

SOLUTIONS: Stage I Question Set 3

Solution to Question #1:

What is the largest number in this set? $\{2, 2.02, 2 + 0.009, 2.2 - .1, 2.09\}$

$$2 + 0.009 = 2.009, \quad 2.2 - .1 = 2.1$$

Of the numbers $\{2, 2.02, 2.009, 2.1, 2.09\}$, 2.1 is the largest.

The correct answer is (d).

Solution to Question #2:

Joe spent 3% of his monthly salary (after deductions) on candy bars, 5% on video arcade games, and 35% on rent. What percentage of his salary does Joe have left?

So far, Joe has spent $3\% + 5\% + 35\% = 43\%$ of his salary. Joe has 57% of his salary left.

The correct answer is (c).

Solution to Question #3:

How many seconds are there between 8:00:00 a.m. and 11:12:00 p.m.?

There are 15 hours and 12 minutes. 15 hours = $15 \times 60 = 900$ minutes = $900 \times 60 = 54,000$ seconds.

12 minutes = $12 \times 60 = 720$ seconds. Adding the two together gives you $54,000 + 720 = 54,720$ seconds.

The correct answer is (d).

Solution to Question #4:

$x = 4$. Which of the following expressions represents the largest value?

$$\{-x + 8, x + 4, -1(4 - x), x^2, \frac{1}{2}x + x\}$$

$$-x + 8 = -4 + 4 = 0$$

$$x + 4 = 4 + 4 = 8$$

$$-1(4 - x) = -1(4 - 4) = 0$$

$$x^2 = 4(4) = 16$$

$$\frac{1}{2}x + x = 2 + 4 = 6$$

The correct answer is (d).

Solution to Question #5:

A rectangular solid has dimensions $4 \times 4 \times 8$. How many of the faces have dimensions of 4×8 ?

Two faces have dimensions of 4×4 . Four faces have dimensions of 4×8 .

The correct answer is (a).

Solution to Question #6:

If two-thirds of a number N is 4, what is five-thirds of N ?

$$\left(\frac{2}{3}\right)N = 4, \text{ so } 4\left(\frac{3}{2}\right) = 6 = N.$$

$$\text{Five-thirds of } N = \left(\frac{5}{3}\right)(6) = 10$$

The correct answer is (b).

Solution to Question #7:

$$3 + \frac{3}{10} + \frac{3}{100} + \frac{3}{1000} = 3.333$$

The correct answer is (b).

Solution to Question #8:

How many composite numbers are there between, and excluding, 10 and 20?

Composite numbers are non-prime numbers. 11 is a prime, as are 13, 17, and 19.

The composite numbers between, and excluding, 10 and 20, are 12, 14, 15, 16, and 18.

There are five composite numbers between, and excluding 10 and 20.

The correct answer is (a).

Solution to Question #9:

Casey's gas tank is $\frac{1}{4}$ full. The capacity of the gas tank is 30 litres. How many litres must be added to make the tank two-thirds full?

Two-thirds of the capacity is 20 litres. Since Casey's gas tank is $\frac{1}{4}$ full, there are $(\frac{1}{4})(30) = 7.5$ litres in the tank right now. The number of litres must be added to make the tank two-thirds full is $20 - 7.5 = 12.5$ litres. The correct answer is (a) .

Solution to Question #10:

The sum of four numbers (p, q, r, s) is 190. $p = q + 5$. $q = r + 5$. $r = s + 5$. What does s equal?

$$s + s + 5 + s + 5 + 5 + s + 5 + 5 + 5 = 4s + 30 = 190.$$

Therefore, $4s = 160$, or $s = 40$.

The correct answer is (a) .

Solution to Question #11:

Valene's room is a rectangle, with the length twice as long as the width. If the perimeter of the room is 24 meters, what is the length of the longer side?

$$L = 2W. \text{ The perimeter of the room} = P = 2L + 2W = 4W + 2W = 6W = 24 \text{ meters.}$$

$W = 4$ meters. The longer side $L = 2(4) = 8$ meters. The correct answer is (d) .

Solution to Question #12:

The average age of Amy, John, and Matthew is 17. If Amy is one year younger than Matthew, and Matthew is one year younger than John, how old is Amy?

a = Amy's age, m =Matthew's age, j =John's age

$$a = m - 1, \text{ and } m = j - 1, \text{ and } j = m + 1.$$

$$a + m + j = m - 1 + m + m + 1 = 3m = 3(17) = 51.$$

$m = 17$, so Matthew is 17 years old.

