UNIVERSITY OF TORONTO
Faculty of Applied Science and Engineering

FINAL EXAMINATION, DECEMBER 12, 2009
First Year - Programs 1,2,3,4,6,7, 8 and 9

CIV 100F - MECHANICS
Examiner: Staff in Civil Engineering

FAMILY NAME: _____ GIVEN NAMES: _____

(Please **print clearly**)

STUDENT NUMBER: _____

CIRCLE THE NAME OF YOUR LECTURER AND YOUR GROUP LETTER

A	**Kuhn**, Eva	D	**Sinnathurai**, Vijay	G	**Johnson**, David
B	**Zhang**, Jinyue	E	**El-Diraby**, Tamer	H	**Seica**, Michael
C	**Grasselli**, Giovanni	F	**Kamaleddine**, Fouad	J	**Gauvreau**, Paul

CIRCLE MODEL NUMBER OF CALCULATOR

CASIO 260   SHARP 520   TI 30

NOTES:

1. Be sure you have all 7 sheets of this examination paper. Page 7 is blank. If you need more space for a question please use the back of the preceding question. In all cases indicate clearly where your calculations are continued.

2. Answer all 5 (five) equal-valued questions.

3. No other paper will be accepted for marking nor allowed on the desk.

4. The permissible calculators are listed above.

DO NOT WRITE IN THIS SPACE.

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

Name_____

1. The horizontal, homogeneous platform ABCDE of uniform thickness, weighs 1500 kN. The platform is
    supported by the cable CF, a ball and socket at A and by a connection at B that provides support in the x
    and y direction only.
    Determine the force in the cable and the reaction components at B.

Top View of Platform
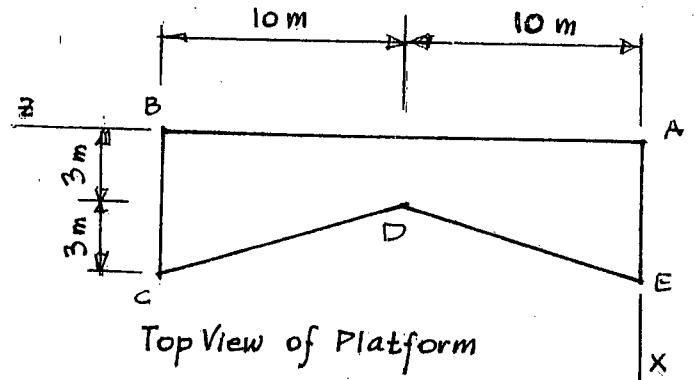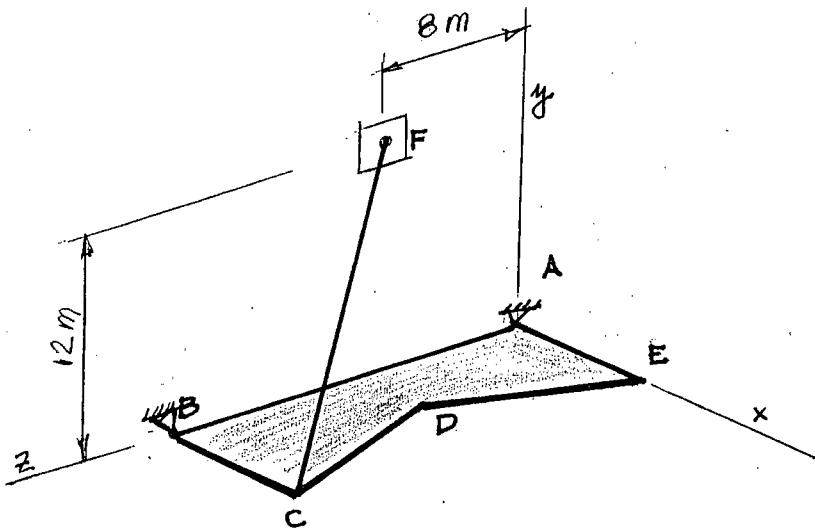
2. The pin connected frame is supported by the cable AG and by a pin at C and F. Neglecting the weight of all members determine the force in cable AG and force components at B and C. Show your final answer on a **new** free body diagram sketch of ABC .
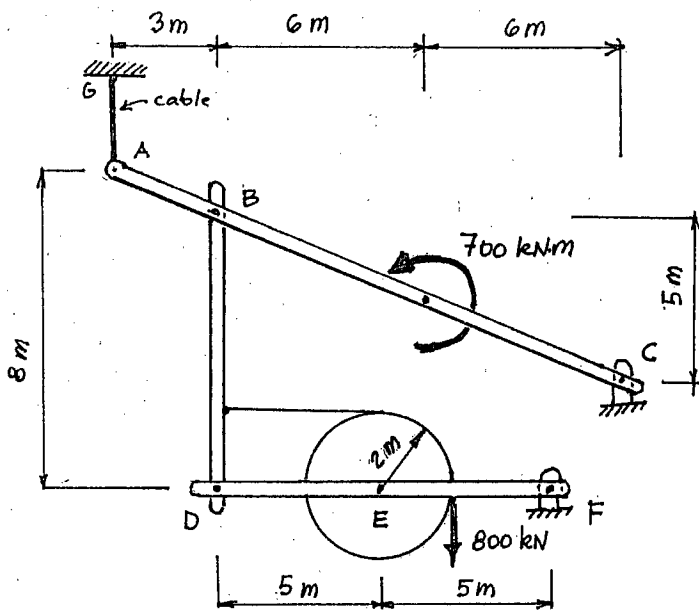
3. The steel truss below is supported by a pin at A and a roller at B. For the given truss determine:
    a. The forces in members DK, JK and EF.
    b. Assuming that the force in member KL is 175 kN in tension calculate the minimum overall width b
        for member KL knowing that the cross section is a hollow square as shown. The maximum yield
        stress for steel is 300 MPa.
    c. Calculate the elongation of member KL if the modulus of elasticity (Young's modulus)
   is 200 000 MPa.
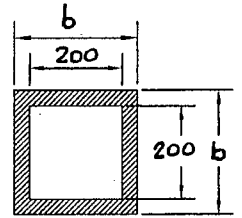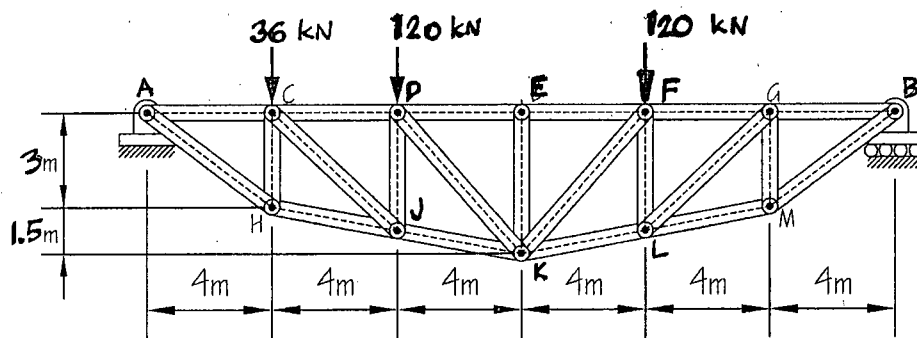
Cross Section Dimensions
are in millimeters

