

APPENDIX D

EQUILIBRIUM ON THE BALANCE BEAM
LEVELS OF CONCEPTUALIZATION and RELATED KNOWLEDGE

LEVELS OF CONCEPTUALIZATION:

[1] A representation of the phenomenon that does not incorporate weight or distance

[2] A representation of the phenomenon that incorporates either weight or distance but not both

[3] A representation that incorporates both weight and distance

[4] Representation that EITHER the greater the weight at the same distance the greater the effect OR similarly, the greater the distance from the fulcrum for the same weight the greater the effect.

[5] Representation that the greater the weight at the same distance the greater the effect AND similarly, the greater the distance from the fulcrum for the same weight the greater the effect.

[6] Discovery of the inverse relationship between weight and distance from the fulcrum

[7] Use of proportion as a mathematical representation of the inverse relationship between mass and distance from the fulcrum

[8] Representation of the phenomenon in terms of compensations between weight * distance combinations of known properties

[9] Representation of the phenomenon in a mathematical relationship expressed as a comparison of the sums of torques (weight * distance) on either side of the fulcrum.

APPENDIX D

RELATED KNOWLEDGE

`K3' - Knowledge Related to Equilibrium on the Balance BEAM (BAL)

#1-Measurement of weight:

- [0] DOES NOT FORMALLY MEASURE WEIGHT
- [1] USES MEASUREMENT INSTRUMENT
- [2] USES MEASUREMENT INSTRUMENT CORRECTLY AND EXPRESSES THE UNITS OF MEASUREMENT CORRECTLY

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`K3' - Knowledge Related to Equilibrium on the Balance BEAM (BAL)

#2-Measurement of Distance:

- [0] DOES NOT FORMALLY MEASURE DISTANCE
- [1] USES A MEASUREMENT INSTRUMENT
- [2] USES MEASUREMENT INSTRUMENT CORRECTLY AND EXPRESSES THE UNITS OF MEASUREMENT CORRECTLY

APPENDIX D

`K3' - Knowledge Related to Equilibrium on the Balance BEAM (BAL)

#3 - Knowledge of Ratio - Nominal

[0] DOES NOT SPONTANEOUSLY MENTION `RATIO(S)'

[1] SPONTANEOUSLY USES THE TERM `RATIO(S)'

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#4 - Knowledge of Ratio - Functional

[0] DOES NOT FORMULATE RATIOS

[1] FORMULATES RATIOS

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`K3' - Knowledge Related to Equilibrium on the Balance BEAM (BAL)

#5 - Knowledge of Proportion - Nominal

[0] DOES NOT SPONTANEOUSLY MENTION `PROPORTION(S)'

[1] SPONTANEOUSLY USES THE TERM `PROPORTION(S)'

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#6 - Knowledge of Proportion -Functional

[0] DOES NOT FORMULATE PROPORTIONS

[1] FORMULATES AND USES PROPORTIONS

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