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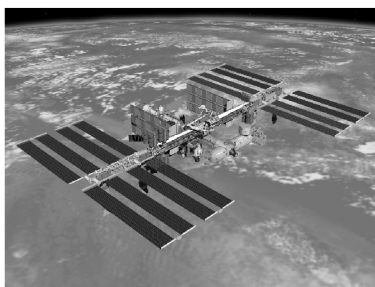
MathLinks 8 Option 1

Final Exam Multiple Choice and Numerical Response

Record your answers on the answer sheet provided.

Space and Technology

Humans continue to explore creative ways to travel in space. When a spacecraft is being designed, mathematics is needed to make precise calculations and predictions. Use your mathematical skills to solve problems related to space and technology.



Use this information to answer #1–3.

The space shuttle has a covering of protective tiles to keep from burning up when re-entering Earth's atmosphere. On an average, 50 of 24 000 tiles are lost on re-entry.

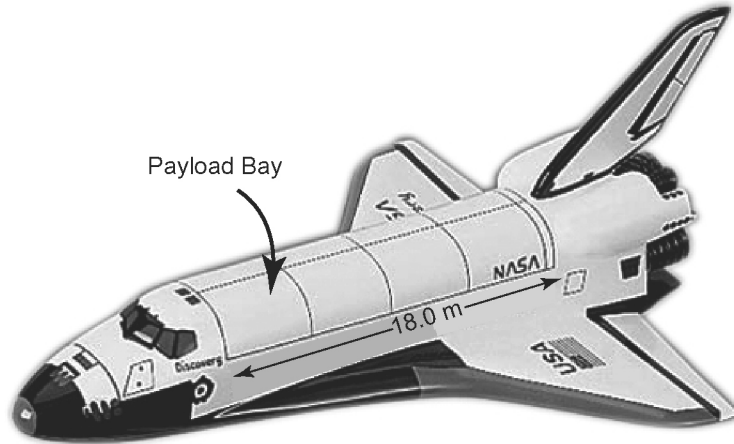
- 1.** What percent of tiles, to the nearest hundredth, is lost on re-entry?
A 0.01% **B** 0.02% **C** 0.21% **D** 0.23%
- 2.** What is the ratio of lost tiles to total tiles, in lowest terms?
A 50:24000 **B** 5:2400 **C** 2:960 **D** 1:480
- 3.** If the space shuttle had 50 400 tiles, predict how many tiles would be lost on re-entry.
A 103 **B** 104 **C** 105 **D** 106

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Use this information to answer #4.

The payload bay area of the space shuttle is a cylindrical storage area for carrying equipment. The length of the payload bay is 18.0 m and its diameter is 4.6 m.



4. What is the volume of the payload bay area, to the nearest metre?

A 305 m²

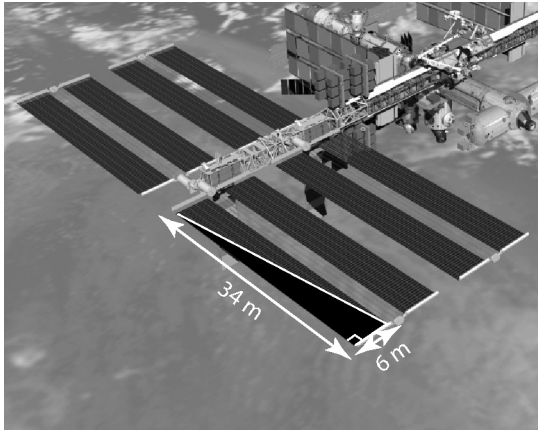
B 300 m²

C 299 m²

D 296 m²

Use this information to answer #5.

The International Space Station (ISS) collects its energy from solar panels.



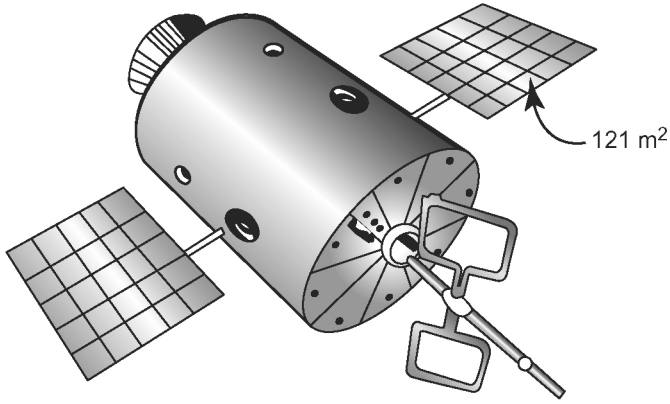
Numerical Response

5. If each solar panel is 34 m long and 6 m wide, how long is the diagonal, to the nearest tenth of a metre?

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Use this information to answer #6.

Satellites that orbit Earth also have solar panels. The large panels are square with an area of 121 m^2 . Each large square panel is made of several smaller squares.



Numerical Response

6. What is the length of a side of a large square panel?

Use this information to answer #7.

