

# Graduation Numeracy Assessment 2017 SAMPLE ASSESSMENT



BRITISH  
COLUMBIA

Ministry of  
Education





# Common Component



Questions on computer,  
*responses completed on computer*

In this part you will:

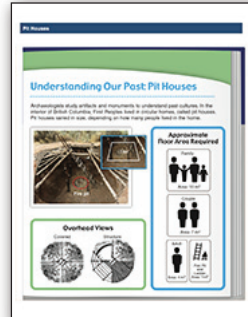
- read two tasks
- complete 6 questions for each task



1. Which of the following communities uses an average between 200 and 400 Liters per day of water?

Select all that apply.

Whelan  
 Vancouver  
 Port Alberni  
 Prince George



2. You want to estimate the number of people who might have lived in a pit house. Which of the following is required to determine the best way to do so?

better weight  
 pit house height  
 area required for living space  
 dimensions of the building

3. Which expression could you use to estimate how many adults lived in a pit house with a perimeter of 40?

$\frac{40}{2} + 4$   
  $\frac{40}{2} + 8$   
  $\frac{40}{2}$   
  $\frac{40}{4}$

4. Which strategies could you use to estimate how many people lived in 10 pit houses of similar size?

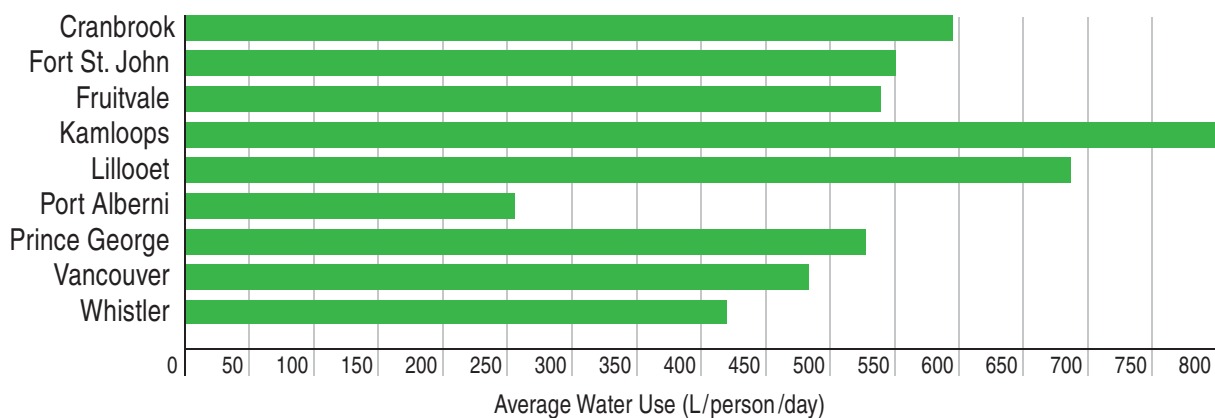
Estimate the number of people who lived in 1 pit house and multiply by 10.  
 Estimate the total area of 10 pit houses and divide by the area required for 1 person.  
 Estimate the total area of 10 pit houses and multiply by the area required for 1 person.

A newspaper headline grabs your attention.








# DAILY NEWS

## Water use skyrockets

Recent studies have predicted water shortages.



### Indoor Water Use with Conventional Appliances and Fixtures

	Toilet	13 L/flush		Tap	8 L/minute
	Shower	10 L/minute		Dishwasher	40 L/cycle
	Bath	100 L/bath		Leaks	3 L/day
	Clothes Washer	150 L/cycle			

\$2.75 Our office 14 1st Street Volume 51 / Est. 1987



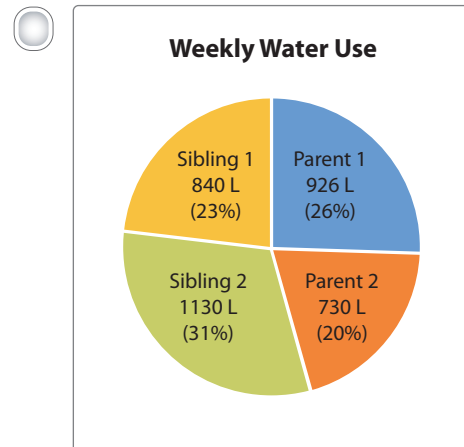
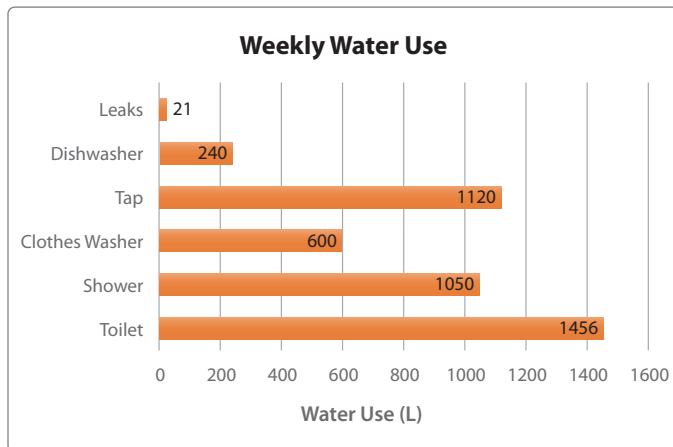
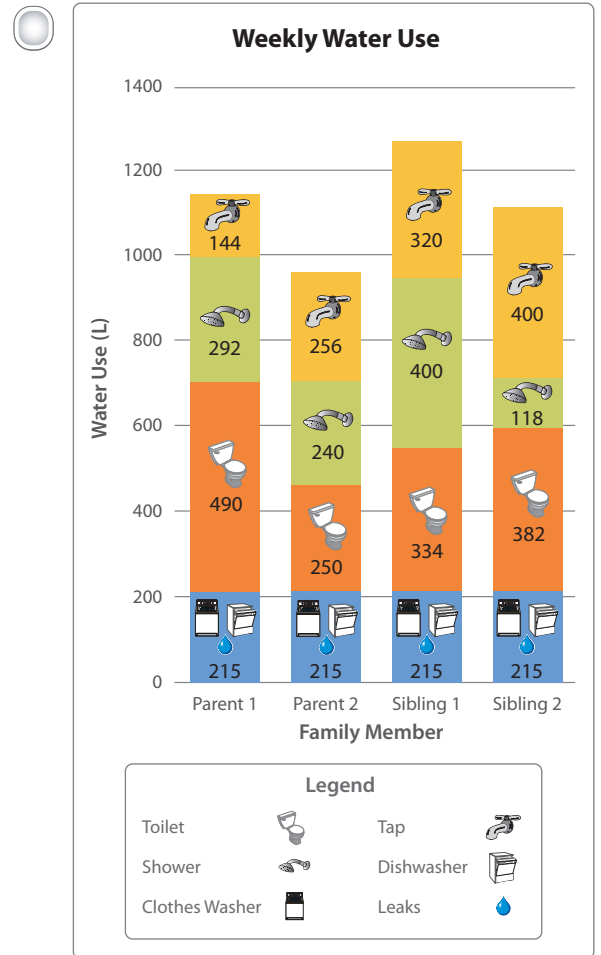
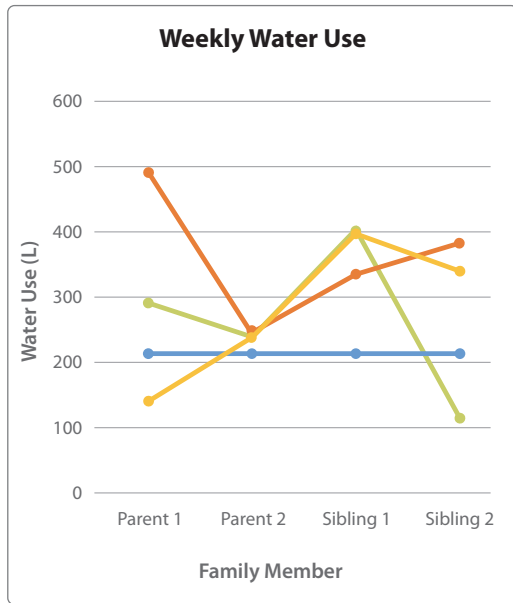


