

Time	
0.10 – 0.18	Module: EMM Topic: Force
0.19 -0.45	music
0.46 -0.51	Teacher: Hi, my name is Janischaya Siripoon, or Teacher Yui. I am a teacher at Wat Krokkeaw wongprachan, Chachoengsao Province.
0.51 – 1.35	Teachers: In this activity, 1) Students need to understand relationships between elastic force and stretching distance of rubber band. 2) This will be in activity 2.2, students will identify effects of gravity on an object. 3) Students will be able to use spring scale to weigh an object. 4) Students will describe relationships between mass on weight of an object. 5) Students will describe relationship between mass on changes in motions of an object. 6) Students will be able to design data tables and graphs to use for data interpretation.
1.36 – 1.45	Teacher: Now, let's warm up by checking your prior knowledge. So we can know what have you learned so far and what to be learned later.
1.46 -2.15	Teacher: First one, which of the following describe relationships of mass and weight correctly? A: they are the same. B: They are different. A unit of mass is in Newton, while a unit of weight is in kilogram. C: They are different. A unit of mass is in kilogram, while a unit of weight is in Newton. D: They are different: Weight is to use (for an object) on earth, while mass is to use (for an object) in space.
2.16 – 2.23	Teacher: which one you choose? Please raise your AR card. Keep holding while I scan.
2.24 -2.29	Teacher: How many I can see? Now I have 7. Please kindly stay put so I can see clearly.
2.30 -2.33	Teacher: Now, I have 14.
2.34 -2.41	Teacher: Now, I have 17. Ok! I won't reveal the result yet. We shall conclude that at the end. Only I can reveal that very few are correct!

Time	
2.42 -2.48	Teacher: Look at this grouping. Each person will has different role. Let see what will be your role.
2.49 – 3.11	Teacher: First row, if you have same position, please raise your hand. If you have the same position as Ms. Kwankhao, you will be a group manager. You will design an experiment, and manage the group
3.12 – 3.19	Teacher: Next, the opposite position will be a material manager. Let see which position will be a presenter.
3.20 – 3.30	Teacher: Next...this position will be...the presenter. This person will present results from experiments.
3.31 – 3.35	Teacher: the last position will be a data collector
3.36 – 3.42	Teacher: Shall we leave data collection duty to data collector solely? Students: No! Teacher: No
3.43 -3.45	Teacher: what shall we do?... We must work together.
3.46-3.50	Teacher: The group material managers please collect materials at the side of the room.
3.50-3.58	music
3.59- 4.05	Teacher: when you receive all materials, please put them underneath your tables. As we have 2 experiment, only pick up what you need.
4.06 – 4.27	Teacher: Could you see the rubber bands here? If I will ask you to pull the rubber bands, how would you feel when you stretch the rubber bands further? A. Apply less force. B. Apply more force.
4.28-4.37	-
4.38 – 4.42	Teacher: Now, you are all correct. Please give yourself a round of applause.
4.43 - 4.45	Teacher: Some may confused...it's ok.
4.46-5.01	music
5.02- 5.18	Student: when we pulled the rubber band, the (Newton) force increased because the force we stretched. The forces increased due to pulling.
5.19 -5.31	Students: Additionally, we know the force according to the distances pulled. If we pull continuously, the (Newton) force will be increasing. However, if we pull pass the threshold, the (Newton) force will decrease.

Time	
5.32 – 5.42	Teacher: Student to explain relationships between mass and weight. Please write down. However, you can discuss with your groups. You have 1 minute.
5.43-5.49	Students discussing
5.50 – 5.54	Students: ...weightif gravity change it will change.....
5.55- 6.05	Students discussing
6.06 – 6.15	Teacher: Time's up. Please share with me your conclusion on the relationship between mass and weight.
6.16 -6.33	Student: First, weight results from gravity, this relates to mass. Mass should be constant at all time except if we increase mass. Therefore, if we know mass, weight can be obtained. Teacher: That's all?
6.34 – 6.52	Teacher: learning this way is great as we can assess learner along the way beyond questions. We can assess by their own conversations or discussions within their groups. They might not totally understand. This can be recognized during their discussion. I can intervene in time.
6.53 – 7.08	Teacher: I always make notes to all groups about their misunderstandings. If I see that the issues are repetitive across the class, I will correct those immediately.
7.09 – 7.18	Teacher: If the problems are minor and found in a group, I will correct them within a group discussion. This is better than to correct them that their graphs, data table, or results are incorrect the end of the activity.
7.19 – 7.25	Teacher: ...pull and release.....what you think will happen to the rubber bands?
7.26 – 7.34	Students: 5...yes...it's 5...20
7.35 -7.48	Teacher:when you pull the rubber bands...how do you feel (about the rubber bands)? Everyone try...I have a test for you all. There are 3 questions.
7.49 -7.51	Students discussing Student: small rubber bands...small rubber bands
7.52 – 7.59	Teacher: how you feel? Student: ...I feel... Teacher:not yet 2 centimeters Students: ...it goes further...it stretches