NASA will replace the space shuttle with the Orion in 2014. During a test flight of Orion, the following groups of people were watching in the spectator area.

Group	Total
Parents	33
Teachers	8
Students	120
Others	41

7. Which is the best choice of graph to display the above data?

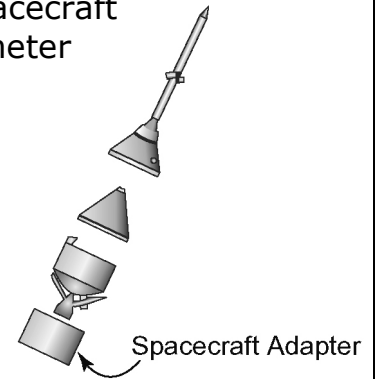
A double bar graph **B** double line graph **C** pictograph **D** bar graph

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Use this information to answer #8.

The Orion has four sections. The bottom section, the spacecraft adapter, is in the shape of a right cylinder. It has a diameter of 5.5 m and a height of 3.3 m.

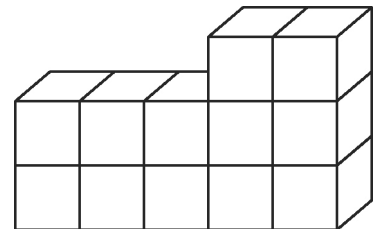


Numerical Response

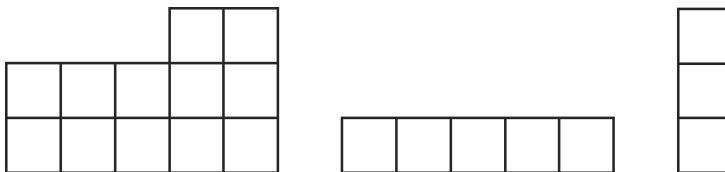
- 8.** What is the surface area of the curved face and one base, to the nearest tenth of a square metre?

Use this information to answer #9.

Supplies for space missions are transported to the launch site in storage boxes. The boxes are stacked as shown.



- 9.** These diagrams show three views of the stack of storage boxes.



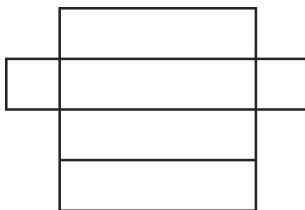
What are the views from left to right?

- A** front, side, top **B** top, front, side **C** side, top, front **D** front, top, side

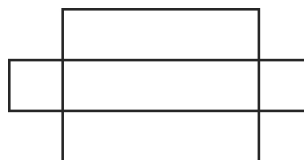
Name: _____ Date: _____

- 10.** A storage box is in the shape of a long rectangular prism. It has no top. Which diagram could be the net for the storage box?

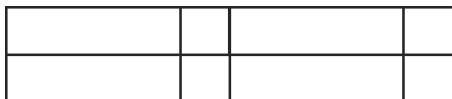
A



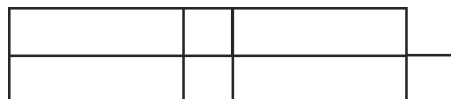
B



C



D



- 11.** The equation, $y = 3(x - 100)$, was used by one of the flight technicians. Which table of values represents the equation?

A

x	y
10	330
20	360
30	390
40	420

B

x	y
110	10
120	20
130	30
140	40

C

x	y
100	0
101	3
102	6
103	9

D

x	y
105	-15
106	-18
107	-21
108	-24

- 12.** One of the calculations used was in the form of the following expression.
 $1 + 4 \times (-2) + (-6) \div (-2) + 10$
 What is the answer to the calculation?

A 13

B 12

C 6

D 2

The Great Outdoors

The outdoors is home to many recreational activities as well as many jobs. Apply your understanding of mathematics to solve problems related to the outdoors.



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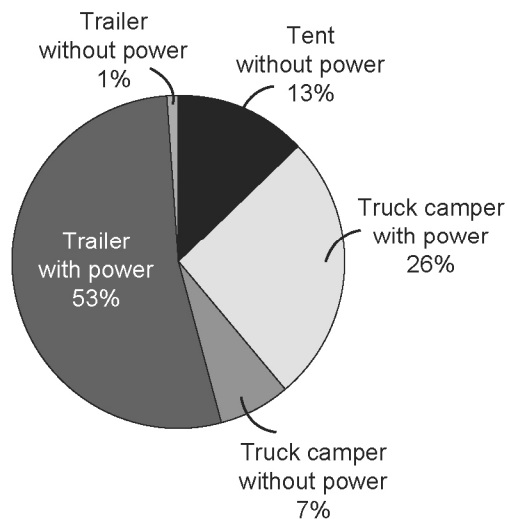
Use this information to answer #13–14.

A campground owner kept records of the first 144 000 requests for campsites by type that were received for each of two years.

