Draw a Large Scalene Triangle on Grid Paper: Plotting from Coordinates and Side Lengths

Original tasks 1, 2 / complete keys

Task 1

On grid paper with one square equal to one unit, plot vertices P(2,2), Q(7,2), and R(5,6). Connect them and determine whether the triangle is scalene. Show your side-length calculations.

Answer: PQ is horizontal, length 5 units. PR spans 3 right and 4 up, length 5 units. QR spans 2 right and 4 up, length about 4.47 units. Two sides are equal, so the triangle is isosceles, not scalene.

Reason: Count grid differences between each pair of vertices, apply the Pythagorean relationship to diagonal sides, and compare the three lengths. Equal lengths mean the triangle is not scalene.

Check: Recount the grid differences and recalculate each square root. Confirm that PQ and PR both equal 5 by checking 3 squared plus 4 squared equals 25.

Task 2

Construct a triangle with side lengths 6 units, 5 units, and 4 units on grid paper where one square equals one unit. Draw the 6-unit side horizontally first, then locate the third vertex with a compass. Confirm the triangle is scalene.

Answer: Draw AB horizontally with length 6. Set the compass to 5 units, place the point at A, and draw an arc. Set the compass to 4 units, place the point at B, and draw a second arc. Label the intersection C. The sides are 6, 5, and 4 units, all different, so the triangle is scalene.

Reason: The longest side is drawn first as a base. The two remaining lengths determine the third vertex by arc intersection. Since 6, 5, and 4 are all different, the result is scalene.

Check: Measure all three sides with a ruler and compare with 6, 5, and 4 units. Confirm the arc intersection was used rather than an estimated point.

Draw a Large Scalene Triangle on Grid Paper: Plotting from Coordinates and Side Lengths

Original tasks 3, 4 / complete keys

Task 3

A student plots vertices X(0,0), Y(4,0), and Z(2,3) and claims the triangle is scalene. Check the claim by calculating all three side lengths and state whether the claim is correct.

Answer: XY is horizontal, length 4 units. XZ spans 2 right and 3 up, length about 3.61 units. YZ spans 2 right and 3 up, length about 3.61 units. Two sides are equal, so the triangle is isosceles and the claim is incorrect.

Reason: Calculate each side from grid differences. XZ and YZ have the same horizontal and vertical differences, so they are equal in length. Equal sides mean the triangle is not scalene.

Check: Recalculate 2 squared plus 3 squared equals 13, so each diagonal side is the square root of 13. Confirm both diagonals use the same differences.

Task 4

On grid paper with one square equal to one unit, choose coordinates for a scalene triangle with one horizontal side of length 7 units and a third vertex above the base. State your coordinates, calculate all three side lengths, and confirm the triangle is scalene.

