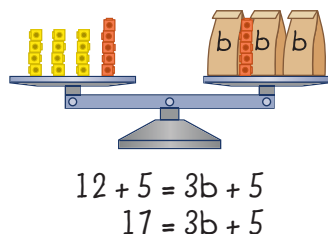
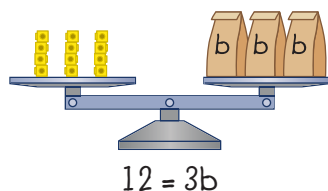


## Frequently Asked Questions

**Q:** How can you write equivalent equations?

**A:** Modelling equations on balance scales can help you write equivalent equations.



For example, the balance scales at the top left show the equation  $12 = 3b$ . Each bag holds  $b$  cubes. The sides balance because the masses on the left are equal to the masses on the right.

The scales at the bottom left show that if you add 5 cubes to each side, the left side will still balance the right side and each bag will still hold  $b$  cubes. The new equation,  $17 = 3b + 5$ , is equivalent to  $12 = 3b$ .

**Q:** How can you show that two equations are equivalent?

**A1:** You can change one equation into the other equation by adding, subtracting, multiplying, or dividing to increase or decrease each side by the same amount.

For example, to show that  $c + 6 = 10$  and  $c + 1 = 5$  are equivalent, you can show that 5 was subtracted from both sides of one equation to make the other.

$$c + 6 = 10$$

$$c + 6 - 5 = 10 - 5$$

$$c + 1 = 5$$

**A2:** You can show that the solutions are the same.

For example, the only solution to  $c + 1 = 5$  is  $c = 4$ . When you substitute  $c = 4$  into  $c + 6 = 10$ , you get  $4 + 6 = 10$ , which is true. So the equations are equivalent.

# Practice

Row number	Number of cards in each row
1	20
2	17
3	14
4	11

Day	Height (cm)
1	100
2	102
3	104
4	106

Number of lessons	Cost (\$)
5	
10	
15	
20	

## Lesson 1

- Katy made a card pattern with rows of cards. The table at the left shows the number of cards in each row.
  - Show Katy's pattern with counters or diagrams.
  - Write a pattern rule for each column in the table.
  - Predict the number of cards in row 7. Explain your prediction.
  - Show how to check your prediction from part c).

## Lesson 2

- Adam measured the height of a sunflower each day, starting when it reached 100 cm. The table at the left shows his measurements for the first four days.
  - Write a rule, in words, that shows how the number of days can be used to figure out the height of the sunflower. Explain your thinking.
  - Use your rule from part a) to figure out the height of the sunflower on day 7. Show your work.
  - Extend Adam's table to check your answer for part b).

## Lesson 3

- A skateboard park charges a registration fee of \$10. Each skateboard lesson costs \$25.
  - Write a rule and an expression that show how to calculate the total cost of any number of lessons.
  - Copy and complete the table at the left.
- Correct the errors in each table.

a)

$n$	$n + 11$
20	31
30	41
40	51
50	71

b)

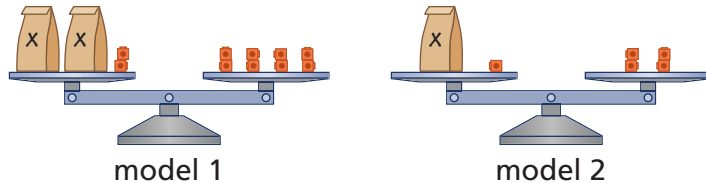
$n$	$3n - 4$
5	11
10	26
15	41
20	53

$m$	$2m - 1$	$2m + 1$
1		
2		
3		
4		

5. a) Copy and complete Avram's table.  
 b) What number patterns do you see in the second column and the third column?  
 c) Compare each number in the second column with the corresponding number in the third column. What do you notice?

### Lesson 5

6. a) Write an equation that represents each model.



- b) Are the equations from part a) equivalent? Explain how you know.

7. Are the two equations in each pair of equations equivalent? Explain how you know.

- a)  $n + 5 = 10$        $n + 3 = 19$   
 b)  $2z = 10$            $4z = 20$   
 c)  $12 = 4r$            $13 = 4r + 1$   
 d)  $x + 1 = 12$        $2x + 2 = 25$

8. Write two equations that are equivalent to  $3m = 12$ . Explain what you did.

### Lesson 6

9. A bus leaves the station with 18 passengers. At odd-numbered bus stops (stops 1, 3, 5, ...), 2 people get in. At even-numbered bus stops (stops 2, 4, 6, ...), 5 people get out. At what bus stop will the bus have no passengers? Show your work.



## What Do You Think Now?

Look back at **What Do You Think?** on page 3. How have your answers and explanations changed?