Lesson Research Proposal for Time

<div align="right">

Date of lesson: 08/02/19
School name: Creagh College
Teacher giving lesson: Amiee Doyle
Associate: Keith O Hara
Lesson plan developed by: Amiee Doyle and Gerald Lally

</div>

1. **Title of the Lesson:** Its Show Time

2. **Brief description of the lesson**
In this lesson, students will try to solve problems relating to time, and to enhance their understanding and reading of time.

3. **Research Theme**
At Creagh College, we want students who:
   1) Are motivated through positive learning experiences, that arise from attainable and challenging learning outcomes
   2) Have a sense of ownership of their work, take pride in it, and take responsibility for improving it.

As math teachers, we will actively support the achievement of these goals by:
   1) Providing a positive learning environment that allows for collaborative learning and values all ability levels
   2) Structuring our lesson to include positive feedback and promote personal reflections.

4. **Background & Rationale**
This problem is aimed at first year students who are in the JC class in Creagh College, it is a mix ability class with varying needs within the class. We have chosen this problem as from our experience we have noticed recurring problems regarding reading time. We felt that these problems are seen with students at JC/LC/LCA/L2LP/JCSP levels, and hope that by doing this lesson in first year, students might get a better understanding of time for the rest of second level education. Of course, students will use time in their everyday lives.

Through discussions with members of our math department and reflecting upon our own discussions we feel many students especially at JC level are unable to read a clock or calculate a start/finish time given a duration.

5. Relationship of the Unit to the Specification

Related prior learning Outcomes	Learning outcomes for this unit	Related later learning outcomes
Read & interpret timetables & the 24 hour clock (digital & analogue) Interpret & convert between times in 12, and 24, hour formats.	Tell the time from analogue/digital clocks for 5 minute intervals. Identify key times during the day e.g. lunch breaks etc. Solve problems to work out the passage of time e.g. Use the start & finish times to calculate duration of journey or film.	N.3 investigate situations involving proportionality so that they can: a. use absolute and relative comparison where appropriate b. solve problems involving proportionality including those involving currency conversion and those involving average speed, distance, and time N.4 analyse numerical patterns in different ways, including making out tables and graphs, and continue such patterns

6. Goals of the Unit

Students should be able to:
● recognise and use symbols to denote the units of time
● read the time from a digital clock
● read the time from an analogue clock
● tell the difference between AM and PM
● calculate a duration of time
● calculate start and finish times

7. Unit Plan

Lesson	Brief overview of lessons in unit
1	Recognise and use symbols to denote the units of time Read the time from a digital clock Stand up, then sit down when you think a minute has passed What did people do before clocks
2	Read the time from an analogue clock Tell the difference between AM and PM Brief overview of other lesson in unit ???
3	Calculate a duration of time Brief overview of other lesson in unit ???

4	Calculate a duration of time
	Brief overview of other lesson in unit
5	Research Lesson Class
	Calculate start and finish times

8. Goals of the Research Lesson:

Mathematical goals:
- We want students to be able to read a timetable and calculate start/finish times
- Students will be able to make connections between time formats eg. 60mins = 1hr and read both digital/analogue clocks as we want them to be comfortable with all formats
- Students will be able to apply this knowledge to any real-life time problem

Key Skills
- Being Numerate: By calculating times of films, students will develop positive attitudes towards problem-solving/investigating and reasoning
- Working with others: During board work for each question students will discuss individual work and therefore learn from different approaches taken by others.
- Communicating: Every student will have the opportunity to come to the board to discuss their solutions
- Managing myself: At the end of class students will reflect on their own learning from the class. This will be discussed at the end of class and given for written homework as a result.
- Managing information and thinking: During each task, teacher will encourage students to think creatively and critically
- Being Creative: Students will explore other options and more effective ways to calculate the correct times

Statements of Learning
This lesson is also designed to meet the following JC Statements of Learning in particular:
- 1. The student communicates effectively using a variety of means in a range of contexts.
- 15. The student recognises the potential uses of mathematical knowledge, skills and understanding in all areas of learning
- 16. The student describes, illustrates, interprets, predicts and explains patterns and relationships.
- 17. The student devises and evaluates strategies for investigating and solving problems using mathematical knowledge, reasoning and skills.

