**For scenarios 1–3 below, fill in all the information you can on the bar model diagram. Then use it to ask and answer as many questions as you can. (Also feel free to draw the models differently if you prefer.)**

Important Note: Bar models are a tool for problem solving. They can be used in multiple ways. The "answers" provided here are possible ways to use bar models to model the scenarios but are not the <u>only</u> ways. In these diagrams, information that is given in the scenario is not underlined and information that can be deduced from the given information is underlined. The questions and answers given are examples. You might come up with others!

1. It takes you 45 minutes to get to work in the morning and 20 minutes longer than that to get home.

Travel time to work | 45 min | 20 min ▶

Travel time home | 65 min |
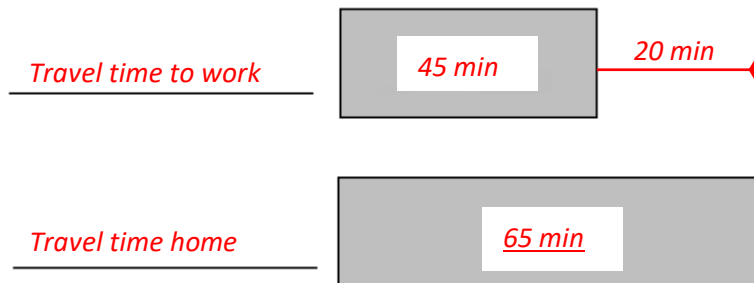
My questions and answers:

How long does it take to get home? 65 min or 1 hr and 5 min

How much time do I spend commuting all together? 110 min or 1 hr and 50 min

Is my commute home more or less than twice as long as my commute to work? Less than twice as long.

2. The cost of three large pizzas and a liter of soda is $29. The soda costs $2.

Total cost: $29

| $9 | $9 | $9 | $2 |

Cost of a pizza   *Cost of soda*
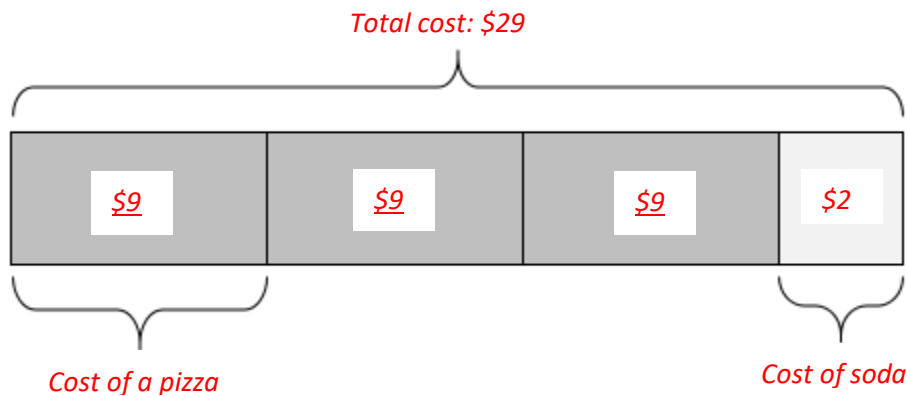
My questions and answers:

Assuming all the pizzas were the same price, how much was each one? $9

How much were the pizzas all together? $2

3. Zaman, Consuela, and Chenda collected canned goods for a food drive. Together they collected 500 cans! Zaman collected 20 more cans than Consuela. Consuela collected twice as many cans as Chenda.

Zaman's cans | 96 | 96 | 20 |

Consuela's cans | 96 | 96 |

Chenda's cans | 96 |

500 cans
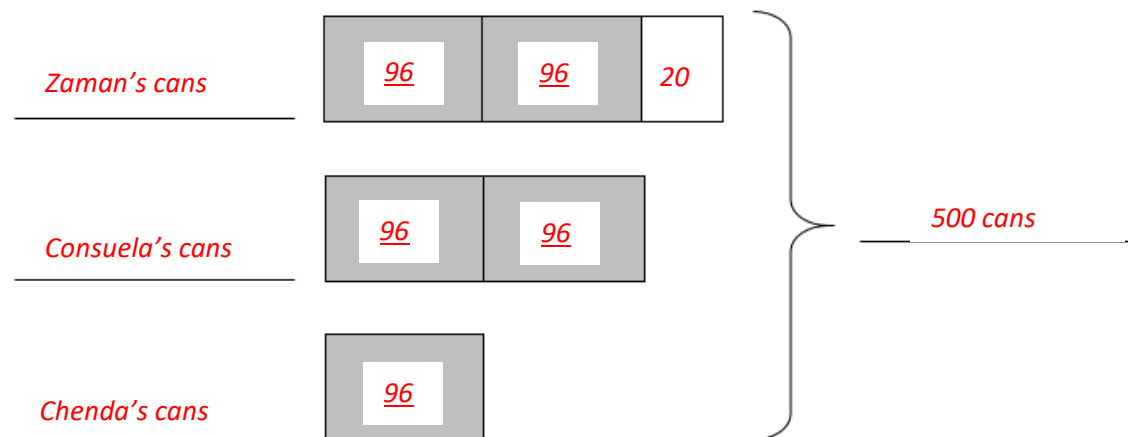
My questions and answers:

How many cans did each person collect? Zaman: 212, Consuela: 192, Chenda: 96

*How many more cans did Consuela collect than Chenda?* 96

How many cans did Consuela and Chenda collect together? 288

More questions and answers along these lines are possible!

For scenarios 4–9, draw a bar model yourself and then use it to ask and answer questions.

