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MathLinks 8 Option 2
Final Exam Written Response

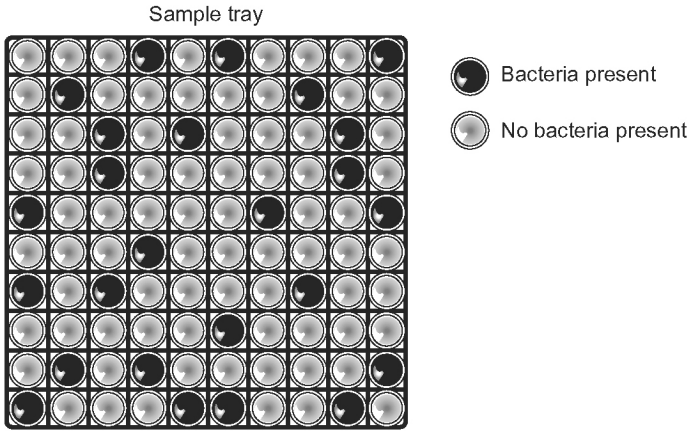
Write your response in the space provided. Present your response in a well-organized way using complete sentences and correct units.

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 **no** bacteria present is _____?

b) Express the samples with 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 842 samples were collected from various places on another river, bacteria were present in 130.

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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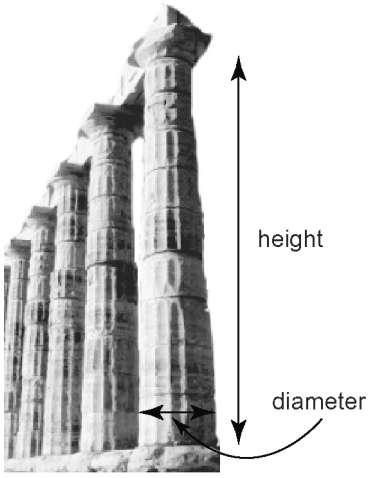
Historical Architecture

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. Doric columns were shorter than other styles, but could hold more weight. The cylindrical part of Doric columns, shown here, has a height to width (diameter) ratio of 8:1.



2. a) If the height of the cylindrical part of a Doric column is 16 m, what is its width or diameter? Show your thinking.

b) What is the surface area of the curved face of the cylindrical part of one Doric column with the dimensions in part a)? Justify your answer mathematically. Round your answer to the nearest tenth of a square metre.

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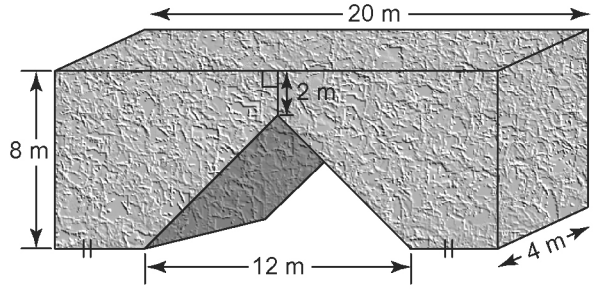
Use this information to answer #2c).

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 volume of stone in the central block.

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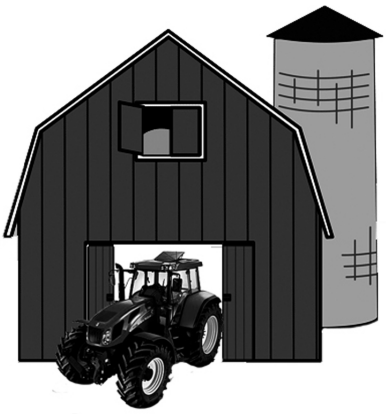
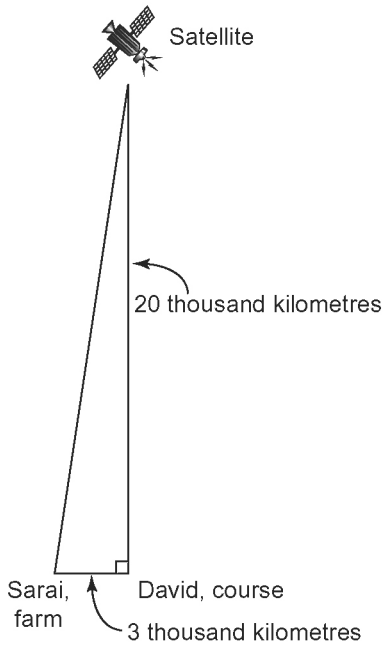
Farming
Farming makes use of mathematics daily. Apply your understanding of mathematics to solve problems related to farming.



Use this information to answer #3a).

David and Sarai are farmers. David is 3000 km or 3 thousand kilometres away at a course and need to keep in contact with Sarai on the farm. A satellite sends phone transmissions between David and Sarai.



3. a) Calculate the distance between the satellite and the farm, to the nearest tenth of a thousand kilometre. Show your work.

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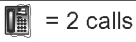
Use this information to answer #3b).

This pictograph shows the number of calls that David and Sarai made in one week.

David and Sarai's Phone Calls

Day	Number of Calls
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

 = 2 calls

b) Identify another type of graph to display the information that would make it easy to read. Explain why you selected that type. Give one advantage of that graph over the pictograph and one disadvantage.

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Use this information to answer #3c).

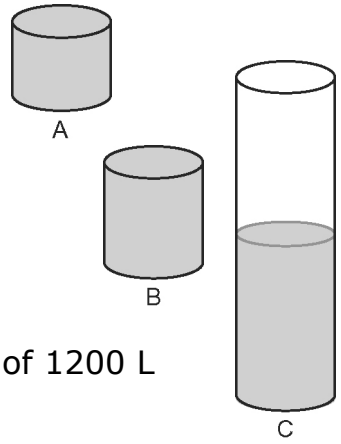
David and Sarai purchased a sprayer for use in their fields. The sprayer's tank holds 3600 L. This is the spray mixture they intend to use:

3000 L of water

$\frac{2}{3}$ of Barrel A with a capacity of 480 L

$\frac{1}{5}$ of Barrel B with a capacity of 620 L

$\frac{1}{4}$ of the $\frac{1}{2}$ full Barrel C with a capacity of 1200 L



c) Did they buy a sprayer with a large enough tank for this spray mixture? Explain.

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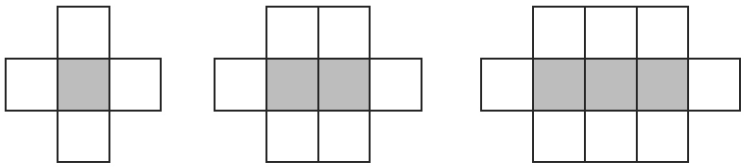
Use this information to answer #4a)–f).

A tile pattern has grey tiles with white tiles on each side.



4. a) Complete this table of values.

Grey	White
1	
2	
3	
4	

b) Draw a graph of the relation in the table.

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c) Would it be reasonable to include values on the graph between the points that correspond to the table of values? Explain.

d) Describe the pattern in words.

e) Write an equation that represents between the number of grey tiles, *g*, and the number of white tiles, *w*.

f) If there are 22 white tiles, how many grey tiles were used? Justify your answer mathematically.