1. Which of the following communities uses on average between 250 and 450 L/person/day of water?

**Select all that apply.**

- Whistler
- Vancouver
- Port Alberni
- Prince George

2. Which representation of a family's weekly water use best illustrates where and how water could be saved?



3. A family of four wants to calculate each family member's daily water use from the appliances they share (dishwasher and clothes washer). The family does 6 dishwasher loads and 5 clothes washer loads each week.

Select one expression they could use to do this calculation.



represents the amount of water used per dishwasher load.



represents the amount of water used per clothes washer load.

- $\frac{6 \text{ (dishwasher)} + 5 \text{ (clothes washer)}}{4}$
- $\frac{6 \text{ (dishwasher)} + 5 \text{ (clothes washer)}}{7}$
- $\frac{6 \text{ (dishwasher)} + 5 \text{ (clothes washer)}}{4} \div 7$
- $\frac{6 \text{ (dishwasher)} + 5 \text{ (clothes washer)}}{7} \div 4$
- $\frac{(6 + 5) (\text{dishwasher} + \text{clothes washer})}{4} \div 7$
- $\frac{(6 + 5) (\text{dishwasher} + \text{clothes washer})}{7} \div 4$




4. You calculate the average shower length to be 11 minutes and 15 seconds.

If everyone in a family of 5 showers daily, how much water would the family use for showering each week?

**Answer to the nearest litre.**

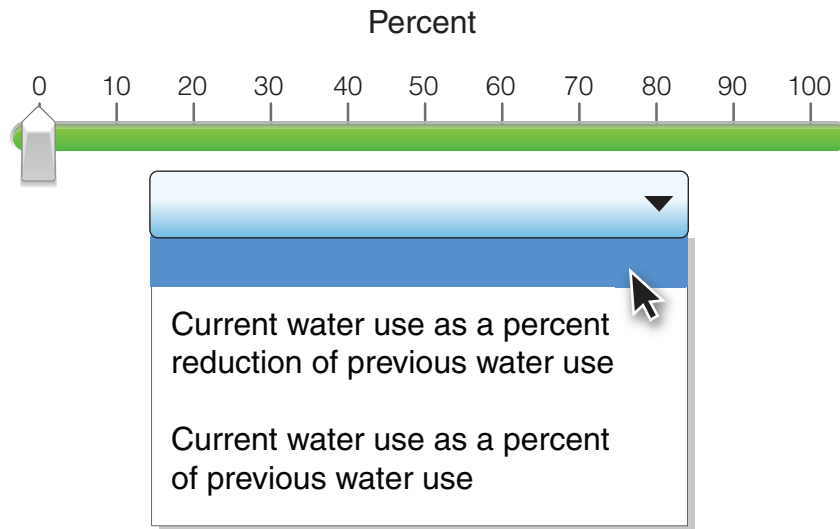
 L

5. A friend has worked to reduce their bathroom water use. You compare their current bathroom water use to their previous bathroom water use.







	Previous Bathroom Water Use (L/day)	Current Bathroom Water Use (L/day)
 Toilet	65	52
 Tap	48	32
 Shower	110	80

What can you say about their current bathroom water use compared to their previous bathroom water use?

Select your answer by using the drop-down menu to label the graph **and** by dragging the point to the correct location on the graph.



6. A family of four decides to challenge themselves to use less water. For 1 week, they record their water use.

	Water Use	Total Water Use (L)
 Toilet	4 flushes/person/day	1456
 Tap	5 min/person/day	1120
 Shower	8 min/person/day	2240
 Dishwasher	7 loads/week	280
 Clothes washer	4 loads/week	600
 Leaks	3 L/day	21
<b>TOTAL</b>		5717

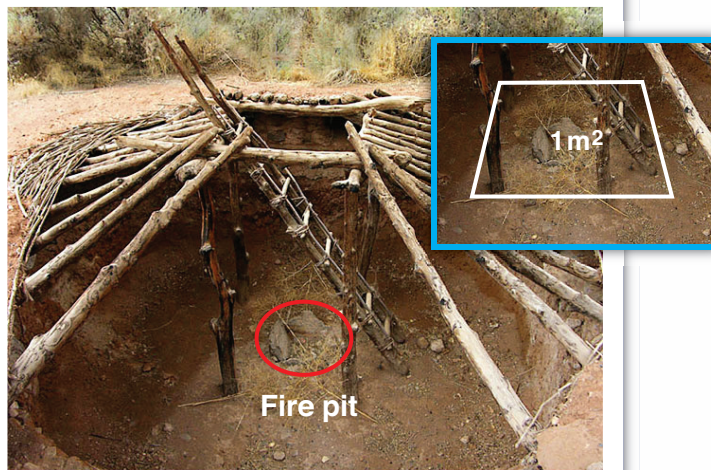
The family has decided on some strategies to reduce their total water use. Which strategies are **unreasonable**?

