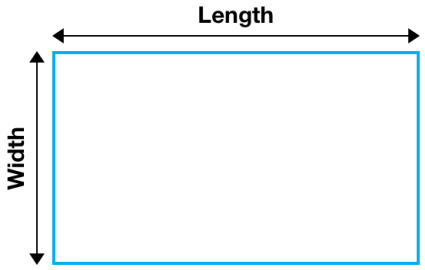
Sample Questions

Primary (Grades 4-6)

1. Because of the COVID-19 outbreak, a minimum distance must be maintained between student seats in the classrooms. There are rooms of different sizes in the school and they can fit different numbers of students as shown in the table below.



Room size (length x width in *m*)	Allowed number of students
2 x 2 *m*	1
3 x 3 *m*	4
4 x 4 *m*	9

How many students can fit in a 6 x 6 *m* room?

A. 16
B. 25
C. 27
D. 36

2. John and his sister Xin Yi are running around a circular track with opposite direction, starting at the same place. The moment Xin Yi finishes her first lap, John passes her again for the second time.

Assuming they run at constant speeds throughout, how do the John's and Xin Yi's running speeds compare?

A. Xin Yi is faster than John
B. John is faster than Xin Yi
C. John and Xin Yi have same running speeds
D. Not enough information to answer the question conclusively

3. Windmills generate power using wind energy. The greater the wind speed the greater the power that can be generated. One of the reasons why windmills are so tall is because it is windier the higher you go.

An engineer is prospecting suitable locations for a windmill farm. At one place, an engineer measured the wind speed at the ground to be 50 *km*/*h*. From experience, the engineer knows that for every 100 m, the wind speed increases by about 20 %.

What is the approximate wind speed at the height of 200 *m*?

A. 50 *km*/*h*
B. 60 *km*/*h*
C. 70 *km*/*h*

D. 80 *km*/*h*

4. In one popular game, every round 2 out of 10 players are randomly chosen to be impostors.

If you were to play 30 games in a row, how many times on average would you be an impostor?

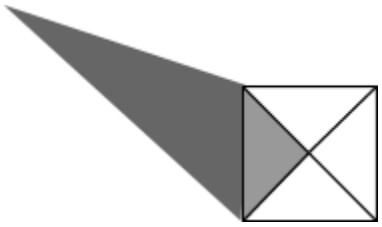
A. 3
B. 6
C. 10
D. 12

5. The great pyramids cast shadows during the day.

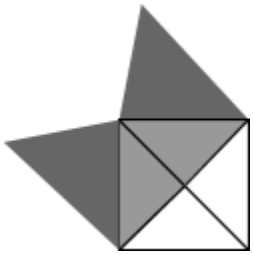
If looking directly from above, which of the following shadows *can* be cast by the pyramid?

Watch the drone footage on Youtube: **Pyramids - Giza, Egypt by drone [4K]**
https://www.youtube.com/watch?v=u1S9p3IfCV0&ab

A. 

B. 

C. 

D. 

Answers

1. D
2. C
3. C
4. B
5. A

Secondary (Grades 7-9)

1. Because of the COVID-19 outbreak, a distance of 1.5 m must be maintained between students in the classrooms. Imagine that you are a school principal that must decide the seating arrangement of students in the classroom.

The classroom area can be divided into square shaped “cells” with dimensions of 1x1 m to help solve the problem. The student seats are marked with an X and are located right in the center of the cell.

Which of the following arrangements does not violate the rule?

A.

X		X		X
	X		X	
X		X		X
	X		X	
X		X		X

B.

X	X		X	X
X	X		X	X

C.

	X		X	
X		X		X
	X		X	

D.

	X			X
X			X	
		X		
	X			X
X			X	

2. A factory produces 100 units of a product in the first week. Every week, the factory increases its production by 12 units. Assuming that the factory keeps this rate of increase throughout, in total how many units will have been produced by the factory at the end of the 20’th week?

A. 2280
B. 2400
C. 3400
D. 3280

3. Jack inherited his crazy uncle's "lucky" coin. The coin is rigged so that one side is heavier than the other.

Jack did a little experiment by tossing the coin 100 times and counting the number of Heads and Tails. To be sure, he did the same experiment two more times and recorded the data:

	Experiment 1	Experiment 2	Experiment 3
Heads	61	72	65
Tails	39	28	35

Jack decided to set up a game, where an opponent bets 1 dollar to potentially win 5 dollars, but only if a certain scenario occurs.

Which of the following scenarios should Jack offer to profit from the game?

A. Toss thrice. If all are Heads, the opponent wins.
B. Toss twice. If both are Tails, the opponent wins.
C. Toss once. If Tails, the opponent wins.
D. Toss twice. If both are Heads, the opponent wins.

4. The sum of the digits of n is written $S(n)$. For example,

$$S(5) = 5 \text{ and } S(2020) = 2 + 0 + 2 + 0 = 4.$$

This notation can be written multiple times, for example

$$S(S(749)) = S(7 + 4 + 9) = S(20) = 2 + 0 = 2.$$

Which of the following has $S(S(n)) = 5$?

A. 158
B. 2030
C. 1231
D. 731

5. For any two numbers a and b, we have the following equalities

$$a^2 - b^2 = (a - b)(a + b)$$
$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$
$$a^4 - b^4 = (a - b)(a^3 + a^2b + ab^2 + b^3)$$

and so on.

If two numbers x and y are given such that $x - y = 1$ and $x^3 - y^3 = \frac{1}{3}$, what is the smallest possible value of $x^2 - y^2$?

A. ½
B. - ½
C. - ⅓
D. ⅓

Answers

1. A

2. D

3. B

4. A

5. C