



Mixed revision of Pythagoras' theory

Mana Maths

Te reo Māori terms



ture a Pythagoras

Pythagoras' theorem

Open in Te Aka

tapatoru hāngai

right-angle triangle

Open in Te Aka

tāroa

hypotenuse

Open in Te Aka

hauroki

diagonal

Open in Te Aka

Pythagoras Revision - Find a Side



Key idea



In a right-angled triangle: $a^2 + b^2 = c^2$.

c is the **hypotenuse** — the longest side, opposite the right angle.

Find the long side



Short sides 8 and 15:

$$8^2 + 15^2 = 64 + 225 = 289$$

$$c = \sqrt{289} = 17$$

Mixed revision of Pythagoras' theory

First: spot it



Find the right angle, then name the sides: the two legs are a and b , the long side across from the right angle is c .

Common mistake

The hypotenuse is always the **longest** side. Adding the wrong pair (using c as a short side) gives the wrong answer.

Pythagoras Revision - Reverse Moves



Key idea

For a missing **short** side, **subtract** the squares:

$$b^2 = c^2 - a^2$$

Find a short side

Long side 25, one short side 7:

$$b^2 = 25^2 - 7^2 = 625 - 49 = 576$$

$$b = \sqrt{576} = 24$$

Is it right-angled?

Test 10, 24, 26:

$$10^2 + 24^2 = 100 + 576 = 676$$

$26^2 = 676$ — yes, it is right-angled.

Common mistake

Do not assume a triangle is right-angled. Some questions ask you to **prove** it by checking the squares first.



