

CHAPTER 1 Exercises:

1. (1.1) Starting with the definition 1 in. = 2.54 cm, find the number of (a) kilometers in 1.00 mile, and (b) feet in 1.00 km.
2. (1.3) How many nanoseconds does it take light to travel 1.00 ft. in vacuum?
3. (1.7) How many years older will you be 1 Gs (gigasecond) from now?
4. (1.15) A useful and easy to remember approximate value for the number of seconds in a year is $\pi \cdot 10^7$. Determine the percent error from the actual value. (Hint: there are 365.24 days in one year)
5. (1.29) Vector **A** has a y component $A_y = +9.60$ m, and makes an angle of 32° counterclockwise for the +y axis. (a) what is the x-component of **A**? (b) What is the magnitude of **A**?
6. (1.33) A disorientated professor drives 3.25 km north, then 2.20 km west, and then 1.50 km south. Find the magnitude and direction of the resultant displacement, using the method of components.
7. (1.45) What is the angle between vector **A** = $-2\mathbf{i} + 6\mathbf{j}$ and **B** = $2\mathbf{i} - 3\mathbf{j}$?
8. (1.51) In January 2006, astronomers reported the discovery of planet having a mass about 5.5 times greater than the earth's mass. It is believed to consist of a mixture of rock and ice, similar to Neptune, which has a density of 1.76 g/cm^3 . What is its radius expressed in (a) kilometers, and (b) as a multiple of earth's radius? (Noted: $M_e = 5.97 \cdot 10^{24} \text{ kg}$ and $R_e = 6.37 \cdot 10^6 \text{ m}$)
9. (1.61) A cave diver follows a passage 180 m straight west, then 210 m in a direction 45° east of south, and the 280 m at 30° east of north. After the fourth displacement, she finds herself back where she started. Use the method of components to determine the magnitude and direction of the fourth displacement.
10. (1.65) You leave College Station airport and fly 23 km in a direction 34° south of east. You then fly 46 km due north. How far and in what direction must you fly to reach a private landing strip that is 32 km due west of the College Station airport?
11. (1.69) You are lost at night in a large open field. Your GPS tells you that you are 122 m from your truck, in a direction 58° east of south. You walk 72 m due west along a ditch. How much farther, and in what direction, must you walk to reach your truck?
12. (1.75) A dog in an open field runs 12 m east and then 28 m in a direction 50° west of north. In what direction and how must the then run to end up 10 m south of her original starting point?