

UNIVERSITY OF TORONTO
Faculty of Applied Science and Engineering
CIV 100S – MECHANICS
Final Examination
23rd April 2010
Examiner: Michael Seica
Time allowed: 2½ hours

FAMILY NAME: _____ **GIVEN NAME(S):** _____
(Please print clearly)

STUDENT NUMBER: _____

CIRCLE MODEL NUMBER OF YOUR CALCULATOR:

CASIO 260

TEXAS INSTRUMENTS 30

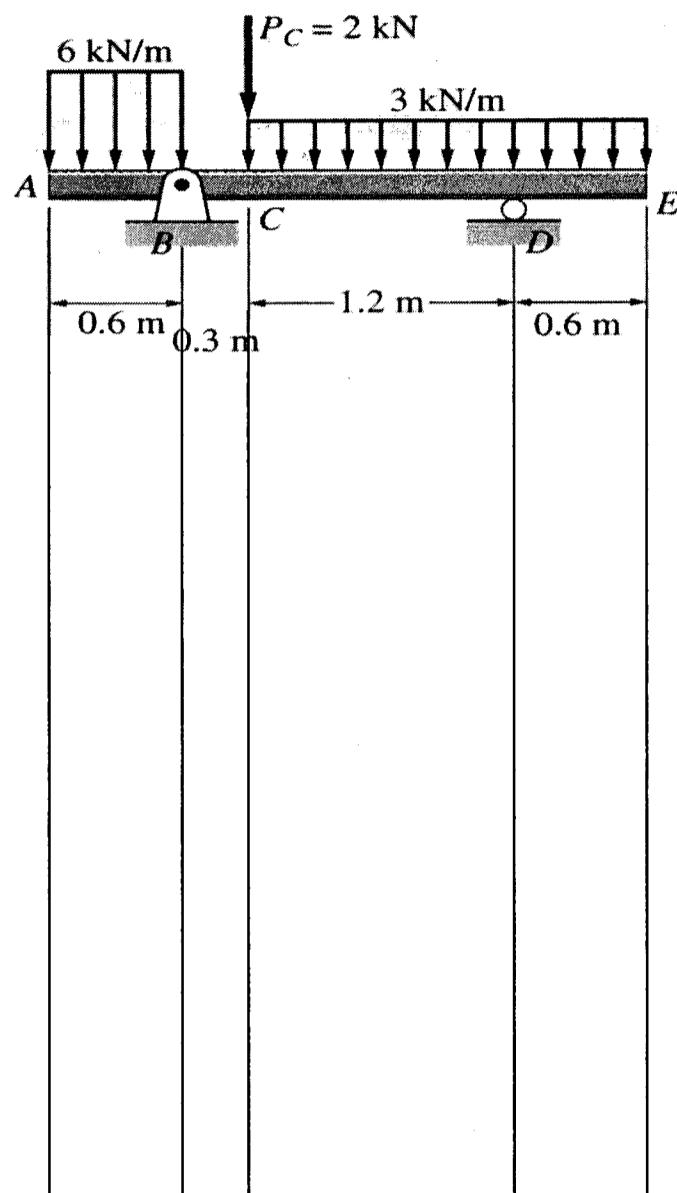
SHARP 520

- NOTES:**
1. Make sure you have all 7 sheets of the examination paper. Page 7 is blank.
 2. If you need more space for a question, please use the back of the preceding question. In all cases, please indicate clearly where your calculations are continued.
 3. Answer all 5 (five) equal-value questions.
 4. The only calculators permissible are listed above. Please circle your model.
 5. No other paper will be accepted for marking or allowed on the desk.
 6. Do not remove the staple.
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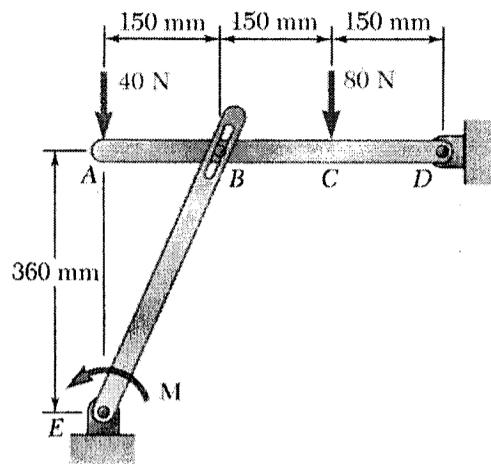
DO NOT WRITE IN THIS SPACE.

