Name $\qquad$ Period $\qquad$ Date $\qquad$

## Math 2: Variations

## Write the formula for each variation. Solve.

1. If $y$ varies directly as the square of $x$ and $y=6$ when $x=4$, then find $y$ when $x=8$.
2. If $y$ varies jointly as $x$ and $z$ and $y=90$ when $x=2$ and $z=5$. Find $y$ when $x=108$ and $z=1 / 4$.
3. If $y$ varies directly as $x$ and inversely as $z$ and $y=8$ when $x=80$ and $z=5$, find $y$ when $x=20$ and $z=8$.
4. If $y$ varies inversely as the cube of $x$ and $y=5$ when $x=4$, find $y$ when $x=2$.
5. If $y$ varies directly as $x$ and inversely as $z$ and $y=8$ when $x=56$ and $z=21$, find $y$ when $x=35$ and $z=5$.
6. The distance between two points measured on a map varies directly with the actual distance. If 1 cm represents 12 km , how many kilometers are represented by 5 cm .
7. When a bicycle is being pedaled in a certain gear, it travels 10 m for every 4 revolutions. If the number of meters traveled varies directly with the number of revolutions, how far will a bicycle travel if the pedal makes 200 revolutions?
8. The electrical resistance $R$ of a wire varies directly as the length / of the wire and inversely as the square of the diameter $d$. If 20 m of wire with a diameter of 1.5 mm has a resistance of 12 ohms, what is the resistance of 20 m of the same type of wire if the diameter is increased to 2 mm ?
9. The luminance expressed in lux (Ix) of an electric bulb above a flat surface is inversely proportional to the square of the distance to the surface. If the luminance is 4.5 lx when the bulb is 4 m from the surface, what is the luminance when the bulb is 3 m from the surface?
10. A concrete supplier has determined that the area an amount of concrete will cover is inversely proportional to the depth of the concrete. For a depth of 1 ft , the supplier will cover an area of 300 $\mathrm{ft}^{2}$. Find the depth when the supplier needs to cover $900 \mathrm{ft}^{2}$.
11. The volume of a cone varies jointly as its height and the square of its base radius. A cone of base radius measuring 5 cm , height measuring 5 cm and the volume measuring $15 \pi$. In terms of $\pi$, find the volume when the base radius remains the same and the height changes to 10 cm .
12. According to Newton's Law of Universal Gravitation, the weight of an object is inversely proportional to the square of its distance from the center of the Earth. The Earth has a radius of 22,000 miles. If an astronaut weighs 135 pounds on Earth, what is her weight when she is 6,000 miles above the Earth's surface?
13. The distance a bolt of lightning if from you varies directly as the number of seconds that you count after you hear the thunder. Suppose you count 10 seconds when the lightning is 2 miles away from you. How long would you count if the lightning were 15 miles away from you?
14. The time required for a team of road workers to dig a ditch is directly proportional to the length of the ditch and inversely proportional to the number of people digging. It takes 10 workers 5 hours to dig a 100 -yard ditch. How many hours would it take 20 workers to dig a 1700-yard ditch?
