



MATH ON THE JOB

The banks of the Kennebecasis River near Bloomfield, New Brunswick, border Evelyn Cassidy's dairy farm and her Farm Stay Bed and Breakfast. Evelyn is the self-employed owner and operator of these businesses.

Evelyn makes a point of taking courses that contribute to her skills as a host and businessperson. She has studied agriculture, French, computer programs, cooking, and risk management and outdoor adventure. She has attended New Brunswick Community College, the University of New Brunswick, and is a graduate of Hampton High School.

"Being self-employed, I have to do every job involved in my work. I use math all the time," Evelyn says. For example, she must calculate costs, prices, profit, guest bills, and staff wages.

Suppose Evelyn hires two part-time employees, one to help her guide tours and one to help her with cooking and cleaning for the bed and breakfast. Each person works 5 days a week. The guide makes \$10.50 an hour and works 15 hours per week. The cook/cleaner works for 25 hours in one week and makes a total of \$268.75 before taxes. How much will Evelyn pay the tour guide for one week's work? What hourly wage will Evelyn pay the cook/cleaner?



Evelyn in the kitchen of her Farm Stay Bed and Breakfast. Evelyn also runs tours on her dairy farm where participants have the chance to sample dairy products, learn how to milk a cow, and feed a calf.

SOLUTION

To calculate the tour guide's weekly earnings, multiply the number of hours worked by the rate of pay for the job.

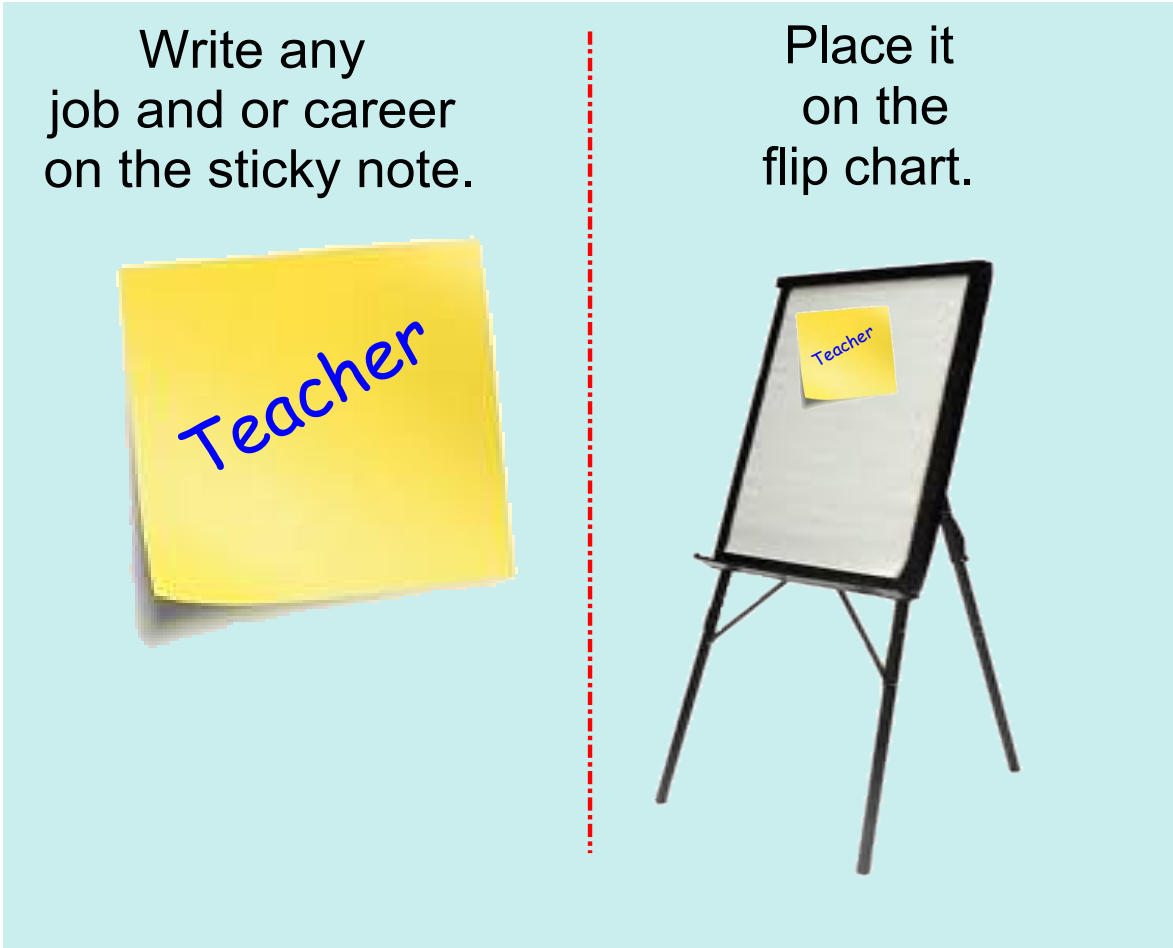
$$15 \text{ h} \times \$10.50/\text{h} = \$157.50$$

