

SAT Maths Sample Paper 7

1. At 7:00 A.M., a sewage treatment tank contains 3,000,000 gallons of water. Starting at 7:00 A.M., x gallons per minute flow into the tank, and y gallons per minute flow out of the tank. No water enters or leaves the tank otherwise. Which of the following functions, f , models the number of gallons of water in the sewage treatment plant at 8:00 A.M.? (Note: 1 hour = 60 minutes)

- A) $f(x, y) = 3,000,000 + 60xy$
 B) $f(x, y) = 3,000,000 - 60(x + y)$
 C) $f(x, y) = 3,000,000 + 60(x - y)$
 D) $f(x, y) = 3,000,000 + x - y$

2. When a solute is added to a solvent to create a solution, the change in freezing point can be determined by using the formula $\Delta T = K_f \times m \times i$, where ΔT = freezing point of pure solvent – freezing point of solution, in degrees Celsius; K_f is the freezing point depression constant for the solvent; m is the concentration of solute in molality, and i is the van 't Hoff factor. Pure water has a freezing point of 0°C . Solute NaCl (van 't Hoff factor = 2) is added to the solvent water to create a 0.1 molal solution with a freezing point of -0.372°C . Which of the following equations, if solved, would accurately determine the freezing point depression constant of water, given the provided information?

- A) $K_f = \frac{0 - (-0.372)}{(0.1)(2)}$
 B) $K_f = \frac{(0.1)(2)}{0 - (-0.372)}$
 C) $K_f = [0 - (-0.372)](0.1)(2)$
 D) $K_f = \frac{(0)(-0.372)}{2 - 0.1}$

3. Bombast Cable Company charges a flat monthly rate of \$22.95 for its basic cable package. For every additional 10 channels added, a customer has an additional monthly charge of \$1.25. Additional channels can only be purchased in groups of 10. For example, if a customer wants to add 12 channels, the customer would actually be charged for 20 channels or two groups of 10 channels. If a customer adds x channels to the package then, in terms of x , what is the charge after one year?

- A) $22.95 + 1.25\left(\frac{x}{10}\right)$
 B) $12(22.95) + 12(1.25)\left(\frac{x}{10}\right)$
 C) $12(22.95) - 12(1.25)\left(\frac{x}{10}\right)$
 D) $22.95 + \frac{12(1.25)x}{10}$

4. Marguerite and Whitney are collecting canned goods for their neighborhood ThanksGiving-a-Can can drive. For each house they visit when collecting, they receive an average of 2 canned goods. If Whitney started with 4 cans from her own kitchen for the drive while Marguerite started with none, which of the following situations is correct at a given point during their can drive?

- A) When Marguerite has 4 cans, Whitney has 4 cans
 B) When Marguerite has 8 cans, Whitney has 12 cans
 C) When Marguerite has 12 cans, Whitney has 20 cans
 D) When Marguerite has 16 cans, Whitney has 24 cans

5. Chad and Julia run a life-coaching business, Go Get 'Em, that charges \$150 per hour per client. They each have a weekly schedule of 20 clients who have 1-hour sessions each. Chad and Julia meet their students in an office for which they each pay \$500 in monthly rental fees. If r represents the hourly rate that Go Get 'Em charges its clients, which of the following represents Go Get 'Em's profit, P , in one month? (Note: 1 month = 4 weeks)

- A) $P = 80r - 500$
- B) $P = 80r - 1,000$
- C) $P = 160r - 500$
- D) $P = 160r - 1,000$

1. If $\frac{400}{100(x+3)} = 4$, then what does x equal?

- (A) -4
- (B) -3
- (C) -2
- (D) -1

4. The equations $2x + 2y = 6$ and $-7x - 7y = -21$ are graphed in the xy -plane. Which of the following must be true of the graphs of the two equations?

- (A) The slope of the graph of $2x + 2y = 6$ is 1 and the slope of the graph of $-7x - 7y = -21$ is -1.
- (B) The graphs of the two equations are perpendicular lines.
- (C) The y -intercept of the graph of $-7x - 7y = -21$ is -21.
- (D) The graphs of the two equations are the same line.

2. A kilowatt-hour (kWh) is a unit of energy equivalent to one kilowatt of power expended for one hour. For example; an electrical load rated at 1 kW that operates for 1 hour uses 1 kWh of energy. Electricity in a certain city costs \$0.18 per kilowatt-hour, and a light bulb rated at 80 W operates in that city for two hours every day for 200 consecutive days. If 1 kW equals 1,000 W, which equation best models the cost in dollars, c , of the light bulb over this time period?

(A) $c = \frac{80}{1000} \cdot 400 \cdot 0.18$

(B) $c = \frac{1000}{80} \cdot 400 \cdot 0.18$

(C) $c = \frac{80}{1000} \cdot \frac{400}{0.18}$

(D) $c = 80 \cdot 1000 \cdot 400 \cdot 0.18$