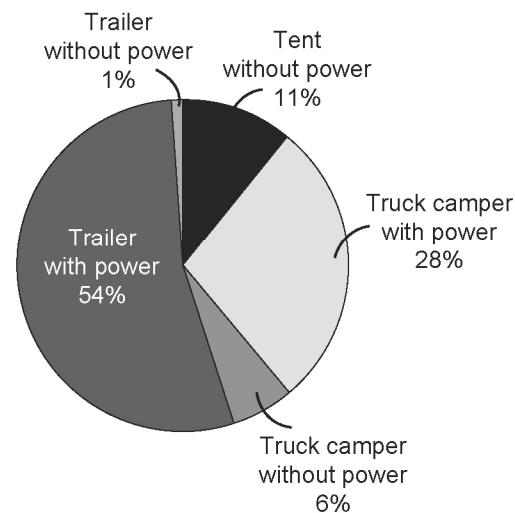
Type of Campsite Requested	Year 1	Year 2
Tent without power	18 000	16 296
Truck camper with power	37 800	40 100
Truck camper without power	9 600	8 735
Trailer with power	76 480	77 480
Trailer without power	1 320	1 389
Total	144 000	144 000

Then, the owner created two circle graphs to compare the data.

Type of Campsite Requested in Year 1



Type of Campsite Requested in Year 2



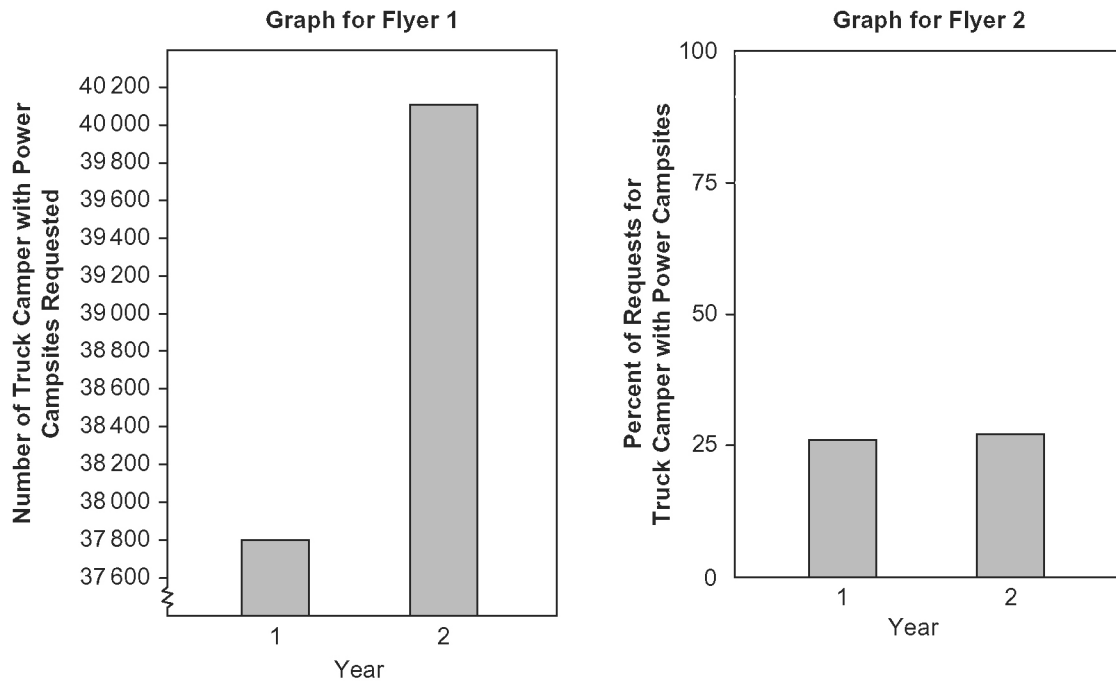
- 13.** One conclusion that can be drawn from the data collected is
- A** requests for Truck camper with power campsites doubled from Year 1 to Year 2
 - B** more campsites were requested With power than Without power in both years
 - C** requests for Trailer without power campsites showed the greatest increase from Year 1 to Year 2
 - D** requests for Tent without power campsites decreased from Year 1 to Year 2 because more campers wanted power
- 14.** What is the increase in the number of requests for Trailer with power campsites from Year 1 to Year 2, expressed as a percent of the total number of requests?
- A** 6.90% **B** 0.69% **C** 0.069% **D** 0.0069%

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Use this information to answer #15.

The campground owner wants to expand the campground believing more campsites with power are needed. A neighbourhood group prefers no expansion. Both the owner and the neighbourhood group circulated flyers with a graph to area residents.



15. Which statement is most likely true?

- A** Flyer 1 is the campground owner's and is not misleading.
- B** Flyer 1 is the campground owner's and is misleading.
- C** Flyer 2 is the campground owner's and is not misleading.
- D** Flyer 2 is the campground owner's and is misleading.

16. Another campground has 315 campsites. The ratio of tent to truck camper to trailer campsites is 5:7:9. How many of the campsites are for tent?