The tour guide will earn \$157.50 in one week, before taxes.

To calculate the cook/cleaner's hourly wage, divide the weekly amount earned by the number of hours worked.

$$\$268.75 \div 25 = \$10.75$$

The cook/cleaner earns an hourly wage of \$10.75.



Minimum Wage

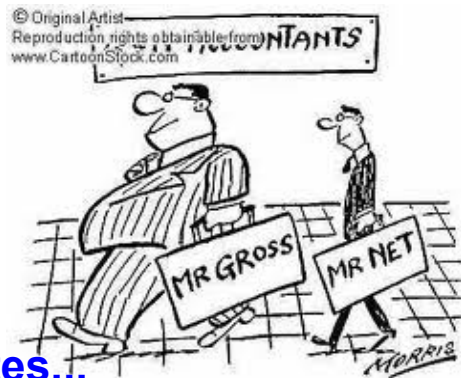
- the minimum amount a worker must be paid an hour.

this rate varies, depending on which province or territory you live in

Alberta	\$8.80
British Columbia	\$8.75
Manitoba	\$9.50
New Brunswick	\$9.50
N.L.	\$10
NWT	\$10
Nova Scotia	\$9.65
Nunavut	\$11
Ontario	\$10.25
P.E.I.	\$9.30
Quebec	\$9.65
Saskatchewan	\$9.25
Yukon	\$9

Gross Pay

the total amount
of money earned
(pay before deductions)



Overtime

work beyond a normal
work week (40 hours)

Rates...

- time and a half: your regular rate plus half of your regular rate (Rate x 1.5)
- double time: double your hourly rate (Rate x 2)
- triple time: triple hourly rate (Rate x 3)

Net Pay - after deductions
- take home pay

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Check out the **pay statement**
on page 55
and answer questions 1 to 4.

**ACTIVITY 2.1
INTERPRETING PAY STATEMENTS**

Work in a small group to complete this activity. Your friend Jolie has started a job as an apprentice elevator repairperson. Study her first **pay statement**, which is shown below. Pay statements are provided by the employer.

pay statement: a form an employer gives an employee that shows earnings and deductions from earnings for a defined pay period

Employee Name: Jolie			
Company: ABC Elevator Repair		Pay Begin Date: 10/13/2011	Pay End Date: 10/19/2011
General			
Employee ID: 999999	Job Title: Elevator repair apprentice		
Address:	Pay Rate: \$19.00/h Annual:		
Hours and Earnings			
Description	Rate	Hours	Gross Earnings
Regular	19.00/h		\$712.50

1. How many days does the pay period cover? $\frac{712.50}{19} = 37.5$ hr
2. If Jolie's gross earnings are \$712.50, how many hours did she work?
3. Did she earn more or less than the minimum wage in your province or territory? *More we only get \$11.50/hr*
4. Develop a formula Jolie could use to calculate her earnings for any given pay period.
Pay Rate x # hours = gross pay



EX #1: Each summer, Rick works at a home show in Halifax as a parking lot attendant. His wages this year are \$9.76 an hour and his hours of work vary from week to week. He worked 25 hours for the week August 14–20 and 35 hours for the week August 21–27.

Rick's pay statement is shown below. Check it for accuracy and correct any errors you find.