4. A recent local election between two candidates was decided by only 15 votes! The winning candidate got 228 votes.
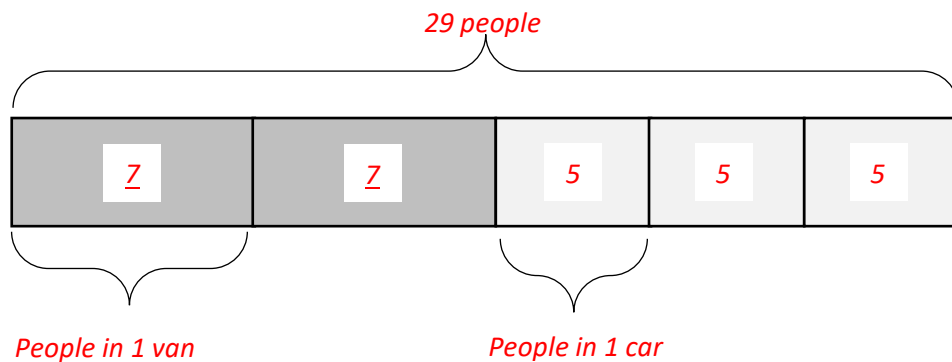
My model:

Winner's votes

| 228 |

Loser's votes

| <u>213</u> |

15 votes
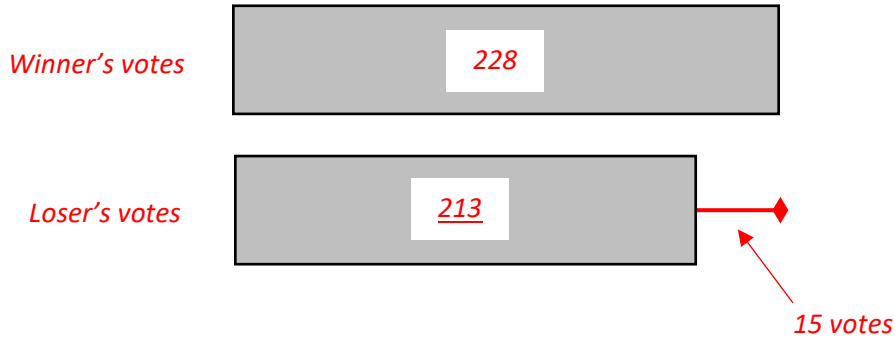
My questions and answers:

How many votes did the losing candidate get? 213

How many votes were cast in the election? 441

5. 29 people went on a trip in 2 vans and 3 cars. Each car held 5 people and every vehicle was full.

My model:

29 people

| <u>7</u> | <u>7</u> | 5 | 5 | 5 |

People in 1 van   *People in 1 car*

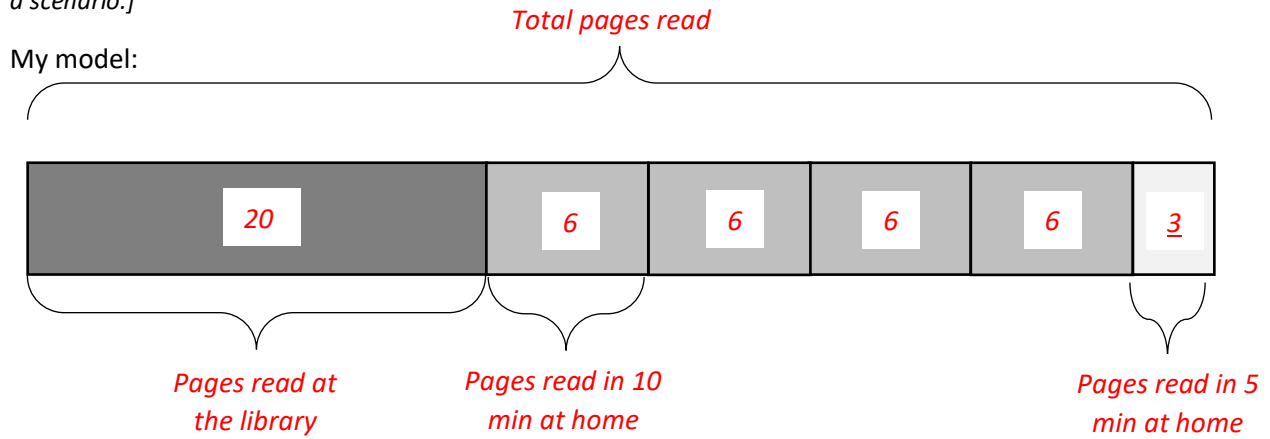My questions and answers:

How many people rode in cars? 15

How many people rode in vans? 14

How many people rode in each van? 7

6. On Tuesday, Liane read the first 20 pages of a book at the library. Then she took the book home and read it at a rate of 6 pages every 10 minutes. Liane read at this rate for 45 minutes.
[This scenario is from the 2014 grade 10   MCAS. The question has been removed to make it a scenario.]

