Angles 3 · Angles in triangles and quadrilaterals

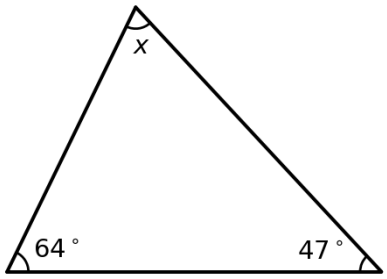
Graded Drill Set

Name: _____ Class: _____ Date: _____

Work through Levels 1 to 3 in order. Angles are in degrees. Diagrams are drawn accurately, but always **calculate**, never measure. In Level 3, write a reason for every step. Answers are at the back.
Angles in a **triangle** add up to 180° · Angles in a **quadrilateral** add up to 360° · An **exterior angle** of a triangle equals the sum of the two interior opposite angles · The **base angles of an isosceles triangle** are equal. Dashes on sides show equal lengths.

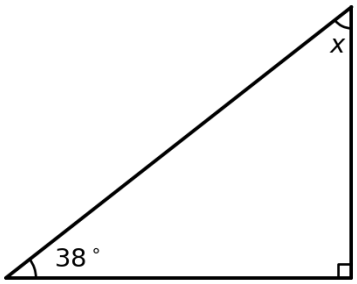
Section A · Level 1 · One step

1 Find x.



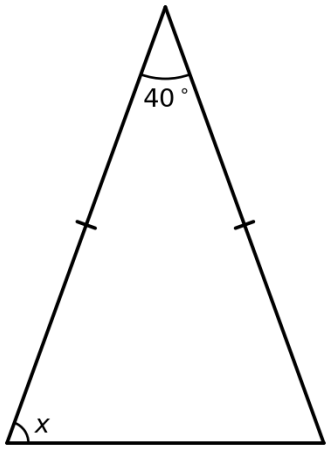
Answer: _____

2 Find x.



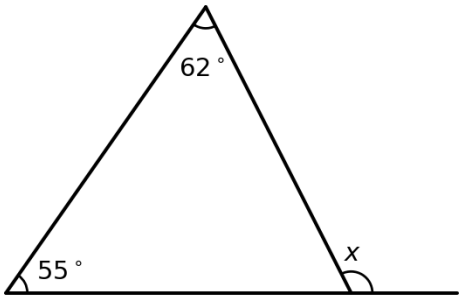
Answer: _____

3 The triangle is isosceles. Find x.



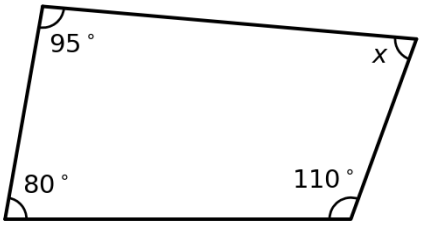
Answer: _____

4 Find x.



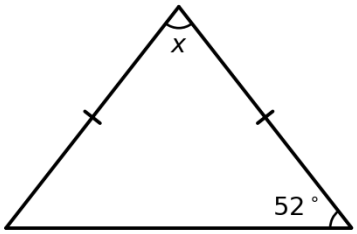
Answer: _____

5 Find x.



Answer: _____

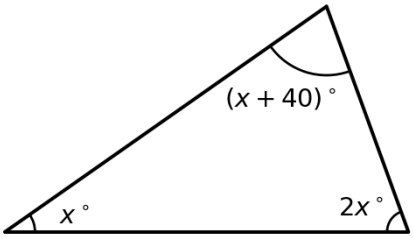
6 The triangle is isosceles. Find x.



Answer: _____

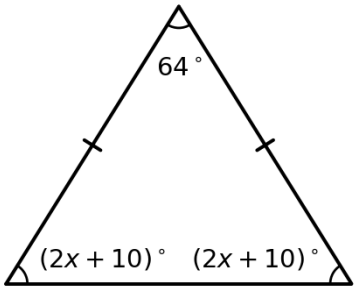
Section B · Level 2 · Form and solve an equation