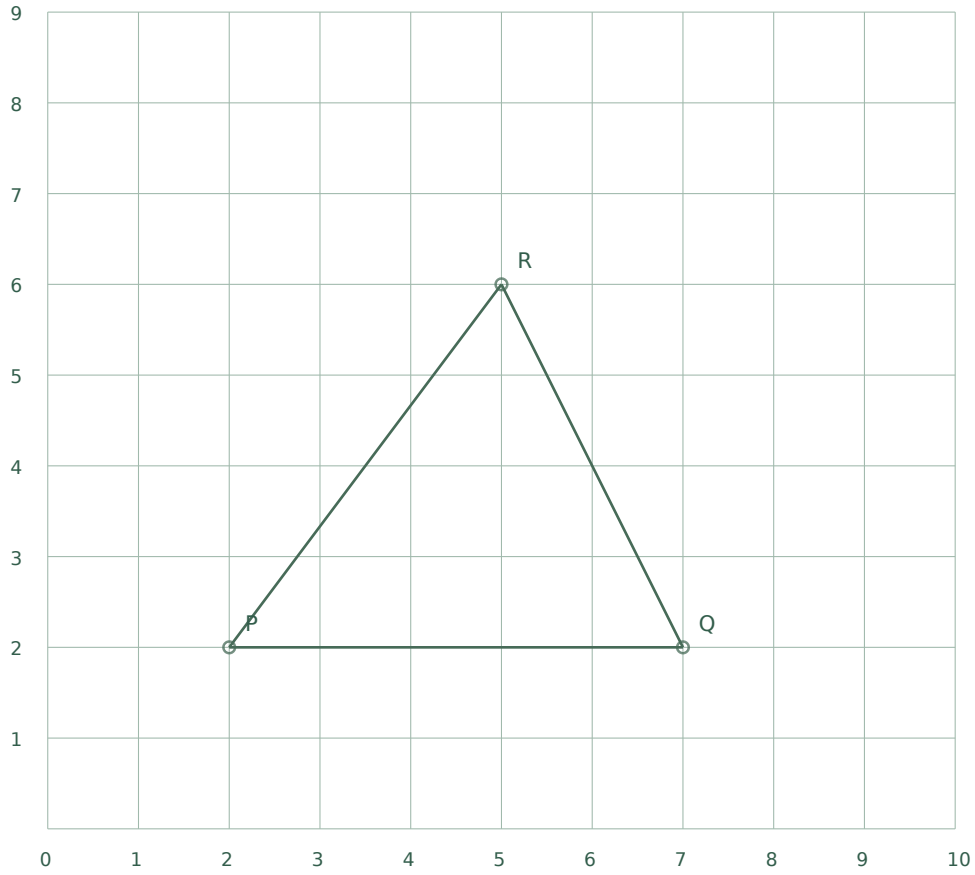
Answer: One valid choice is A(1,1), B(8,1), and C(5,5). AB is horizontal, length 7 units. AC spans 4 right and 4 up, length about 5.66 units. BC spans 3 right and 4 up, length 5 units. The lengths 7, about 5.66, and 5 are all different, so the triangle is scalene.

Reason: Place the horizontal base first, then choose a third vertex whose horizontal and vertical differences from each endpoint produce two lengths different from the base and from each other. Calculate each diagonal with the Pythagorean relationship.

Check: Recount the grid differences for AC and BC, recalculate the square roots, and confirm that 7, about 5.66, and 5 are all different. Other coordinate choices are valid if the three calculated lengths differ.

Task 1 / answers

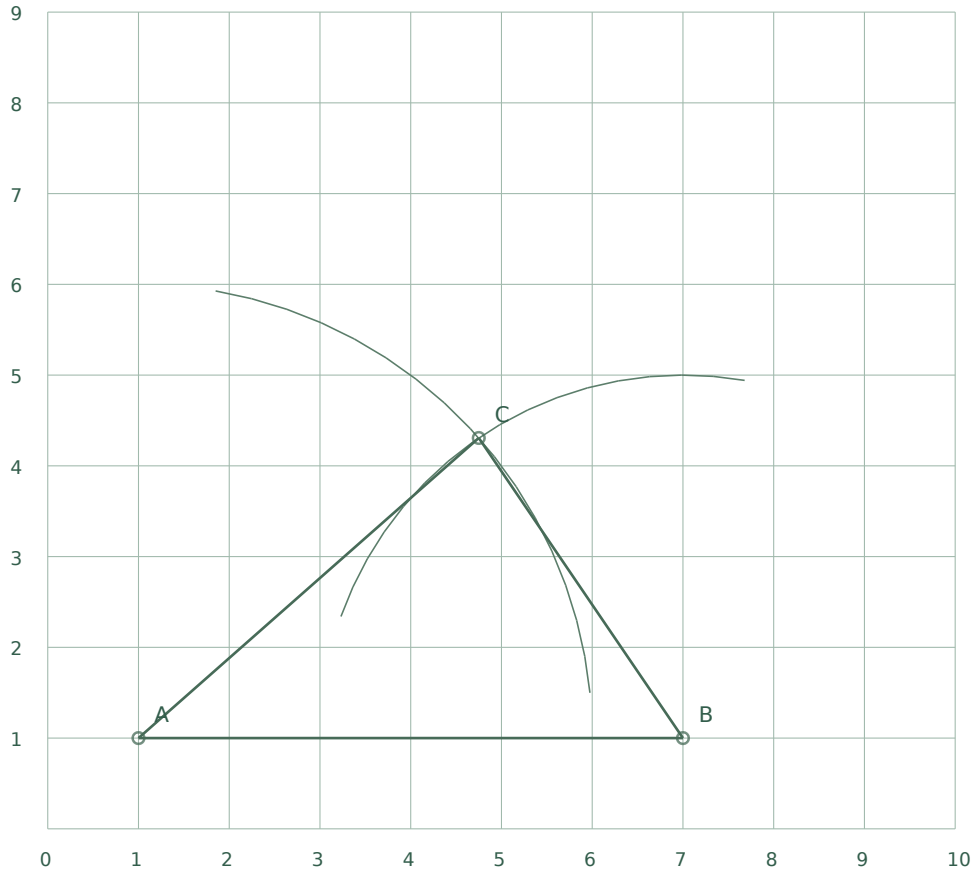
Chosen physical pitch 12 mm / one grid square = one abstract unit