9. Flow of the Research Lesson:

Steps, Learning Activities Teacher's Questions and Expected Student Reactions	Teacher Support	Assessment
Introduction Today we are going to use our mathematical knowledge to solve a problem. We are going to try and solve the problem by ourselves and then we're going to come together as a class and use all our knowledge to learn something new… (5 mins)	Mention classwork from previous classes – calculating start times, finish times and durations of time	Are the students motivated.
Posing the Task See Question Handout attached. Do Q1 (2/3mins) – Can you think of another way) Student Solutions (4/5 mins) Do Q2 (2/3mins) Student Solutions (4mins) Do Q3/4 (5mins) Student Solutions (10mins)	Distribute worksheet, paper clocks.	Do students understand the task. Are students eager to solve the problem?
Student Individual Work Possible solutions could be as follows: Q 1 16:00 + 2hr = 18:00 - algebra 16:00 + 1 hr. = 17:00 17:00 + 1 hr. = 18:00 Calculator 16.00 + 2 = 18 16:00 + 2 hr. = 18:00 - using available clocks Q2	Take students solutions and present on board(s) Start at top left of board with student name beside their solution. If students use calculator can they come up with another way to solve the problem.	

18:40 + 2:20 = 20:60 – algebra 20:60 - using available clocks Calculator 18.4 + 2.2 = 20.6 Add hours, then minutes Add minutes, then hours Discussion on 60 mins = 1 hour Q 3 Methods as above Q 4 20.05 + 105 = 125.05 105 mins = 1hr 25 mins, then add Counting on clock every 5 mins (potential mistakes) 20.05 + .105 = 20.155	Take students solutions and present on board(s) Discuss the various solutions Highlight how the calculator does not always give the correct answer and why. Same as above Highlight again how the calculator won't always give the correct answer. However, using the DMS function will.	
Ceardaíocht /Comparing and Discussing All appropriate solutions will be put on the board Teacher will try to encourage discussion amongst the students. During this discussion, we want students to be comfortable with all formats eg. If start time was 5:30 pm or 10 to 5 how would they cope? Ensure students make connections between time formats: 60 mins = 1 hour. Correct strategies will be explained, and teacher will explain why incorrect strategies were unsuccessful		
Summing up & Reflection		

Discussion and reflection is taking place at each stage of the lesson. At the end, students will be asked how they felt about the lesson and will be given a small questionnaire for homework.		

10. Board Plan

Learning Intentions:

Add and Subtract time in hours and minutes

Show our workings

Explain how we got out answers

Film	Length of Film	Start time	Start time	Start time	Start time
A Star is Born	2 hours	16:00 Screen 2	17:30 Screen 4	18:45 Screen 2	20:00 Screen 4
Bohemian Rhapsody	2 hours 20 minutes	16:30 Screen 1	17:00 Screen 6	18:40 Screen 1	19:55 Screen 6
Mary Poppins	180 minutes	15:30 Screen 3	17:05 Screen 8	18:45 Screen 3	19:50 Screen 8
Bumblebee	105 minutes	16:00 Screen 5	17:25 Screen 7	18:45 Screen 5	20:05 Screen 7

If 'A Star is Born' begins at 16:00, at what time will it end?

If 'Bohemian Rhapsody' begins at 18:40, at what time will it end?

$$16:00 + 2hrs = 18:00$$

$$16:00 + 1hr = 17:00 + 1hr$$
$$= 18:00$$

Using Clock
$$16:00 + 2hrs$$
$$= 18:00$$

$$18:40 + 2:20 = 20:6$$

$$18:40 + 2:20 = 21:0$$

$$18:40$$
$$+ 2$$
$$\overline{20:40}$$
$$+ 0:20$$
$$\overline{21:0}$$

Using Clock

WHAT IF MATH TEACHERS ARE REALLY PIRATES

AND THEY JUST WANT US TO FIND THE X SO THEY CAN GET THE BURIED TREASURE

Mary needs to be at the cinema 15 minutes before the first showing of 'Mary Poppins'. At what time does she need to be at the cinema for?