My model:

Total pages read

| 20 | 6 | 6 | 6 | 6 | 3 |

Pages read at the library   *Pages read in 10 min at home*   *Pages read in 5 min at home*

My questions and answers:

How many pages did Liane read all together? 47
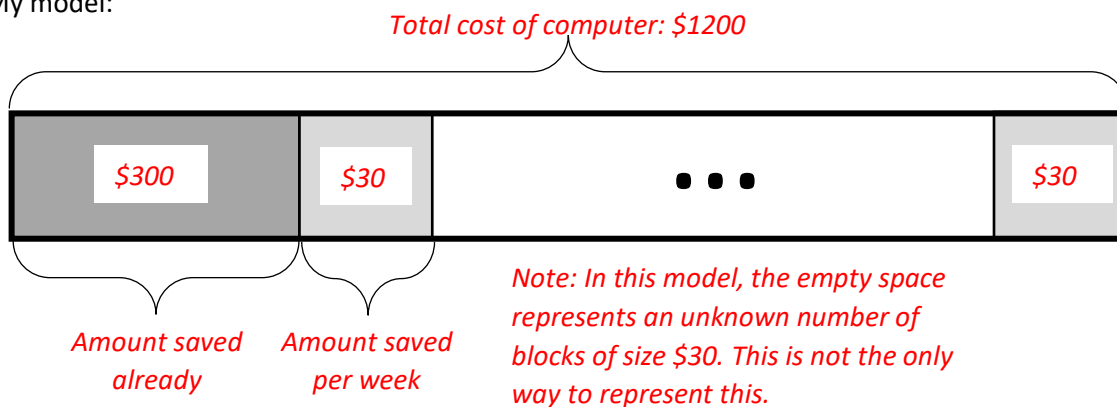
How many pages did Liane read at home? 27

7. Shirley is saving money to buy a computer.

- The computer she will buy costs $1,200.
- She has already saved $300.

Shirley will save another $30 each week until she has saved enough money to buy the computer.
[This scenario is from the 2017 grade 10 MCAS. The question has been removed to make it a scenario.]

My model:

Total cost of computer: $1200

| $300 | $30 | • • • | $30 |

Amount saved already   *Amount saved per week*   *Note: In this model, the empty space represents an unknown number of blocks of size $30. This is not the only way to represent this.*

My questions and answers:

How many weeks will it take Shirley to save the full amount? 30 weeks

How much more does Shirley have to save? $900

8. 650 pounds (lbs.) of food were collected in a drive. Three times as many pounds were collected at the supermarket as at the library. The community center collected 50 pounds more than the library.

My model:

Library	*120*		

Supermarket | *120* | *120* | *120* | — *650 pounds*

Community Center | *120* | *50* |
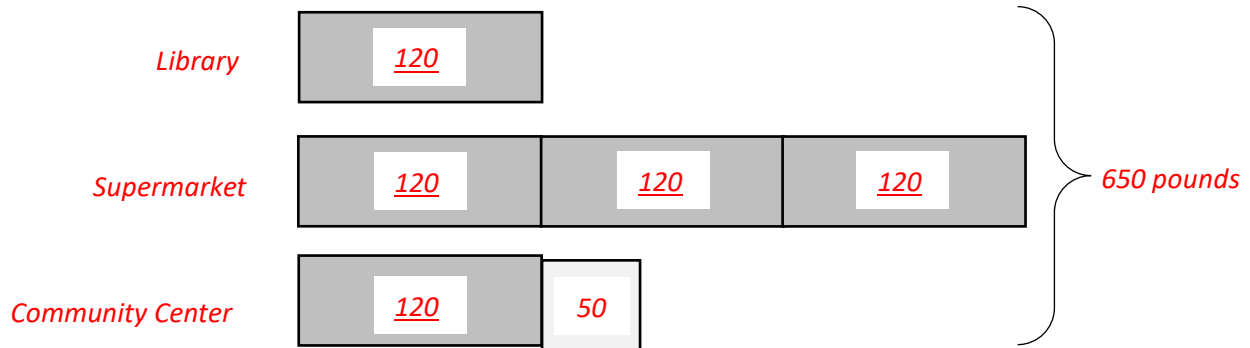
My questions and answers:

How many pounds of food were collected at each location?
Library: 120 lbs.; Supermarket: 360 lbs.; Community Center: 170 lbs.

How many more pounds were collected at the supermarket than at the library? 240

How many pounds were collected at the library and community center combined? 290

More questions and answers along these lines are possible!

9. I went to the fair with $35. I spent $15 on admission and went on 4 rides that all cost the same amount. I had $8 left after that.

My model:

Total: $35

$15	$3	$3	$3	$3	$8

Cost of admission   *Cost of four rides*   *Money left*
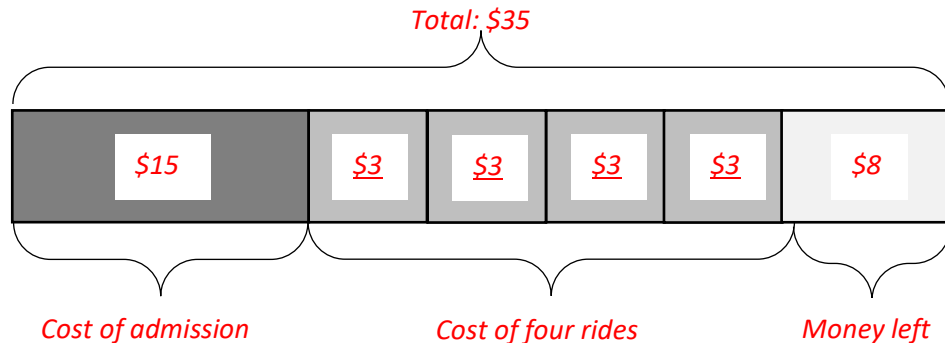
My questions and answers:

What is the cost of one ride? $3

How many more rides can I afford? $2

For scenarios 10–13, fill in all the information you can on the bar model diagram. Then use it to ask and answer as many questions as you can. (Also feel free to draw the model differently if you prefer.)

