Direct and Inverse Variation Word Problems

Determine whether each situation is an example of a direct variation or inverse variation. Write and equations of variation to represent the situation and solve for the indicated information.

1) The volume $V$ of a gas kept at a constant temperature varies inversely with the pressure $p$. If the pressure is 24 pounds per square inch, the volume is 15 cubic feet. What will the volume be when the pressure is 30 pounds per square inch?

2) The amount of money spent at the gas station varies directly with the number of gallons purchased. When 11.5 gallons of gas were purchased the cost was $37.72. How much would 8 gallons of gas cost?

3) The time to complete a project varies inversely with the number of employees. If 3 people can complete the project in 7 days, how long will it take 5 people?

4) The time needed to travel a certain distance varies inversely with the rate of speed. If it take 8 hours to travel a certain distance at 36 miles per hour, how long will it take to travel the same distance at 60 miles per hour?

5) The number of centimeters $y$ in a linear measurement varies directly with the number of inches $x$ in the measurement. Pablo's height is 152.4 centimeters or 60 inches. What is Maria's height in centimeters if she is 64 inches tall?

6) The number of revolutions made by a tire traveling over a fixed distance varies inversely with the radius of the tire. A 12-inch radius tire makes 100 revolutions to travel a certain distance. How many revolutions would a 16-inch radius tire require to travel the same distance?

7) Karen earns $28.50 for working 6 hours. If the amount $m$ she earns varies with $h$ the number of hours she works, how much will she earn for working 10 hours?

8) A bottle of 150 vitamins costs $5.25. If the cost varies directly with the number of vitamins in the bottle, what should a bottle of 250 vitamins cost?

9) For a fixed number of miles, the gas mileage of a car (miles/gallon) varies inversely with the number of gallons. Stephen's truck averaged 24 miles per gallon and used 750 gallons of gas in one year. If the next year, to drive the same number of miles, Stephen drove a compact car averaging 39 miles per gallon, how many gallons of gas would he use?

10) Wei received $55.35 in interest on a $1230 in her bank account. If the interest varies directly with the amount deposited, how much would Wei receive for the same amount of time if she had $2000 in her account?
11) The number of gallons \( g \) of fuel used on a trip varies directly with the number of miles \( m \) traveled. If a trip of 270 miles required 12 gallons of fuel, how many gallons are required for a trip of 400 miles?

12) The time it takes to travel a fixed distance varies inversely with the speed traveled. If it takes Pam 40 minutes to bike to her fishing spot at 9 miles per hour, how long will it take her if she rides at 12 miles per hour?

13) The time needed to paint a fence varies directly with the length of the fence. If it takes 5 hours to paint 200 feet of fence, how long will it take to paint 500 feet of fence?

14) The number of bricks laid varies directly with the amount of time spent. If 45 bricks are laid in 65 minutes, how much time would it take to lay 500 bricks?

15) The time to prepare a field for planting is inversely proportional to the number of people who are working. A large field can be prepared by 5 workers in 24 days. In order to finish the field sooner, the farmer plans to hire additional workers. How many workers are needed to finish the field in 15 days?

16) An egg is dropped from the roof of a building. The distance it falls varies directly with the square of the time it falls. If it takes 0.5 second for the egg to fall 8 feet, how long will it take the egg to fall 200 feet?

17) The number of hours needed to assemble computers varies directly with the number of computers. If 12 computers can be assembled in 9 hours, how many computers can be assembled in 15 hours?

18) The weight of a person varies inversely as the square of the distance from the center of the earth. If the radius of the earth is 4000 miles, how much would a 180 pound person weigh 2000 miles above the surface of the earth?

19) Bob's dentist determined the number of cavities developed in his patient's mouth each year is inversely proportional to the total number of minutes spent brushing during each session. If Bob developed 4 cavities during the year in which he spent only 30 seconds brushing his teeth each time, how many annual cavities will Bob develop if he increases his brushing time to 2 minutes per session?

20) To balance a seesaw, the distance, \( d \) (in feet), a person is from the fulcrum is inversely proportional to his or her weight, \( w \) (in pounds). Roger, who weighs 120 pounds, is sitting 6 feet away from the fulcrum. Eva weighs 108 pounds. How far from the fulcrum must she sit to balance the seesaw?