Time	
8.00 – 8.18	Teacher: I use questions from easier questions to guide students' thinking step-by-step. Then, use their answers to conclude as big questions for students to find relationships among questions.
8.19 -8.23	Teacher: until they understand terms and read from their memorization.
8.24 – 8.45	Teacher: Attention please. Please see questions prior to the experiment section. I would like you to discuss with your group...if we stretch the rubber band 2 cm each time, do you think that the magnitude of force applying on the rubber band each time is equal? Think as a group.
8.46 – 9.02	Students discussion Students:go further...apply more force?not equal... more stretching, more forces apply
9.03 -9.25	Music
9.26 - 9.40	Teacher: Which quantity relates to weight? A. Gravity B. Electromagnetic force Only 2 choices.
9.41 -9.55	Teacher: At the back please. Ok! Everyone answers gravity.
9.56 – 11.22	<p>Teacher: This is a free software that can be used as a simple formative assessment technique that can be used off-line. Teachers only require a computer and internet. Just add names and the limit are up to 40 participants per class. You can input students' names and use many sections of questions. This software allows us to collect assessment data in quite real time. Students only need 1 paper that contains AR code each, while teachers use only a mobile phone camera. This helps me to know whether or not students understand.</p> <p>However, it has limitation too. Now, the software can be used for simple questions to check upon basic understanding. For instance, what is gravity? This kind of questions has definite answers and definitions.</p> <p>For more complicated questions such as what are relationships...writing and group discussion are used instead.</p> <p>This method is used to assess students during their learning. If there are issues, we can correct immediately without waiting for another class.</p>

Time	
11.23 -11.45	<p>Student: I learned about force, its unit, mass, weight, various types of forces such as contacting forces, and non-contacting forces, and experiment on gravitational force. We hung spring scale on a wooden panel to measure weights of 5 metal rings. I like that the teacher uses technology in class by using QR code cards instead of using verbal answers.</p>
11.46-12.15	<p>Student: I learned about elastic force. The teacher let us to do experiment to learn about elastic force. We used screws and rubber bands, then pulled (rubber band) to measure (Newton) forces.</p> <p>I like her questioning method by using an application to scan while students holding QR codes. This is very convenient and saving time.</p>
12.16 – 12.34	<p>Teacher: Now, to conclude, when increasing masses, weights are increasing. Therefore, weight and mass (of an object) are directly proportional.</p> <p>The examples are such as carrying or lifting up loads. The higher numbers of loads, the heavier it gets.</p>
12.35 - 12.45	<p>Teacher: Suppose that a person is moving... a person with higher or lower mass...which one is moving faster?</p>
12.46 – 13.20	<p>Teacher: suppose that there are a person with a mass of 150 kg, and a person with a mass of 50 kg. If I push them both, which one moves easier?</p> <p>Students: 50</p> <p>Teacher: ...50...therefore, lower mass...is easier...</p> <p>Teacher: Imagine when you are lifting up weights, which one you prefer?...the lighter or the heavier?</p> <p>Students: lighter</p> <p>Teacher: Therefore, lighter objects have lower masses, and they move easier.</p>
13.21 - 13.26	<p>Teacher: Please read the question. If you finalize your answer, please raise your hand. You've got 1 minute.</p>
13.27 - 13.39	<p>Music</p>
13.40 - 13.42	<p>Teacher: Who has an answer, please raise your hand.</p>
13.43 - 13.50	<p>Music</p>

Time	
13.51- 14.00	Teacher: 15...16...17...the table at the back all finishes.
14.03 - 14.06	Teacher: which tables have not yet finished? ...ok that's all.
14.07 – 14.26	<p>Teacher: In this question, you answered as A...1 person, B...1 person, and C...16 persons.</p> <p>Which answer is correct?</p> <p>Students: C</p> <p>Teacher: C because mass is constant wherever....what is changing?</p> <p>Students: ...weight...</p> <p>Teacher: weight</p>
14.26 - 14.46	“Formative assessment helps to solve issues within classroom immediately, and leaves no one behind” - Janischaya Siripoon
14.46 – 14.52	End credit