Employee Name: Rick			
Company: Nova Scotia Spring Ideal Home Show		Pay Begin Date: 14/08/2011	Pay End Date: 27/08/2011
General			
Employee ID: 999999	Job Title: Parking lot attendant		
Address:	Pay Rate: \$9.76/h Annual:		
Hours and Earnings			
Description	Rate	Hours	Gross Earnings
Regular	\$8.76 <i>9.76</i>	60	\$585.66 <i>\$525.60</i>

DISCUSS THE IDEAS**TYPES OF EARNINGS**

Working with a partner, discuss the following questions:

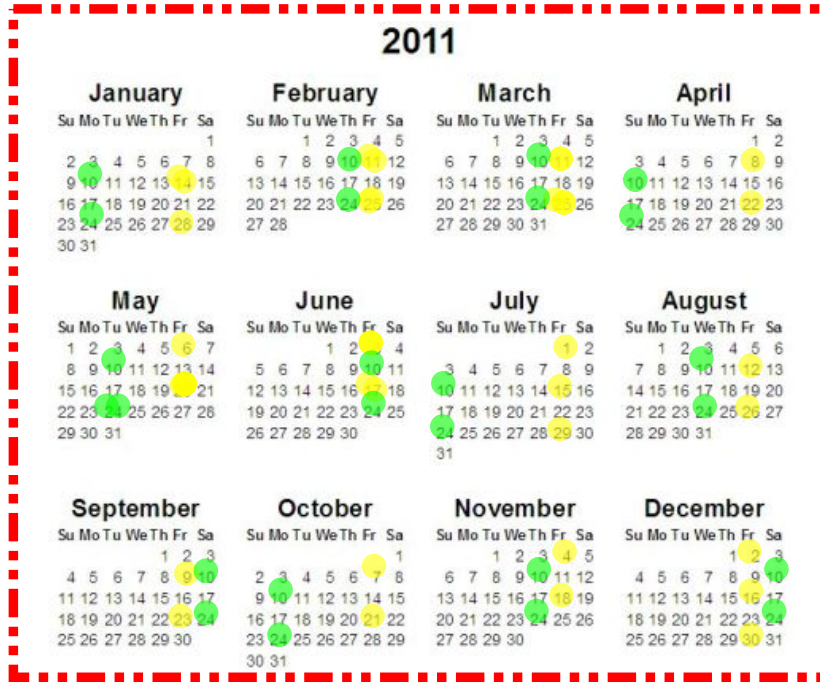
1. Make a list of the different ways people are paid.
2. What are several different types of jobs that fall into each category of pay?
3. Is there an advantage to being paid weekly rather than monthly? Why do you think most workers are not paid weekly?
4. If you worked at a job in which you earned an annual salary that was paid monthly, and you worked more than 40 hours in a week, how might you be compensated for your overtime work?

SOLUTIONS

1. People can be paid weekly, biweekly, semi-monthly, monthly, daily, hourly, annually, by contract, on commission, and by piecework.
2. Answers will vary. Examples of daily, hourly, or weekly paying jobs include temp work, administrative jobs, part-time work, and construction jobs. Examples of biweekly, semi-monthly, and monthly paid jobs include full-time work, retail jobs, administrative work, teaching, and clerical positions. Jobs paid on a piecework basis include delivering newspapers or flyers, manufacturing, sewing, floor installation, and cabinet installation. Commission based jobs include retail sales, car sales, and selling real estate. Contract work includes house painting and construction.
3. Answers will vary. One advantage to weekly pay is having more pay periods a year (52 rather than 12). Another advantage is that you would be paid sooner when you start a new job. One reason most workers are not paid weekly is because it would be expensive for a company to have to process payroll payments every week.
4. Most people who work on an annual salary don't get paid overtime. In some cases, an employer may offer time off in lieu of overtime pay.

Salaries

- a fixed amount of money that is paid over one year.
- daily pay periods - salary divided by 365
- weekly pay periods - salary divided by 52 weeks
- bi-weekly pay periods - salary divided by 26
- monthly pay periods - salary divided by 12
- quarterly pay periods - salary divided by 4



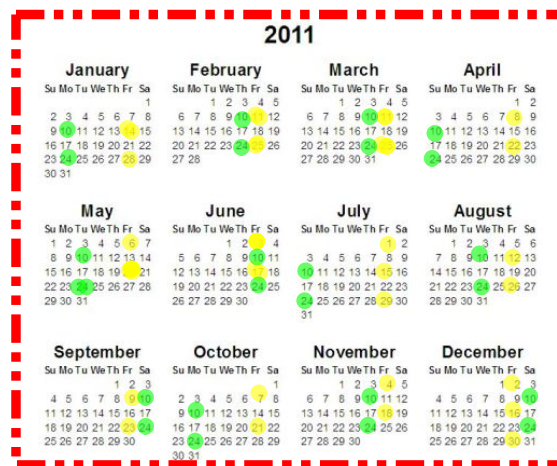
Biweekly

What is the difference?

