Drawing Vehicles: Wheel Placement, Chassis Line, and Body Proportion

Original tasks 1 / complete keys

Task 1

Side view: baseline and midline are 30 mm apart. Wheel centers are 70 mm apart on the baseline. Wheel radius is 12 mm. Draw a chassis line through the centers. Lower body box height is 30 mm and width is 95 mm. Cabin box is 50 mm wide and 24 mm high, set back 15 mm from the front wheel center. Check that the lower body touches the chassis line and the cabin sits within the lower body footprint.

Answer: A side-view vehicle with two wheels on the baseline, a chassis line through the centers, a lower body box 95 mm by 30 mm, and a cabin box 50 mm by 24 mm set back 15 mm from the front wheel. The x-height is 30 mm, wheelbase 70 mm, and wheel radius 12 mm. Check: lower body width 95 mm is at least wheelbase plus one wheel diameter (70 + 24 = 94 mm) and no more than wheelbase plus two diameters (70 + 48 = 118 mm); cabin width 50 mm is within the lower body width 95 mm; cabin height 24 mm is 0.8 x-height.

Reason: The lower body height equals one x-height, and the cabin height is 0.8 x-height. The cabin width is about 0.53 of the lower body width. The front overhang is 15 mm, which is plausible relative to the wheelbase.

Check: Measure the baseline-to-midline distance, the wheelbase, and the wheel radius. Confirm both wheel centers lie on the baseline and the lower body box touches the chassis line. Compare cabin width to lower body width and cabin height to x-height.

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Original tasks 2 / complete keys

Task 2

Three-quarter view: baseline and midline are 35 mm apart. Near wheel center is on the baseline; far wheel center is 5 mm above the baseline and 60 mm to the right. Wheel radius is 14 mm. Chassis line connects the two centers. Lower body box height is 35 mm and width is 100 mm. Cabin box is 55 mm wide and 28 mm high, set back 18 mm from the near front wheel center. Check that the near wheel touches the baseline and the chassis line connects the centers.

Answer: A three-quarter vehicle with the near wheel on the baseline, the far wheel slightly higher, a chassis line connecting the centers, a lower body box 100 mm by 35 mm, and a cabin box 55 mm by 28 mm set back 18 mm from the near front wheel. Check: lower body width 100 mm is at least wheelbase plus one wheel diameter (60 + 28 = 88 mm) and no more than wheelbase plus two diameters (60 + 56 = 116 mm); cabin width 55 mm is within the lower body width 100 mm; cabin height 28 mm is 0.8 x-height.

Reason: The x-height is 35 mm, so the lower body height equals one x-height and the cabin height is 0.8 x-height. The far wheel offset suggests depth without breaking the chassis line. The cabin width is about 0.55 of the lower body width.

Check: Confirm the near wheel center is on the baseline and the far wheel center is 5 mm above it. Measure the chassis line endpoints and check they meet the wheel centers. Compare box heights to the x-height and cabin width to lower body width.

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Original tasks 3 / complete keys

Task 3

Side view with a longer wheelbase: baseline and midline are 25 mm apart. Wheel centers are 90 mm apart on the baseline. Wheel radius is 10 mm. Lower body box height is 25 mm and width is 115 mm. Cabin box is 60 mm wide and 20 mm high, set back 25 mm from the front wheel center. Check that the lower body box spans the wheelbase and the cabin sits within the lower body footprint.

Answer: A side-view vehicle with a 90 mm wheelbase, wheels of 10 mm radius on the baseline, a lower body box 115 mm by 25 mm, and a cabin box 60 mm by 20 mm set back 25 mm from the front wheel. Check: lower body width 115 mm is at least wheelbase plus one wheel diameter (90 + 20 = 110 mm) and no more than wheelbase plus two diameters (90 + 40 = 130 mm); cabin width 60 mm is within the lower body width 115 mm; cabin height 20 mm is 0.8 x-height.

Reason: The x-height is 25 mm, so the lower body height equals one x-height and the cabin height is 0.8 x-height. The longer wheelbase changes the overhang proportions, but the checks remain the same. The cabin width is about 0.52 of the lower body width.

Check: Measure the wheelbase and confirm both centers are on the baseline. Check that the lower body width is at least the wheelbase plus one wheel diameter. Confirm the cabin box is within the lower body footprint and its height is about 0.8 x-height.

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Original tasks 4 / complete keys

Task 4

Three-quarter view with a shorter wheelbase: baseline and midline are 28 mm apart. Near wheel center is on the baseline; far wheel center is 4 mm above the baseline and 50 mm to the right. Wheel radius is 11 mm. Lower body box height is 28 mm and width is 85 mm. Cabin box is 45 mm wide and 22 mm high, set back 12 mm from the near front wheel center. Check that the near wheel touches the baseline and the cabin height relates to the x-height.

Answer: A three-quarter vehicle with a 50 mm apparent wheelbase, near wheel on the baseline, far wheel 4 mm higher, a lower body box 85 mm by 28 mm, and a cabin box 45 mm by 22 mm set back 12 mm from the near front wheel. Check: lower body width 85 mm is at least wheelbase plus one wheel diameter (50 + 22 = 72 mm) and no more than wheelbase plus two diameters (50 + 44 = 94 mm); cabin width 45 mm is within the lower body width 85 mm; cabin height 22 mm is about 0.79 x-height.

Reason: The x-height is 28 mm, so the lower body height equals one x-height and the cabin height is about 0.79 x-height. The shorter wheelbase makes the overhangs relatively larger, which is acceptable if the checks are consistent. The cabin width is about 0.53 of the lower body width.

Check: Confirm the near wheel center is on the baseline and the far wheel center is 4 mm above it. Measure the chassis line and check it connects the centers. Compare cabin height to the x-height and confirm the cabin box sits within the lower body footprint.

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Source rubric / reflection

- [ ] Wheels are placed on the baseline in side view, or the near wheel is on the baseline in three-quarter view.
- [ ] Wheelbase and wheel radius are recorded and used consistently.
- [ ] A chassis line connects or passes near the wheel centers.
- [ ] Lower body and cabin boxes relate to the x-height and wheelbase.
- [ ] Wheel arches are centered on wheel centers.
- [ ] Construction lines are light and checks are documented.
- [ ] Valid alternative proportions are accepted if the checks are consistent and explained.

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