Name _____ Date _____

15.4 Area of a triangle — worksheet

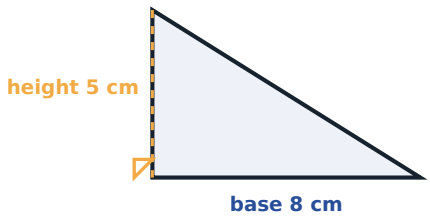
Derive and use the formula for the area of a triangle, and use it in compound shapes. · 55 questions · Show your working.

Remember

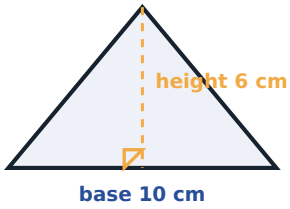
- **Area of a triangle = ½ × base × perpendicular height.**
- It works because **two copies of the triangle make a parallelogram** of base × height.
- The height must be **perpendicular** to the base — not a sloping side.
- In an **obtuse** triangle the height falls outside the triangle. Extend the base and measure to it; the formula is unchanged.
- Triangles with the **same base and height have the same area**, however different they look.
- The answer may end in .5 — that is real, not a rounding error.
- **Area of a parallelogram = base × height**, with no halving.
- To find a missing base or height: **double the area first**, then divide.
- Split a compound shape into rectangles and triangles and add.

A · Fluency — Half base times height, and back again.

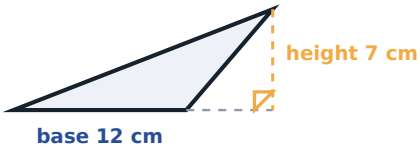
1 Find the area of this triangle, in square centimetres.



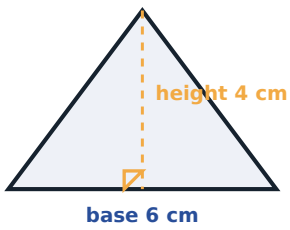
2 Find the area of this triangle, in square centimetres.



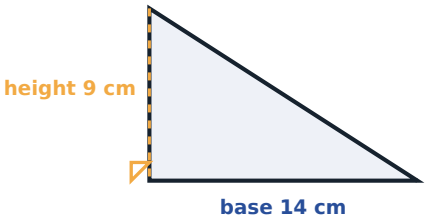
3 Find the area of this triangle, in square centimetres.



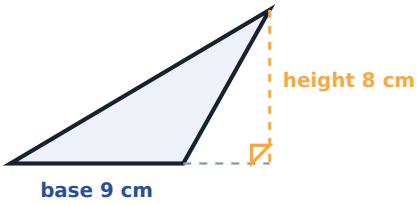
4 Find the area of this triangle, in square centimetres.



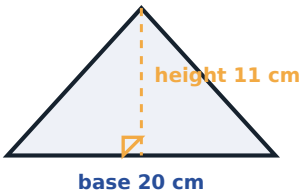
5 Find the area of this triangle, in square centimetres.



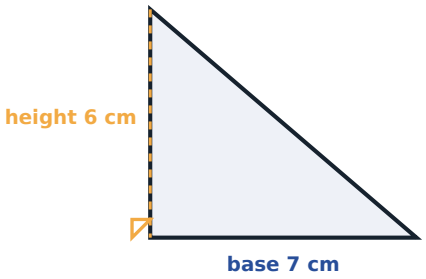
6 Find the area of this triangle, in square centimetres.



