

Geometry and Angles: practice solutions, Grade 4 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Line, ray or segment?



- (a) A **segment**: two endpoints means a fixed length.
- (b) A **ray**: one endpoint and one direction without end.
- (c) A **line**: no endpoints.

2 Segments on a line



Start with P: $\overline{PQ}$, $\overline{PR}$, $\overline{PS}$ (3 segments). Then Q: $\overline{QR}$, $\overline{QS}$ (2 more). Then R: $\overline{RS}$ (1 more).

$$3 + 2 + 1 = 6$$

There are **6** segments.

3 Name the angle



35° is **acute** (less than 90°). 90° is **right**. 112° is **obtuse** (between 90° and 180°). 89° is **acute**, just below a right angle. 180° is **straight**. 151° is **obtuse**.

4 True or false in everyday life



- (a) **True.** Rails stay the same distance apart and never meet.
- (b) **True.** At 3:00 the hands point at 12 and 3, a quarter turn of 90° .
- (c) **False.** At 6:00 the hands point in opposite directions and form a straight angle of 180° .

5 Reading the protractor



- (a) The orange ray crosses the outer scale at 70, so the angle measures **70°** .
- (b) 70° is less than 90° , so the angle is **acute**.

6 Right angles and parallel sides



A square has **4** right angles and **2** pairs of parallel sides. A rectangle also has **4** right angles and **2** pairs. A right triangle has **1** right angle and **0** pairs of parallel sides, because the three sides meet each other.

7 Counting lines of symmetry



- (a) **4** (two through the middles of opposite sides and two diagonals). (b) **2**. (c) **1**, the line through the apex and the middle of the base. (d) **3**, one from each vertex. (e) **0**, no fold matches.

8 Missing angle in a corner



- (a) $90 - 24 = 66$, so **66°** .
- (b) $180 - 128 = 52$, so **52°** .
- (c) $90 - 66 = 24$, so **24°** .

9

Opening a door

- (a) $25 + 40 = 65$. The door is open 65° .
(b) $90 - 65 = 25$. It needs 25° more.

10

Triangles by sides

- (a) All sides equal: **equilateral**. (b) Two equal sides: **isosceles**. (c) No equal sides: **scalene**.
(d) Two equal sides: **isosceles**.

11

Triangles by angles

- (a) All angles are less than 90° : **acute** (sum 180). (b) One right angle: **right** (sum 180). (c) 100° is obtuse: **obtuse** (sum 180). (d) All less than 90° : **acute** (sum 180).

12

Quadrilateral true or false

- (a) **True**: a square has four right angles and opposite sides parallel.
(b) **False**: a 6 cm by 3 cm rectangle has unequal sides.
(c) **True**: that is the definition of a rhombus.
(d) **False**: a trapezoid has at least one pair of parallel sides; two pairs make a parallelogram.

13

Clock angles

The angle is 30° times the number of hours between the hands.

- (a) $2 \times 30 = 60$: 60° , **acute**.
(b) $4 \times 30 = 120$: 120° , **obtuse**.
(c) At 9:00 the hands are 3 hours apart: $3 \times 30 = 90$: 90° , **right**.
(d) $5 \times 30 = 150$: 150° , **obtuse**.

14 A wide angle



- (a) The ray crosses the outer scale at 128, so the angle is **128°**.
- (b) It is between 90° and 180°: **obtuse**.
- (c) $180 - 128 = 52$, so **52°** more.

15 Letters and symmetry



- (a) A, H, M and T can be folded left onto right. F and R cannot, and B and E cannot either.
 - (b) B, E and H can be folded top onto bottom. A, M, T, F and R cannot.
- So H has both kinds.

16 Parallel or perpendicular streets



- (a) Main Street and Oak Street are **parallel**.
- (b) Elm Street is **perpendicular** to Main Street and to Oak Street (the square corners show it).
- (c) **No**. Pine Street slants and crosses Main and Oak without making square corners.

17 Adjacent angles



$$125 - 47 = 78$$

The unknown angle is **78°**. Check: $47 + 78 = 125$.

47° is acute, 78° is acute and 125° is obtuse.

18 Laptop screen



(a) $105 - 38 = 67$, then $67 + 21 = 88$. The final angle is 88° .

(b) 88° is less than 90° : **acute**.

19 Pie chart angles



(a) $90 + 120 + 85 = 295$, then $360 - 295 = 65$. The fourth sector is 65° .

(b) The 120° sector is obtuse. The 90° sector is right and the 85° and 65° sectors are acute.

20 Who am I?



(a) A **square**. (b) A **rhombus**. (c) A **trapezoid**. (d) A **rectangle**.

21 Robot turns



(a) $40 + 75 + 65 = 180$. The total turn is 180° .

(b) $\frac{180}{360} = \frac{1}{2}$: a **half turn**, which makes a straight angle.

22 Find the mistake



The angle is clearly smaller than a square corner, so it must be acute. Maya read the inner scale (which starts at 0 on the left), but the base ray points to 0 on the outer scale.

The correct measure is 50° . Indeed $180 - 130 = 50$.

23

Folding a banner

(a) Folding across the long side gives **6 in by 8 in**. Folding across the short side gives **12 in by 4 in**.

(b) $6 \times 8 = 48$ and $12 \times 4 = 48$. Yes, the area is **48 square inches** in both cases, half of $12 \times 8 = 96$.

24

Describe a triangle

By sides: two sides are equal and the third is different, so it is **isosceles**.

By angles: 120° is between 90° and 180° , so it is **obtuse**.

It is an **obtuse isosceles** triangle.

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