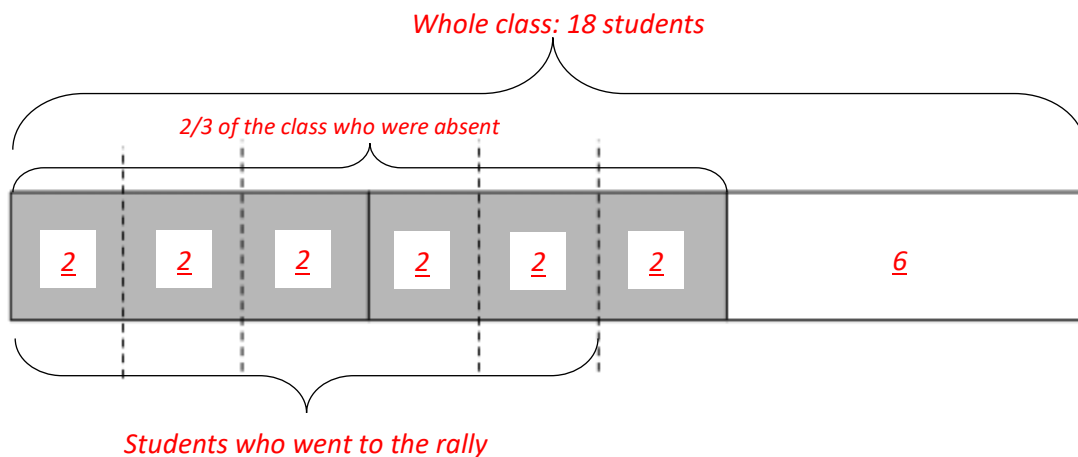**10.** Suong spends $\frac{2}{5}$ of her monthly income on rent. Her rent is $800.

Total monthly income

$400	$400	$400	$400	$400

2/5 or $800 spent on rent
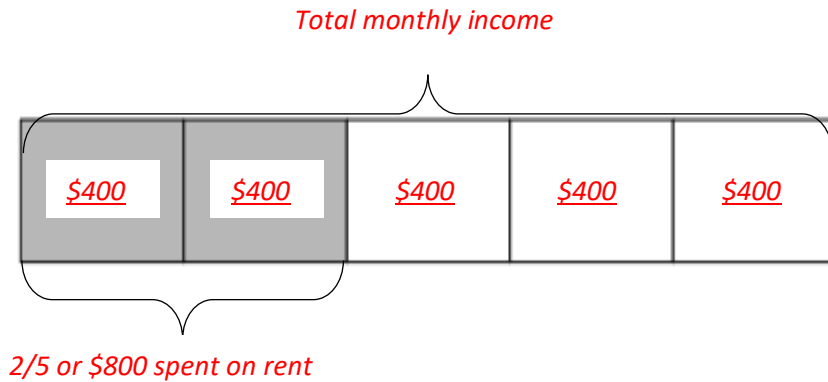
My questions and answers:

What is Suong's total monthly income? $2,000

How much does Suong have left after paying rent? $1200

11. There are 18 students in a class. Yesterday, $\frac{2}{3}$ of the students were absent. $\frac{5}{6}$ of those that were absent went to a rally.

Whole class: 18 students

2/3 of the class who were absent

2	2	2	2	2	2	6

Students who went to the rally
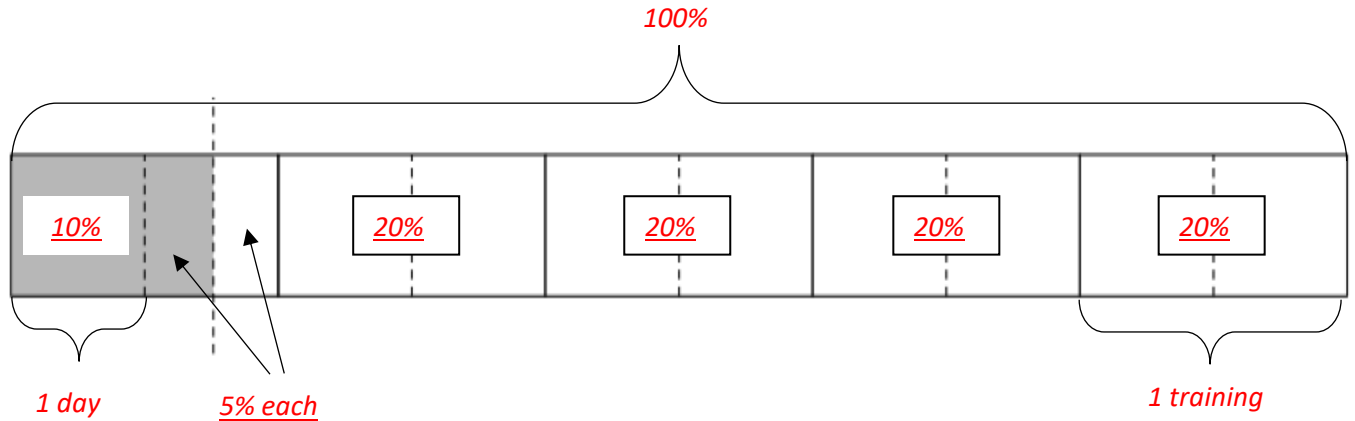
My questions and answers:

How many students were absent? 12

How many students went to the rally? 10

How many students showed up for class? 6

How many students were absent and didn't go to the rally? 2

12. Juan is doing a series of five 2-day trainings. He has completed the first day and a half of training. (Try asking and answering questions that use both fractions and percents!)

100%

| 10% | | 20% | 20% | 20% | 20% |

1 day   *5% each*   *1 training*

My questions and answers:

What fraction and percent of the whole series has Juan completed? 3/20 or 15%

What fraction and percent does he have left? 17/20 or 85%

13. When Danielle left for work this morning, there was $\frac{3}{4}$ of a leftover lasagna in the fridge. When she got home, there was only $\frac{3}{8}$ of that same lasagna left.
The whole bar represents the whole lasagna.

