

Systems of linear inequalities word problems

Anouk is an engineer planning sound and lighting for a free concert in the park. The concert was advertised with a promise to use no more than 108 kilowatts (kW) of power. It was determined that the main contributors to power usage, speakers and floodlights, use 1.8 kW and 2.2 kW, respectively. Anouk also must keep within her budget of \$3,300. The rental company is charging \$75 for each speaker and \$42 for each floodlight. Which of the following combinations meets Anouk's requirements?

A 40 speakers and 30 floodlights

B 12 speakers and 54 floodlights

C 26 speakers and 13 floodlights

D 38 speakers and 22 floodlights

In order to keep a malfunctioning satellite from falling into the earth, space agency officials decide to use a powerful rocket. At the time the rocket is attached, the satellite will be traveling with an initial velocity, v_0 , and for every second that the rocket fires, it will add approximately 180 meters per second $\left(\frac{\text{m}}{\text{s}}\right)$ to this velocity. In order to ensure safety on earth, the velocity must be increased to at least $3,800 \frac{\text{m}}{\text{s}}$. Also, the rocket can fire for no more than 4 seconds. For the initial velocity of the satellite, v_0 , which of the following systems of inequalities best models this situation, where t is time, in seconds, after the rocket is first fired?

A $v_0 + 180t \geq 3,800$
 $t \leq 4$

B $v_0 + 180t \geq 3,800$
 $180t \leq 4$

C $v_0 + 3,800 \leq 180t$
 $t \leq 4$

Vijay needs to take a taxi, which costs a flat fee of 3 dollars, plus an additional 4 dollars per mile. If Vijay has a dollars with him, which inequality shows the number of miles, m , he can afford to travel in the taxi?

A $0 \leq m \leq 4a - 3$

B $0 \leq m \leq \frac{a}{4} - \frac{3}{4}$

C $4a - 3 \leq m$

D $\frac{a}{4} - \frac{3}{4} \leq m$

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The change machine at an arcade gives change in the form of 25-cent coins (quarters) and one-dollar bills. The manager of the arcade would like at least \$50 worth of quarters and \$100 worth of one-dollar bills in the machine at all times. Also, the manager does not allow more than \$500 in the machine at any time. What is the maximum number of quarters the manager would allow in the change machine?

(A) 200

(B) 400

(C) 1,600

(D) 2,000

In order to bring his business to the next level, Christov wants to gain at least 2,000 followers on a popular social media platform. From his own personal account, he knows that each original post gains him approximately 3 new followers and every 5 reposts gains about 1. Which of the following inequalities represents the numbers of posts, P , and reposts, R , Christov needs to reach his goal of gaining at least 2,000 followers?

(A) $3P + 0.2R \geq 2,000$

(B) $3P + 5R \leq 2,000$

(C) $1P + 5R \geq 2,000$

(D) $0.2P + 5R \leq 2,000$
