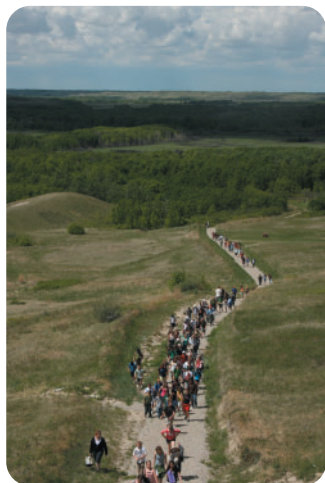# Solving Percent Problems

GOAL

Estimate and calculate percents to solve problems.

A Grade 6 class is planning a 300 km bus trip to Blackfoot Crossing Historical Park. The bus ride will take about 4 h. The students want to figure out how long and how far they will travel before they pass these landmarks:
- the "Welcome to Alberta" sign at 10% of the way
- the picnic sign at 50% of the way

? When will they pass each landmark?

Jason's Number Line

I need to figure out the time and distance the students will travel before they pass each landmark. I'll assume that they will be going about the same speed for the whole trip.

100% of the trip is 300 km and takes 4 h.

The picnic sign is at 50%, which is $\frac{1}{2}$ the trip.

I can divide the total distance and total time by 2 to figure out half of each.

300 km ÷ 2 = 150 km   4 h ÷ 2 = 2 h

I'll mark a number line to show the percents, distances, and times for 0%, 50%, and 100% of the trip. I'll mark the picnic sign at 50%.

School	Picnic sign	Park
0%	$50\% = \frac{1}{2}$	100%
0 km	150 km	300 km
0 h	2 h	4 h

NEL
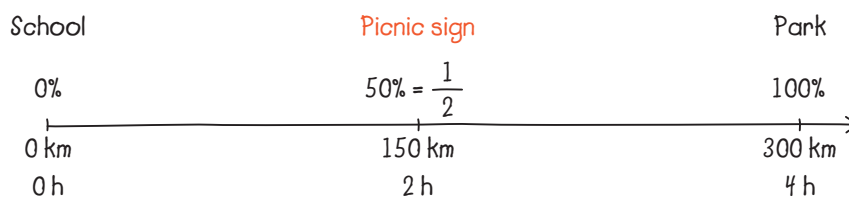
The welcome sign is at 10%. To figure out the time and distance for 10%, I can divide 100% by 10 since $\frac{10}{100} = \frac{1}{10}$.

300 km ÷ 10 = 30 km   4 h ÷ 10 = 0.4 h

	Welcome sign		Picnic sign		Park
School					
0%	10% = $\frac{1}{10}$		50% = $\frac{1}{2}$		100%
0 km	30 km		150 km		300 km
0 h	0.4 h		2 h		4 h
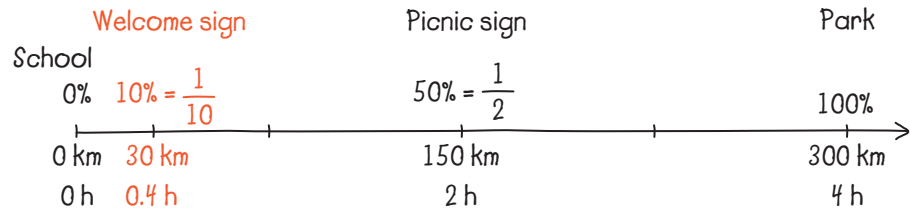
The students will pass the picnic sign after travelling for 2 h or 150 km.

They will pass the "Welcome to Alberta" sign after travelling for 0.4 h or 30 km.

Reflecting

A. How could you use the values for 10% and 50% to estimate the values at other percents on the number line?

B. How did drawing the number line help you estimate or check your answers?

Checking

Blackfoot Crossing
Historical Park
60 km➡

1. What percent of the 300 km trip is left to complete after the students pass the sign at the left?

Practising

2. Decide whether each estimate seems reasonable. Explain your reasoning. Use a number line to help you.
   a) 25% of 39 is about 10.
   b) 90% of 210 is about 120.
   c) 40% of 56 is about 15.
   d) 16% of 99 is about 16.

3. Angela had 40 invitations to write. She wanted to finish at least 75% of them over the weekend.

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0%         25%         50%         75%        100%
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-->
0                                                40
```

    a) How many invitations are 50% of the total? Explain.
    b) How can you use your answer for part a) to decide how many invitations Angela must finish over the weekend?
    c) How many invitations are 75% of the total?

4. Between 20% and 25% of children in British Columbia eat the recommended five servings of vegetables a day. In a class of 32 students, about how many students do you think eat the recommended number of servings of vegetables? Show your work.

5. In 2007, 81% of the 12 million households in Canada had broadband Internet connections. How do you know that more than 9 million of these households had broadband connections in 2007?

6. Estimate or calculate each percent. Show your work.
    a) 50% of the students in a class of 24 students
    b) 10% of the cost of a T-shirt if the whole cost is $12.99
    c) 25% of a 10 kg bag of sugar

7. People often use 120 L of water to take a shower. A low-flow shower head can reduce water use by 30%.
    a) About how much water would be saved if a low-flow shower head cut water use by 10%?
    b) About how much water would be saved by cutting water use by 30%? Show your work.

8. Some people use 10%, 25%, and 50% as **benchmarks** to help them estimate and calculate other percents.
    a) Why might these percents be easier to estimate than other percents of a number?
    b) How could you use these benchmark percents to estimate 30%, 60%, and 75% of a number?