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MathLinks 8 Option 1
Final Exam Written Response

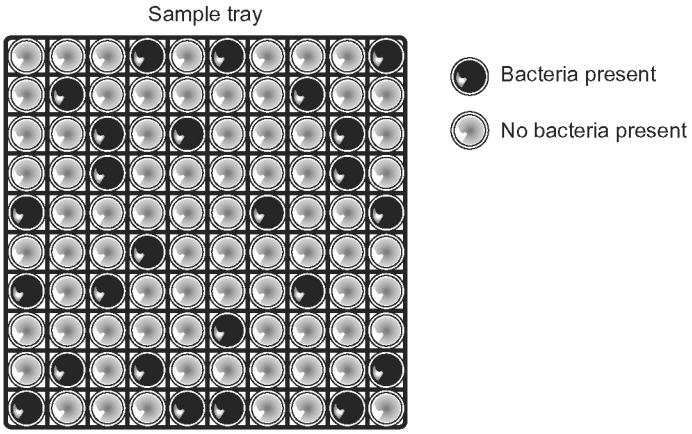
Write your response in the space provided. Present your response in a well-organized way using complete sentences and correct units.

Microbiology

Microbiology plays an important role in our daily lives Scientists help monitor our environment and make sure that we stay healthy. Apply your understanding of mathematics to solve problems related to microbiology.

Use this information to answer #1a)–b).

A microbiologist took 100 samples of water from a river. She placed the samples on a sample tray. Then, she added a chemical that makes the water change colour if bacteria are present.



1. a) Of the 100 samples in the sample tray, the number of samples that have bacteria present is _____?

b) Express the samples with **no** bacteria present as a fraction, a decimal and a percent. Show your work.

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Use this information to answer #1c)–d).

For the water to be safe to use, bacteria can be present in at most 15% of the samples. When 678 samples were collected from various places on another river, bacteria were present in 81.

c) Is the water from this other river safe to use? Justify your answer mathematically.

d) What would you recommend regarding the water? Explain.

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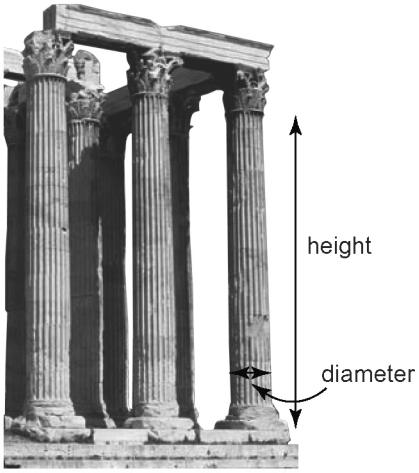
Historical Architecture

There are many examples of interesting architecture from different historical periods. The Greeks and Romans used stone to make buildings that have lasted 2500 years or more. Make connections with your understanding of mathematics to solve problems related to historical architecture.

Use this information to answer #2a)–b).

The Greeks used several different styles of columns in their buildings. The cylindrical part of Corinthian columns, shown here, has a height to width (diameter) ratio of 10:1.



2. a) If the width or diameter of the cylindrical part of a Corinthian column is 2 m, what is its height? Show your thinking.

b) What is the volume of stone in the Corinthian column in part a)? Justify your answer mathematically.

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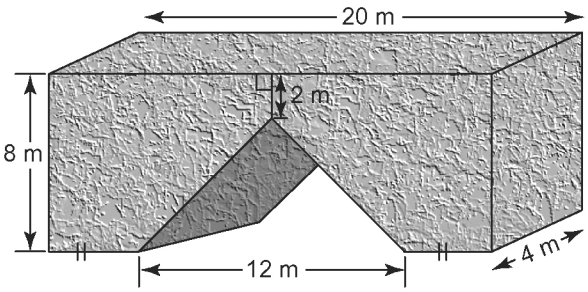
Use this information to answer #2c).