$a = m - 1$, so Amy is 16 years old.

The correct answer is (c) .

Solution to Question #13:

A square sheet of metal has four smaller identical squares cut out of each edge, as shown in the figure. If the box made by folding up the four sides has volume 128 cm^3 , and the base of the box is $8 \text{ cm} \times 8 \text{ cm}$, what were the dimensions of the original square?

The base of the box is 8×8 , and the volume is 128.

$$V = \text{base} \times \text{height} \times \text{length} = 8 \times \text{height} \times 8 = 64h = 128. \text{ h} = \text{height} = 2 \text{ cm.}$$

The height of the box is the same as the side of the square which was cut away.

So the side of the square before any was cut away was $8 + 2 + 2 = 12 \text{ cm}$.

The correct answer is (b) .

Solution to Question #14:

Ken was taking a road trip to California. On the first day he travelled 840 km in 12 hours of driving. The second day he travelled 700 km in 7 hours of driving. The third day he travelled 640 km in 8 hours. On which day did Ken have the fastest average speed?

On the first day, Ken's average speed was $840 \div 12 = 70 \text{ km/hour}$.

On the second day, Ken's average speed was $700 \div 7 = 100 \text{ km/hour}$.

On the third day, Ken's average speed was $640 \div 8 = 80 \text{ km/hour}$.

The correct answer is (b) .

Solution to Question #15:

A circle has an area of $25\pi \text{ cm}^2$. What is its circumference in cm?

$$A = \pi r^2 = 25\pi. \text{ r} = 5 \text{ cm.}$$

The circumference of the circle is $2\pi(5) = 10\pi$

The correct answer is (b) .

Solution to Question #16:

A regular hexagon is made up of 6 equilateral triangles (as shown in the figure). If the perimeter of the hexagon is 21 cm, what is the perimeter of one of the equilateral triangles?

$21 \div 6 = 3.5$ cm = the side length of one of the triangles. Since each side length of each triangle is the same, the perimeter of one of the triangles is $(3.5)(3) = 10.5$ cm. The correct answer is (a) .

Solution to Question #17:

Xavier and Yolanda were racing around a track. Yolanda's speed was 1.2 times as fast as Xavier's on this run. Xavier took 12 minutes to complete a 3.2 km run. How long did Yolanda take?

If Yolanda's speed is 1.2 times as fast as Xavier, the time she took is $12 \div 1.2 = 10$ minutes.

The correct answer is (b) .

Solution to Question #18:

How many integers are there between 100 and 500 such that the sum of their digits is 6?

You need to find ordered pairs (x,y,z) such that $x + y + z = 6$, and $100x + 10y + z$ is between 100 and 500.

Beginning with $x = 1$, you have the following ordered numbers

105 204 303 402

150 240 330 420

114 213 312 411

141 231 321

123 222

132

There are 18 numbers such numbers altogether.

The correct answer is (a) .

Solution to Question #19:

A $4 \times 4 \times 4$ cube has 4 sides painted blue, and 2 sides painted red. It is then cut into 64 unit cubes. How many cubes have both blue and red paint on them?

If two opposite surfaces are painted red, and the other sides are painted blue, then there will be 32 cubes which have both the red and blue surfaces (16 on top and 16 on the bottom). If two adjacent sides are painted red, then $16 + 12$ cubes have both red and blue on them. (There are four shared cubes on the shared edge.) So it depends on which sides of the $4 \times 4 \times 4$ cube are painted. The correct answer is (d) .

Solution to Question #20:

Alex threw four darts, and hit the board each time. He added the scores from each hit together. How many different possible total scores could he have gotten?

Alex could have gotten scores of:

$4(4) = 16$ if Alex hit the "4" each time

$4(3) + 6 = 18$ if Alex hit the "4" 3 times and the "6" one time.

$4(2) + 6(2) = 20$ if Alex hit the "4" 2 times and "6" two times.

$4(1) + 6(3) = 22$ if Alex hit the "4" 1 time and "6" three times.

$6(4) = 24$ if Alex hit the "4" 4 times.

So there are 5 possible scores.