- A** 15
- B** 21
- C** 63
- D** 75

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Use this information to answer #17.

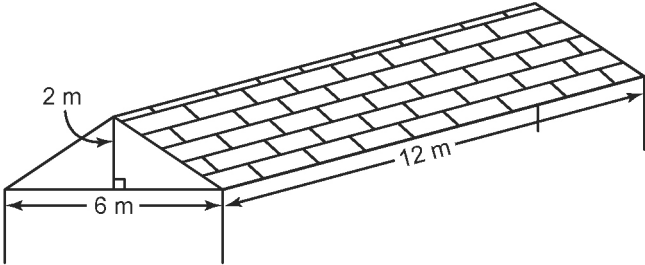
Family Park Adventures

\$195.00 for 6 days
 \$18.00 for 4 bundles of firewood
 \$108.00 for 8 people to waterslide
 27 km in 3 laps of cross-country go-carting

- 17.** Which is a correct unit rate for an item listed in Family Park Adventures?
- A** \$35.20 per day
B \$4.50 per bundle of firewood
C \$18.00 per person to waterslide
D 3 km per lap of cross-country go-carting

Use this information to answer #18.

A picnic shelter is getting a new roof.
 The unseen half of the roof is the same as the visible part.



- 18.** The roofing comes in packages of 10 m^2 . How many packages are needed?
- A** 6 **B** 7 **C** 8 **D** 9

Use this information to answer #19.

A camp counsellor placed pieces of firewood in a pattern with an increasing number of triangles.



Design 1



Design 2



Design 3



Design 4

- 19.** Which relation represents the number of pieces of firewood, f , in a design based on the design number, d ?
- A** $f = d - 2$ **B** $f = d + 2$ **C** $f = 2d - 1$ **D** $f = 2d + 1$

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- 20.** Every 20th person to enter an amusement park is given a card with a skill-testing question. If the question is answered correctly, the person receives a free lunch. What is the answer to the following skill-testing question?

$$12^2 - (10 + 6) \times 2 \times \frac{1}{4} \div \frac{4}{5}$$

A -134

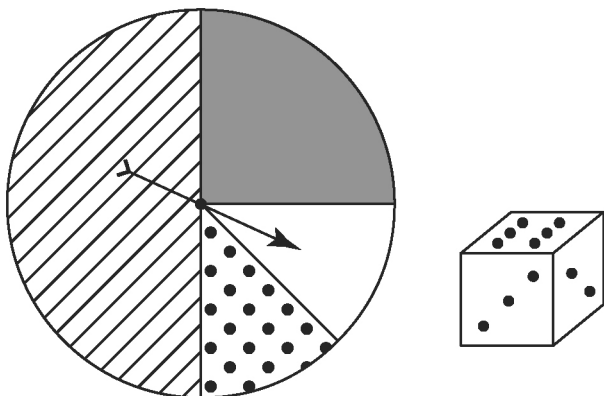
B 134

C -70

D 70

Use this information to answer #21.

A game at an amusement park gave a prize for spinning white and rolling six.



- 21.** The probability of getting the winning combination can be calculated using

A $\frac{1}{8} \div \frac{1}{6}$

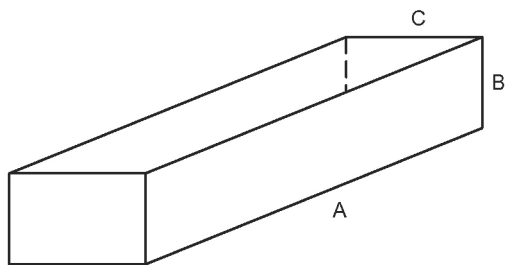
B $\frac{1}{8} \times \frac{1}{6}$

C $\frac{1}{8} \div \frac{6}{1}$

D $\frac{1}{8} \times \frac{6}{1}$

Use this information to answer #22.

A rectangular prism shaped tool storage box has edges A, B, and C.



Numerical Response

- 22.** Edges A, B, and C are in a ratio of 8:2:3. What is the volume of the tool storage box if edge B is 8 cm?

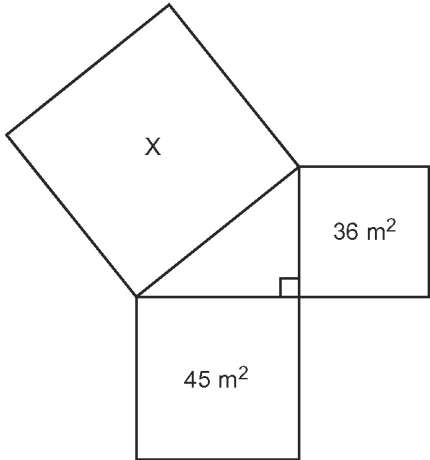
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- 23.** Water skis with a regular price of \$480.00 are on sale for 40% off. GST is 5%. What is the cost of the skis?
A \$302.40 **B** \$288.00 **C** \$201.60 **D** \$192.00
- 24.** A beach volleyball court is being laid out. One side is $\sqrt{96}$ m. The length of that side is between
A 11 m and 10 m **B** 10 m and 9 m **C** 9 m and 8 m **D** 8 m and 7 m
- 25.** Landscapers have created a square flowerbed with an area of 405 cm^2 . Which is the best approximation of the dimensions, to the nearest tenth of a centimetre?
A 21.0 cm $\times$ 2.01 cm **B** 20.5 cm $\times$ 20.5 cm
C 20.1 cm $\times$ 20.1 cm **D** 20.0 cm $\times$ 20.0 cm

Use this information to answer #26.