Adam will be collecting his sister from the last showing of 'Bumblebee'. At what time does he need to be at the cinema for?

$15.30 - 15\text{mins}$

$= 15.15$

Using Clock

$15.30 - 5\text{mins} = 15.25$

$15.25 - 5\text{mins} = 15.20$
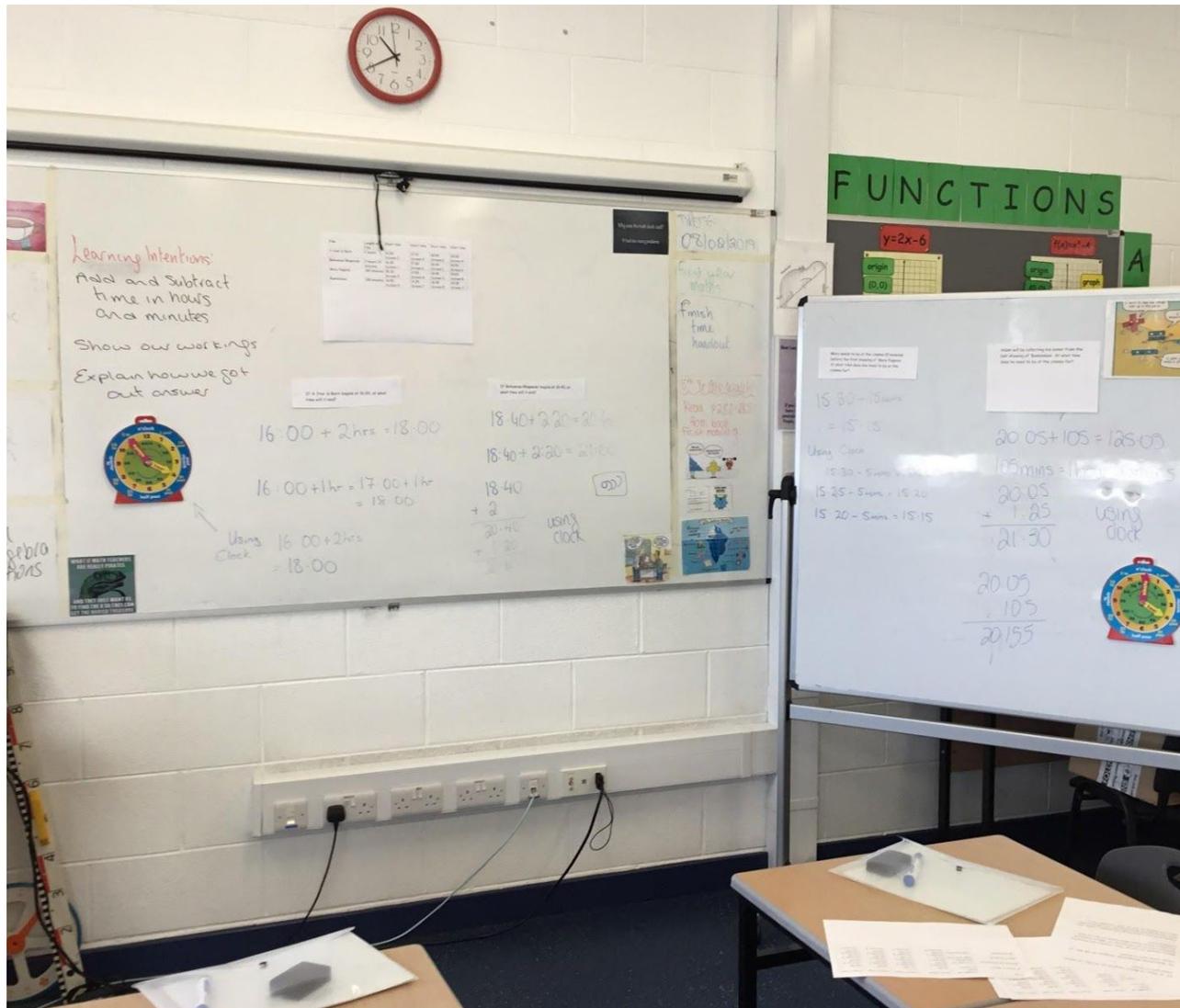
$15.20 - 5\text{mins} = 15.15$

$20.05 + 105 = 125.05$

$105\text{mins} = 1\text{hour } 25\text{mins}$

$$\begin{array}{r} 20.05 \\ +\ 1.25 \\ \hline 21.30 \end{array}$$

using clock

$$\begin{array}{r} 20.05 \\ 105 \\ \hline 20155 \end{array}$$

11. Evaluation

- How will we observe the students as the attempt each problem?
  Walk around and observe students work. Taking notes and pictures of how the students solved each problem and where difficulties arose.