Semi-monthly

Paid every two weeks. 26 pays

Paid twice a month. 24 pays



Biweekly

What is the difference?

Semi-monthly

Paid every two weeks. 26 pays

Paid twice a month. 24 pays

$$\frac{52 \text{ weeks in a year}}{2}$$

$$= 26 \text{ pays}$$

$$12 \text{ months} \times 2$$

$$= 24 \text{ pays}$$

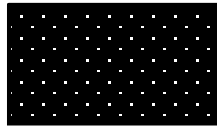


EXAMPLE #2...

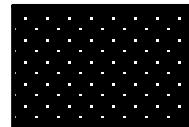
Amos was hired to be the office clerk at an insurance company. His annual salary will be \$34 756.00.

- a) Why is Amos not paid annually for his work? *He needs money*
- b) Would he earn more each pay period if he were paid **semi-monthly** or **biweekly**?

Semi-monthly: $\frac{\$34\,756.00}{24}$
\$1448.17



Biweekly: $\frac{\$34\,756.00}{26}$
\$1336.17



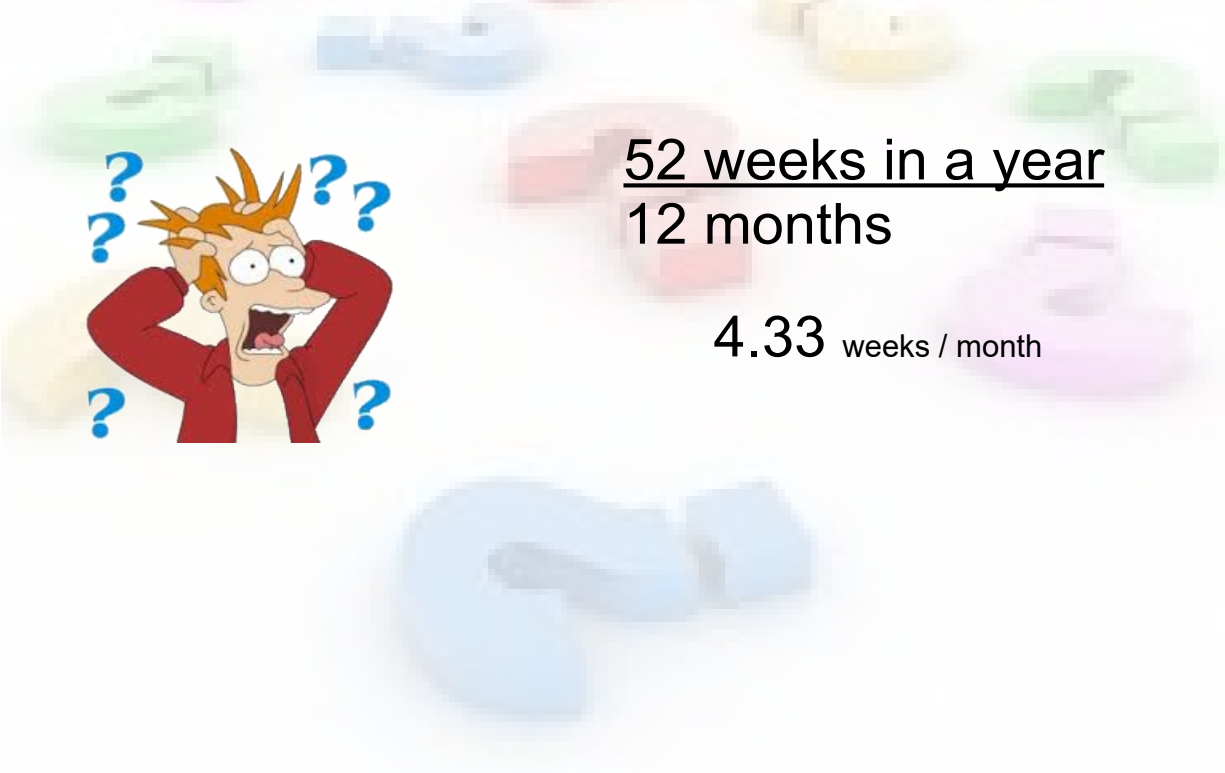
How many weeks are in a month??