**Select all that apply.**

- Parent 1 strategy: Fix leaks
- Parent 1 strategy: Use the clothes washer 1 time/week
- Parent 2 strategy: Reduce tap use by  $\frac{1}{4}$
- Sibling 1 strategy: Reduce shower time by  $\frac{1}{3}$
- Sibling 1 strategy: Pack the dishwasher more efficiently and run 5 loads/week
- Sibling 2 strategy: Wash and rinse dishes by hand instead of using the dishwasher

# Understanding Our Past: Pit Houses

Archaeologists study artifacts and monuments to understand past cultures. In the interior of British Columbia, First Peoples lived in circular homes, called pit houses. Pit houses varied in size, depending on how many people lived in the home.



## Approximate Floor Area Required

Family

Area: 10 m<sup>2</sup>

Couple

Area: 7 m<sup>2</sup>

Adult

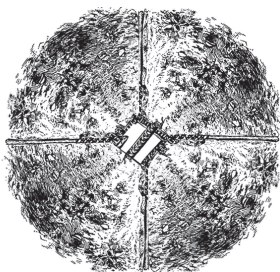
Area: 4 m<sup>2</sup>

Fire Pit and Ladder

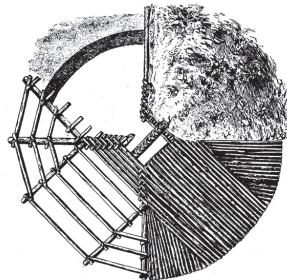
Area: 1 m<sup>2</sup>

## Overhead Views

Covered



Structure



7. You want to estimate the number of people who might have lived in a pit house.

Which of the following is required to determine the floor area needed?

- ladder length
- pit house height
- area required for living space
- dimensions of the top opening

8. Which expression could you use to estimate how many adults lived in a pit house with a diameter of 9 m?

- $\pi\left(\frac{9}{2}\right)^2 \times 4$
- $\pi(9)^2 \times 4$
- $\frac{\pi\left(\frac{9}{2}\right)^2}{4}$
- $\frac{\pi(9)^2}{4}$

9. Which strategies could you use to estimate how many people lived in 12 pit houses of similar size?

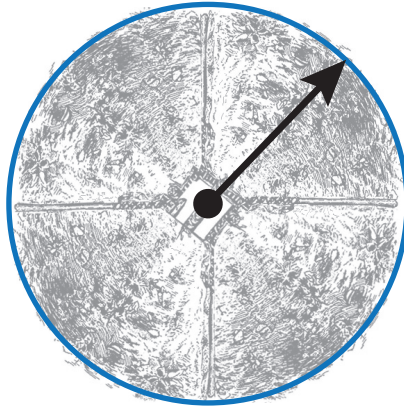
**Select all that apply.**

- Estimate the number of people who lived in 1 pit house and divide by 12.
- Estimate the number of people who lived in 1 pit house and multiply by 12.
- Estimate the total area of 12 pit houses and divide by the area required for 1 person.
- Estimate the total area of 12 pit houses and multiply by the area required for 1 person.

10. What radius is required for a pit house with 3 families and 2 couples?

Drag the point to show the required radius for the floor area of the pit house.

**Answer to the nearest metre.**



11. You estimate that approximately 10 adults lived in a pit house with a diameter of 8 m.

Using this estimate, how many adults might have lived in a pit house with a diameter of 12 m?

adults



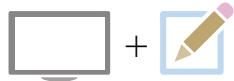
12. An archeologist calculated how many people lived in a pit house with a floor area of  $63 \text{ m}^2$ . He divided  $63 \text{ m}^2$  by 4 and said 15.75 people. This is incorrect.

What mistakes did the archeologist make?

**Select all that apply.**

- diameter of pit house not used
- number of people not rounded
- age of occupants not considered
- gender of occupants not considered
- assumed only single adults lived there
- fire pit and ladder space not considered

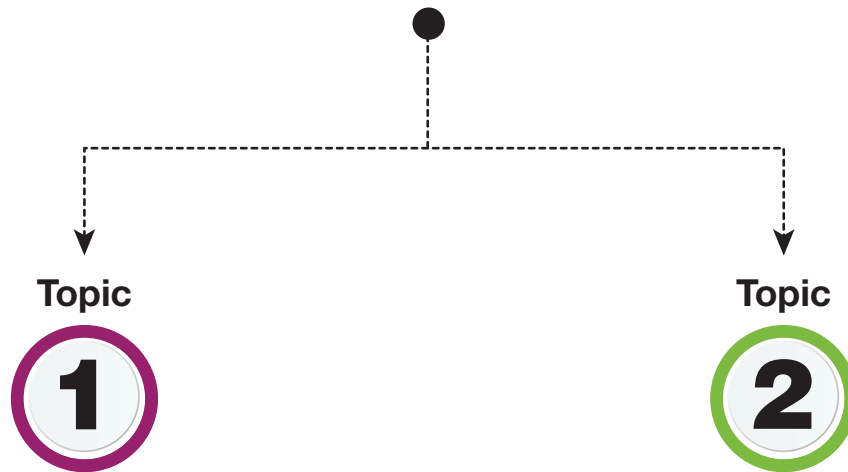
# Student-Choice Component



Questions on computer,  
*responses completed on paper response sheet*

Choose the numeracy task for which you would like to complete an extensive constructed response question. These questions are a logical progression from where the tasks are headed.

Think carefully; once you make your choice you must complete this question.