What was there when Danielle left for work
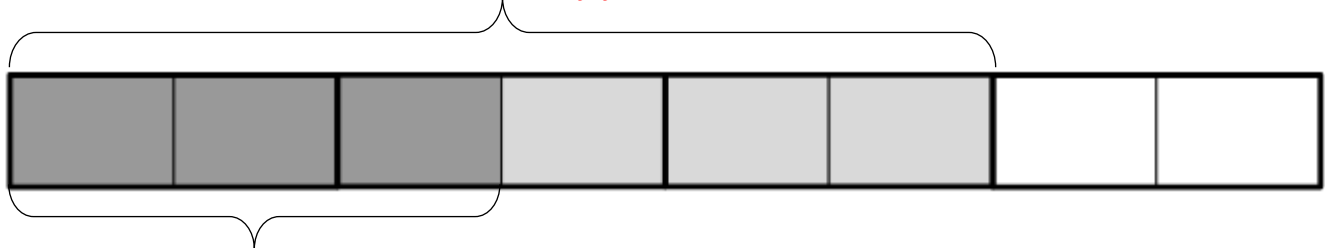
What was there when she got home
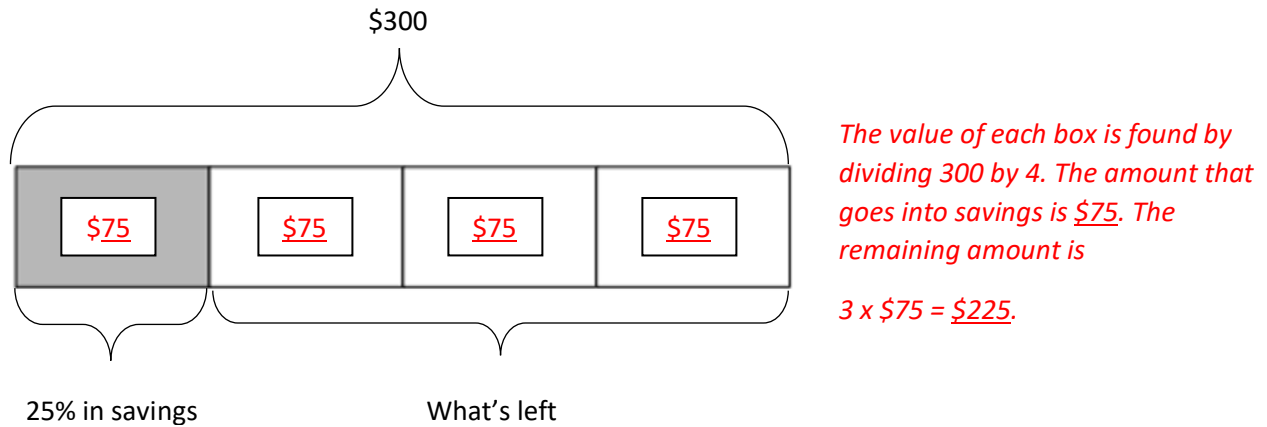
My questions and answers:

What happened to the lasagna? Someone ate half of what was there or someone ate 3/8 of the whole thing.

For scenarios 14–20, draw a bar model yourself and then use it to ask and answer questions.

14. Juanita always tries to put 25% of her weekly take home pay in savings. She then allows herself to spend 10% of what is left on entertainment. She brings home about $300 per week.
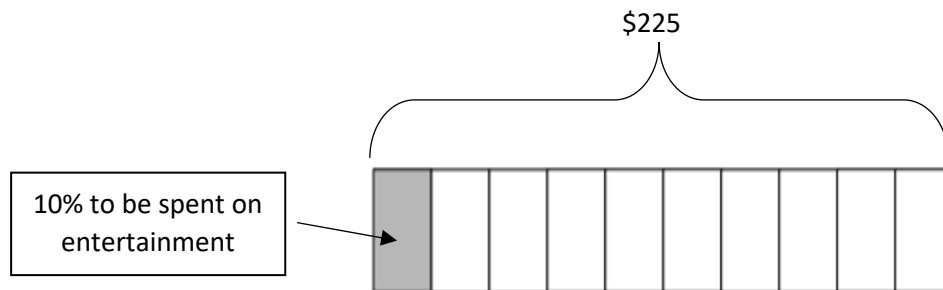
My model:

You may want to use two models to illustrate this scenario. In the first, you might draw a model to figure out how much goes into savings and how much is left, like this:

$300

| $75 | $75 | $75 | $75 |

The value of each box is found by dividing 300 by 4. The amount that goes into savings is $75. The remaining amount is

3 x $75 = $225.

25% in savings   What's left

Now that the first diagram has shown that there is $225 left, a second diagram can be drawn to find 10% of that. Since 10% = $\frac{1}{10}$ the diagram can be divided into 10 equal boxes.

