Chapter I
Selected Solutions

3. *REASONING AND SOLUTION*

a. 1 minute = 60 seconds, 1 hour = 3600 seconds.
(35 minutes) [60 seconds/(1 minute)] = 2100 seconds.
Hence, 1 hour 35 minutes = 3600 seconds + 2100 seconds = **5700 s**

b. 1 day = 24 hours, 1 hour = 3600 s
1 day = (24 hours) [3600 seconds/(1 hour)] = **86 400 s**

7. *REASONING AND SOLUTION*

a. $F = [M][L]/[T]^2$; $ma = [M][L]/[T]^2 = [M][L]/[T]^2$ so $F = ma$ **is dimensionally correct**.

b. $x = [L]$; $at^3 = ([L]/[T]^2)[T]^3 = [L][T]$ so $x = (1/2)at^3$ **is *not* dimensionally correct**.

c. $E = [M][L]^2/[T]^2$; $mv = [M][L]/[T]$ so $E = (1/2)mv$ **is *not* dimensionally correct**.

d. $E = [M][L]^2/[T]^2$; $max = [M]([L]/[T]^2)[L] = [M][L]^2/[T]^2$ so $E = max$
is dimensionally correct.

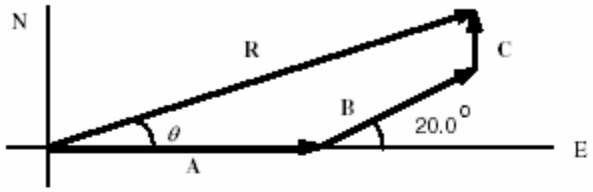
e. $v = [L]/[T]$; $(Fx/m)^{1/2} = \{([M][L]/[T]^2)([L]/[M])\}^{1/2} = \{[L]^2/[T]^2\}^{1/2} = [L]/[T]$ so
$v = (Fx/m)^{1/2}$ **is dimensionally correct**.

33. *REASONING AND SOLUTION* The east and north components are, respectively

a. $A_e = A\cos\theta = (155\text{ km})\cos 18.0^\circ =$ **147 km**

b. $A_n = A\sin\theta = (155\text{ km})\sin 18.0^\circ =$ **47.9 km**

41. SSM *REASONING* The individual displacements of the golf ball, **A**, **B**, and **C** are shown in the figure. Their resultant, **R**, is the displacement that would have been needed to "hole the ball" on the very first putt. We will use the component method to find **R**.



SOLUTION The components of each displacement vector are given in the table below.

Vector	*x* **Components**	*y* **Components**
A	(5.0 m) cos 0° = 5.0 m	(5.0 m) sin 0° = 0
B	(2.1 m) cos 20.0° = 2.0 m	(2.1 m) sin 20.0° = 0.72 m
C	(0.50 m) cos 90.0° = 0	(0.50 m) sin 90.0° = 0.50 m
R = **A** + **B** + **C**	7.0 m	1.22 m

The resultant vector **R** has magnitude

$$R = \sqrt{(7.0\text{ m})^2 + (1.22\text{ m})^2} = \boxed{7.1\text{ m}}$$

and the angle θ is

$$\theta = \tan^{-1}\left(\frac{1.22\text{ m}}{7.0\text{ m}}\right) = 9.9^\circ$$

Thus, the required direction is $\boxed{9.9^\circ \text{ north of east}}$.