## Water Use

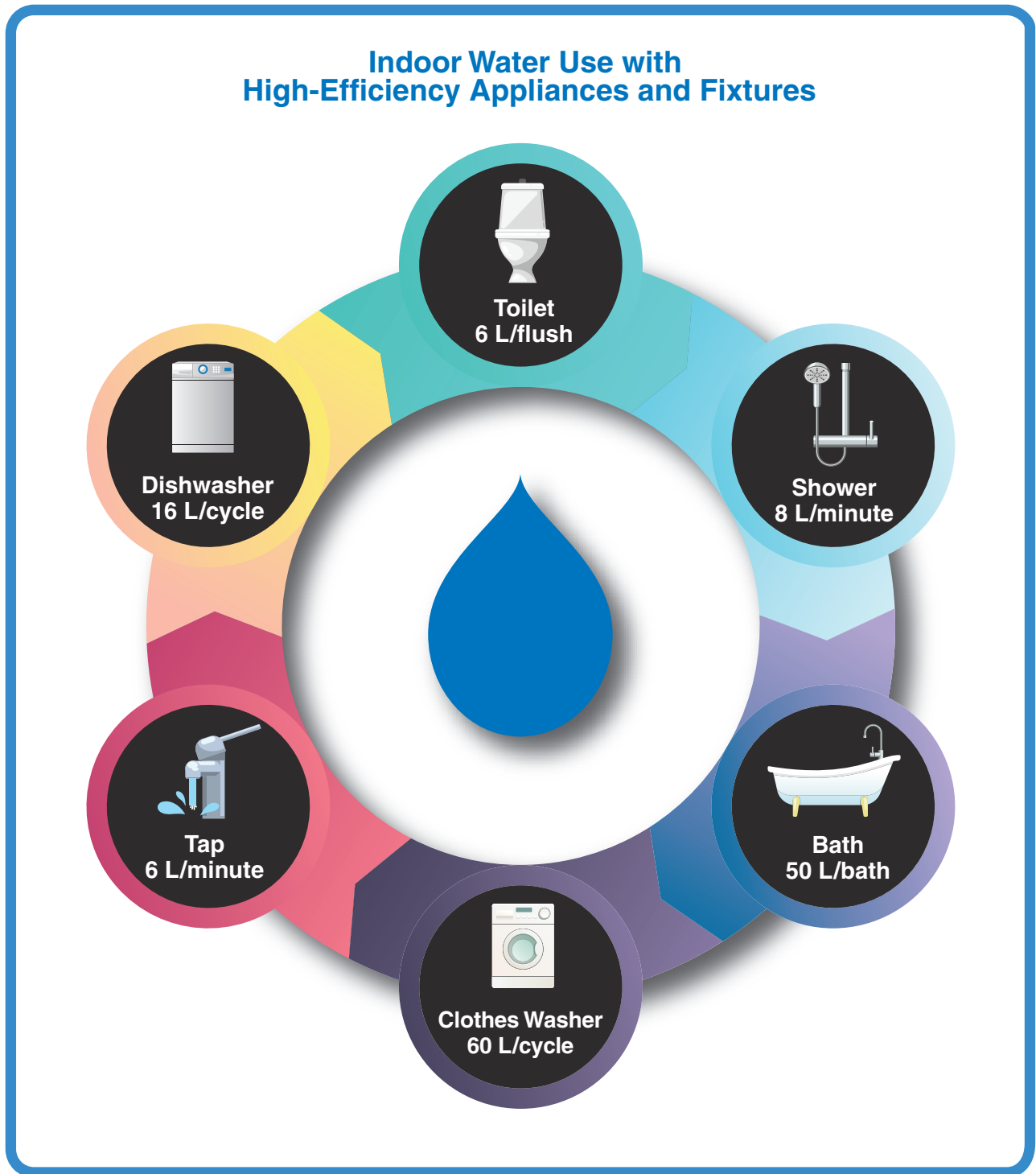


## Pit Houses





High-efficiency appliances and fixtures can help reduce the amount of water we use.



13. You want to reduce your personal water use to 1050 L/week. You install high-efficiency appliances and fixtures, and change your water-use habits.

Plan a water budget for yourself for 1 week that meets this goal using the high-efficiency appliances and fixtures.

Explain and justify your solution.

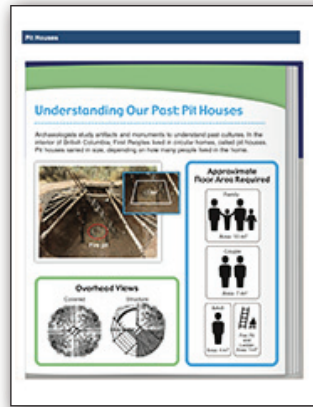
You must use everything in the table below at least once in the week.

High-Efficiency Appliances and Fixtures	
	Shower and/or bath
	Toilet
	Tap
	Dishwasher
	Clothes Washer

This question is to be answered on paper.

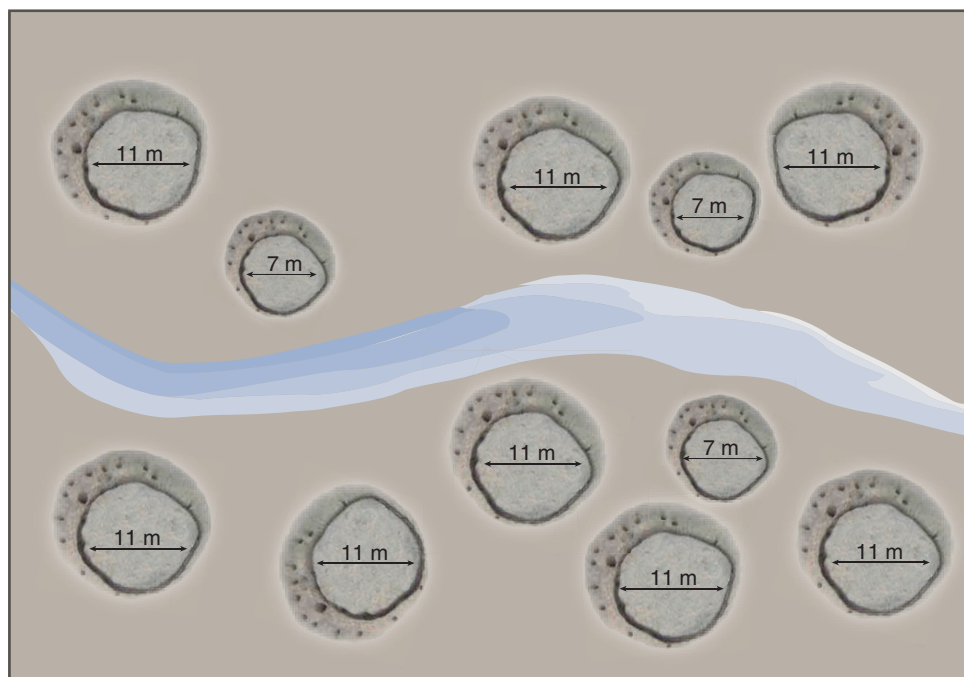
You have chosen:

# Pit Houses



## Pit Houses

13. Archaeologists examine the remains of a village of pit houses. Impressions of where the pit houses were located are still visible. The diagram below shows the remains of a village with a number of pit houses.