Since there are ten equal boxes, the value of each can be found by dividing $225 by 10. Therefore, the amount she spends on entertainment is $22.50.
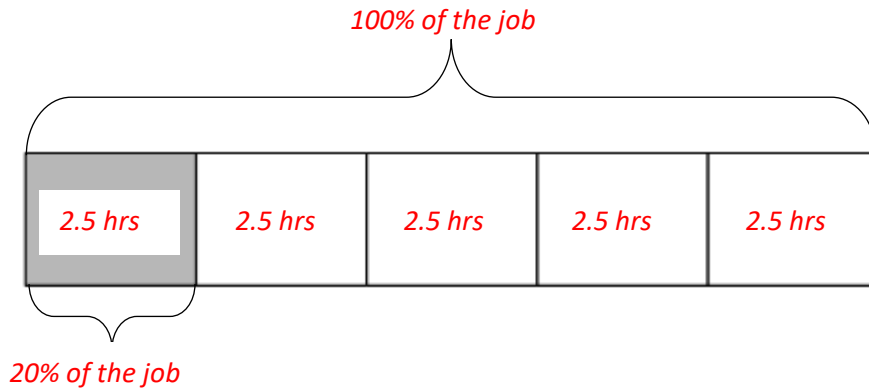
$225

10% to be spent on entertainment →

My questions and answers:

How much does Juanita have for entertainment? $22.50

How much does she put in savings? $75

15. Caleb painted for 2.5 hours in the morning and then declared that he was 20% done with the job.
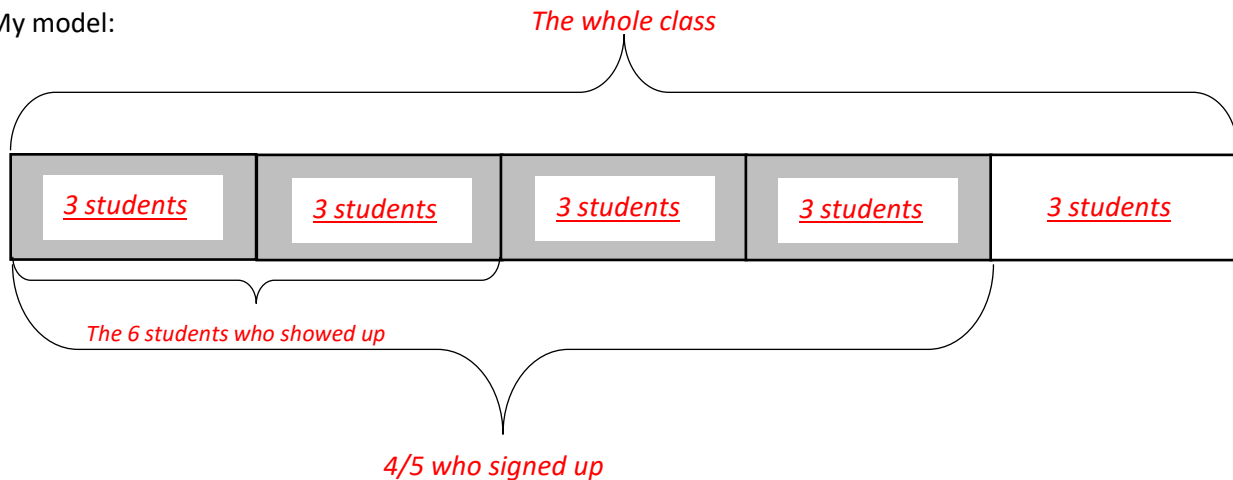
My model:

100% of the job

| 2.5 hrs | 2.5 hrs | 2.5 hrs | 2.5 hrs | 2.5 hrs |

20% of the job

My questions and answers:

How long will the whole job take? 12.5 hours

How much more time will it take Caleb to finish? 10 hours

16. $\frac{4}{5}$ of the students in an ABE program signed up for a career workshop. When the day came, only half of those who signed up actually showed up. 6 students showed up.

My model:　　　　　*The whole class*

| 3 students | 3 students | 3 students | 3 students | 3 students |

The 6 students who showed up

4/5 who signed up

My questions and answers:

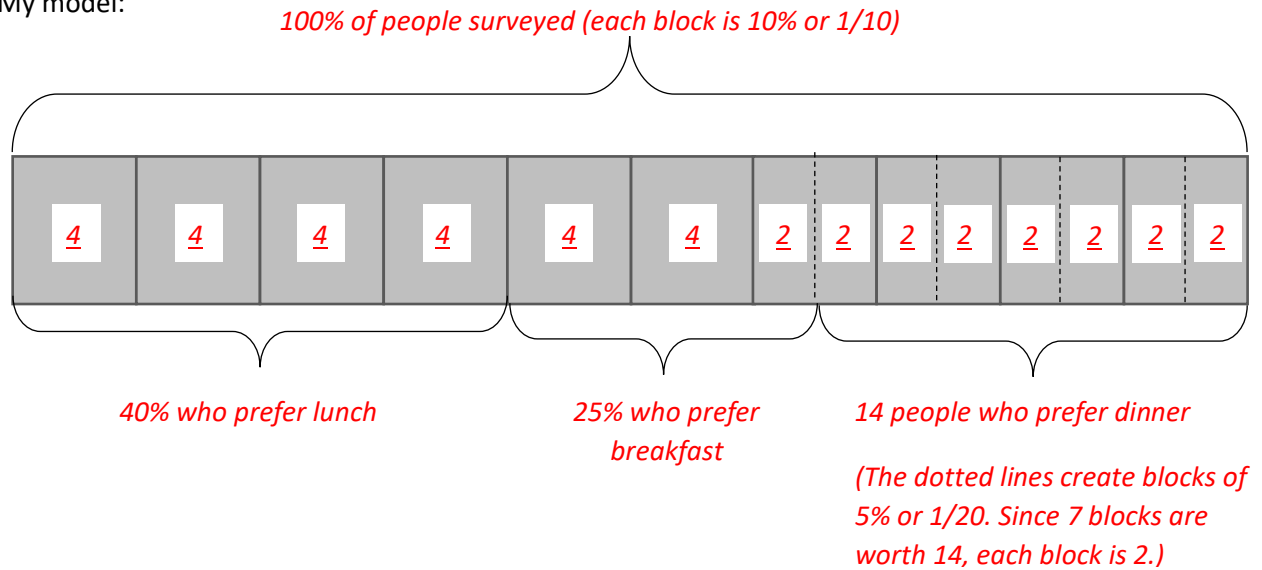*How many students are in the class?* 15

How many signed up for the workshop? 12

How many signed up but didn't show? 6

How many didn't sign up at all? 3

17. A group of ABE students conducted a survey about people's favorite meal of the day and found that $\frac{1}{4}$ of the people surveyed preferred breakfast, 40% of them preferred lunch, and the remaining 14 people preferred dinner.