Side lengths (units): 5.0, 4.4721, 5.0. Isosceles, NOT scalene.

Task 2 / answers

Chosen physical pitch 12 mm / one grid square = one abstract unit

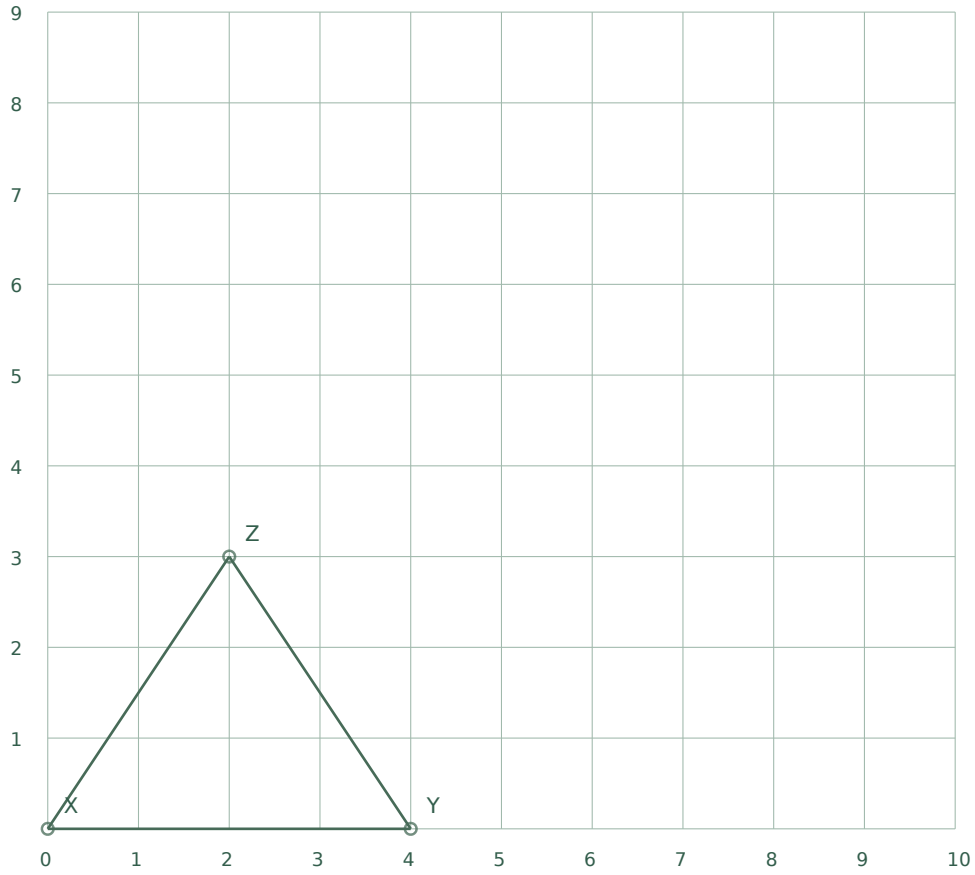


Side lengths (units): 6.0, 4.0, 5.0. All three lengths differ: scalene.