Estimate the number of people that could have lived in this village. State any assumptions made.

Explain and justify your solution.

This question is to be answered on paper.

# Common Component



Questions on computer,  
*responses completed on computer*

In this part you will:

- read two tasks
- complete 6 questions for each task

**Video Game Company**

Five years ago, Joe, Earl, and Ted, started a company together. They each contributed a different amount of money to start the company.

The contract governs the partnership between Joe, Earl, Ted, and... (The contract is signed by Joe, Earl, and Ted.)

The Company staff made video games.

Recently Joe, Earl, and Ted decided to close their company operations. Instead of \$5000 and \$30,000 towards the startup costs, they decided to close the company. Joe, Earl, and Ted each got 1/3 of the profit for the Company's business.

By signing below, each of them indicates an agreement of the terms of the contract as it is written.

The Company is closed several months after games. Now Joe, Earl, and Ted receive an offer from an individual who wants to buy their company.

14. What information do you need to determine who has contributed the most to the company at this point in time?

Select all that apply.

- number of employees hired
- profit earned from each video game sold
- original cost of the company equipment
- amount each number contributed at the start
- number of video games the company produced
- number of months the company was in business

15. Joe, Earl, and Ted contributed \$50,000 to the Company. Ted wants to calculate his total contribution to the Company when it starts.

Which of the following expressions should he use?

- $50,000 + 1000 + 10 + 5$
- $50,000 + 1000 + 10 + 5$
- $50,000 + 10 + 1000 + 5$

**Planet Pines**

You are being tested on changing forest fires. Your Fire Fighting Training Manual describes a forest fire spread simulation.

The map below is a fire grid. Fire starts at the top left and spreads to neighboring cells at each step.

Each cell has the following the spread using whether the probability that the cell spread that cell from a neighboring cell.

Fire Spreads	Probability of Spreading
0	Fire does not spread to neighboring cells.
1	Fire has a 50% chance of spreading into U.S. neighboring cells.
2	Fire has a 75% chance of spreading into U.S. neighboring cells.

16. If the highlighted cell is burning, which is true of the cell that has a fire spread rating of 2?

Fire has a 50% chance of spreading into the cell.  
 Fire has a 75% chance of spreading into the cell.  
 Fire has a four out of five chance of spreading into the cell.  
 Fire has a four out of five chance of spreading into the cell.



Five years ago, Jae Eun and Ted, started a company together. They each contributed a different amount of money to start the company.



The Company created several popular video games. Now Jae Eun and Ted receive an offer from an individual who wants to buy their company.

14. What information do you need to determine who has contributed the most to the company at any point in time?

**Select all that apply.**

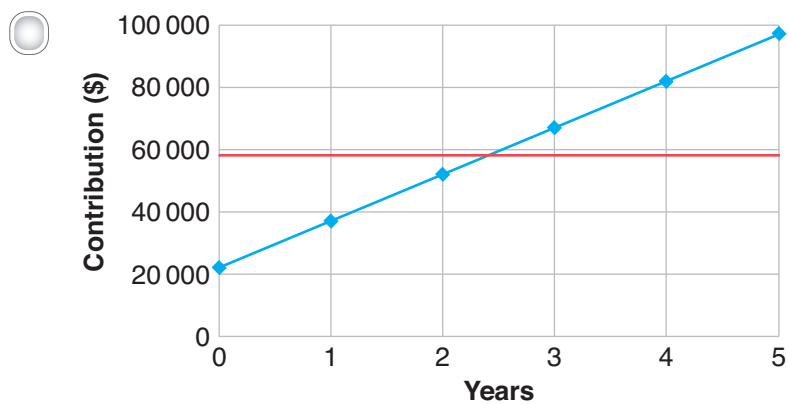
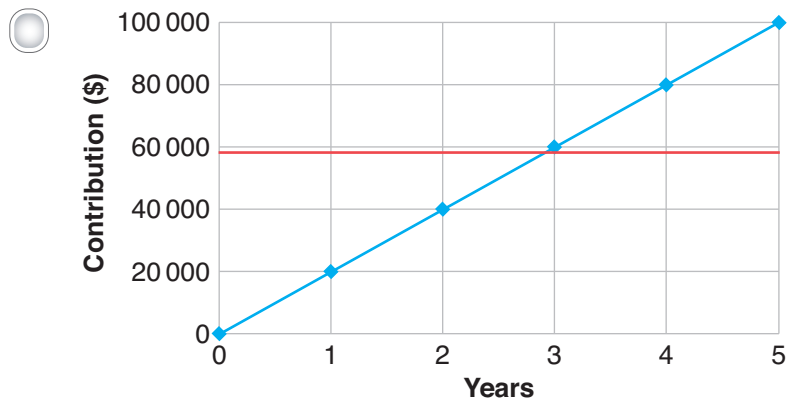
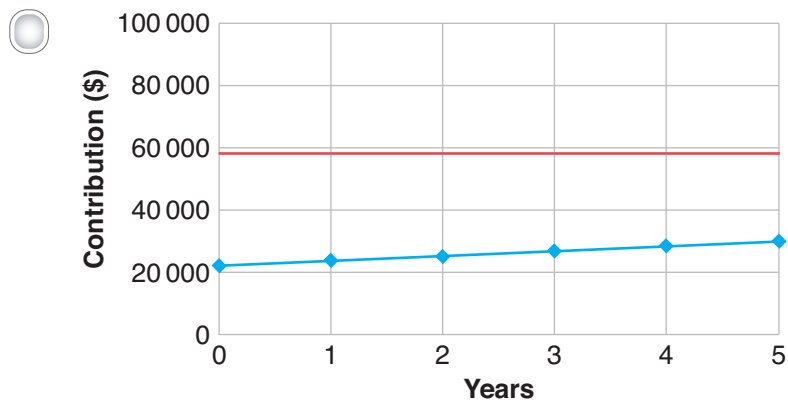
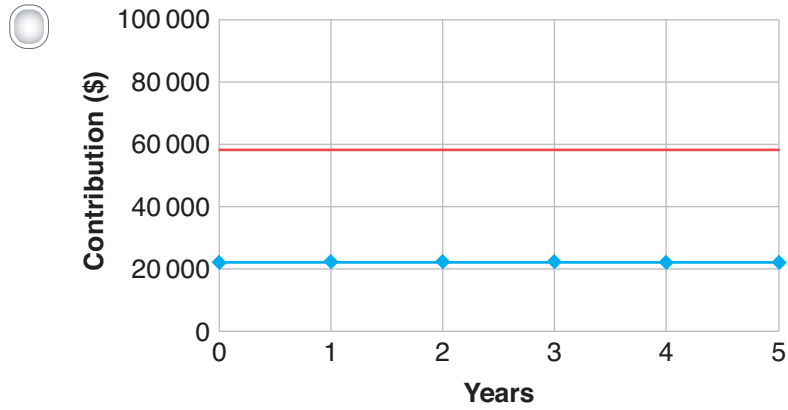
- number of employees hired
- profit earned from each video game sold
- original value of the computer equipment
- amount each founder contributed at the start
- number of video games the company produced
- number of months the company was in business

