FE/EIT
Sample Examinations

Second Edition
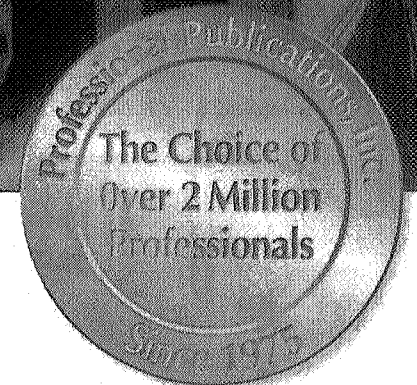
Michael R. Lindeburg, PE

per year,   ~~~~~y years will the ma-
chine pay ~~ ~~~~~ if compounding is considered? The
effective annual interest rate is 6%.

    (A) 5.2 years
    (B) 6.1 years
    (C) 7 years
    (D) 8 years

59. Funds are deposited in a savings account at an in-
terest rate of 8% per annum. If the interest is com-
pounded semi-annually, what is most nearly the ini-
tial amount that must be deposited to yield a total of
$10,000 in 10 years?

    (A) $4530
    (B) $4560
    (C) $6730
    (D) $8200

60. $500 is deposited into a bank savings account with
6% interest compounded annually. Most nearly how
much is in the account at the end of three years?

    (A) $550
    (B) $600
    (C) $650
    (D) $700

61. At the end of each year for five years, $500 is de-
posited into a credit union account. The credit union
pays 5% interest compounded annually. At the end of
five years (immediately following the fifth deposit) most
nearly how much will be in the account?

    (A) $640
   (B) $1750
    (C) $2760
    (D) $3550

62. On January 1, $5000 is deposited into a high-
interest savings account that pays 8% interest com-
pounded annually. If all of the money is withdrawn
in five equal end-of-year sums beginning December 31
of the first year, most nearly how much will each with-
drawal be?

    (A) $1008
    (B) $1150
    (C) $1210
    (D) $1250

63. If you needed to have $800 in savings at the end of
four years and your savings account yielded 5% interest
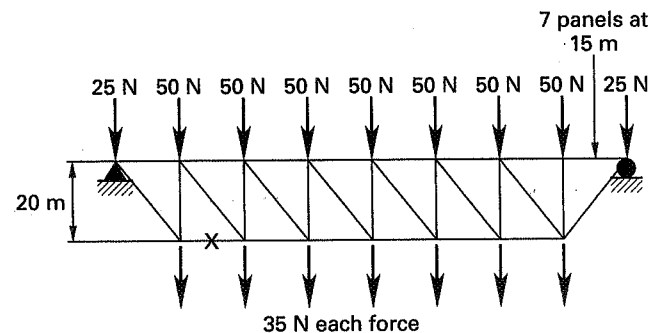paid annually, most nearly how much would you need
to deposit today?

    (A) $570
    (B) $600
    (C) $660
    (D) $770

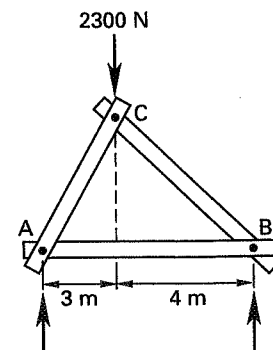**64.** What is most nearly the reaction at A?
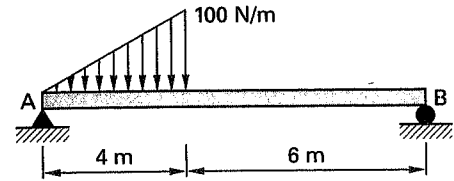
    (A) 50 N
    (B) 100 N
    (C) 130 N
    (D) 150 N

65. Find the magnitude of the force in the member
marked with an "X." All members are pin-connected.
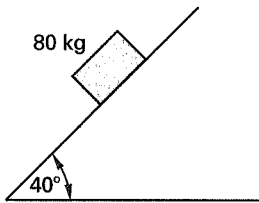

    (A) 9.70 N
    (B) 27.3 N
    (C) 85.0 N
    (D) 223 N

66. The approximate vertical force component in mem-
ber BC is

(A) 990 N
(B) 1300 N
(C) 2300 N
(D) 3600 N

67. What is most nearly the frictional force between the 80 kg block and the ramp? The coefficient of static friction is 0.2, and the coefficient of dynamic friction is 0.15.
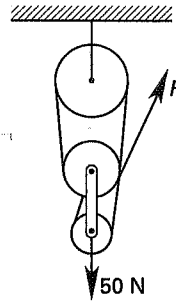

