Train Side View Drawing: Wheels, Cars, and Proportions

Original tasks 1, 2, 3 / complete keys

Task 1

A train has three cars. Each car has two wheels of diameter 3 cm. Wheel centers within a car are 4 cm apart. The gap between cars is 1.5 cm. Each car length equals wheel spacing plus one wheel diameter. Find the total train length from the left edge of the first car to the right edge of the third car.

Answer: Car length = 4 + 3 = 7 cm. Three cars = 21 cm. Two gaps = 3 cm. Total = 24 cm.

Reason: Each car is 7 cm long. Three cars give 21 cm. There are two gaps between three cars, each 1.5 cm, adding 3 cm. Total is 24 cm.

Check: Measure one car as 7 cm, multiply by three, add two gaps of 1.5 cm, and compare to 24 cm.

Task 2

A two-car train uses wheels of diameter 2.5 cm. Body height is two wheel diameters. What is the body height in centimeters? If the body bottom sits 0.5 cm above the wheel tops, what is the total height from baseline to body top?

Answer: Body height = 5 cm. Total height = 2.5 + 0.5 + 5 = 8 cm.

Reason: Two wheel diameters = 5 cm. Wheel top is one diameter above baseline, 2.5 cm. Add the 0.5 cm gap and the 5 cm body height to reach 8 cm.

Check: Measure wheel diameter 2.5 cm, double it for body height, add gap, and compare total to 8 cm.

Task 3

You draw a car with wheel centers 6 cm apart and wheel diameter 2 cm. You want the car length to be wheel spacing plus one wheel diameter. Where should the left and right car edges be relative to the left wheel center if the left edge is half a wheel diameter left of the left wheel center?

Answer: Left edge is 1 cm left of the left wheel center. Car length is 8 cm, so right edge is 7 cm right of the left wheel center.

Reason: Half a wheel diameter is 1 cm. Car length = 6 + 2 = 8 cm. From left edge, 8 cm to the right gives the right edge position relative to the left wheel center as 8 - 1 = 7 cm.

Check: Mark left wheel center, measure 1 cm left for left edge, then measure 8 cm right for right edge; confirm 7 cm from left wheel center.

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Original tasks 4 / complete keys

Task 4

A train has two cars with equal wheel spacing. Car one has two wheels of diameter 2 cm and car two has two wheels of diameter 3 cm. Wheel centers within each car are 5 cm apart. Body height equals two wheel diameters for each car. Find the difference in body heights and the total length if each car length equals wheel spacing plus one wheel diameter and the gap is 1 cm.

Answer: Body height difference = 2 cm. Car one length = 7 cm, car two length = 8 cm, total length = 16 cm.

Reason: Body heights are 4 cm and 6 cm, difference 2 cm. Car lengths are 5+2=7 cm and 5+3=8 cm. Sum 15 cm plus 1 cm gap gives 16 cm.

Check: Measure each body height against twice its wheel diameter, then add car lengths and gap to confirm 16 cm.

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Source rubric / reflection

- [ ] Baseline is horizontal and all wheel bottoms touch it.
- [ ] All wheel centers lie on one horizontal center line.
- [ ] Wheels are circles of equal diameter within each car.
- [ ] Car bodies are rectangles with rounded corners and consistent height.
- [ ] Body height follows the chosen ratio to wheel diameter.
- [ ] Gaps between cars are equal and clearly marked.
- [ ] Vertical car guides align windows and details.
- [ ] Roof lines are parallel to the baseline.
- [ ] Measurements are labeled with units and checked with a ruler.
- [ ] Valid alternatives are accepted if proportions and alignment are consistent and documented.

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