Start Tasks



1. A right-angled triangle has short sides 3 cm and 4 cm. Find the long side.

2. A right-angled triangle has short sides 5 m and 12 m. Find the long side.

3. A right-angled triangle has long side 13 cm and one short side 5 cm. Find the other short side.

4. Is a triangle with side lengths 6, 8, 10 right-angled?

5. Is a triangle with side lengths 8, 15, 16 right-angled?

6. Is a triangle with side lengths 7, 24, 25 right-angled?

7. A rectangle is 6 cm by 8 cm. Find its diagonal.

8. A ladder reaches 12 m up a wall and is 13 m long. How far is the base from the wall?

9. A square has side length 5 m. Find its diagonal to 1 decimal place.

Start Tasks Answers



1. 5 cm

2. 13 m

3. 12 cm

4. Yes

5. No

6. Yes

7. 10 cm

8. 5 m

9. $5\sqrt{2} \approx 7.1$ m

Start Tasks



10. A rectangle is 9 m by 12 m. Find its diagonal.

11. A right-angled triangle has long side 17 cm and one short side 8 cm. Find the other short side.

12. A park is 8 m by 15 m. Find the shortest path corner to corner.

13. Is a triangle with side lengths 9, 40, 41 right-angled?

14. Is a triangle with side lengths 10, 10, 14 right-angled?

15. A right-angled triangle has short sides 12 cm and 16 cm. Find the long side.

16. Is a triangle with side lengths 6, 8, 9 right-angled?

17. Is a triangle with side lengths 8, 15, 17 right-angled?

18. Is a triangle with side lengths 20, 21, 29 right-angled?

Start Tasks Answers



10. 15 m

11. 15 cm

12. 17 m

13. Yes

14. No

15. 20 cm

16. No

17. Yes

18. Yes

Start Tasks



19. A rectangle is 3 cm by 4 cm. Find its diagonal.

20. A screen is 24 cm wide and 7 cm high. Find the diagonal.

21. A tent rope goes from the top of a 6 m pole to a peg 8 m away. How long is the rope?

22. A right-angled triangle has long side 17 cm and one short side 15 cm. Find the other short side.

23. Is a triangle with side lengths 12, 13, 15 right-angled?

24. Is a triangle with side lengths 16, 30, 34 right-angled?

25. A square has side length 10 cm. Find the diagonal to 1 decimal place.

26. A garden is 5 m by 12 m. Find the diagonal path.

27. A right-angled triangle has short sides 9 cm and 12 cm. Find the long side.

Start Tasks Answers



19. 5 cm

20. 25 cm

21. 10 m

22. 8 cm

23. No

24. Yes

25. $10\sqrt{2} \approx 14.1$ cm

26. 13 m

27. 15 cm

Build Tasks



1. A right-angled triangle has short sides 8 cm and 15 cm. Find the long side.

2. A right-angled triangle has long side 25 cm and one short side 7 cm. Find the other short side.

3. A triangle has side lengths 9, 12, 15. Show whether it is right-angled.

4. A rectangle is 12 m by 16 m. Find its diagonal.

5. A ladder is 15 m long and reaches 12 m high. How far is the base from the wall?

6. A triangle has side lengths 10, 24, 26. Show whether it is right-angled.

7. A square has side length 9 cm. Find its diagonal to 1 decimal place.

8. A right-angled triangle has short sides 20 cm and 21 cm. Find the long side.

9. A triangle has side lengths 12, 16, 19. Show whether it is right-angled.

Build Tasks Answers



1. 17 cm

2. 24 cm

3. Yes: $81 + 144 = 225$

4. 20 m

5. 9 m

6. Yes: $100 + 576 = 676$

7. $9\sqrt{2} \approx 12.7$ cm

8. 29 cm

9. No: $400 \neq 361$

Build Tasks



10. A television is 32 cm wide and 24 cm high. Find the diagonal.

11. A triangle has side lengths x , 24, 25. If it is right-angled, find x .

12. A rectangle is 5 m by 12 m. Find the diagonal and then the perimeter.

13. A triangle has side lengths 14, 48, 50. Show whether it is right-angled.

14. A rectangle has diagonal 13 cm and width 5 cm. Find the length.

15. A field is 9 m by 40 m. Find the diagonal path.

16. A triangle has side lengths 8, 15, 18. Show whether it is right-angled.

17. A triangle has side lengths 18, 24, 30. Explain in one sentence why it is right-angled.

18. A triangle has side lengths 12, 13, 15. Explain in one sentence why it is not right-angled.

Build Tasks Answers



10. 40 cm

11. $x = 7$

12. Diagonal 13,
perimeter 34

13. Yes:
 $196 + 2304 = 2500$

14. 12 cm

15. 41 m

16. No: $289 \neq 324$

17. $18^2 + 24^2 = 30^2$

18. $144 + 169 \neq 225$

Build Tasks



19. A square park has area 64 m^2 . Find its diagonal.

20. A right-angled triangle has long side 37 cm and one short side 12 cm. Find the other short side.

21. A triangle has side lengths 12, 35, 37. Show whether it is right-angled.

22. A rectangle is 8 m by 15 m. Find the diagonal and then the area.

23. A triangle has side lengths 11, 60, 61. Show whether it is right-angled.

24. A triangle has side lengths 10, 24, 25. Show whether it is right-angled.

25. A ladder reaches 8 m up a wall and the base is 6 m away. Find the ladder length.

26. A rectangle has length 4 cm and diagonal 5 cm. Find the width and then the area.

27. A triangle has sides $3k$, $4k$, $5k$. Explain why it is always right-angled.

Build Tasks Answers



19. $8\sqrt{2} \approx 11.3$ m

20. 35 cm

21. Yes

22. Diagonal 17, area 120

23. Yes

24. No

25. 10 m

26. Width 3, area 12

27. $(3k)^2 + (4k)^2 = (5k)^2$

Push Tasks



1. A square has side length 12 cm. Find the diagonal exactly and to 1 decimal place.

2. A rectangle is 9 m by 12 m. Find the diagonal, then compare it with walking along two sides.

3. A triangle has side lengths 16, 30, 34. Prove whether it is right-angled.

4. A right-angled triangle has long side 29 cm and one short side 20 cm. Find the other short side.

5. A football pitch is 105 m by 68 m. Find the diagonal to 1 decimal place.

6. A triangle has side lengths 14, 48, 51. Prove whether it is right-angled.

7. A rectangle has length 4 cm and diagonal 5 cm. Find the width, then the perimeter.

8. A triangle has side lengths 9, 40, 41. Explain why the longest side matters in the check.

9. A ladder is 25 m long and reaches 24 m high. How far is the base from the wall?

Push Tasks Answers



1. $12\sqrt{2} \approx 17.0$ cm

2. Diagonal 15; 6 m shorter

3. Yes: $256 + 900 = 1156$

4. 21 cm

5. $\sqrt{15649} \approx 125.1$ m

6. No: $2500 \neq 2601$

7. Width 3, perimeter 14

8. Only the longest side can be the hypotenuse.

9. 7 m

Push Tasks



10. A square garden has area 81 m^2 . Find the diagonal exactly and to 1 decimal place.

11. A triangle has side lengths 12, 35, 37. Prove whether it is right-angled.

12. A right-angled triangle has side lengths $3k, 4k, 5k$. Explain why every scaled version stays right-angled.

13. A box top is 8 cm by 15 cm. Find the diagonal. Then a string goes straight from one top corner to the opposite top corner and down 17

14. A triangle has side lengths 15, 36, 39. Prove whether it is right-angled.

15. A student says 10, 24, 25 is right-angled because it is close to 10, 24, 26. Explain the flaw.

16. A rectangle is 12 m by 16 m. How much shorter is the diagonal path than walking along two sides?

17. A right-angled triangle has one short side 11 cm and long side 61 cm. Find the other short side

18. Create a whole-number triangle that is not right-angled but is close to 20, 21, 29. Explain why it fails

Push Tasks Answers



10. $9\sqrt{2} \approx 12.7$ m

11. Yes

12. Because the squares scale by k^2 .

13. Top diagonal 17, total 34 cm

14. Yes:
 $225 + 1296 = 1521$

15. Close is not enough;
 $676 \neq 625$.

16. Diagonal 20, shorter by 8 m

17. 60 cm

18. Example: 20, 21, 28

Push Tasks



19. A triangle has perimeter 84 and two sides 21 and 28. Could it be right-angled? Explain.

20. A triangle has perimeter 70 and two sides 20 and 21. Could it be right-angled? Explain.

21. A rectangle is 20 m by 21 m. Find the diagonal.

22. A triangle has side lengths 27, 36, 45. Prove whether it is right-angled.

23. A right-angled triangle has long side 65 cm and one short side 16 cm. Find the other short side.

24. A screen is 40 cm wide and 30 cm high. Find the diagonal and explain why this is a scaled triple.

25. A student claims every triangle with sides $5n$, $12n$, $13n$ is right-angled. Are they correct? Explain.

26. Give one right-angled whole-number triangle with perimeter greater than 90.

27. Why do mixed revision questions still begin by asking, 'What right-angled triangle can I see?'

Push Tasks Answers



19. Yes. Third side 35.

20. Yes. Third side 29.

21. 29 m

22. Yes: $27^2 + 36^2 = 45^2$

23. 63 cm

24. Diagonal 50; scaled
3, 4, 5

25. Yes. It is a scaled
5, 12, 13 triple.

26. Example: 24, 32, 40

27. Because that triangle
is still the structure the
theorem solves.