7 Find x. Then find the size of the largest angle.



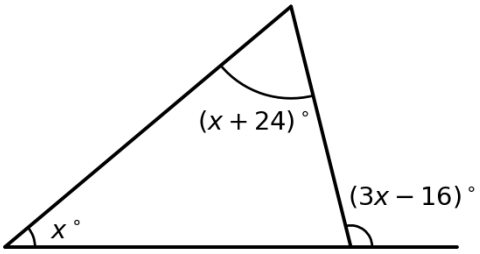
Answer: _____

8 The triangle is isosceles. Find x.



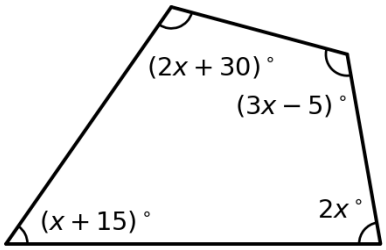
Answer: _____

9 Find x. Then find the size of each marked angle.



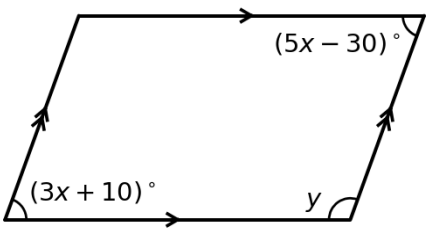
Answer: _____

10 Find x. Then find the size of the largest angle.



Answer: _____

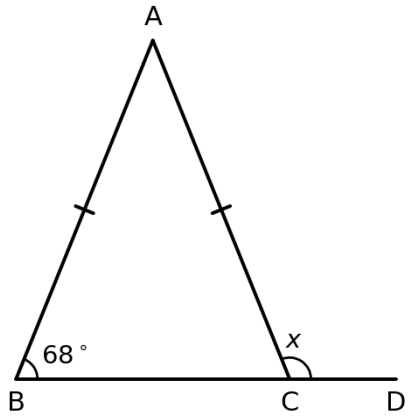
11 The diagram shows a parallelogram. Find x and y.



Answer: _____

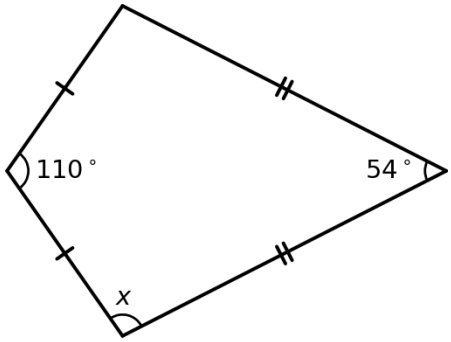
Section C · Level 3 · Multi-step, give reasons

12 AB = AC and BCD is a straight line. Find x, giving reasons.



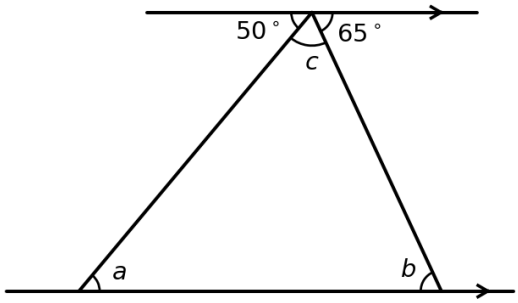
Answer: _____

13 The diagram shows a kite. Find x, giving a reason.



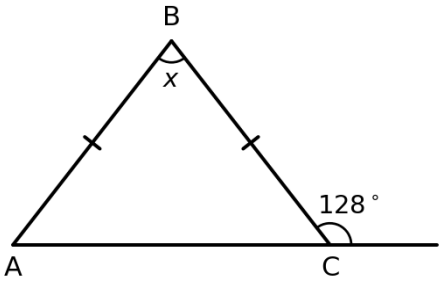
Answer: _____

14 The two lines are parallel. Find a, b and c, giving reasons. What do your answers show about the angles in a triangle?



Answer: _____

15 AB = BC and the side AC is extended beyond C. Find x, giving reasons.



Answer: _____

Answers

1	$x = 69°$
2	$x = 52°$
3	$x = 70°$
4	$x = 117°$ (exterior angle = 55 + 62)
5	$x = 75°$
6	$x = 76°$
7	$x + 2x + (x + 40) = 180$, so $x = 35$; largest angle = 75°
8	$2(2x + 10) + 64 = 180$, so $x = 24$ (base angles are 58°)
9	$x + (x + 24) = 3x - 16$ (exterior angle), so $x = 40$; angles are 40°, 64° and 104°
10	$(x + 15) + 2x + (3x - 5) + (2x + 30) = 360$, so $x = 40$; largest angle = 115°
11	$3x + 10 = 5x - 30$ (opposite angles of a parallelogram are equal), so $x = 20$; $y = 180 - 70 = 110°$
12	Angle ACB = 68° (base angles of an isosceles triangle); $x = 180 - 68 = 112°$ (angles on a straight line)
13	$x = 98°$ (the two angles between the unequal sides of a kite are equal: $2x = 360 - 110 - 54 = 196$)
14	$a = 50°$ and $b = 65°$ (alternate angles); $c = 65°$ (angles on a straight line); $a + b + c = 180°$, so the angles in a triangle add up to 180°
15	Angle ACB = 180 – 128 = 52° (angles on a straight line); angle BAC = 52° (base angles of an isosceles triangle); $x = 180 - 52 - 52 = 76°$