In a new recreation park, three square platforms that will be used for different games are planned. The right triangle between them is to be green space.

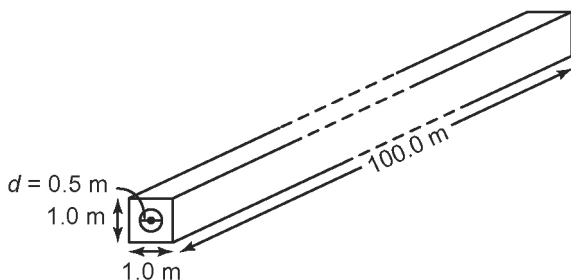


- 26.** What is the area of square platform X?
A 9 m^2 **B** 54 m^2 **C** 81 m^2 **D** 162 m^2
- 27.** The cost of an addition to the clubhouse at a golf course was 162% higher than expected. The expected cost was \$800 000. Which is an expression to calculate the actual cost?
A $162 \times 800\,000$ **B** $16.2 \times 800\,000$ **C** $1.62 \times 800\,000$ **D** $0.162 \times 800\,000$

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Use this information to answer #28–29.

A concrete culvert runs under the golf club entrance road for a distance of 100 m. It is in the shape of a long rectangular prism with a cylindrical hole running down the middle of it to let water flow through.



28. The outer surface area of the culvert, including both ends, to the nearest tenth of a square metre, is

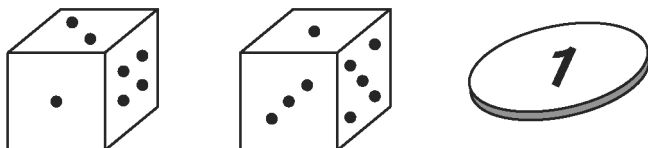
- A** 402.0 m² **B** 401.6 m² **C** 400.0 m² **D** 102.0 m²

Numerical Response

29. What is the volume of concrete needed for the culvert, to the nearest cubic metre?

Use this information to answer #30–35.

Students decide to play a game of chance at a picnic table. The game uses two standard six-sided dice and a chip with 1 on one side and 2 on the other.



30. All possible outcomes when the two dice are tossed are called

- A** a simulation **B** a favourable outcome
C a sample space **D** independent events

31. The result when one die and the chip are tossed so that one does not affect the other is called

- A** a simulation **B** a favourable outcome
C a sample space **D** independent events

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32. The two dice are tossed at the same time. What is the probability of getting a six on both?

A $\frac{1}{4}$

B $\frac{1}{6}$

C $\frac{1}{12}$

D $\frac{1}{36}$

33. One die and the chip are tossed at the same time. What is the probability of getting even numbers on both?

A 25%

B 37.5%

C 50%

D 75%

34. The chip is tossed three times in a row. What is the probability of getting a 1 each time?

A 12.5%

B 25%

C 37.5%

D 50%

Numerical Response

35. There are 5 boys and 6 girls at the picnic table playing the game of chance. If a team consists of one boy and one girl, how many different teams are possible?

Use this information to answer #36.

Arie has had 42 homeruns so far this season. His goal is 50 homeruns. There are 6 games left.

36. Which equation can be used to find the average number of homeruns, h , that Arie must get in the remaining games to reach his goal?

A $50 + 6h = 42$

B $42 + 6h = 50$

C $42 - 6h = 50$

D $42h + 6 = 50$

Use this information to answer #37.

For maintaining the greens at the ball stadium, the greenskeeper is paid according to the formula $W = 11h + 13$ where W is the wage and h is hours worked.

37. The greenskeeper's wage was \$293.50. How many hours were worked?

A 27.5 h

B 26.5 h

C 25.5 h

D 24.5 h

38. Several different polygons can be used to tile a patio. To make sure the tiles tessellate, the interior angles where the vertices meet must add up to

A 360°

B 270°

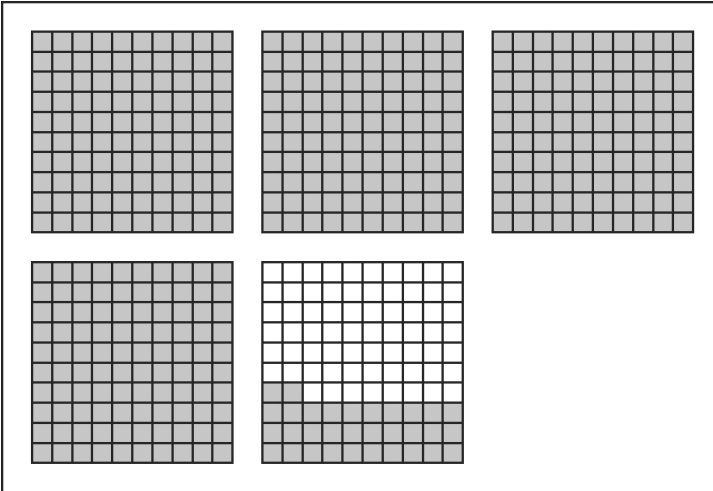
C 180°

D 90°

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Use this information to answer #39.