15. Jae Eun has contributed \$58 500 to The Company. Ted wants to calculate his total contribution to The Company after 5 years.

Which of the following expressions could he use?

- $22\,000 + 1250 \div 12 \times 5$
- $22\,000 + 1250 \times 12 \times 5$
- $22\,000 \times 12 \times 1250 \times 5$
- $22\,000 \times 12 \div 1250 \times 5$

16. Select the graph that shows both Jae Eun and Ted's individual contributions to The Company over the first 5 years.



17. Jae Eun contributed more than Ted towards The Company's start-up costs (including the computer equipment).

How much time after the start of The Company until Ted's contribution is equal to Jae Eun's contribution?

**Answer to the nearest month.**

year(s) and  month(s)

18. One year after Jae Eun and Ted started their company, they agree to add the following to their contract.

### ADDENDUM

The portion of The Company owned by each of The Founders is based on the total amount of money (includes the value of the computer equipment) each has contributed up to that point in time.

After 5 years, what portion of The Company does Ted own?

**Answer to the nearest percent.**

%

19. Five years after Jae Eun and Ted started their company, they receive two offers for their company.

**OFFER 1**

Sale price: \$200 000

The Founders will continue to run The Company for 5 more years and will each receive a salary of \$60 000 per year.

**OFFER 2**

Sale price: \$600 000

Jae Eun wants to accept Offer 1 and Ted wants to accept Offer 2.

Drag and drop the outcome for each of their choices.

Jae Eun  
Offer 1

Ted  
Offer 2

lower immediate sale price  
and lower overall value

lower immediate sale price  
but higher overall value

higher immediate sale price  
but lower overall value

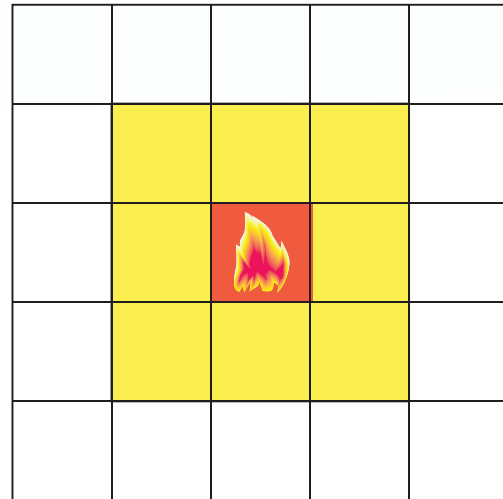
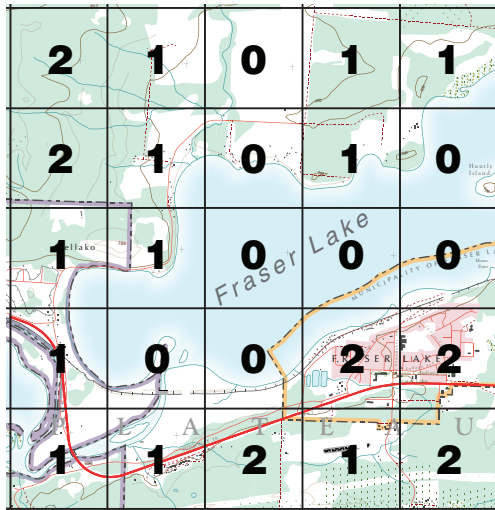
higher immediate sale price  
and higher overall value

You are being trained in managing forest fires. Your Fire Fighting Training Manual describes a forest fire spread simulation.



The map below is a fire grid. It describes the likelihood of a fire spreading to different cells.

Fire may spread from one cell into neighbouring cells as shown:



■ Burning cell    ■ Neighbouring cell

Each cell has the following fire-spread rating reflecting the probability that fire will spread to that cell from a neighbouring cell:

Fire-Spread Rating	Probability of Spreading
<b>0</b>	Fire has a 0% chance of spreading into it from neighbouring cells
<b>1</b>	Fire has a 50% chance, or probability of 0.5, of spreading into it from neighbouring cells
<b>2</b>	Fire has an 80% chance, or probability of 0.8, of spreading into it from neighbouring cells

**Example:** At time zero, the forest in the highlighted cell (🔥) is burning. There are many possible ways that the fire can spread. Two possible scenarios are shown below.



1	1	1	2
1	🔥	1	1
0	1	2	0
1	1	1	1



**Scenario 1**

3 neighbouring cells are burning.



1	1	1	2
1	🔥	1	1
0	1	2	0
1	1	1	1



5 more neighbouring cells are burning.



	1	1	2
1	🔥	1	1
0			0
1	1	1	1



**Scenario 2**

5 neighbouring cells are burning.


1	1	1	2
1	🔥	1	1
0	1	2	0
1	1	1	1



5 more neighbouring cells are burning.

1			2
	🔥		1
0	1		0
1	1	1	1

20. If the highlighted cell is burning, which is true of the cell that has a fire-spread rating of 2?

1	1	1	1
1	0	1	1
1	1		2
0	1	1	1

- Fire has a 0% chance of spreading into the cell.
- Fire has a 100% chance of spreading into the cell.
- Fire has a two out of five chance of spreading into that cell.
- Fire has a four out of five chance of spreading into that cell.



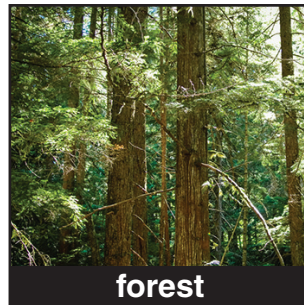
21. The environment has an effect on how quickly a fire spreads. Put the following landscapes in order from lowest-to-highest fire-spread rating.

