

Math Domain

- | | | |
|---|--------------------------------------|---|
| <input checked="" type="checkbox"/> Number/Quantity | <input type="checkbox"/> Shape/Space | <input type="checkbox"/> Function/Pattern |
| <input type="checkbox"/> Chance/Data | <input type="checkbox"/> Arrangement | |

Math Actions (possible weights: 0 through 4)

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|--|--|
| <input type="checkbox"/> 0 Modeling/Formulating | <input type="checkbox"/> 3 Manipulating/Transforming |
| <input type="checkbox"/> 2 Inferring/Drawing Conclusions | <input type="checkbox"/> 2 Communicating |

Math Big Ideas

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Scale | <input type="checkbox"/> Reference Frame | <input type="checkbox"/> Representation |
| <input type="checkbox"/> Continuity | <input type="checkbox"/> Boundedness | <input type="checkbox"/> Invariance/Symmetry |
| <input type="checkbox"/> Equivalence | <input type="checkbox"/> General/Particular | <input type="checkbox"/> Contradiction |
| <input type="checkbox"/> Use of Limits | <input type="checkbox"/> Approximation | <input type="checkbox"/> Other |

Pre-Activity:

Most students will need to review the process for calculating elapsed time. Hopefully, once the students have determined the length of each movie (1 hour and 50 minutes), they will realize that this can either be added to 1:55, or subtracted from 5:35 to get a starting time of 3:45 for the third show.

Task:

The intent of this task is to have students demonstrate their ability to reason in the context of arithmetic addition and subtraction of time (hours and minutes).

1. Making the assumption that the bus always takes the same amount of time to travel between any two stops, one can use the bus trips appearing on both signs to find the travel time. For instance, the first or second set of times shows that the bus takes 12 minutes to go from **B** to **C**, thus the missing time at stop **C** is 1:12 PM.

It takes 18 minutes to go from **C** to **D** so the missing time at **D** is 1:30 PM. It takes 32 minutes to go from **E** to **F** so the missing time at **F** is 12:25 PM (here the student must carry minutes into the next hour.)

Finally, to find the missing time at **A**, one might choose to work backwards from **B**. It takes 20 minutes to go from **A** to **B**, so the missing time must be 20 minutes before 11:10 AM, which is 10:50 AM.

2. Since it takes 15 minutes to get from **F** to **A** by bus, you would need 5 x 15, or 75 minutes to walk from **A** to **F**.

Since the bus needs 95 minutes to get from **A** to **F**, it is faster by 20 minutes to walk from **A** to **F** than to take the bus around most of its loop.

	partial level	full level
Modeling/ Formulating (weight: 0)		
Transforming/ Manipulating (weight: 3)	Show partial success in calculating the times in 1 and 2 .	Perform all of the time computations correctly.
Inferring/ Drawing Conclusions (weight: 2)	Show an understanding of some of the following ideas: -Recognize that the walking time between A and F is the same in either direction, while the bus trip time varies depending on the direction. -Correctly use the “five times faster” relationship between walking and riding times. -Reach an appropriate answer to question 2 .	Show an understanding of all of the ideas listed under partial level.
Communicating (weight: 2)	Clearly display time computations and answers, including proper labels (AM or PM).	Additionally, give an understandable explanation in 2 .