Two teams are playing a game in which they draw cards. Team 1 drew this card.

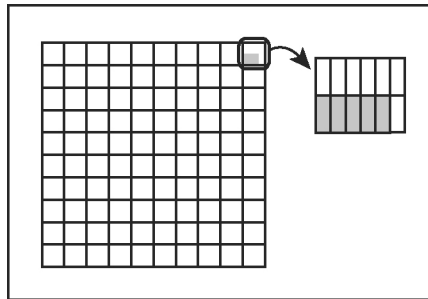


Numerical Response

39. What percent is modelled on the card drawn by Team 1?

Use this information to answer #40.

Team 2 drew this card.



40. What percent is modelled on the card drawn by Team 2?

A $\frac{5}{12}\%$

B $\frac{5}{240}\%$

C 4.16%

D 4.16%

Name: _____

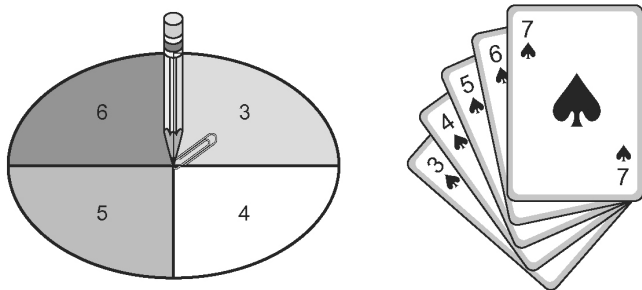
Date: _____

Connections

Many concepts learned in one chapter can help us solve problems in another. Use your mathematical understanding to solve the following problems.

Use this information to answer #41–43.

A trick is based on one spin of a spinner and one draw of a card.



A variation of the trick is based on the sum of the spin and the card drawn. The sum chart has been started.

SUM		Spinner			
		3	4	5	6
Cards	3	6	7	8	9
	4	7			
	5	8			
	6	9			
	7	10			

Numerical Response

41. What is the probability, as a decimal, of spinning 6 and drawing 6?

42. Which of the following does **not** represent $P(\text{sum of } 10)$?

A $\frac{5}{20}$

B $\frac{1}{5}$

C 0.2

D 20%

43. Which is the same probability as $P(\text{sum of } 12)$?

A $P(\text{sum of } 13)$

B $P(\text{sum of } 11)$

C $P(\text{sum of } 8)$

D $P(\text{sum of } 7)$

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Use this information to answer #44.

Reba solved the equation $\frac{r}{20} - 4 = -3$.

Her work was as follows:

$$\frac{r}{20} - 4 + 4 = -3 + 4 \quad \text{Step 1}$$

$$\frac{r}{20} = -1 \quad \text{Step 2}$$

$$\frac{r}{20} \times 20 = -1 \times 20 \quad \text{Step 3}$$

$$r = -20 \quad \text{Step 4}$$

44. Reba's mistake was in

A Step 1

B Step 2

C Step 3

D Step 4

45. What is the solution to $5(x - 3) = -5$?

A -4

B -2

C 2

D 4

46. Which equation represents the following statement?

Seven less than three times a number is fourteen.

A $7 - 3n = 14$

B $3n - 7 = 14$

C $3(n - 7) = 14$

D $3(7 - n) = 14$

47. Which regular polygons can not be used to tile a plane?

A triangle

B square

C hexagon

D octagon

48. If

 is to be shaded to represent $\frac{1}{2} \times \frac{4}{5}$, how many shaded squares represent the answer?

A 4

B 5

C 8

D 9

49. What does $3\frac{3}{4} \times 3\frac{3}{5}$ equal?

A $6\frac{3}{28}$

B $9\frac{9}{20}$

C $10\frac{6}{9}$

D $13\frac{1}{2}$

Numerical Response

50. There are 24 000 plants in a botanical garden of which $\frac{4}{15}$ are roses. How many roses are there?

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51. What does $3\frac{2}{3} \div 2\frac{1}{16}$ equal?

