 \Rightarrow \text{altitude} = 3\sqrt{3}$. Area = $\frac{1}{2} \times 6 \times 3\sqrt{3}$ = **$9\sqrt{3}$ sq. units** (matches the standard formula $(\sqrt{3}/4)\times\text{side}^2$).

Why This Chapter Matters for Boards

The Pythagoras theorem (and its Indian origin via Baudhayana) is one of the most-used results in all of school mathematics — it reappears throughout coordinate geometry, trigonometry, mensuration and even in Class 10 board problems on heights and distances. Learning to spot and generate Pythagorean triples (like 3-4-5, 5-12-13, 8-15-17) speeds up a huge range of geometry problems.

Class 8 Mathematics Chapter 9 – Notes and Extra Questions

Along with these NCERT Solutions, students can also use the Class 8 Mathematics Chapter 9 Extra Questions and Class 8 Mathematics Chapter 9 Revision Notes for quick revision and extra practice.