I
always
thought
there
were
4!!

$$\frac{52 \text{ weeks}}{12 \text{ months}} = 4.\bar{3} \text{ wk/mos}$$

How many weeks are in a month??



52 weeks in a year
12 months

4.33 weeks / month

EX #3:

Laura's regular rate at her job in a warehouse is \$9.86 an hour. She works 8 hours a day. She has to work an extra shift on a holiday, and her overtime rate is time and a half.

- a) What are Laura's gross earnings for the holiday?

$$\begin{array}{c} \text{"time and a half"} \\ \downarrow \\ \$9.86 \times 1.5 = \$14.79 \end{array}$$

$$\begin{array}{c} \$14.79 \times 8 \\ \$118.32 \end{array}$$



- b) What is her hourly rate on the holiday?

$$\$9.86_{hr} \times 1.5 = \$14.79_{hr}$$

EX #4:

Gregor works as a glazier, a person who cuts and fits glass, at a window manufacturing company in Miramichi, NB. He earns \$19.99/h for 37.5 hours a week and time and a half for any hours over that. Gregor examines the schedule for the upcoming week, shown here.

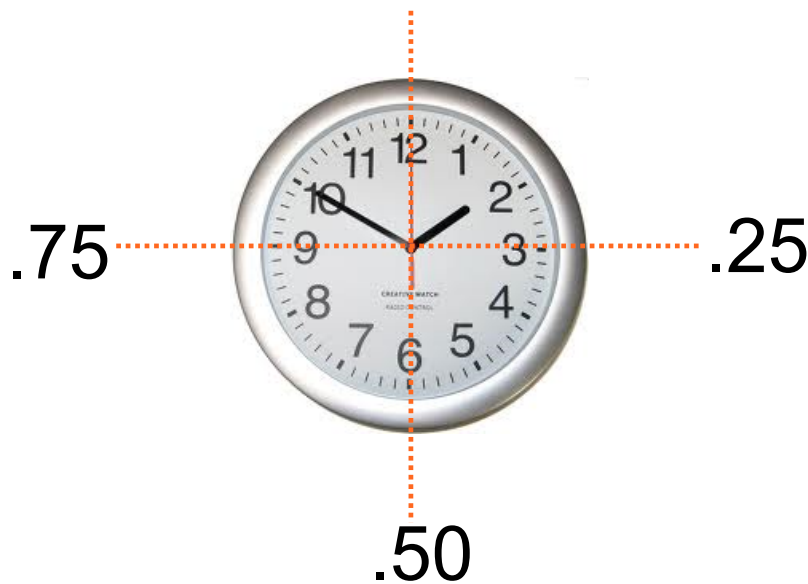
WEEKLY SCHEDULE			
Employee Name	Day	Start time	End time
Gregor	Sunday		
	Monday	8:00 am	4:00 pm 8
	Tuesday	8:15 am	4:00 pm 7.75
	Wednesday	8:00 am	3:30 pm 7.50
	Thursday	8:00 am	4:00 pm 8
	Friday	9:00 am	4:15 pm 7.25
	Saturday	8:30 am	6:30 pm 10.00
			\$48.50



Ritchie Wharf Park is a popular tourism destination for those visiting Miramichi, New Brunswick.

- a) Describe your strategy for determining the number of hours Gregor will work each day and express these amounts as decimals.
- b) How many hours of overtime will he work?

$48.50 - 37.50 = 11.00 \text{ O.T.}$



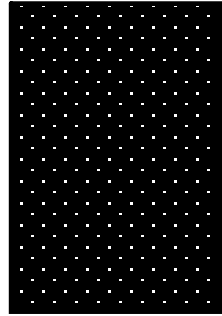
Employers don't usually pay for every minute. Round off the hours to the nearest quarter hour.