A $\frac{99}{176}$

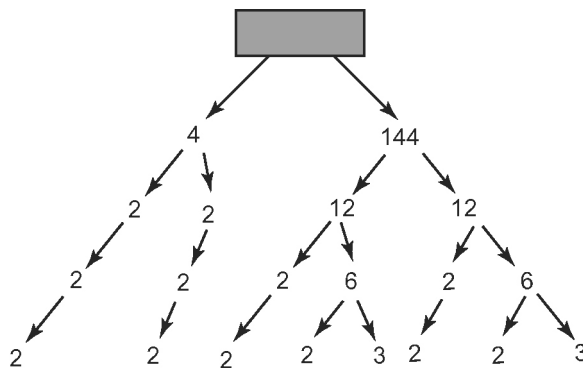
B $1\frac{1}{24}$

C $1\frac{7}{9}$

D $7\frac{9}{16}$

Use this information to answer #52–54.

A student produced the following diagram. The start number at the top is covered.



52. What does the bottom row of the diagram represent?

A prime factors

B lowest terms

C factor tree

D squares on numbers

53. Use the bottom row to determine the square root of the start number at the top of the diagram.

A 8

B 10

C 12

D 24

Numerical Response

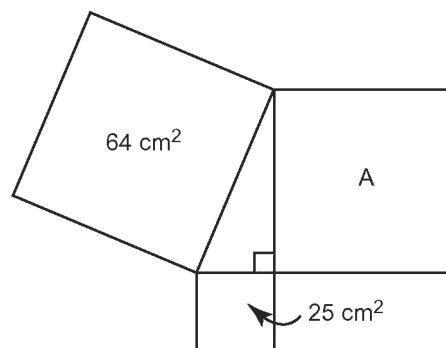
54. What is the start number at the top of the diagram?

Name: _____

Date: _____

Use this information to answer #55.

The right triangle had a square on each side.



55. What is the area of square A?

A 89 cm²

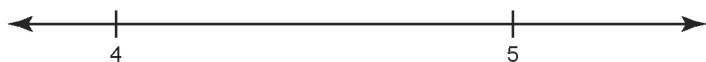
B 39 cm²

C 9 cm²

D 3 cm²

Use this information to answer #56.

The $\sqrt{x}$ lies somewhere between 4 and 5.



56. What is a possible whole number, x , with a square root between 4 and 5?

A 9

B 15

C 22

D 27

57. Express $\frac{3}{4}\%$ as a fraction in lowest terms.

A $\frac{3}{4}$

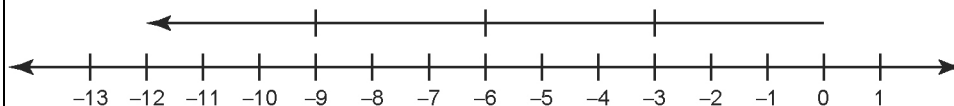
B $\frac{2}{100}$

C $\frac{75}{100}$

D $\frac{3}{400}$

Use this information to answer #58.

The diagram shows how to model a division using a number line.



58. Which division is being modelled using the number line?

A $12 \div (-4)$

B $12 \div (-4)$

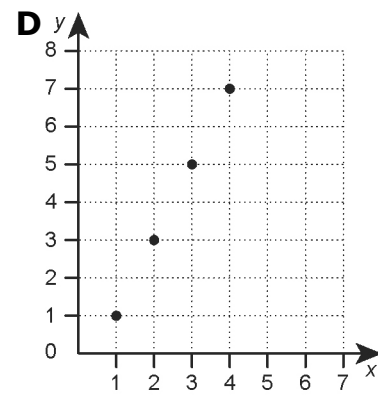
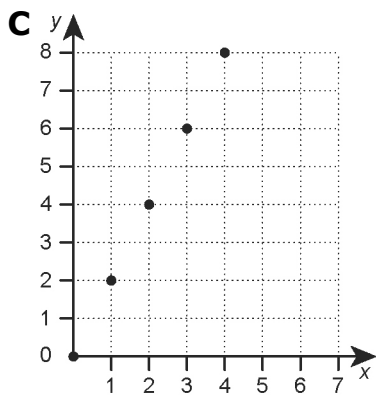
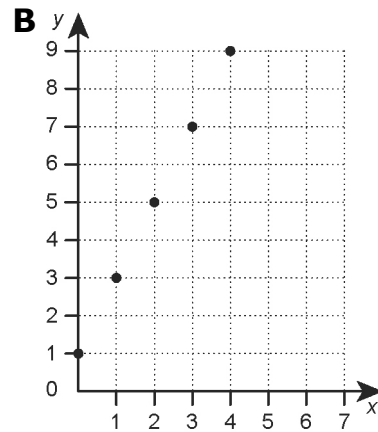
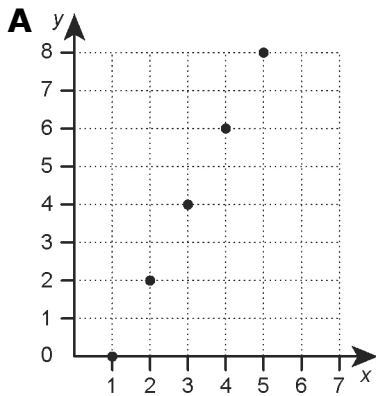
C $-12 \div 3$

D $-12 \div (-3)$

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59. Which graph represents $y = 2x - 1$ where x is a whole number?



