1.7

1) c varies directly as a

$\frac{c}{a} = k$

3) w varies inversely as x

$wx = k$

5) f varies jointly as x and y

$\frac{f}{xy} = k$

7) h is directly proportional to b

$\frac{h}{b} = k$

9) a is inversely proportional to b

$ab = k$

11) p is jointly proportional to q and r and p = 12 when q = 8 and r = 3

$\frac{p}{qr} = k$

$\frac{12}{(8)(3)} = \frac{12}{24} = \frac{1}{2}$

13) t varies directly as the square of u and t = 6 when u = 3

$\frac{t}{u^2} = k$

$\frac{(6)}{(3)^2} = \frac{6}{9} = \frac{2}{3}$

15) w is inversely proportional to the cube of x and w is 54 when x = 3

$wx^3 = k$

$(54)(3)^3 = 54(27) = 1458$

17) a is jointly proportional with the square of x and the square root of y and a = 25 when x = 5 and y = 9

$\frac{a}{x^2\sqrt{y}} = k$

$\frac{(25)}{(5)^2\sqrt{(9)}} = \frac{25}{25 \cdot 3} = \frac{1}{3}$

19) The electrical current, in amperes, in a circuit varies directly as the voltage. When 15 volts are applied, the current is 5 amperes. What is the current when 18 volts are applied?

$\frac{a}{v} = k$

$\frac{(5)}{15} = \frac{1}{3}$

$(18)\frac{a}{18} = \frac{1}{3}\ (18)$

$a = 6\ amperes$

21) Hooke's law states that the distance that a spring is stretched by hanging object varies directly as the mass of the object. If the distance is 20 cm when the mass is 3 kg, what is the distance when the mass is 5 kg?

$\frac{d}{m} = k$

$\frac{20}{(3)} = \frac{20}{3}$

$\frac{x}{5} = \frac{20}{3}$

$x = \frac{100}{3} = 33.3\ cm.$

23) The number of aluminum cans used each year varies directly as the number of people using the cans. If 250 people use 60,000 cans in one year, how many cans are used each year in Dallas, which has a population of 1,008,000?

$\frac{c}{p} = k$

$\frac{60000}{250} = 250$

$(1{,}000{,}000)\frac{c}{1{,}000{,}000} = 240\ (1{,}000{,}000)$

$c = 241{,}920{,}000\ cans$

25) According to Fidelity Investment Vision Magazine, the average weekly allowance of children varies directly as their grade level. In a recent year, the average allowance of a 9th-grade student was 9.66 dollars per week. What was the average weekly allowance of a 4th-grade student?

$\frac{a}{g} = k$ $\qquad \frac{(9.66)}{(9)} = 1.07$

$(4)\frac{x}{4} = 1.07(4)$

$x = \$4.28$

27) The number of kilograms of water in a human body varies directly as the mass of the body. A 96-kg person contains 64 kg of water. How many kilo grams of water are in a 60-kg person?

$\frac{w}{m} = k$ $\qquad \frac{(64)}{(96)} = \frac{2}{3}$

$(60)\frac{x}{60} = \frac{2}{3}(60)$

$x = 40\ kg$

29) The weight of an object on Mars varies directly as its weight on Earth. A person weighs 95lb on Earth weighs 38 lb on Mars. How much would a 100-lb person weigh on Mars?

$\frac{m}{e} = k$ $\quad \frac{38}{95} = \frac{2}{5}$

$(100)\frac{m}{100} = \frac{2}{5}(100)$

$m = 40\ lbs$

31) The time required to empty a tank varies inversely as the rate of pumping. If a pump can empty a tank in 45 min at the rate of 600 kL/min, how long will it take the pump to empty the same tank at the rate of 1000 kL/min?

$tr = k$ $\quad (45)(600) = 27000$

$\frac{t(1000)}{1000} = \frac{27000}{1000}$

$t = 27\ min$

33) The stopping distance of a car after the brakes have been applied varies directly as the square of the speed r. If a car, traveling 60 mph can stop in 200 ft, how fast can a car go and still stop in 72 ft?

$\frac{d}{r^2} = k$ $\quad \frac{(200)}{(60)^2} = \frac{200}{600} = \frac{1}{18}$

$(r^2)\frac{72}{r^2} = \frac{1}{18}r^2$

$(18)(72) = \frac{r^2}{18}(18)$

$\sqrt{1296} = \sqrt{r^2}$

$36\ mph = r$

35) The intensity of a light from a light bulb varies inversely as the square of the distance from the bulb. Suppose intensity is 90 W/m^2 (watts per square meter) when the distance is 5 m. How much further would it be to a point where the intensity is 40 W/m^2?

$Id^2 = k$ $\quad (90)(5)^2 = k$

$90(25) = 2250$

$\frac{40d^2}{40} = \frac{2250}{40}$

$\sqrt{d^2} = \sqrt{56.25}$

$d = 7.5$

$7.5 - 5 = 2.5\ m\ further$

37) The intensity of a television signal varies inversely as the square of the distance from the transmitter. If the intensity is 25 W/m^2 at a distance of 2 km, how far from the transmitter are you when the intensity is 2.56 W/m^2?

$Id^2 = k$ $\quad (25)(2)^2 = k$

$25(4) = 100$

$\frac{(2.56)d^2}{2.56} = \frac{100}{2.56}$

$\sqrt{d^2} = \sqrt{39.0625}$

$d = 6.25\ m$