Mirror Time   *E021 scoring rubric*

Math Domain

☐ Number/Quantity	✓ Shape/Space	☐ Function/Pattern
☐ Chance/Data	☐ Arrangement	

Math Actions (possible weights: 0 through 4)

0 Modeling/Formulating	2 Manipulating/Transforming	
2 Inferring/Drawing Conclusions	1 Communicating	

Math Big Ideas

☐ Scale	☐ Reference Frame	✓ Representation
☐ Continuity	☐ Boundedness	✓ Invariance/Symmetry
☐ Equivalence	☐ General/Particular	☐ Contradiction
☐ Use of Limits	☐ Approximation	☐ Other

The intent of this task is to have students demonstrate their understanding of reflection symmetry.

1. The minute hand is at 50 on the real clock, so it is at 10 on the reflected clock. The hours hand has almost reached the 3 on the real clock, so it is just past the 9 on the mirror clock; the time in the mirror is 9:10.

2. The minute hand in the mirror is at 45, so the real minute hand is at 15. The hour hand in the mirror is 1/4 short of 7, so the real hour hand is 1/4 beyond 5. The real time is 5:15.

3. The hands in the real clock move from right to left (clockwise), while the hands of the mirror clock move from left to right (counter-clockwise)..

4. The only times that the two clocks show the same time are 12:00 (both hands straight up) and 6:00(minute hand straight up, hour hand straight down). Note that the times 12:30 and 6:30 do not look the same in the mirror, because the hour hand is not exactly vertical (e.g. at 6:30 the hour hand has already moved off the 6 towards the 7.)

	partial level	full level
Modeling/ Formulating (weight: 0)		
Transforming/ Manipulating (weight: 2)	Translate correctly between clock pictures and numerical expressions for time. Correctly reflect hands that are pointing at hour marks.	In addition, correctly reflect hands that are pointing between marks.
Inferring/ Drawing Conclusions (weight: 2)	In **4,** identify times that are nearly self-symmetric (possibly including 12:30 or 6:30)	In **4,** correctly identify the two times that are exactly self-symmetric.
Communicating (weight: 1)	Draw clocks that are not totally accurate. Give a minimal explanation for **3**.	Draw clocks that clearly communicate the student's ideas, **and** give a clear verbal explanation for **3**.