Use this information to answer #60.

To convert a temperature in degrees Fahrenheit ($^{\circ}\text{F}$) to degrees Celsius ($^{\circ}\text{C}$), the formula $C = \frac{5}{9}(F - 32)$ is used.

Numerical Response

60. What is the equivalent temperature in degrees Celsius for a temperature of 59°F ?

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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.

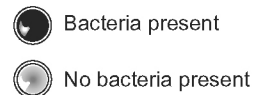
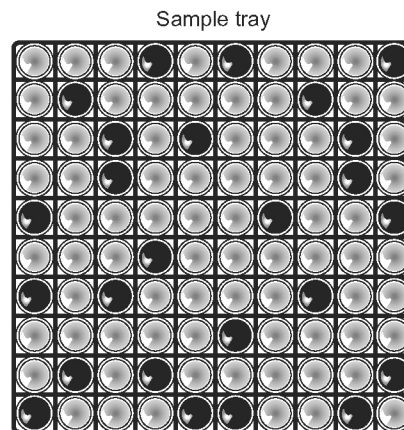
Microbiology

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.

Name: _____

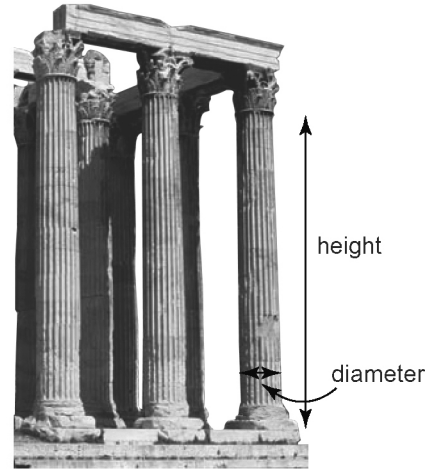
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Historical Architecture

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.

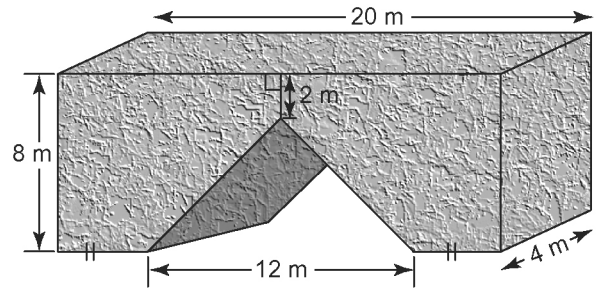
b) What is the volume of stone in the Corinthian column in part a)? Justify your answer mathematically.

Name: _____

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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.

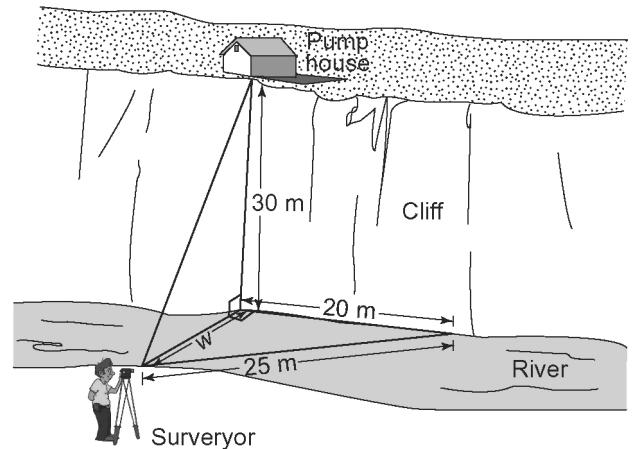
Name: _____ Date: _____

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.



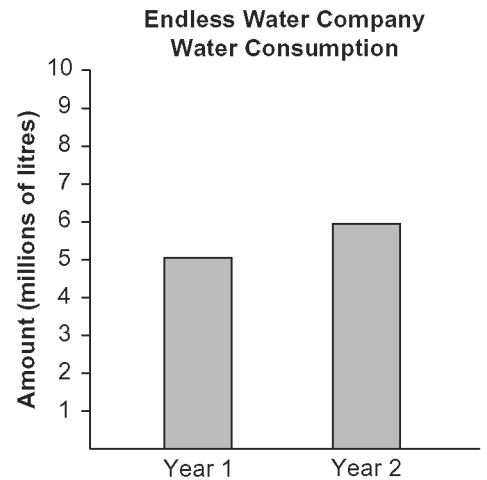
- 3. a)** What formula do you know that helps you find the lengths of sides on right triangles?
- b)** Find the width of the river, w . Show all your work.
- c)** How far is the surveyor from the pumphouse? Justify your answer mathematically. Express your answer to the nearest tenth of a metre.

Name: _____

Date: _____

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.

Name: _____

Date: _____

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.

Name: _____

Date: _____

- 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.