

Facet / Level	Unacceptable 0	Needs Improvement 50%	Developing 80%	Good Work 100%
<b>Solution Plan</b>	Unable to effectively begin to solve the problem	Little evidence of a plan, or a flawed plan. Work shows scant understanding of the problem's important ideas or solution method. Evidence of conceptual errors and/or poor mathematical skills.	Appears to have a workable plan to solve the problem, but plan is incorrectly executed, incomplete, or muddled. Makes poor or invalid assumptions or errors which lead to incorrect answers. Work completed is reasonable.	Plan is suitable and complete. Complete, coherent, unambiguous work, which arrives at a solution that completely answers the stated question(s). All calculations are justified and performed efficiently in a logical sequence.
<b>Diagrams</b>	No diagram is included, or diagram doesn't apply to the problem.	Diagram is inadequate to solve the problem, or indicates conceptual errors. Typical errors: Right triangles assumed incorrectly. Missing or extra forces, forces not labeled symbolically, missing or ambiguous arrowheads. Indicated reaction forces not consistent with constraints. Inconsistent or incorrect representation of internal forces.	Diagram is adequate to solve the problem, however contains some flaws such as: sloppy, poorly labeled, unclear arrowheads, unclear coordinate system, or unnecessary information included.	Neat diagram that encompasses all information needed to develop equations. Drawn roughly to scale, using a straightedge. Forces and moments are shown correctly, consistently and properly labeled. Coordinate systems, dimensions and angles indicated if needed for solution.
<b>Fundamental or governing equations</b>	No fundamental equations provided.	Some fundamental equations necessary to solve the problem are missing or wrong. Equations have errors such as: not applicable, not an equation, incorrect notation, no sigma, wrong subscripts, missing "= 0," etc.	The fundamental equations necessary to solve the problem are identified and used but they are not clearly stated.	Fundamental equations correctly chosen and stated. Equilibrium equations indicate which FBD they apply to when more than one has been drawn. Equations are selected to minimize mathematical difficulties.
<b>Symbolic work</b>	Little or no work performed symbolically.	Symbols not defined, multiply defined, or symbols used in equations do not agree with those previously defined; or, most work is performed numerically, not symbolically.	Work begins with symbolic equations, though they may contain minor errors or premature substitution of numeric values. Symbols used are defined on the diagram or elsewhere. Symbol names follow standard naming conventions.	All symbols are defined and consistent with problem statement and diagram. Symbolic equations are clearly written before values are inserted. Known information is clearly stated.
<b>Mechanics</b>	Demonstrates conceptual errors regarding mechanics principles: vectors and scalars, forces and moments, weight and mass.	Forces, components, or moments often determined incorrectly. Basic concepts, e.g, vector addition, equilibrium, components, moments, Varignon's Theorem, perpendicular distances, are misunderstood or incorrectly applied.	Forces, components and moments usually determined correctly, though not necessarily in the most efficient way. Typical errors: terms missing from equations, sign convention errors, incorrect assumptions.	Forces, components and moments calculated correctly and efficiently. Sign conventions are clearly indicated and applied. All necessary terms are included in equations.
<b>Mathematics</b>	Work is not formulated as equations.	Work contains a major math error, or many minor errors. Major errors include inability to use Geometry, Algebra, Trigonometry, or Calculus. Sloppy work, impossible to follow. Scraps.	Work contains a few minor mathematical errors, for example: trivial algebra errors, sign errors, calculator errors, round-off errors, notation errors, sloppiness. Work can be followed with effort.	No mathematical errors. Work is clear and easy to follow.
<b>Answer</b>	No answer, or answer pulled out of thin air.	Incomplete work which doesn't arrive at an answer, or an answer where one or more of these applies: answer has no units or wrong units, answer does not follow from the work, parts of problem not attempted. Answer not in the form of an equation.	Incorrect or partially correct answer with correct units which follows from logical work and reasonable assumptions. Answer is clearly indicated.	Correct answers for everything asked for in the problem statement. Answers include correct units, and vector quantities include directions. Answers are stated as equations and numerical quantities are rounded to 3 significant digits. Answer in answer box, intermediate answers underlined.