



Name _____ Date _____ Period _____

APPLYING RADICAL FUNCTIONS WORKSHEET

- 1) At an amusement park a ride called the *rotor* is a cylindrical room that spins around. The riders stand against the circular wall. When the rotor reaches the necessary speed, the floor drops out and the centrifugal force keeps the riders pinned to the wall. The model that gives the speed s (in meters per second) necessary to keep a person pinned to the wall is $s = 4.95\sqrt{r}$ where r is the radius (in meters) of the rotor. Estimate the radius of a rotor that spins at a speed of 8 meters per second.
- 2) Biologists have discovered that the shoulder height h (in centimeters) of a male African elephant can be modeled by $h = 62.5\sqrt[3]{t} + 75.8$ where t is the age (in years) of the elephant. Solve the equation for t and estimate the age of an elephant whose shoulder height is 200 centimeters.
- 3) The fetch f (in nautical miles) of the wind at sea is the distance over which the wind is blowing. The minimum fetch required to create a fully developed storm can be modeled by $s = 3.1\sqrt[3]{f + 10} + 11.1$ where s is the speed (in knots) of the wind. Then determine the minimum fetch required to create a fully developed storm if the wind speed is 25 knots.
- 4) The formula $S = 2\pi\sqrt{\frac{L}{32}}$ represents the swing of a pendulum. S is the time in seconds to swing back and forth, and L is the length of the pendulum in feet. Solve the formula for L and find the length of a pendulum that makes one swing in 2.5 seconds.
- 5) The speed that a tsunami (tidal wave) can travel is modeled by the equation $S = 356\sqrt{d}$ where S is the speed in kilometers per hour and d is the average depth of the water in kilometers. Solve the equation for d and find the average depth of the water for a tsunami found to be traveling at 120 kilometers per hour.

- 6) Isaac Newton established the formula $V_{esc} = \sqrt{\frac{2GM}{R}}$ to calculate the escape velocity from a planet or star.
- V_{esc} is the escape velocity
 - G is the Gravitational Constant
 - M is the mass of the planet or star
 - R is the radius of the planet or star
- Solve the equation for the radius of the planet or star.
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- 7) The formula $\bar{V} = \sqrt{\frac{3kT}{m}}$ calculates average velocity of a molecule, atom or ion in a gas at a given temperature.
- \bar{V} is the average velocity of the particles
 - k is the Boltzmann Constant
 - T is the temperature of the gas
 - m is the mass of the particle
- Solve the equation for the Boltzmann Constant.
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- 8) Before determining the dosage of a drug to give to a patient, doctors will sometimes calculate the patient's Body Surface Area (or BSA). One way to determine a person's BSA is to use the following formula: $BSA = \sqrt{\frac{wh}{3600}}$ where w = weight in pounds, h = height in centimeters and BSA is measured in square meters. Gustav weighs 160 pounds and has a BSA of about $2\sqrt{2}m^2$. How tall is he (in cm)?
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- 9) The distance, d , in miles that a person can see to the horizon can be modeled by the formula $d = \sqrt{\frac{3h}{2}}$ where h is the person's height above sea level in feet. To the nearest tenth of a mile, how far to the horizon can a person see if they are 100 feet above sea level?
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- 10) The surface area of a cube in terms of its volume is $A = 6V^{\frac{2}{3}}$. Solve the formula for V and find the volume of a cube with a surface area of 12 square feet.