7 Find the area of this triangle, in square centimetres.

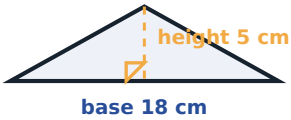


8 Find the area of this triangle, in square centimetres.



9 Find the area of this triangle, in square centimetres.

10 Find the area of this triangle, in square centimetres.



11 A triangle has base 6 cm and perpendicular height 4 cm. What is its area, in square centimetres?

12 A triangle has base 10 cm and perpendicular height 3 cm. What is its area, in square centimetres?

13 A triangle has base 8 cm and perpendicular height 7 cm. What is its area, in square centimetres?

14 A triangle has base 12 cm and perpendicular height 5 cm. What is its area, in square centimetres?

15 A triangle has base 9 cm and perpendicular height 6 cm. What is its area, in square centimetres?

16 A triangle has base 14 cm and perpendicular height 4 cm. What is its area, in square centimetres?

17 A triangle has base 5 cm and perpendicular height 8 cm. What is its area, in square centimetres?

18 A triangle has base 11 cm and perpendicular height 10 cm. What is its area, in square centimetres?

19 A triangle has area 24 cm² and base 8 cm. What is its perpendicular height, in centimetres?

20 A triangle has area 30 cm² and base 10 cm. What is its perpendicular height, in centimetres?

21 A triangle has area 18 cm² and base 6 cm. What is its perpendicular height, in centimetres?

22 A triangle has area 45 cm² and base 9 cm. What is its perpendicular height, in centimetres?

23 A triangle has area 36 cm² and base 12 cm. What is its perpendicular height, in centimetres?

24 A triangle has area 21 cm² and base 7 cm. What is its perpendicular height, in centimetres?

25 A parallelogram has base 8 cm and perpendicular height 5 cm. What is its area, in square centimetres?

26 A parallelogram has base 12 cm and perpendicular height 4 cm. What is its area, in square centimetres?

27 A parallelogram has base 9 cm and perpendicular height 7 cm. What is its area, in square centimetres?

28 A parallelogram has base 15 cm and perpendicular height 6 cm. What is its area, in square centimetres?

29 A parallelogram has base 10 cm and perpendicular height 10 cm. What is its area, in square centimetres?

30 A parallelogram has base 6 cm and perpendicular height 11 cm. What is its area, in square centimetres?

B · Reasoning — Where the formula comes from, and which height to use.

31 Why is the area of a triangle half the base times the height?
- ☐ It just is
- ☐ Two copies of the triangle make a rectangle or parallelogram of base × height
- ☐ Because triangles are small
- ☐ Because it has three sides

32 Which height goes in the formula?
- ☐ The longest side
- ☐ The perpendicular height from the base to the opposite vertex
- ☐ Any side
- ☐ The shortest side

33 Can the perpendicular height fall outside the triangle?
- ☐ Yes
- ☐ No

34 Two triangles have the same base and the same height. Their areas are …
- ☐ different
- ☐ equal
- ☐ in the ratio 2 : 1
- ☐ impossible to compare

35 A triangle has base 10 cm and height 6 cm. Its area is …
- ☐ 60 cm²
- ☐ 30 cm²
- ☐ 16 cm²
- ☐ 15 cm²

36 Why does a parallelogram not need the halving?
- ☐ It is bigger
- ☐ It is made of two of the triangles
- ☐ The formula is different
- ☐ It does need it

37 Is the area of a triangle always a whole number?
- ☐ Yes
- ☐ No

38 To find the height from the area, you …
- ☐ divide the area by the base
- ☐ double the area, then divide by the base
- ☐ halve the area, then divide by the base
- ☐ multiply

39 A compound shape is a rectangle with a triangle on top. Its area is …
- ☐ the difference
- ☐ the sum of the two areas
- ☐ the product
- ☐ half the rectangle

40 The units of the area of a triangle are …

- ☐ cm
- ☐ cm²
- ☐ cm³
- ☐ there are none

C · Challenge — Halves, compound shapes and comparisons.

41 A triangle has base 7 cm and height 5 cm. What is its area, in square centimetres?

42 A triangle has area 42 cm² and height 12 cm. What is its base, in centimetres?

43 A shape is a 10 cm by 6 cm rectangle with a triangle of base 10 cm and height 4 cm on top. What is the total area, in square centimetres?

44 A square of side 8 cm has a triangle cut from it with base 8 cm and height 8 cm. What area is left, in square centimetres?

45 A triangle has base 9 cm and area 27 cm². A second triangle has the same base but twice the height. What is its area, in square centimetres?

46 A parallelogram has area 96 cm² and base 12 cm. What is its perpendicular height, in centimetres?

47 A triangle has base 6 cm and height 5 cm. How many times larger is the area of a 12 cm by 10 cm rectangle than the area of that triangle?

D · Word problems — Sails, gables, pennants and fields.

48 A triangular sail has base 4 m and height 6 m. What is its area, in square metres?

49 A triangular flag has base 30 cm and height 20 cm. What is its area, in square centimetres?

50 A gable end of a house is a triangle with base 8 m and height 3 m. What area must be painted, in square metres?

51 A triangular garden has area 60 m² and base 15 m. How far, in metres, is the far corner from the base?

52 A pennant is a triangle of base 25 cm and height 40 cm. Fabric costs 2 cents per square centimetre. What does one pennant cost, in cents?

53 A roof is made of two identical triangles, each with base 10 m and height 4 m. What is the total area, in square metres?

54 A field is a triangle with base 200 m and height 150 m. What is its area, in hectares?

55 A window is a 120 cm by 80 cm rectangle with a triangular top of base 120 cm and height 30 cm. What is the total area, in square centimetres?