



69. The vibration frequency of a string varies as the square root of the tension and inversely as the product of the length and diameter of the string. If the string is 3 feet long and 0.03-inch in diameter vibrates at 720 times per second under 90 pounds tension, at what frequency will a 2 feet long, 0.025-inch string vibrate under 2500 pounds tension.
A. 6210 C. 7514
B. 6830 D. 5645
70. A man travels in a motorized boat at the rate of 12 kph from his barrio to the town and come back to his barrio at the rate of 10 kph. If the total time consumed is 3 hours and 10 minutes, what is distance of the barrio to the town?
A. 15.12 km C. 18.43 km
B. 17.27 km D. 15.92 km
71. A merchant sold 100 bananas. Eighty of them were sold at a profit of 30% while the rest were sold at a loss of 40%. What is the percentage gain or loss on the business?
A. 16% gain C. 16% loss
B. 12% loss D. 12% gain
72. The sum of the squares of two consecutive odd numbers is 130. Find the product of the numbers.
A. 56 C. 63
B. 72 D. 69
73. If 3 is subtracted from the numerator of a certain fraction, the value of the fraction becomes $\frac{3}{5}$. If one is subtracted from the denominator of the same fraction, the value of the fraction becomes $\frac{2}{3}$. Find the original fraction.
A. $\frac{34}{56}$ C. $\frac{38}{56}$
B. $\frac{36}{55}$ D. $\frac{34}{52}$
74. Boyle's law states that at constant temperature, the volume of a gas varies inversely as the pressure to which it is subjected. If volume = 10,000 when pressure = 10 find the pressure when volume = 12,000.
A. 7.53 C. 5.43
B. 6.73 D. 8.33

75. John started running at a speed of 10 kph. Five minutes later, Peter started running in the same direction and catches up with John in 20 minutes. What is the speed of Peter?
A. 17.5 kph C. 15.0 kph
B. 12.5 kph D. 14.2 kph
76. The time required for an elevator to lift a weight varies directly with the weight and the distance through which it is to be lifted and inversely as the power of the motor. If it takes 20 seconds for a 5 hp motor to lift 50 lbs through 40 ft, what weight can an 80 hp motor lift through a distance of 40 ft within 30 seconds?
A. 1000 lbs C. 1500 lbs
B. 1800 lbs D. 1200 lbs
77. A tank is filled through its inlet pipe and then emptied through its outlet pipe in a total of 8 hours. If water enters through its inlet pipe and simultaneously allowed to leave through its outlet pipe, the tank is filled in $7\frac{1}{2}$ hours. How long it will take to fill the tank with the outlet pipe closed?
A. 2 hours C. 4 hours
B. 3 hours D. 2.5 hours
78. Find two consecutive positive even numbers such that the difference of their squares is 76.
A. 18, 20 C. 16, 18
B. 14, 16 D. 20, 22
79. The sum of the digits of a 3-digit number is 14. The hundred's digit being 4 times the unit's digit. If 594 is subtracted from the number, the order of the digits will be reversed. Find the number.
A. 563 C. 842
B. 824 D. 743
80. How many liters of water must be added to 35 liters of 89% hydrochloric acid solution to reduce its strength to 75%?
A. 4.83 C. 6.53
B. 7.33 D. 5.34
81. The cost of labor varies jointly as the number of workers and the number of days they work. If 8 men working 9 days each are paid P 576, in how many days it take 6 men to earn P 624?
A. 13 C. 12
B. 11 D. 10

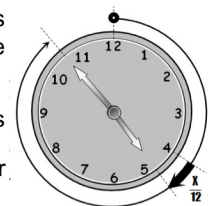
VII. CLOCK PROBLEMS

✓ BASIS OF ANALYSIS:

Let:

x = no. of minute spaces covered by the minute hand.

$\frac{x}{12}$ = no. of minute spaces traveled by the hour hand.



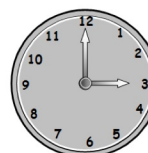
This means that the minute hand travels 12 times faster than the hour hand.

POSITIONS OF THE HANDS OF THE CLOCK AND ANGLE BETWEEN THEM:

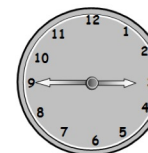
TOGETHER



PERPENDICULAR



OPPOSITE



Hands of the clock:

Together

Separation in degrees and minutes

: 0° or 0 minutes apartPerpendicular : 90° or 15 minutes apartOpposite : 180° or 30 minutes apart

VIII. VARIATION

A **variation** is an expression in which a variable may be related to a power, a quotient, a product, or a combination of powers, quotients, and products of other variables.

✓ TYPES OF VARIATION

❶ Direct Variation:

Statement:

If y is *directly proportional* to x , then, $y \propto x$.

In Equation Form:

$$y = kx$$

❷ Inverse Variation:

Statement:

If y *varies inversely* as x : $y \propto \frac{1}{x}$

In Equation Form:

$$y = k \left(\frac{1}{x} \right)$$

❸ Joint Variation:

Statement:

If y *varies jointly* as x and z : $y \propto xz$.

In Equation Form:

$$y = kxz$$

❹ Combined Variation:

Statement:

If y *varies directly* as x and *inversely* to

$$z: y \propto \frac{x}{z}$$

In Equation Form:

$$y = k \left(\frac{x}{z} \right)$$

Practice Problems



- P-1** Roberto is 25 years younger than his father. However his father will be twice his age in 10 years. How old is Roberto?
- P-2** In a certain family, the sum of the parents' ages is twice the sum of their children's ages. Five years ago, the sum of the parents' ages was four times the sum of the children's ages during that time. In fifteen years, the sum of the parents' ages will be equal to the sum of their children's ages. How many children are there in the family?
- P-3** Twelve men can finish the job in 16 days. Five men were working at the start and after 8 days 3 men were added. How many days will it take to finish the job?
- P-4** One pipe can fill a tank in 5 hrs and another pipe can fill the same tank in 4 hours. A drain pipe can empty the full content of the tank in 20 hours. With all three pipes open, how long will it take to fill the tank?