

**Math Domain**

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

**Math Actions** (possible weights: 0 through 4)

- |  |  |
|--|--|
| <input type="checkbox"/> 1 Modeling/Formulating          | <input type="checkbox"/> 1 Manipulating/Transforming |
| <input type="checkbox"/> 3 Inferring/Drawing Conclusions | <input type="checkbox"/> 2 Communicating             |

**Math Big Ideas**

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> Scale                  | <input type="checkbox"/> Reference Frame    | <input checked="" type="checkbox"/> Representation |
| <input type="checkbox"/> Continuity             | <input type="checkbox"/> Boundedness        | <input type="checkbox"/> Invariance/Symmetry       |
| <input checked="" 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                     |

- On American digital clocks, the hours shown usually range from 0 to 11 or from 1 to 12. On military or European clocks, the hours range from 0 to 23. In either case, the minutes range from 0 to 59. Therefore, any clocks showing hours in excess of 23 or minutes in excess of 59 are not showing a possible time. This means that clocks **B**, **E** and **I** are broken.
- In an analog clock, when the minute hand is on 12, the hour hand must be exactly on an hour mark. As the minute hand moves around the dial, the hour hand moves proportionately between the consecutive hour marks. For every elapsed 12 minutes, the hour hand moves the equivalent of 1 minute mark.  
Clocks **K**, **L** and **P** do not reflect correct combinations of the hour hand and the minute hand. These are definitely broken. Since no time of day is stated and the remaining clocks are all showing possible times, no quality assumptions may be made about them.
- The correct pairs are **A** and **N**, **C** and **M**, **D** and **Q**, **F** and **R**, **G** and **J**, **H** and **O**.
- The correct readings are: Three o'clock; nine forty-five or quarter to ten or quarter of ten; eight fifteen or quarter past eight; two thirty or half past two; nine forty-five or quarter to ten or quarter of ten.

	<b>partial level (1 or 2)</b>	<b>full level (3)</b>
<b>Modeling/ Formulating (weight: 1)</b>	Student correctly matches readings on some of the clocks (analog to digital).	Student correctly matches readings on all of the clocks (analog to digital).
<b>Transforming/ Manipulating (weight: 1)</b>	Student gives a correct verbal translation of the readings on some of the clocks.	Student gives a correct verbal translation of the readings on all of the clocks.
<b>Inferring/ Drawing Conclusions (weight: 3)</b>	Student identifies the impossible times on some of the clocks, or only those shown by the digital clocks.	Student identifies the impossible times shown on all of the clocks.
<b>Communicating (weight: 2)</b>	Student provides incomplete verbal statements of time and/or provides partial reasoning in identifying broken clocks.	Student provides complete verbal statements of time, and expresses clear reasoning in identifying broken clocks.