1	/12
2	/12
3	/12
4	/12
5	/12
TOTAL	/60

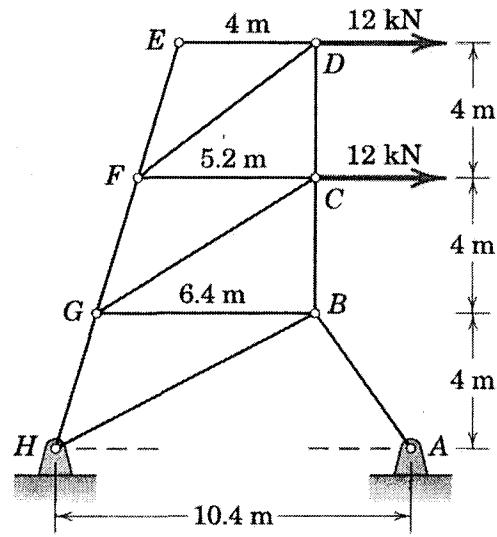
1. Draw the shear and bending moment diagrams for the beam loaded as shown, and indicate values at all 'critical' points. Assuming the beam is made of wood having a failure stress of 30 MPa, determine the dimensions of the beam cross-section, if the width of the beam is twice its depth. The lumberyard can saw-cut timber in multiples of 20 mm only. The load factor for wood in bending is 2.0. Is this beam used, in your opinion, efficiently?



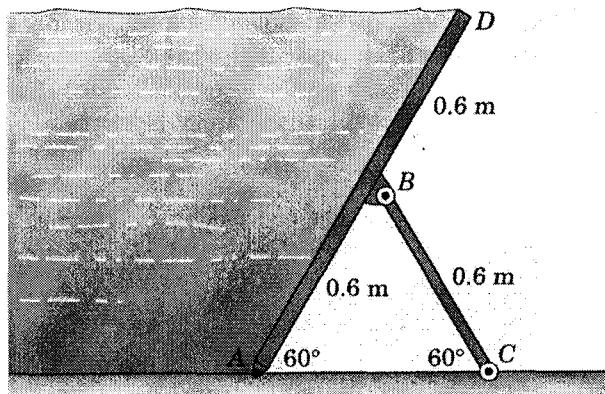
2. The pin at *B* is attached to member *ABCD* and can slide along a slot cut in member *BE*. If all connections are frictionless, determine the couple *M* required to hold the system in equilibrium.



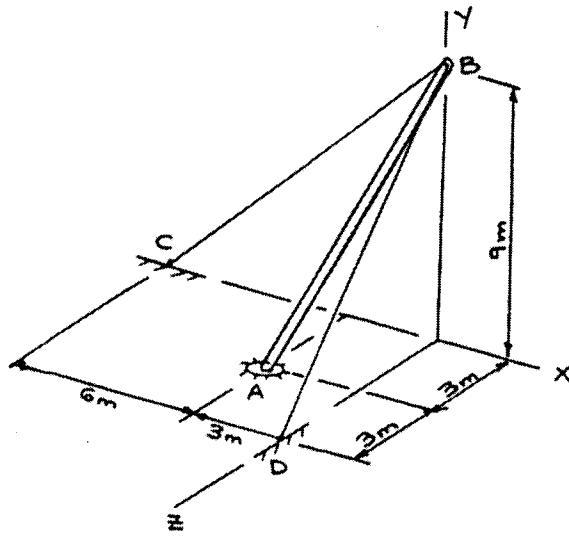
3. For the truss below, calculate the forces in members CF and CG , and indicate the zero-force members, if any. Determine the required size for member CG , if it has to be made of square solid steel bar, from material that is available in 2 mm increments. Also, determine the elongation of member CG . The modulus of elasticity for steel is 200,000 MPa, the yield stress is 300 MPa and the load factor for members under axial load is 3.0.



4. A 3-m wide (normal to the plane of the paper) fresh-water channel is retained at its end by a rectangular barrier, ABD , shown in section. Supporting struts BC are spaced every 0.6 m along the 3-m width. Determine the compression force in each strut.



5. Member AB is supported by a ball-and-socket at A and by two cables connected to it at B . Determine the total weight of member AB given that the tension in cable BD is 24 kN.



NAME: _____

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