Rat Exercise Wheel Cutaway: Frame, Axle, and Posture Drawing Guide

Original tasks 1, 2, 3 / complete keys

Task 1

Draw a cutaway wheel with a hypothetical radius of 4 units, a base line tangent to the bottom, a two-leg frame, and a horizontal axle. Mark the center height above the base.

Answer: The center is 4 units above the base. The axle line passes through the center at that height. The frame legs run from the base to a hub at the center.

Reason: A tangent base touches the circle at its lowest point, so the center is one radius above the base. The axle sits at the center height.

Check: Measure the distance from the base to the center and confirm it equals the radius. Confirm the axle line is horizontal and passes through the center cross.

Task 2

Draw a cutaway wedge from the center to the near rim on a wheel with a hypothetical radius of 6 units. Show the axle line extending 1 unit beyond the hub on each side. How long is the visible axle line?

Answer: The visible axle line is 2 units longer than the hub width if the hub is centered; with a 1-unit extension on each side, the total visible length is hub width plus 2 units.

Reason: The axle extends 1 unit beyond the hub on each side, so the added length is 1 + 1 = 2 units. The hub width is whatever you drew.

Check: Measure the extension on each side of the hub and confirm each is 1 unit. Add them to the hub width to get the total visible axle length.

Task 3

Place a rat in the lower half of a wheel with a hypothetical radius of 5 units. The center is 5 units above the base. Put the rat's back 2 units below the center. How far is the rat's back above the base?

Answer: The rat's back is 3 units above the base.

Reason: Center height is 5 units. Subtract 2 units to get 5 - 2 = 3 units above the base.

Check: Measure from the base to the rat's back line and confirm it is 3 units. Confirm the back is below the axle at 5 units.

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Original tasks 4 / complete keys

Task 4

Draw a cutaway wheel with a frame that has three legs. Keep the axle and rat visible. Describe where the third leg goes and how you keep the opening clear.

Answer: The third leg can be drawn behind the wheel, meeting the same hub, and any part that crosses the cutaway opening is erased or left behind the wheel surface. The axle and rat stay visible in the opening.

Reason: Extra frame legs are allowed if they do not hide the key features. Placing the third leg behind the wheel keeps the cutaway clear.

Check: Look through the cutaway opening and confirm the axle line and rat are not crossed by the third leg. Confirm all legs meet the hub.

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Source rubric / reflection

- [ ] Frame: two or more straight supports meet at a hub; legs are symmetric about the vertical center line.
- [ ] Axle: horizontal line passes through the hub center and is visible inside the cutaway opening.
- [ ] Cutaway: a clear wedge removes part of the near wheel surface without hiding the axle or rat.
- [ ] Rat posture: body sits in the lower half, feet touch the lower inside surface, head faces the running direction, tail trails behind.
- [ ] Clarity: labels, if used, have x-height between baseline and midline; letter style may vary.
- [ ] Valid alternatives: either running direction is acceptable if posture cues are consistent; extra frame legs are acceptable if the opening stays clear.

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