(A) 60 N
(B) 80 N
(C) 90 N
(D) 120 N

68. Force F is gradually increased until the 20 kg block begins moving to the right. The 5 kg block is prevented from moving by a cord. What is most nearly the minimum force F for which movement is possible?
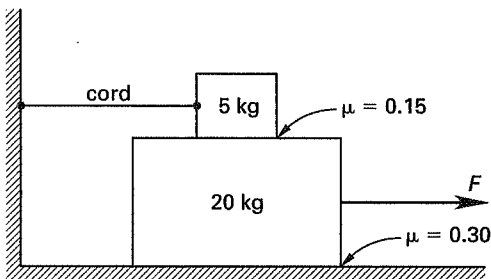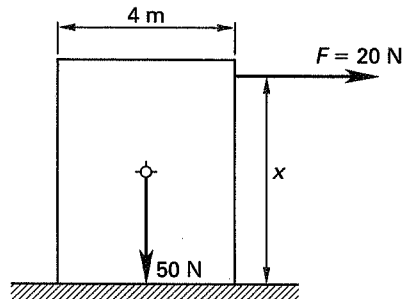

(A) 7.4 N
(B) 59 N
(C) 74 N
(D) 81 N

69. Most nearly, what force, F, is required to lift a 50 N load? All pulleys are frictionless. Assume all strands are parallel.
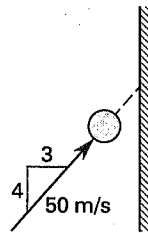

(A) 8.3 N
(B) 13 N
(C) 17 N
(D) 25 N

70. What is most nearly the maximum value of x such that F can be applied without tipping the block? ($\mu = 0.4$.)

(A) 1.5 m
(B) 3.5 m
(C) 4.4 m
(D) 5.0 m

71. What is most nearly the component of velocity perpendicular to the wall after impact if the coefficient of restitution is 0.8?

(A) 24 m/s
(B) 30 m/s
(C) 32 m/s
(D) 40 m/s

72. The velocity of a particle at time t is

$$v(t) = 12t^4 + \frac{7}{t}$$

Most nearly, what total distance is traveled between $t = 0.2$ and $t = 0.3$?

(A) 0.98
(B) 1.8
(C) 2.8
(D) 8.4

73. A spring has a spring constant of 10 N/cm. It is compressed 5 cm. The spring is released and pushes against a free projectile with a mass of 1 kg. The projectile velocity immediately after losing contact with the spring is most nearly

(A) 0.32 m/s
(B) 1.6 m/s
(C) 32 m/s
(D) 50 m/s

74. A rocket is moving through a vacuum. It changes its velocity from 9020 m/s to 5100 m/s in 48 s. The power required to accomplish this if the rocket's mass is 213 000 kg is most nearly

(A) 34 GW
(B) 120 GW
(C) 170 GW
(D) 250 GW

75. A projectile is launched at 52 degrees from horizontal with an initial velocity of 3600 m/s. If the mass of the projectile is 32 kg, what is most nearly the total kinetic and potential energy possessed by the projectile at $t = 13$ s? Neglect all forms of friction.

(A) 5.9 kJ
(B) 0.58 MJ
(C) 210 MJ
(D) 420 MJ

Problems 76 and 77 are based on the following statement.

A 30 cm long rod ($E = 3 \times 10^7$ N/cm^2, $\alpha = 6 \times 10^{-6}$ cm/cm·°C) with a 2 cm^2 cross section is fixed at both ends.

76. If the rod is heated to 60°C above the neutral temperature, what is most nearly the stress?

(A) 110 N/cm^2
(B) 11 000 N/cm^2
(C) 36 000 N/cm^2
(D) 57 000 N/cm^2

**77.** If one end of the rod is free to expand the elongation is most nearly

(A) 5.4×10^{-4} cm
(B) 3.6×10^{-4} cm
(C) 0.01 cm
(D) 0.03 cm

78. Vickers, Knoop, and Brinell are all names of
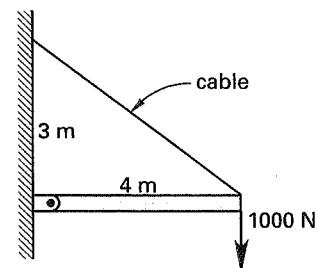
(A) Nobel prize winners in metallurgy
(B) thermodynamic constants
(C) hardness tests
(D) chi-squared statistics

79. What is the maximum flexural stress at a distance x from the free end of a cantilever beam supporting a tip load, P?
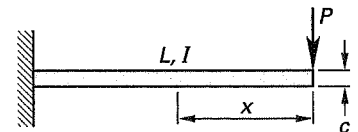
(A) $\dfrac{Pxc}{2I}$

(B) $\dfrac{Pc}{2I}$

(C) $\dfrac{PcL}{2I}$

(D) $\dfrac{Pxc}{2EI}$

80. What is most nearly the elongation in the cable if $F = 1000$ N? The cable's effective cross-sectional area is 2 cm^2. Its modulus of elasticity is 1.5×10^6 N/cm^2.

(A) 0.0028 cm
(B) 0.14 cm
(C) 0.28 cm
(D) 0.56 cm