- What other roles/responsibilities have the observers during the research lesson?
  A seating plan will be laid out so that each of the two observers had a group of students to focus on. While students are working on the task, we as the observers will note methods/approaches used by the students.

- As observers, what are we looking for from the students?
  We are observing to see can all/some students read and understand the timetable to calculate start and finish times.
  Do students understand how to add/subtract hours and minutes.
  Are students correctly converting from minutes to hours i.e. 105 minutes.

- During the Boardwork/Ceardaiocht are students engaged and participating in the discussion?
  Encourage students to discuss what they learned from the lesson and areas of the problem, which they found difficult. Encourage students to use the various clocks provided to demonstrate the correct times for each question.

12. Reflection

1. An initial concern was that the presence of two more adults in the room might affect students. However, students quickly settled into the lesson and "forgot" the two extra adults were there.
2. Show me boards made it easier for students to communicate their ideas, especially those students who were somewhat shy.
3. Manual paper, and metal, clock faces provided some students with an alternative, more manual method of modelling the problem, from which they were able to find solutions.
4. The clear timetable made the information, questions and solutions more accessible to students, as well as further familiarising them with timetable concepts.
5. Comparison of different student solutions on the main whiteboard helped students to see, and compare, their answers.
6. By question 3 all students were very engaged in the process, albeit at slightly different levels of understanding.
7. As students found solutions the teacher asked those students to see if they could find a second way of solving the problems, which led to differentiation giving more able students the opportunity to further express their ideas.
8. Some students presented their ideas to the others on the main board. This "novelty" of seeing their peers working at the main board added another dimension which further engaged students, both for those presenting and those watching.
9. The last question advanced many students' learning significantly. The 105 minutes $\neq$ 1:05 hours caused them to revisit and change their initial understanding and perceptions.
10. As students worked on questions it allowed the teacher time to give individual attention to students who needed some extra help to progress.
11. The lesson was punctuated by several "Eureka" moments where students expressed joy at having discovered new concepts and were able to find solutions as a result.

12. The lesson finished with a discussion where students were asked to reflect on if they enjoyed the learning, what they had learned and what they found difficult. This provided great insight into how they felt regarding the live lesson. Students "really enjoyed using the clocks/show me boards and going to the board". One student mentioned in Q2 she knew 20:60 "was wrong but didn't know how to fix it". Another student said how Q1-3 really helped in answering Q4. "If we did Q4 on its own it would have been very hard. Q1-3 really helped us with Q4". All students were in agreement that they enjoyed and gained confidence from the lesson and would love to do similar lessons in future.

13. The lesson pacing was perfect with student reflection finishing just before the end of the period.

It's Show Time:

Film	Length of Film	Start time	Start time	Start time	Start
A Star is Born	2 hours	16:00 Screen 2	17:30 Screen 4	18:45 Screen 2	20:00 Scree
Bohemian Rhapsody	2 hours 20 minutes	16:30 Screen 1	17:00 Screen 6	18:40 Screen 1	19:55 Scree
Mary Poppins	180 minutes	15:30 Screen 3	17:05 Screen 8	18:45 Screen 3	19:50 Scree
Bumblebee	105 minutes	16:00 Screen 5	17:25 Screen 7	18:45 Screen 5	20:05 Scree

If 'A Star is Born' begins at 16:00, at what time will it end?

If 'Bohemian Rhapsody' begins at 18:40, at what time will it end?

Mary needs to be at the cinema 15 minutes before the first showing of 'Mary Poppins'. At what time does she need to be at the cinema for?

Adam will be collecting his sister from the last showing of 'Bumblebee'. At what time does he need to be at the cinema for?