In addition to columns, the Romans also used block designs. The central block of an archway, shown here, is made of stone.



c) Find the surface area of the top face, two end faces, and front and back faces of the central block. Do not include any of the underneath surface.

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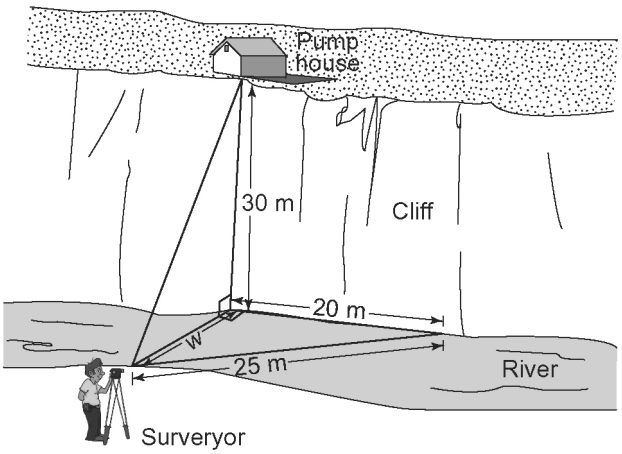
Surveying
Surveyors often work for water and oil companies mapping out areas around wells.

Use this information to answer #3a)–c).

A pump house is at the top of a cliff above a river. The surveyor uses right angles to help complete the mapping.



3. a) What formula do you know that helps you find the lengths of sides on right triangles?

b) Find the width of the river, *w*. Show all your work.

c) How far is the surveyor from the pumphouse? Justify your answer mathematically. Express your answer to the nearest tenth of a metre.

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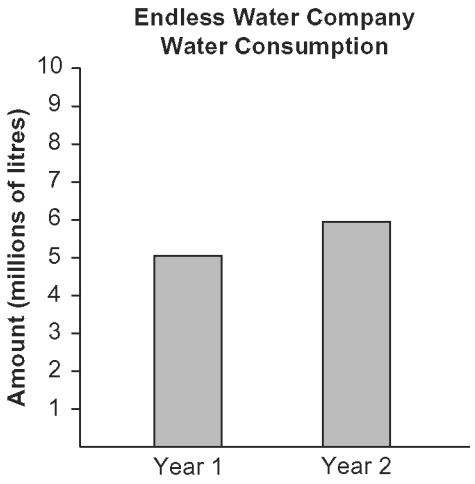
Use this information to answer #3d).

When several companies and communities draw water from the same source, it can cause water levels to drop. The Endless Water Company displayed this graph showing their water consumption. As a member of a conservation committee, you need to argue that the Endless Water Company's water consumption could cause a problem.



d) How could you change the graph to help your argument? Draw your graph. Explain your reasoning.

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Camping and Biking

Biking and camping are favourite summer activities of many people. You are taking a biking-camping trip with a friend. The two of you have biked every day to get ready for the trip. Apply your understanding of mathematics to solve problems related to biking and camping.

Use this information to answer #4a)–d).

You are able to bike 22 km in one hour. This is represented by the equation $D = 22t$ where D is the distance in kilometres and t the time in hours. Your friend is able to bike a bit faster, 25 km in one hour.

4. a) Complete this table of values for **your** first four hours of the trip.

t	***D***
1	
2	
3	
4	

b) Write an equation that represents your friend's distance and time.

c) Make a table of values for your friend's first four hours of travel.

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d) Choose an appropriate method to display the data that will clearly show both bicyclers. Then, draw it.

Use this information to answer #4e).

Your water bottle holds 750 mL.

e) By the time of your first stop, you notice that your water bottle is only $\frac{2}{5}$ full. You decide to refill it. How much water do you **add** to the bottle?

Use this information to answer #4f).

While you are setting up camp, you notice that the temperature has changed from 25°C to 13°C in the last 6 hours.

f) Write an integer statement to show the average change in temperature per hour.