

Buoyancy: WTSF Progress Guide

Harshness Rule:

If different parts of the response suggest different levels, score the **lowest possible level**.

Level	What the Student Already Knows		What the Student Needs to Learn	
RD	Relative Density Student knows that floating depends on having less density than the medium. <ul style="list-style-type: none"> • “An object floats when its density is less than the density of the medium.” 			
D	Density Student knows that floating depends on having a small density. <ul style="list-style-type: none"> • “An object floats when its density is small.” 		To progress to the next level, student needs to recognize that the medium plays an equally important role in determining if an object will sink or float.	
MV	Mass and Volume Student knows that floating depends on having a small mass and a large volume. <ul style="list-style-type: none"> • “An object floats when its mass is small and its volume is large.” 		To progress to the next level, student needs to understand the concept of density as a way of combining mass and volume into a single property.	
M	V	Mass Student knows that floating depends on having a small mass. <ul style="list-style-type: none"> • “An object floats when its mass is small.” 	Volume Student knows that floating depends on having a large volume. <ul style="list-style-type: none"> • “An object floats when its volume is large.” 	To progress to the next level, student needs to recognize that changing EITHER mass OR volume will affect whether an object sinks or floats.
PM	Productive Misconception Student thinks that floating depends on having a small size, heft, or amount, or that it depends on being made out of a particular material. <ul style="list-style-type: none"> • “An object floats when it is small.” 		To progress to the next level, student needs to refine their ideas into equivalent statements about mass, volume, or density. For example, a small object has a small mass.	
UF	Unconventional Feature Student thinks that floating depends on being flat, hollow, filled with air, or having holes. <ul style="list-style-type: none"> • “An object floats when it has air inside it.” 		To progress to the next level, student needs to refine their ideas into equivalent statements about size or heft. For example, a hollow object has a small heft.	
OT	Off Target Student does not attend to any property or feature to explain floating. <ul style="list-style-type: none"> • “I have no idea.” 		To progress to the next level, student needs to focus on some property or feature of the object in order to explain why it sinks or floats.	
NR	No Response Student left the response blank.		To progress to the next level, student needs to respond to the question.	
X	Unscorable Student gave a response, but it cannot be interpreted for scoring.			

Reasoning Progress Guide

Leniency Rule:

If different parts of the response suggest different levels, score the **highest possible level**.

Level	What the Student Can Already Do	What the Student Needs to Improve
P	<p>Principled Student uses an explicit principle that applies to objects in general.</p> <ul style="list-style-type: none"> • “An object floats when its mass is large.” 	
R	<p>Relational Student uses a specific relationship in which the object, the property, and the magnitude of the property (e.g., more vs. less) are all clear.</p> <p>Note: Some of the parts of the relationship may be made clear by the item stem, or by another part of the response (e.g., a prediction), rather than in the explanation.</p> <ul style="list-style-type: none"> • “Object A floats because its mass is large.” 	To progress to the next level, student needs to use a principle that would apply to objects in general.
U	<p>Unclear Relational Student uses a specific relationship in which either the object, the property, or the magnitude of the property (e.g., more vs. less) is not clear.</p> <ul style="list-style-type: none"> • “Object A floats because of its mass.” 	To progress to the next level, student needs to explicitly identify all three parts of the relationship in their explanation.
E	<p>Experiential Student justifies their answer by appealing to prior experience, in the form of a personal observation or an authoritative source.</p> <ul style="list-style-type: none"> • “It floats because that’s what we saw in class.” 	To progress to the next level, student needs to use a relationship to explain their answer, not just evidence to justify it.
IE	<p>Inadequate Explanation Student either restates their answer as an explanation, or simply asserts that their answer is correct.</p> <ul style="list-style-type: none"> • “Object A will float.” 	To progress to the next level, student needs to understand what evidence is and the relationship between evidence and an explanation.
OT	<p>Off Target Student cannot or does not give an explanation for their answer.</p> <ul style="list-style-type: none"> • “I have no idea.” 	To progress to the next level, student needs to justify their answer in some way.
NR	<p>No Response Student left the response blank.</p>	To progress to the next level, student needs to respond to the question.
X	<p>Unscorable Student gave a response, but it cannot be interpreted for scoring.</p>	