C is the upper intersection of the real radius5 and radius4 construction arcs. Its coordinates need not be whole grid intersections; the compass lengths determine it.

Task 3 / answers

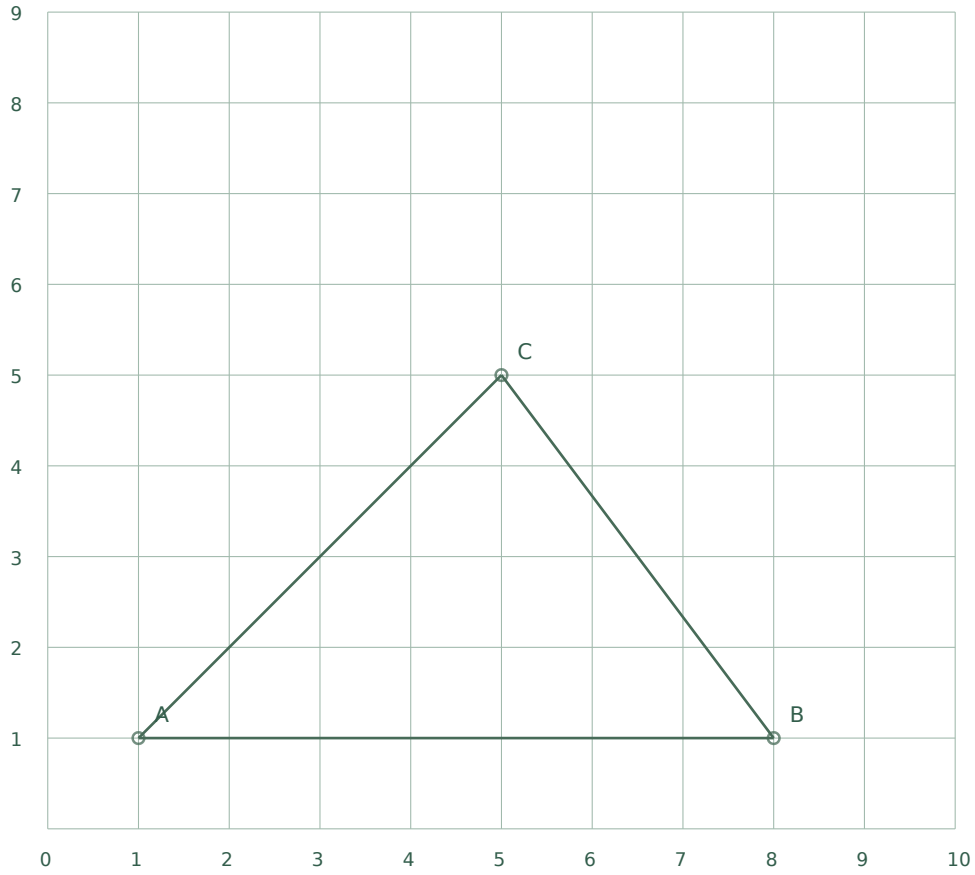
Chosen physical pitch 12 mm / one grid square = one abstract unit



Side lengths (units): 4.0, 3.6056, 3.6056. Isosceles, NOT scalene.

Task 4 / answers

Chosen physical pitch 12 mm / one grid square = one abstract unit



Side lengths (units): 7.0, 5.0, 5.6569. All three lengths differ: scalene.

Draw a Large Scalene Triangle on Grid Paper: Plotting from Coordinates and Side Lengths

Source rubric / reflection

- [ ] Scale and units are stated clearly at the top of the page.
- [ ] All three vertices are plotted or constructed accurately within one grid square.
- [ ] All three side lengths are measured or calculated and recorded.
- [ ] The triangle is confirmed scalene by showing three different lengths.
- [ ] Labeling convention is stated and followed consistently.
- [ ] Work is checkable: calculations or measurements are written beside the drawing.

Reflection: What did you check, what did you change, and what will you try next?