

16.5



Given: $\mu_s = 0.80$
Find: (a) Assume
(a) Four-wheel drive
(b) Rear-wheel drive
(c) Front-wheel drive

(a) Four-wheel drive:

$$+ \uparrow \Sigma F_y = 0: N_A + N_B - W = 0 \quad N_A + N_B = W = mg$$

Then: $F_A + F_B = \mu_s N_A + \mu_s N_B = \mu_s (N_A + N_B) = \mu_s W = 0.80 mg$

$$+ \rightarrow \Sigma F_x = \Sigma (F_x)_{\text{eff}}: F_A + F_B = ma$$

$$0.80 mg = ma$$

$$a = 0.80g = 0.80(32.2 \text{ ft/s}^2) \quad a = 25.8 \text{ ft/s}^2 \rightarrow$$

(b) Rear-wheel drive:

$$+ \rightarrow \Sigma M_G = \Sigma (M_G)_{\text{eff}}: (50 \text{ in})W - (100 \text{ in})N_B = -(20 \text{ in})ma$$

$$N_B = 0.4W + 0.2ma$$

Then: $F_B = \mu_s N_B = 0.80(0.4W + 0.2ma) = 0.32mg + 0.16ma$

$$+ \rightarrow \Sigma F_x = \Sigma (F_x)_{\text{eff}}: F_B = ma$$

$$0.32mg + 0.16ma = ma$$

$$0.32g = 0.84a$$

$$a = \frac{0.32}{0.84}(32.2 \text{ ft/s}^2) \quad a = 12.27 \text{ ft/s}^2 \rightarrow$$

(c) Front-wheel drive:

$$+ \rightarrow \Sigma M_B = \Sigma (M_B)_{\text{eff}}: (100 \text{ in})N_A - (50 \text{ in})W = -(20 \text{ in})ma$$

$$N_A = 0.6W - 0.2ma$$

Then: $F_A = \mu_s N_A = 0.80(0.6W - 0.2ma) = 0.48mg - 0.16ma$

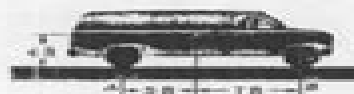
$$+ \rightarrow \Sigma F_x = \Sigma (F_x)_{\text{eff}}: F_A = ma$$

$$0.48mg - 0.16ma = ma$$

$$0.48g = 1.16a$$

$$a = \frac{0.48}{1.16}(32.2 \text{ ft/s}^2) \quad a = 13.32 \text{ ft/s}^2 \rightarrow$$

16.6



Given: $v_0 = 30 \text{ ft/s}$
From Sample Problem 16.1
 $\mu_s = 0.677$
Find: Distance required to stop if
(a) Rear-wheel brake fail to operate
(b) Front-wheel brake fail to operate

(a) If rear-wheel brake fail to operate

$$+ \rightarrow \Sigma M_A = \Sigma (M_A)_{\text{eff}}: N_B(50 \text{ in}) - W(50 \text{ in}) = -ma(4 \text{ ft})$$

$$N_B = \frac{5}{12}W + \frac{1}{3}ma$$

$$+ \rightarrow \Sigma F_x = \Sigma (F_x)_{\text{eff}}: F_A = -ma$$

$$\mu_s N_B = \frac{W}{3}a$$

$$0.677\left(\frac{5}{12}W + \frac{1}{3}ma\right) = \frac{W}{3}a$$

$$a = \frac{0.677\left(\frac{5}{12}\right)(32.2 \text{ ft/s}^2)}{1 - 0.223} \quad a = 12.27 \text{ ft/s}^2 \rightarrow$$

