# MATHEMATICS TIPS (DECEMBER 2023)
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1.  Sherri has a bag of 14 red marbles 8 green marbles, 9 blue marbles and 3 yellow marbles. What is the probability Sherri chooses two marbles, with replacement and gets a red or green each time?

(A) $\frac{11}{17}$    (B) $\frac{7}{11}$    (C) $\frac{7}{17}$    (D) $\frac{121}{289}$    (E) $\frac{15}{17}$

The probability of getting a red or green marble is $\frac{14+8}{14+8+9+3}$ = $\frac{22}{34}$ = $\frac{11}{17}$.  The probability of getting a red or green marbles when selecting two marbles, with replacement is $\left(\frac{11}{17}\right)\left(\frac{11}{17}\right)$ = $\frac{121}{289}$.

2.  The area of two identical circles combined is $512\pi$ units$^2$. If a square has a side length equal to that of the diameter of one of the circles, what is the perimeter of the square?

(A) 64 units (B) 32 units (C) 128 units (D) 256 units (E) 144 units

The area of one of the circles is $\frac{1}{2}(512\pi) = 256\pi$. Find the radius of one of these circles.

$\pi r^2$ = $256\pi$ ; $r^2$ = $256$ ; $r$ = $\sqrt{256}$ = $16$

Thus, the diameter of the circle is 2(16) = 32, which is also the length of the side of the square. Find the perimeter of the square.

$$4(32) \quad = \quad 128$$

3. A normal animal cell has a diameter of 0.000000024 mm. If a bacterial cell has a radius half the length of a normal animal cell, what is the bacteria cell's length in scientific notation?

(A) $1.2 \times 10^{-8}$  (B) $2.4 \times 10^{-8}$  (C) $6 \times 10^{-9}$  (D) $3 \times 10^{-9}$  (E) $1.5 \times 10^{-9}$

If you read the problem carefully, the length of the radius of a bacteria cell is one half the radius of an animal cell. The radius of the animal cell is .000000012 and the radius of the bacteria cell is .000000006 which is equal to $6 \times 10^{-9}$.

4. What is the maximum number of intersection points created using only three lines?

(A)  0        (B)  1        (C)  2        (D)  3        (E)  4

Note : The maximum number of intersection points created by n lines is $_nC_2$.

$$_3C_2 \quad = \quad \frac{3!}{2!\,1!} \quad = \quad 3$$

5. What is the positive difference between the geometric mean and arithmetic mean of the numbers 48 and 12?

(A) 2        (B) 10        (C) 14        (D) 12        (E)  6

Geometric mean (48,12)   -   Arithmetic mean (48, 12)

$$\sqrt{(48)(12)} \; - \; \frac{48+12}{2} \;=\; \sqrt{(16)(3)(12)} \; - \; \frac{60}{2} \;=\; \sqrt{16(36)} \; - \; 30$$

$$=\; 4(6) \; - \; 30 \;=\; 24 \; - \; 30 \;=\; -6$$

The positive difference is $|-6| \;=\; 6$