

HOMEWORK EXERCISES (TIME: 10 MINUTES)

23. While adding a string of two-digit numbers, Javier accidentally transposed the digits of one of the numbers, so that the digit that should have been in the tens place was in the ones place and vice versa. As a result, the sum he obtained exceeded the correct sum by 72. Assuming the number that was in error did not contain 0 as a digit, what was the correct number that Javier should have included in his addition?
- (A) 19
(B) 27
(C) 35
(D) 45
(E) 72
24. If a projectile is launched straight upwards from an initial height of h_0 meters at a rate of v meters per second, its height t seconds after launch is given by the formula: $h(t) = -4.9t^2 + vt + h_0$. If a ball launched upwards from a height of 2 meters takes 4 seconds to hit the ground, at what speed was it launched, in meters per second?
- (A) 4.4
(B) 6.9
(C) 12.9
(D) 19.1
(E) 20.1
25. The population of Dullsville in 2013 is 55,203. Tom reads that Dullsville has grown at a rate of 4% per year over the past 20 years. What was Dullsville's population in 1993?
- (A) 10,551
(B) 11,041
(C) 12,379
(D) 24,400
(E) 25,194
26. There are 168 hours in a week. Last week, Hugo spent $\frac{1}{4}$ of his waking hours at work. As for the remaining hours he was awake, Hugo spent $\frac{1}{3}$ of them preparing and eating food. Finally, of the hours still remaining, Hugo devoted $\frac{5}{12}$ of them to exercise. If Hugo spent 16 hours exercising last week, how many hours did he sleep?
- (A) 23.2
(B) 46.1
(C) 57.0
(D) 83.4
(E) 91.2
27. The larger of two numbers exceeds the positive difference of the larger number and the smaller number by three times the square root of the smaller number. What is the smaller number?
- (A) 4
(B) 9
(C) 16
(D) 36
(E) Cannot be determined from the given information.
28. A print shop charges \$0.20 per copy for the first 100 copies of a large poster, \$0.08 per copy after that up to 500 copies, and then \$0.04 per copy for each copy over 500. Which of the following is a formula for the total cost C of p posters, where $p > 500$?
- (A) $C = 32 + 0.04p$
(B) $C = 52 + 0.04p$
(C) $C = 60 + 0.04(p - 500)$
(D) $C = 0.2(p - 400) + 0.08(p - 100) + 0.04(p - 500)$
(E) $C = 0.2(p - 400) + 0.08(p - 100) + 0.04(p - 500)$

29. A person's *blood pressure* is defined by the ratio of two measurements: the systolic (maximum) over the diastolic (minimum) pressure. The *pulse pressure* is defined as the difference between the systolic and diastolic pressures, $P_{sys} - P_{dias}$. The *mean arterial pressure*, an average pressure over the cycle of a full heartbeat, can be approximated by the following formula: $AP \approx P_{dias} - \frac{1}{3}(P_{sts} - P_{dias})$. All of these pressures are measured in mm Hg (millimeters of mercury). If John has a pulse pressure of 36 mm Hg and a mean arterial pressure of 60 mm Hg, which of the following is an approximation of John's blood pressure?
- (A) $\frac{72}{108}$
(B) $\frac{108}{72}$
(C) $\frac{48}{84}$
(D) $\frac{84}{48}$
(E) $\frac{96}{60}$
30. Ingrid has 5 liters of a solution that is 60% water and 40% hydrochloric acid (HCl). She adds another solution that is 80% water and 20% HCl until her combined solution reaches a concentration of 32% HCl. What is the volume in liters of the combined solution, to the nearest tenth of a liter?
- (A) 3.3
(B) 5.0
(C) 8.3
(D) 10.0
(E) 11.7
31. Raymond defines a new function $x \leftrightarrow y$, for positive integers x and y , such that it is equal to y raised to the power of the sum of all the integers from 1 through x (e.g. $x \leftrightarrow y = y^{1+2+3+\dots+x}$). If $n \leftrightarrow 2 = 4096 \cdot (n - 3) \leftrightarrow 2$, then $n = ?$
- (A) 3
(B) 5
(C) 6
(D) 9
(E) 15
32. Denise's investments in the stock market lost 9% of their value per year between the beginning of 2008 and the beginning of 2011. After that, they began to grow again at a rate of 3% per year. At this rate, what is the first year by the beginning of which Denise will have recouped all of her losses?
- (A) 2019
(B) 2020
(C) 2021
(D) 2022
(E) 2023