Features Analysis Chart—Forces

Teacher Name:

Circle One: PRE POST

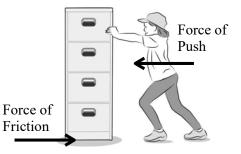
Describe the assessment item: Questions 1–5 on the pre-post assessment for the Forces unit:



- 1. What **forces** caused the ball to start moving?
- 2. Why do you think the ball slowed down and stopped?



- 3. Do you think any **forces** are pushing or pulling the pencil when it's sitting still on the table? Explain your answer.
- 4. After the pencil started to move, why did it change direction from rolling across the table to falling to the floor?



5. Why could your friend move the file cabinet she was pushing, but you couldn't budge the cabinet you were pushing?

Describe the ideal response:

- 1. The ball started moving because the girl kicked it, exerting a force by giving it a push.
- 2. The ball stopped moving because of friction exerting a force in the opposite direction of the ball's motion. Tiny bumps on the surface of the grass pushed against tiny bumps on the surface of the ball, causing the ball to slow down and eventually stop.
- 3. Yes, I think forces are acting on the pencil even when it's still. Gravity is pulling down on it, and the table is pushing up on it.
- 4. When the pencil rolled off the table, gravity was the only force pulling on the pencil, so it changed direction and fell to the floor.
- 5. I couldn't move the cabinet I was pushing because there were more bumps on the surface that created more friction. My friend could move the cabinet she was pushing because the surface was smoother. Smoother surfaces have less friction than bumpier surfaces, so she was able to move the cabinet using less force.

Features of a Complete,	-	2	3	4	5	6	7	8	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Accurate Response	-	~	(7)	4	47	•		~	5	-	-	-	-	-	-	-	1	-	-	~	~	7	2	2	2	2	2	2	2	69	(7)	с.)
Things start to move because of a																																
push or pull—also known as a <i>force</i> .																																
Things change speed or direction																																
because of forces acting on them.																																
<i>Friction</i> is a force that pushes in the																																
opposite direction of an object's motion.																																
Friction is caused when tiny bumps on																																
the surfaces of two objects—an object and the surface it's on or the air/water																																
it's moving through—push against one another.																																
			-	-	-			<u> </u>							<u> </u>				<u> </u>					<u> </u>		<u> </u>						
More or bigger bumps on the																																
surface of an object create more friction. Fewer or smaller bumps																																
on a surface create less friction.																																
<i>Gravity</i> is a force that pulls objects																																
toward Earth.																																
If an object on Earth isn't moving,																																
gravity is still pulling on it, and the																																
surface it's on is pushing back with an																																
equal force.																																
equal loice.																																
Features Consistent with										_			_				_		_	_			_				_		_	_		
Misconceptions/Problems	1	7	3	4	S	9	7	8	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Changes in speed or the direction of																																
motion occur without a force being																																
applied (e.g., a soccer ball stops or a																																l
rolling pencil changes direction).																																
Objects stop moving because the																																l
force "runs out."																																
No forces act on objects at rest.																																l
If an object is moving, a force must be																																
acting on it.																																
The force it takes to move an object is				\vdash	\vdash																					1						
determined only by the strength of the						1	1												1					1	1			1	1			l
force in one direction, not taking into																																1
account the net forces (or forces						1	1												1					1	1			1	1			l
pushing in another direction).																																l l
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Gravity and friction are the same.		1		1																							1					1