

MAH Unit 9- WS 2

Applications of Equations

For #1-6, define your variables and set up an equation/ equations to solve. You do not need to solve.

- 1) A rectangle has a perimeter of 45 centimeters and an area of 112.5 square centimeters. What are its dimensions?
- 2) A triangle has an area of 96 square inches, and its height is two-thirds of its base. What are the base and height of the triangle?
- 3) A worker gets an 8% pay raise and now makes \$1600 per month. What was the worker's old salary?
- 4) A merchant has 5 pounds of mixed nuts that cost \$30. He wants to add peanuts that cost \$1.50 per pound and cashews that cost \$4.50 per pound to obtain 50 pounds of a mixture that costs \$2.90 per pound. How many pounds of peanuts are needed?
- 5) The diameter of a circle is 16 cm. By what amount must the radius be decreased in order to decrease the area by 48π square centimeters?
- 6) A corner lot has dimensions 25 by 40 yards. The city plans to take a strip of uniform width along the two sides bordering the streets in order to widen these roads. How wide should the strip be if the remainder of the lot is to have an area of 844 square yards?
- 7) A 13 foot long ladder leans on a wall. The bottom of the ladder is 5 feet from the wall. If the bottom is pulled out 3 feet farther from the wall, how far does the top of the ladder move down the wall?
- 8) Find a real number that exceeds its cube by 2.
- 9) The dimensions of a rectangular box are consecutive integers. If the box has a volume of 13, 800 cubic centimeters, what are its dimensions?
- 10) A factory that makes can openers has fixed costs for building, fixtures, machinery, etc. of \$26, 000. The variable cost for material and labor for making one can opener is \$2.75.
 - a) What is the total cost of making 1000 can openers? 20, 000? 40, 000?
 - b) What is the average cost per can opener in each case?

In #11-13, an object is thrown upward, dropped, or thrown downward and travels in a vertical line subject only to gravity with wind resistance ignored. The height h , in feet, of the object above the ground after t seconds is given by

$$h = -16t^2 + v_0 t + h_0$$

where h_0 is the initial height of the object at starting time $t=0$, and v_0 is the initial velocity (speed) of the object at time $t=0$. The value v_0 is taken as positive if the object starts moving upward at time $t=0$ and negative if the object starts moving downward at $t=0$. An object that is dropped (rather than thrown downward) has initial velocity $v_0 = 0$.

- 11) How long does it take an object to reach the ground in each case?
 - a) It is dropped from the top of a building that is 640 feet tall.
 - b) It is thrown downward from the top of the same building, with an initial velocity of 52 feet per second.
- 12) You are standing on a cliff 200 feet high. How long will it take a rock to reach the ground at the bottom of the cliff in each case?
 - a) You drop it.
 - b) You throw it downward at an initial velocity of 40 feet per second.
 - c) How far does the rock fall in 2 seconds if you throw it downward with an initial velocity of 40 feet per second.
- 13) A rocket is fired straight up from the ground level with an initial velocity of 800 feet per second.
 - a) How long does it take the rocket to rise 3200 feet?
 - b) When will the rocket hit the ground?