My model:

100% of people surveyed (each block is 10% or 1/10)

| 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

40% who prefer lunch

25% who prefer breakfast

14 people who prefer dinner

(The dotted lines create blocks of 5% or 1/20. Since 7 blocks are worth 14, each block is 2.)
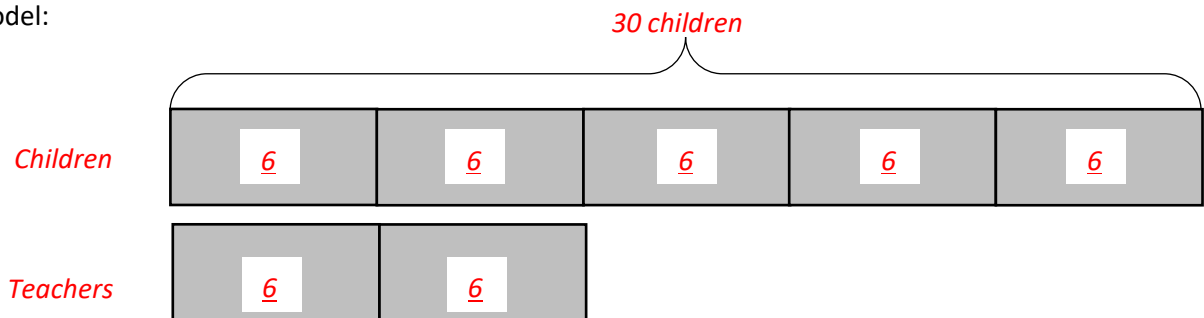
My questions and answers:

How many people were surveyed? 40

How many people preferred lunch and breakfast? Lunch: 16; Breakfast: 10

What percent of those surveyed preferred dinner? 35%

18. A day care center advertises that they have a child to teacher ratio of 5 : 2. They enroll 30 children.

My model:

30 children

| Children | 6 | 6 | 6 | 6 | 6 |

| Teachers | 6 | 6 |

My questions and answers:

How many teachers work there? 12

How many people are in the center? 42

19. Wyatt owns a food truck. He offers a selection of 8 types of sandwiches and 4 types of tacos.

- He will increase his selection of sandwiches by 1 per month.
- He will increase his selection of tacos by 2 per month.

In how many months will Wyatt offer an equal number of sandwich and taco selections?
[This scenario is from the 2016 grade 10 MCAS. The question has been left in, but that doesn't mean you can't ask and answer even more!]

For this scenario, the illustration below shows a completed model, but while building it, it will be useful to add blocks one at a time to the bars until they are the same length. Added blocks are in lighter gray. Blocks of size 1 are added to the sandwiches bar and blocks of size 2 are added to the tacos bar in equal numbers until the bars are the same length, indicating that the number of sandwiches is the same as the number of tacos.
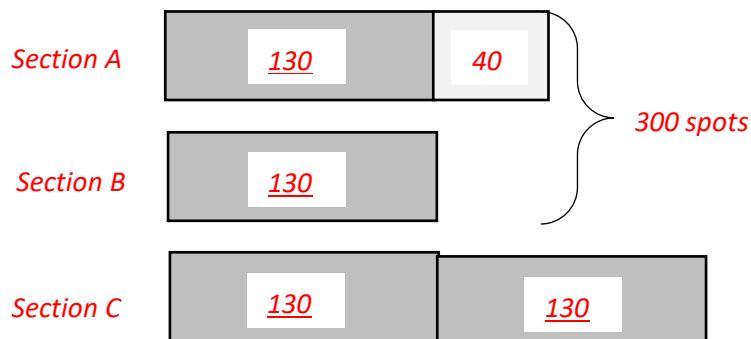
My model:
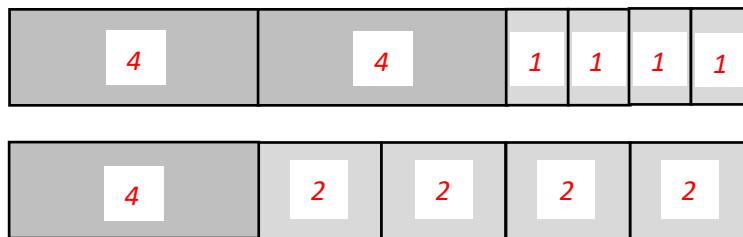
My questions and answers:

In how many weeks will Wyatt offer an equal number of sandwich and taco selections? 4 months
How many of each will he have at that time? 12

