SOLUTIONS: Stage I Question Set 8

Solution to Question #1:
In order to get a "7", Barry would have to roll a "1". Since he has equal chances to roll a 1, 2, 3, 4, 5 or 6, his odds that his total score will be "7" are 1/6.
The correct answer is **(a).**

Solution to Question #2:
(a - b) = 5 - 1000 = -995; ab = 5000
(a - b) + ab = -995 + 5000 = 4005
Alternatively: (a - b) + (ab) = 5 - 1000 + 5000 = 5 + 4000 = 4005
The correct answer is **(d)** .

Solution to Question #3:
Currently, Henry pays 0.3(40,000) = $12,000 on income taxes.
If he moved to a jurisdiction where the rates were 10%, he would pay 0.1(40,000) = $4,000
$12,000 - $4,000 = $8,000. Thus, Henry would save $8,000 per year in income taxes by moving to the other jurisdiction.
Alternatively: Henry would pay (30 - 10)% = 20% = $ 0.20(40,000) = $8,000 less
The correct answer is **(d)** .

Solution to Question #4:
(1 + 2 + 4 + 5 + 2 + 4)/6 = *18/6* = 3.
The correct answer is **(c)** .

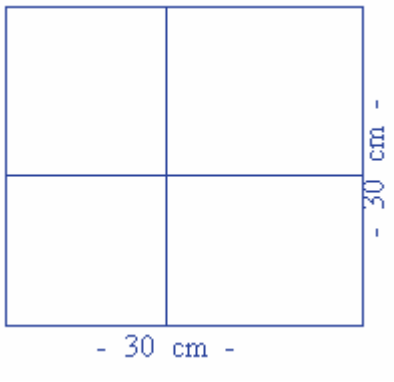
Solution to Question #5:
Lynne has 23 minutes left, and 23 x 60 = 1380 seconds.
The correct answer is **(b)** .

Solution to Question #6:
The small cubes have volume of 2 x 2 x 2 = 8.
The large cube has a volume of 32 x 32 x 32 = 32768
32768 ÷ 8 = 4096.
Alternatively: 32 / 2 = 16 small cubes will define each side of the larger cube. Therefore, number of small cubes that will fit the larger cube = 16 x 16 x 16 = 4096.
The correct answer is **(c)** .

Solution to Question #7:
1 m = 39.37/12 ~ 3.28 feet. *Therefore, 1 m² = (3.28)² ~ 10.76 sq. ft.*
10m² = 10(3.28)(3.28) ~ 107.6 square feet ~ 108 square feet, to the nearest whole number.
The correct answer is **(e)** .

Solution to Question #8:
a) 2 squares which are 15 cm x 15 cm
The total surface area of the square is 30 cm x 30 cm = 900 cm²
This cut would only take up (2)(15 x 15) = 450 cm
Only half of the square would be accounted for with this cut.
b) 4 squares which are 15 cm x 15 cm. This cut would account for the entire square as shown in the figure.
4(15 x 15) = 4(225) = 900
c) 6 squares which are 5 cm x 5 cm
This cut would only take up 6(5 x 5) = 150 cm² and would not account for the entire surface area.

d) all of the above
False, since a) and c) are false.
e) none of the above
False, since b) is correct.
The correct answer is **(b)** .



Solution to Question #9:

$$\frac{m-n}{m^2} = \frac{n+1-n}{(n+1)^2} = \frac{1}{(n+1)^2}$$

The correct answer is **(c)** .

Solution to Question #10:
a) If n = -1, then mn = -25 which is less than zero, and outside the interval given.
b) If n = 1, then mn = 25 which is greater than 1, and outside the interval given.
c) If n = 0, then mn = 0, which is outside the interval given, since mn > 0.
d) If n = 1/25, then mn = 1, which is outside the interval given, since mn < 1.
e) True, since none of a) - d) are possible values.
Alternatively: Dividing all elements by m we get, 0 < n < 1/25
The correct answer is **(e)** .

Solution to Question #11:
The shaded region = (the area of the square) - (the area of the quarter-circle).
The area of the square = r^2 = 16cm², since the radius = 4 cm.
The area of the quarter circle = π (16)/4 = 4π
The area of the shaded region = 16 - 4π.
The correct answer is **(d)** .

Solution to Question #12:
x cannot equal 300, since at that point, the equation is undefined.
If x is a negative number, the result of the equation will always be less than zero.
If x < 300, the result of the equation will always be negative.
If 300 < x < 500, the result will always be positive.
If x > 500, the result will be negative.
The integer for which the result is a maximum is x = 301. If x > 301, the result keeps on shrinking as the absolute value of the denominator increases and the absolute value of the numerator decreases.
The correct answer is **(a)** .

Solution to Question #13:
x/y = 2x, which is less than 0.
y/x = 2/x, which is less than 0.
(x - y) = x - 1/2, which is less than 0.
y - x = 1/2 - x, which is always greater than 0 for all the given values of x, since subtracting a negative number is the same as adding a positive number.
0 = 0
The largest element in the set is (y - x), since that is the only positive number.
The correct answer is **(d)** .

Solution to Question #14:
4 x 270 = 1080 hours studying
The correct answer is **(a)**

Solution to Question #15:
The interior surface area of the cube would be 5(4 x 4) = 80 cm² without the rectangular solid in it. The rectangular solid partially obscures three surfaces of the cube, and takes away an area of [(1 x 2) + (2 x 3) + (1 x 3)], but also adds

an area of [(1 x 2) + (2 x 3) + (1 x 3)] on the other surfaces, so there is no net gain or loss. The interior area of the figure is 80 cm². The correct answer is **(d)** .

Solution to Question #16:
The outer square has a side of 16 cm, so the circle has a radius of 8 cm, and a diameter of 16 cm. The diagonal of the smaller square is equal to the diameter of the circle.
The diagonal = $s\sqrt{2}$, where s is the side of the small square. $s = 16/\sqrt{2} = 8\sqrt{2}$
The area of the small square = $(8\sqrt{2})^2 = 128$ cm².
The area of the circle = $\pi\ (8)(8) = 64\pi$
The area of the circle - the area of the small square = the area of the shaded region
The area of the shaded region = $(64\pi - 128)$ cm²
The correct answer is **(b)** .

Solution to Question #17:
What fraction represents the proportion of the area of triangle ADC to the area of triangle BCD?
The area of triangle ADC = (1/2)(4)(10) = 20 m²
The area of triangle BCD = (1/2)(8)(10) = 40m²
The (area of triangle ADC)/(area triangle BCD) = 20/40 = 1/2
The correct answer is **(b)** .

Solution to Question #18:
The first leap year in this interval was in 1904. The last leap year in this interval was in 1992.
1904 ÷ 4 = 476; 1992 ÷ 4 = 498
Which means there are 22 intervals. Thus, there must be 23 leap years between 1901 and 1995.
The correct answer is **(c)** .

Solution to Question #19:
Valerie ate 2 pieces, since she ate 1/6 of one of the pizzas.
The other nine members consumed (2/3)(24) = 16 pieces of pizza.
Altogether, 18 pieces of pizza were eaten, so 6 pieces were left over.
The correct answer is **(b)**

Solution to Question #20:
For numbers between 50 and 100, you have the following:
54, 63, 72, 81, 90
For numbers between 100 and 200, you have the following:
108, 117, 126, 135, 144, 153, 162, 171, 180
Altogether, there are 14 numbers.
The correct answer is **(d)** .