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WEEKLY SCHEDULE

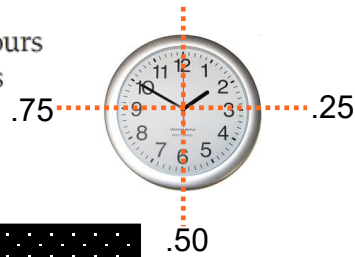
Employee Name	Day	Start time	End time
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	Thursday	8:00 am	4:00 pm
	Friday	9:00 am	4:15 pm
	Saturday	8:30 am	6:30 pm

= 8 hours
 = 7.75 hours
 = 7.5 hours
 = 8 hours
 = 7.25 hours
 = 10 hours
48.5 hours



a) Describe your strategy for determining the number of hours Gregor will work each day and express these amounts as decimals.

b) How many hours of overtime will he work?



ONE LAST EXAMPLE...

Liberty works as a plumber. She receives \$24.50/hr plus time and a half for the first 8 hours of overtime and double time for anything beyond that time. If she has worked a 50 hour week, what is her gross pay?

Reg Pay 24.50×40 \$980.00
 Time + half $24.50 \times 1.5 \times 8$ 294.00
 Double Time $24.50 \times 2 \times 2$ 98.00
 Total \$1372.00

THE ROOTS OF MATH

THE MINIMUM WAGE IN CANADA

In Canada, there is a minimum wage that guarantees a minimum level of income for employees. The minimum wage is set by the provinces and territories and varies from one province or territory to another. Although the minimum wage is intended to guarantee a basic living wage for less skilled positions, there are several sectors in the economy, such as the service industry, where the minimum wage is the norm, no matter how much experience an individual has. The minimum wage is used as a benchmark for other wages. When the minimum wage rises in response to rising costs of living, other wages also rise.



This photo was taken in 1919 in Springhill, Nova Scotia. It shows workers and soldiers marching together. The workers are marching to protest poor working conditions, lack of bargaining power, and low wages. The same year, more than 30 000 workers took part in the Winnipeg General Strike to protest the same conditions.

Until the twentieth century, there was no minimum wage standard anywhere in Canada. Employers could offer people whatever wages they chose to. Many people who worked in factories or in service industries were paid at very low levels and worked very long hours to make enough money to survive.

Achieving laws that require a minimum wage level was the work of tradespeople who joined together in trade unions in the late nineteenth century. They worked together to improve their working conditions and rates of pay. By 1912, 160 000 Canadians belonged to trade unions, and the first minimum wage legislation was passed in British Columbia and Manitoba in 1918. In 1920, Ontario, Quebec, Nova Scotia, and Saskatchewan passed minimum wage laws. Gradually, all the provinces and territories passed minimum wage laws. The last to do so was Prince Edward Island, in 1960.

While most provinces and territories state their minimum wage as an hourly rate, some also have weekly and monthly minimums. Alberta, for example, has a minimum weekly and a minimum monthly wage standard. These apply to certain types of jobs, such as salespeople and domestic workers.

1. What is the minimum wage in your province? How does it compare to the rates in other provinces?
2. What is the annual wage paid in your province if someone earns the minimum wage and works 40 hours a week?
3. Do you think it is sensible to have laws that govern minimum wages?

SOLUTIONS

1. The minimum wage for the students' province or territory can be found on the provincial or territorial website. Students will have already researched their rate for their project.
2. The annual wage will be found by multiplying the hourly minimum wage by 40 hours and then by 52 weeks. Actual answers will vary according to jurisdiction.
3. Answers will vary, but students will likely agree that it is sensible to have minimum wage legislation to protect working people and assure them a minimum standard of living.

JOBS AND CHORES THAT REQUIRE MATH

<i>Job/chore</i>	<i>Math used</i>
retail sales	calculating purchase amounts, including taxes and discounts
restaurant worker	calculating tips
working at an amusement park	counting tickets, making sales, estimating wait times
stocking shelves	calculating how much stock fits on shelves and how much a dolly can carry at one time
newspaper delivery	using reason and logic to determine the best routes, estimating how long delivery takes
cooking	measuring ingredients, calculating timing
cleaning	measuring cleaning products, mixing solutions
laundry	measuring detergent, telling time



HOMEWORK...

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Questions 1 to 10

[2.1 Build Your Skills Detailed Solutions.pdf](#)



2.1 Build Your Skills Detailed Solutions.pdf