20. A parking lot is divided into three sections. Sections A and B together have 300 spots. Section A has 40 more spots than Section B. Section C has twice as many spots as Section B.
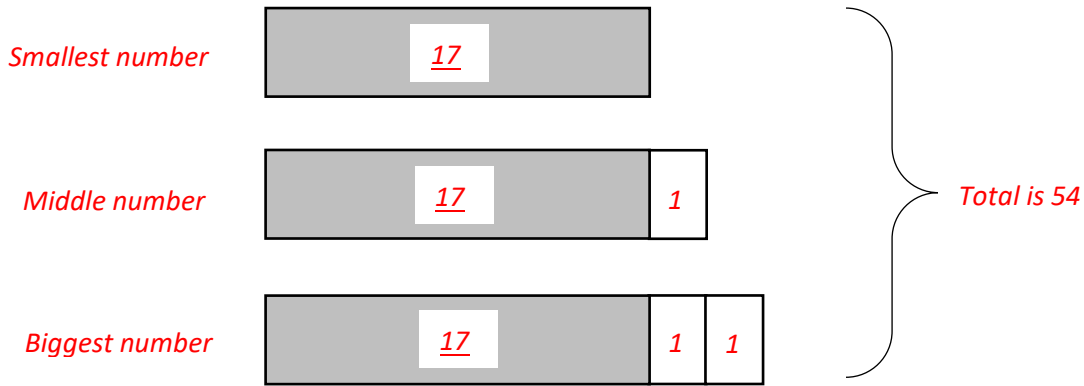
My model:

My questions and answers:

How many spots are in each section? A: 170, B: 130, C: 260

How many spots are in the whole lot? 560

21. The sum of three consecutive integers is 54.

My model: *Note that when integers are consecutive, each one is 1 more than the one before.*

Smallest number — 17

Middle number — 17 | 1

Biggest number — 17 | 1 | 1

Total is 54

My questions and answers:

What are the three integers? 17, 18, 19

22. A landscaping company placed two orders with a nursery. The first order was for 5 bushes and 1 tree and totaled $162. The second order was for 6 bushes and 2 trees and totaled $232. The bills do not list the per-item price.

In this scenario, it may make sense to model with paper strips so the pieces can be moved around. The illustration below shows a useful configuration for figuring the costs of the bushes and trees. The smaller darker boxes represent the bushes and the larger lighter ones represent the trees. Since the difference between the second order and the first order is $70, one bush and one tree cost $70 together. Taking the cost of one bush and one tree off the first order leaves four bushes for $92, making the cost of each bush come to $23.

My model:

$92 $70

First order $162 — 23 | 23 | 23 | 23 | 23 | 47

Second order $232 — 23 | 23 | 23 | 23 | 23 | 47 | 23 | 47
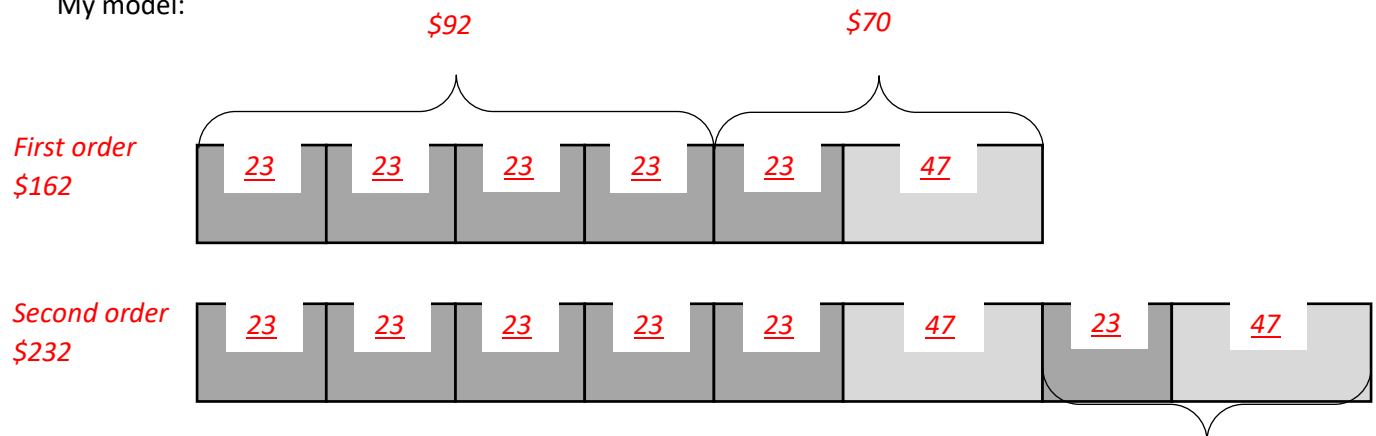
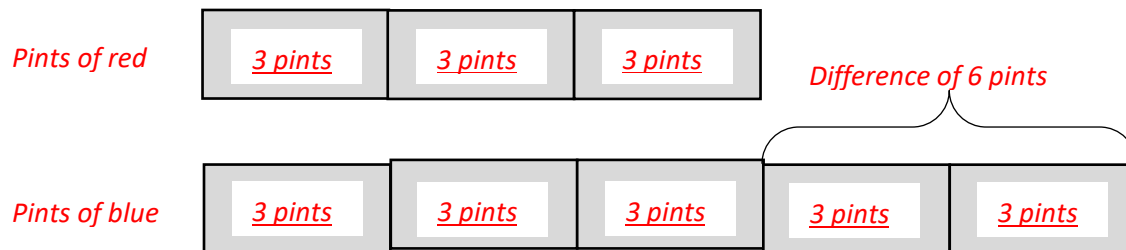My questions and answers: *Difference of $70*

What is the cost of a bush? $23

What is the cost of a tree? $47

23. To make the perfect shade of purple paint, Rani mixes red and blue paint in a ratio of 3 : 5. To have enough to paint her living room, she ends up buying 6 more pints of blue paint than red paint.

My model:

Pints of red	*3 pints*	*3 pints*	*3 pints*

Difference of 6 pints

Pints of blue	*3 pints*	*3 pints*	*3 pints*	*3 pints*	*3 pints*

My questions and answers:

How many pints of each color did she buy? 9 pints of red and 15 pints of blue

How many pints of paint did she buy all together? 24 pints