

Angles and Geometric Constructions: math practice, Grade 7 – download the PDF

23 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Complement and supplement



Find the complement and the supplement of 38° .

2 Sorting pairs



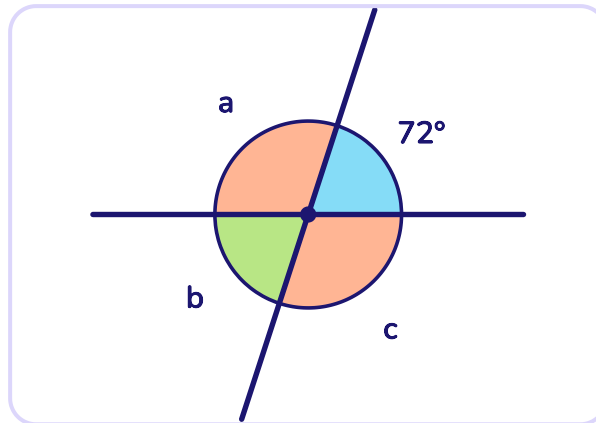
For each pair, write complementary, supplementary, or neither.

- a. 18° and 72°
- b. 110° and 70°
- c. 44° and 47°
- d. 120° and 60°

3 Crossing lines



Two lines cross and one angle measures 72° . Find the measures of the angles a , b and c .



4 Can it be a triangle?



Decide whether each set of lengths (in inches) can be the sides of a triangle.

- a. 5, 6, 10
- b. 2, 3, 7
- c. 8, 8, 15
- d. 4, 9, 13

5 Name the cross section



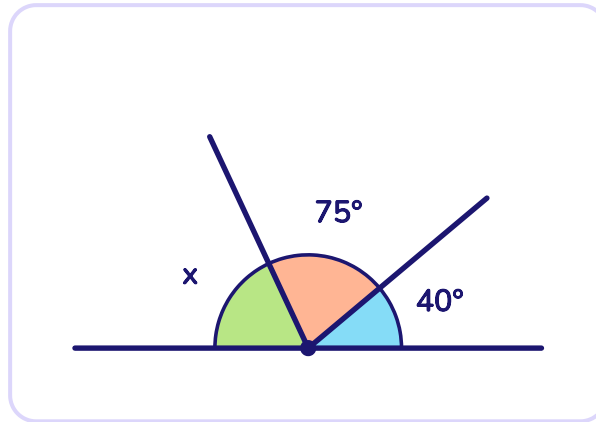
Name the shape of each cross section.

- a. A cube cut by a plane parallel to one face.
- b. A cylinder cut by a plane parallel to its bases.
- c. A sphere cut by any plane.
- d. A cone cut by a plane through its tip, perpendicular to its base.

6 Angles on a line



Three angles sit side by side on a straight line. Two of them measure 40° and 75° , as in the figure. Find x .



7 The leaning ladder



A ladder leans against a vertical wall on level ground. The ladder makes an angle of 74° with the ground. What angle does it make with the wall?

8 A supplementary equation



Two angles measuring $(x + 14)^\circ$ and $(2x - 5)^\circ$ are supplementary. Find x and both angles.

9 Vertical angles with variables



Two lines cross. A pair of vertical angles measure $(4x - 7)^\circ$ and $(2x + 21)^\circ$. Find x and the angle measure.

10 One angle four times the other



Two supplementary angles are such that one is 4 times the other. Find them.

11 Twenty degrees more



Two complementary angles differ by 20° . What are they?

12 Range for the third side



A triangle has two sides of 9 cm and 14 cm. Write an inequality for the third side s , and count how many whole-number lengths are possible.

13 Craft sticks



Dana has sticks of length 12 cm and 7 cm and wants a third stick to make a triangle. She can choose 4 cm, 6 cm, 18 cm or 19 cm. Which choices work?

14 How many triangles?



For each description, say whether there is no triangle, exactly one triangle, or many different triangles.

- a. Sides 5 cm, 5 cm and 12 cm.
- b. Sides 6 cm, 8 cm and 10 cm.
- c. Angles 30° , 60° and 90° only.
- d. Sides 7 cm and 9 cm with a 40° angle between them.

15 Slicing a box



A shoe box is a rectangular prism 10 in long, 6 in wide and 4 in tall. Find the area of the cross section made by a cut parallel to (a) the 10×6 face and (b) the 6×4 face.

16 A linear pair in a crossing

Two lines cross. One angle is $(2x + 10)^\circ$ and its neighbor is $(3x + 20)^\circ$. Find both angles and the measure of the angle vertical to the first.

17 Three angles on a line

Three adjacent angles on a straight line measure $(x + 10)^\circ$, $(2x - 15)^\circ$ and $(3x + 5)^\circ$. Find x and each angle.

18 Complement and supplement together

The complement of an angle is one fourth of its supplement. Find the angle.

19 Three times the complement

The supplement of an angle is three times its complement. Find the angle.

20 Sides with a variable

A triangle has side lengths x , $x + 3$ and $2x + 1$ (in centimeters). Write the triangle inequalities, solve them, and find the smallest whole-number x that works. Give the three side lengths for that value.

21 Construction plan

You must draw a triangle with a side of 8 cm, an angle of 50° at one end and an angle of 60° at the other end. (a) Find the third angle. (b) Describe the drawing steps. (c) Is the triangle unique?

22 Slicing a cone



A cone is 12 cm tall and its base has radius 5 cm. A plane parallel to the base cuts the cone halfway up. The cross section is a circle with half the base radius. Find its radius and its area, to the nearest tenth of a square centimeter. Use $\pi \approx 3.14159$.

23 The garden fence



A triangular garden has two sides of 15 m and 8 m. The third side is a whole number of meters. Marcus has at most 40 m of fencing for the whole perimeter. How many different lengths of the third side s are possible?



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