UNIFORMLY ACCELERATED MOTION

$$v^2 = v_0^2 + 2ax \quad 0 = (30 \text{ ft/s})^2 - 2(12.27 \text{ ft/s}^2)x$$

$$x = 36.9 \text{ ft}$$

(b) If front-wheel brake fail to operate

$$+ \rightarrow \Sigma M_B = \Sigma (M_B)_{\text{eff}}: W(50 \text{ in}) - N_A(50 \text{ in}) = -ma(4 \text{ ft})$$

$$N_A = \frac{3}{12}W - \frac{1}{3}ma$$

$$+ \rightarrow \Sigma F_x = \Sigma (F_x)_{\text{eff}}: F_B = -ma$$

$$\mu_s N_A = \frac{W}{3}a$$

$$0.677\left(\frac{3}{12}W - \frac{1}{3}ma\right) = \frac{W}{3}a$$

$$a = \frac{0.677\left(\frac{3}{12}\right)(32.2 \text{ ft/s}^2)}{1 + 0.223} \quad a = 10.648 \text{ ft/s}^2 \rightarrow$$

UNIFORMLY ACCELERATED MOTION

$$v^2 = v_0^2 + 2ax \quad 0 = (30 \text{ ft/s})^2 - 2(10.648 \text{ ft/s}^2)x$$

$$x = 42.3 \text{ ft}$$

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Vector Mechanics for Engineers Ferdinand Pierre Beer, Elwood Russell Johnston, 1962 **700 Solved Problems In Vector Mechanics for Engineers: Dynamics** Joseph F. Shelley, 1991-04 Suitable for 2nd year college and university engineering students this book provides them with a source of problems with solutions in vector mechanics that covers various aspects of the basic course It offers the comprehensive solved problem reference in the subject It also provides the student with the problem solving drill *Applied Mechanics With Solidworks* Godfrey C Onwubolu, 2014-12-23 Applied Mechanics with SolidWorks aims to assist students designers engineers and professionals interested in using SolidWorks to solve practical engineering mechanics problems It utilizes CAD software SolidWorks based to teach applied mechanics SolidWorks here is presented as an alternative tool for solving statics and dynamics problems in applied mechanics courses Readers can follow the steps described in each chapter to model parts and analyze them A significant number of pictorial descriptions have been included to guide users through each stage making it easy for readers to work through the text on their own Instructional support videos showing the motions and results of the dynamical systems being analyzed and SolidWorks files for all problems solved are available to lecturers and instructors for free download **Engineering Mechanics, Statics and Dynamics** Joseph F. Shelley, 1980 **Smart Modelling for Engineering Systems** Margarita N. Favorskaya, Alena V. Favorskaya, Igor B. Petrov, Lakhmi C. Jain, 2021-01-30 This book is a collection of research papers selected for presentation at the International Conference on Smart Computational Methods in Continuum Mechanics 2021 organized by Moscow Institute of Physics and Technology and the Institute for Computer Aided Design of Russian Academy of Sciences The work is presented in two volumes The primary objective of the book is to report the state of the art on smart computational paradigms in continuum mechanics and explore the use of artificial intelligence paradigms such as neural nets and machine learning for improving the performance of the designed engineering systems The book includes up to date smart computational methods which are used to solve problems in continuum mechanics engineering seismic prospecting non destructive testing and so on The main features of the book are the research papers on the application of novel smart methods including neural nets and machine learning computational algorithms smart software systems and high performance computer systems for solving complex engineering problems The case studies pertaining to the real world applications in the above fields are included The book presents a collection of best research papers in English language from some of the world leaders in the field of smart system modelling and design of engineering systems *Engineering Mechanics* R. C. Hibbeler, 1995 *Engineering Mechanics--statics and Dynamics* R. C. Hibbeler, 1995 This best selling book offers a concise and thorough presentation of engineering mechanics theory and application The material is reinforced with numerous examples to illustrate principles and imaginative well illustrated problems of varying degrees of difficulty The book is committed to developing its users problem solving skills and includes pedagogical features that have made Hibbeler

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Technical Abstract Bulletin Defense Documentation Center (U.S.),1963-05

Boundary Element Methods for Soil-Structure Interaction W.S. Hall,G. Oliveto,2007-05-08 W S HALL School of Computing and Mathematics University of Teesside

Middlesbrough TS1 3BA UK G OLIVETO Division of Structural Engineering Department of Civil and Environmental Engineering University of Catania Viale A Doria 6 95125 Catania Italy Soil Structure Interaction is a challenging

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