--	--	--	--




**Low fire-spread rating (0)**

**High fire-spread rating (2)**



22. At time zero, the highlighted cell is burning.

Create an equation to calculate the probability that a fire will spread to cell A after 4 hours.

1	1	2	2	1
1	1	1	2	1
1	0	0		1
1	1	1	0	1
1	2	1	1	1

**A** →

Drag and drop the operations and probabilities into the boxes below.

−	+	×	÷
0	0.5	0.8	1

Probability =

23. At time zero, the highlighted cell is burning.



1	1	2	2	1
1	1	1	2	1
1	0	0		1
1	1	1	0	1
1	2	1	1	1

Select the cells that will be burning after 2 hours in the worst-case scenario.



1	1	2	2	1
1	1	1	2	1
1	0	0		1
1	1	1	0	1
1	2	1	1	1

24. After 4 hours, the highlighted cells are burning.



1	1	2	2	1	1	1	1
1	0	0	1	1	1	1	1
1	1	1	1	1	1	0	1
0	1	1	1	1	0	1	1
1	1	1	1	2	2	1	1
1	1	1	2	1	2	2	1
2	1	1	1	1	0	1	1
2	1	1	1	1	1	0	1

In which cell did the fire start?



1	1	2	2	1	1	1	1
1	0	0	1	1	1	1	1
1	1	1	1	1	1	0	1
0	1	1	1	1	0	1	1
1	1	1	A	B	2	1	1
1	1	1	C	D	2	2	1
2	1	1	1	1	0	1	1
2	1	1	1	1	1	0	1

- Cell A
- Cell B
- Cell C
- Cell D

25. At time zero, the highlighted cell is burning.



1	2	2	1	2	1	0	1
1	1	1	1	1	2	1	1
1	1		1	1	1	1	2
2	1	1	2	2	1	1	1
2	1	1	2	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	0	1	2	2	2
0	0	2	1	1	2	2	2

Which of the following shows a possible fire-spread pattern after 6 hours?



1	2	2	1	2	1	0	1
1	1	1	1	1	2	1	1
1	1		1	1	1	1	2
2	1	1	2	2	1	1	1
2	1	1	2	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	0	1	2	2	2
0	0	2	1	1	2	2	2



1	2	2	1	2	1	0	1
1	1	1	1	1	2	1	1
1	1		1	1	1	1	2
2	1	1	2	2	1	1	1
2	1	1	2	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	0	1	2	2	2
0	0	2	1	1	2	2	2



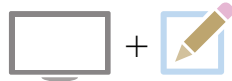
1	2	2	1	2	1	0	1
1	1	1	1	1	2	1	1
1	0		1	1	1	1	2
2	0	1	2	2	1	1	1
2	1	1	2	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	0	1	2	2	2
0	0	2	1	1	2	2	2



1	2	2	1	2	1	0	1
1	1	1	1	1	2	1	1
1	1		1	1	1	1	2
2	1	1	2	2	1	1	1
2	1	1	2	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	0	1	2	2	2
0	0	2	1	1	2	2	2



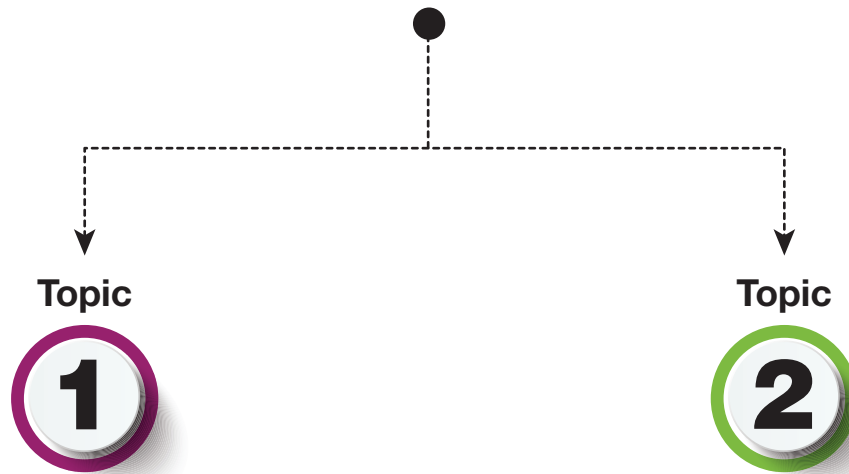
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Questions on computer,  
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Choose the numeracy task for which you would like to complete an extensive constructed response question. These questions are a logical progression from where the tasks are headed.

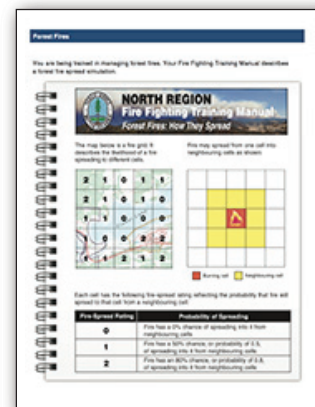
Think carefully; once you make your choice you must complete this question.



## Video Game Company



## Forest Fires



You have chosen:  
**Video Game Company**



26. Five years after the start of The Company, The Founders decide to sell it for \$750 000. To determine their fair share of the sale price, they agree that any contributions made towards start-up costs will be worth 1.5 times their original value. Contributions made after start-up will not be adjusted.

How much should Jae Eun and Ted each receive from the sale of their company?

Explain and justify your solution.

This question is to be answered on paper.



You have chosen:

# Forest Fires



**Forest Fires**

You are being tested in managing forest fires. Your Fire Fighting Training Manual describes a forest fire spread situation.

**NORTH REGION**  
Fire Fighting Training Manual  
Forest Fires: How They Spread

The map below is a 6 by 6 grid. It describes the likelihood of a fire spreading to adjacent cells.

Fire may spread from one cell into neighbouring cells as shown.

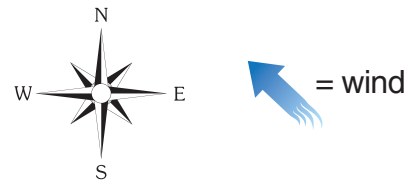
2	1	0	1	1	
2	1	0	1	0	
1	1	0	0		
0	0	2	2		
1	1	2	1	1	

Each cell has the following fire spread rating reflecting the probability that the cell adjacent to that cell will be a neighbouring cell.