4. The given I-beam shown below is supported by a fixed connection (built in) at A, internal pin at B and a roller at D.

For the given loading:
   a. Draw neatly the shear and bending moment diagrams in the space provided below the given beam.
   b. If the maximum allowable (yield) stress of the material is 300 MPa determine if the beam is adequate for the loads shown.

30 kN/m   80 kN   80 kN

A   B   C   D   E

6m   3m   3m   3m

200   20

20   160

200   20
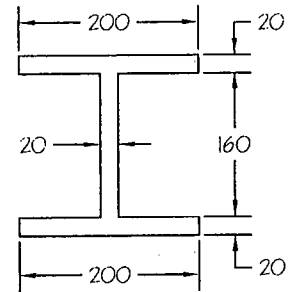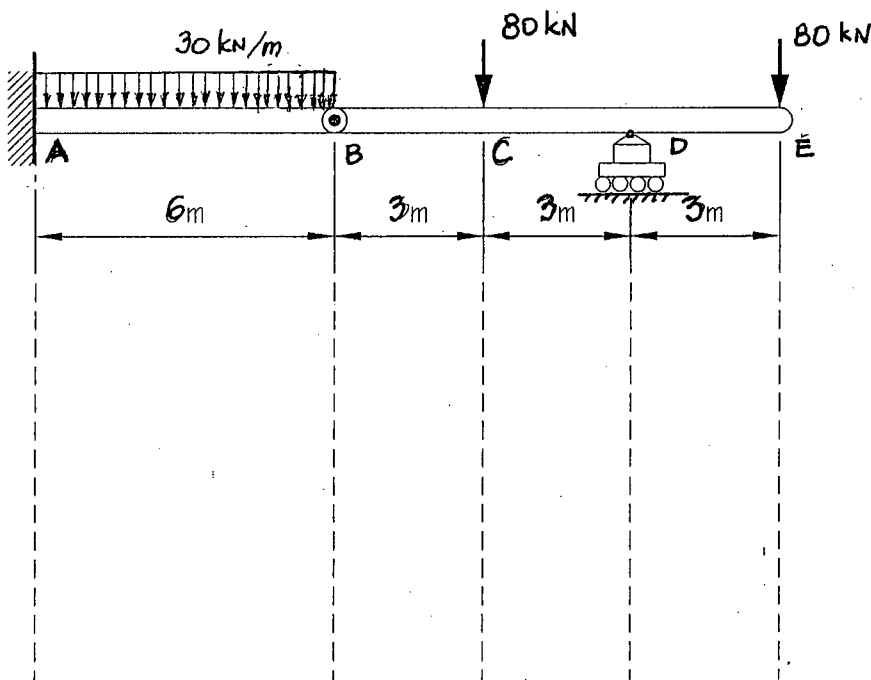
Cross Section dimensions
are in millimeters

5. The gate ABCD retains water as shown. The gate is 6 m wide (perpendicular to the page). The gate is supported by a roller at D and a pin at A.
   Neglecting the weight of the gate determine the reactions at A and D.

Name_____