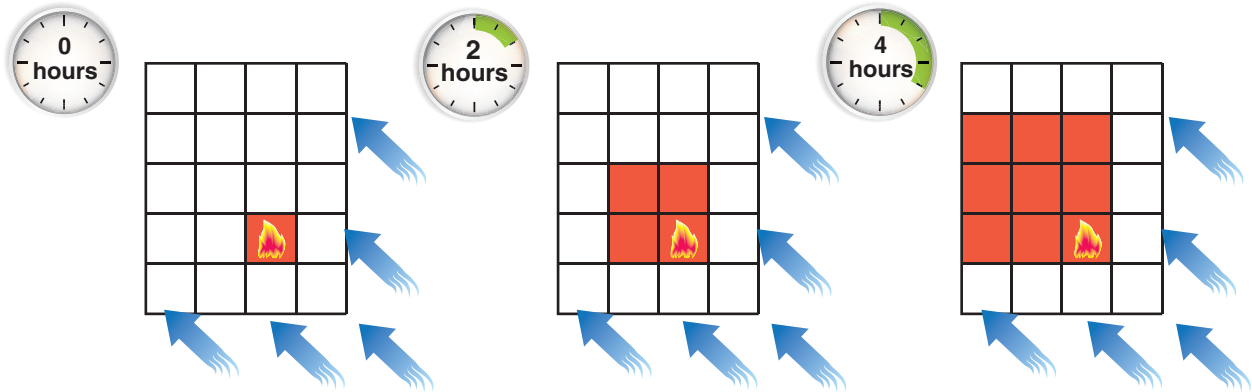
Fire Spread Rating	Probability of Spreading
0	Fire has a 0% chance of spreading into 4 from neighbouring cells.
1	Fire has a 50% chance, or probability of 0.5, of spreading into 4 from neighbouring cells.
2	Fire has an 80% chance, or probability of 0.8, of spreading into 4 from neighbouring cells.

# Forest Fires

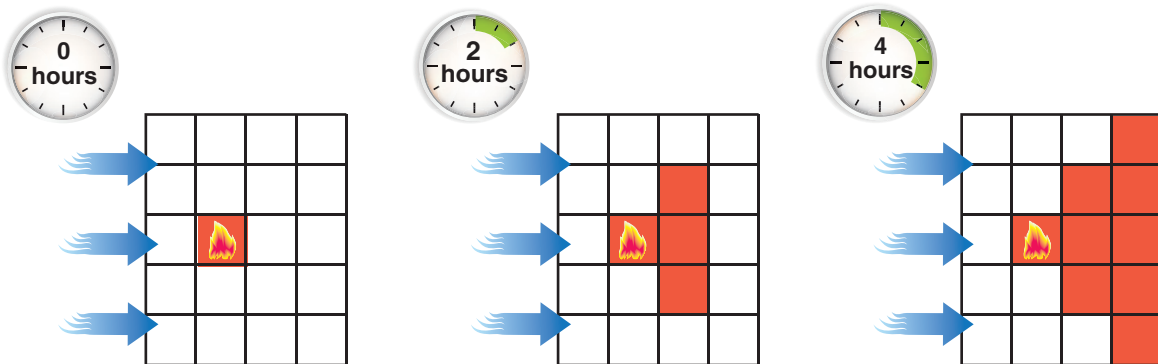
Strong wind conditions can affect the spread of fire into neighbouring cells.



## Wind from the south-east



## Wind from the west



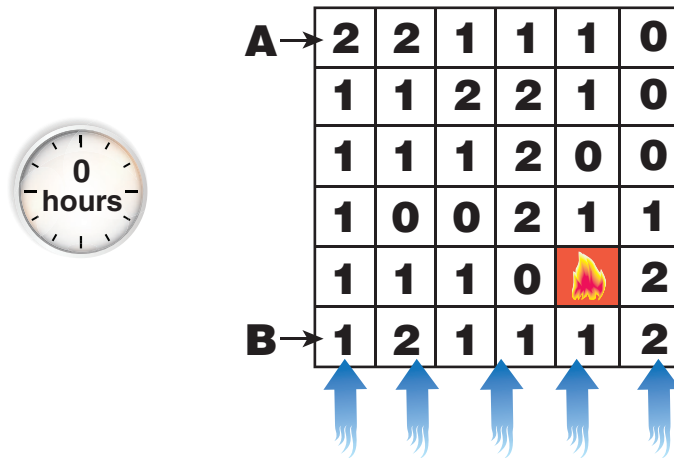
Wind **increases** the probability of fire spreading into neighbouring cells which are **downwind**, and wind **decreases** the probability of fire spreading into neighbouring cells which are **upwind**:

Fire-Spread Rating	Probability of Fire-Spreading		
	Neighbouring (no wind)	Downwind Neighbouring	Upwind Neighbouring
<b>0</b>	0	0	0
<b>1</b>	0.5	0.8	0.2
<b>2</b>	0.8	1.0	0.3

26. At time zero, the highlighted cell is burning and there is a strong, constant wind blowing from the south. There are people living in the areas within cell A and cell B.

What is the minimum time it would take the fire to reach cells A and B?  
 What is the likelihood of the fire spreading to cells A and B within that time?

Explain and justify your solution.



This question is to be answered on paper.

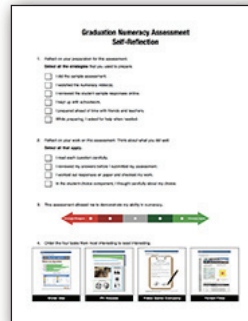
# Self-Reflection Component



Questions on computer,  
*responses completed on computer*

In this part you will:

- complete 4 questions



# Self-Reflection

1. Reflect on your preparation for this assessment.

Select all the strategies that you used to prepare.

- I did the sample assessment.
- I watched the numeracy video(s).
- I reviewed the student sample responses online.
- I kept up with schoolwork.
- I prepared ahead of time with friends and teachers.
- While preparing, I asked for help when needed.

2. Reflect on your work on this assessment. Think about what you did well.

Select all that apply.

- I read each question carefully.
- I reviewed my answers before I submitted my assessment.
- I worked out responses on paper and checked my work.
- In the student-choice component, I thought carefully about my choice.

3. This assessment allowed me to demonstrate my ability in numeracy.



4. Order the four tasks from most interesting to least interesting.

