

Bake Cookies Day

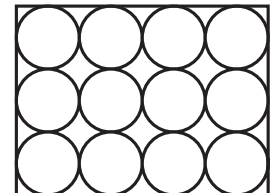
Abby, Brooke, Carter and Travis are each providing cookies for a school bake sale. Let's take a look at their process.

Making the cookies...

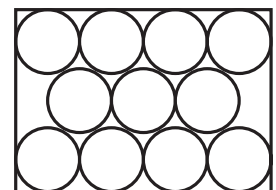
1. One of Brooke's recipes calls for five tablespoons of flour for every 2 ounces of butter. How many tablespoons of flour are needed if two pounds of butter are used? There are 16 ounces of butter in one pound.
2. Travis wanted to create a unique cookie frosting color for his cookies. He mixed together a sample that was 12 teaspoons of red frosting, 2.5 teaspoons of yellow frosting and 0.5 teaspoons of blue frosting. He then mixed a main batch of frosting using 30 teaspoons of yellow frosting and enough red and blue frosting so as to maintain the original ratio. How many total teaspoons of frosting did he use when making both the sample and the main batch?

Packaging the cookies...

3. Carter's cookies are each 4 inches in diameter, and he can fit 12 of them perfectly on the bottom of his container, as shown in this top view. What are the dimensions, in inches, of the bottom of his container?



4. Abby also has cookies that are each 4 inches in diameter, and she can fit 11 of them perfectly on the bottom of her container, as shown in this top view. What are the dimensions, in inches, of the bottom of her container? Express any non-integer values as a decimal to the nearest hundredth.



5. Brooke initially made 60 sugar cookies, 80 chocolate chip cookies and 100 peanut butter cookies. She plans to make packages of cookies that each contain an identical assortment of whole cookies. How many cookies are in a package, assuming that she makes as many packages as possible and uses all of the cookies she made?
6. A 75-cookie bag contains 30 oatmeal cookies, 30 chocolate chip cookies and 15 peanut butter cookies. If this same ratio of the three types of cookies is used for a 100-cookie bag, how many peanut butter cookies should be in the bag?
7. Travis contributed 9 dozen cookies to the bake sale. The cookies will be put into bags of 6 cookies and bags of 8 cookies. If all 9 dozen cookies will be put into bags, what is the greatest number of 8-cookie bags that can be made?
8. Still using the scenario above, if there must be more 8-cookie bags than 6-cookie bags and all 9 dozen cookies must be used, what is the smallest number of 8-cookie bags that can be made?

Selling the cookies...

9. Carter plans to sell a package of two cookies for \$0.50. At this rate, for how much would he sell 3 dozen of these two-cookie packages?
10. Travis plans to sell individual cookies for 30 cents each, but will have a “buy 2, get 1 free” deal available. According to this deal, what is the average cost per cookie, in cents, for a customer who buys 2 and gets 1 free?
11. Abby received one 30-cookie order. This represents 2.5% of the total number of cookies in all of her orders. What is the total number of cookies in all of her orders?
12. Twelve eighth-graders can buy and eat 50 dozen cookies in 1 day. At the same rate, how many dozens of cookies will 20 eighth-graders buy and eat in 3 days?

Bake Cookies Day

1. One of Brooke's recipes calls for five tablespoons of flour for every 2 ounces of butter. How many tablespoons of flour are needed if two pounds of butter are used? There are 16 ounces of butter in one pound.

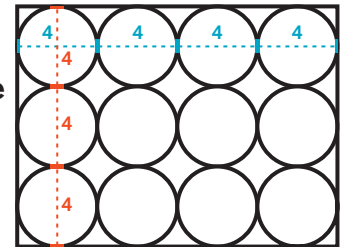
If one pound is equal to 16 ounces, then two pounds of butter is equal to $16 \times 2 = 32$ ounces. If 32 ounces of butter are used, the constant of proportionality between 2 ounces of butter and 32 ounces of butter is $32/2 = 16$. So, $5 \times 16 = 80$ tablespoons of flour.

2. Travis wanted to create a unique cookie frosting color for his cookies. He mixed together a sample that was 12 teaspoons of red frosting, 2.5 teaspoons of yellow frosting and 0.5 teaspoons of blue frosting. He then mixed a main batch of frosting using 30 teaspoons of yellow frosting and enough red and blue frosting so as to maintain the original ratio. How many total teaspoons of frosting did he use when making both the sample and the main batch?

The constant of proportionality between the 2.5 teaspoons of yellow frosting in the sample batch and the 30 teaspoons of yellow frosting in the main batch is $30/2.5 = 12$. The main batch would therefore have $12 \times 12 = 144$ teaspoons of red frosting and $12 \times 0.5 = 6$ teaspoons of blue frosting. The total teaspoons of frosting from both batches would be $12 + 2.5 + 0.5 + 144 + 30 + 6 = 195$ teaspoons.

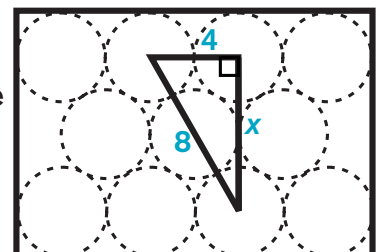
3. Carter's cookies are each 4 inches in diameter, and he can fit 12 of them perfectly on the bottom of his container, as shown in this top view. What are the dimensions, in inches, of the bottom of his container?

4 cookies each of 4-inch diameter aligned precisely (as shown in the image) gives a length of $4 \times 4 = 16$ inches of the container; and 3 cookies each of 4-inch diameter aligned precisely gives a width of $3 \times 4 = 12$ inches.



4. Abby also has cookies that are each 4 inches in diameter, and she can fit 11 of them perfectly on the bottom of her container, as shown in this top view. What are the dimensions, in inches, of the bottom of her container? Express any non-integer values as a decimal to the nearest hundredth.

As shown in the image, create a right triangle. The hypotenuse of this triangle spans 1 whole cookie (4 inches) and half of 2 other cookies (2 inches each), which gives 8 inches. The short leg of the triangle spans half of 2 cookies, which gives 4 inches. Use these values and the Pythagorean theorem to solve for the missing side length: $4^2 + x^2 = 8^2$. This simplifies to $16 + x^2 = 64$, then using inverse operations, $x^2 = 48$ and $x = 6.93$. The remaining length of the container's width above the triangle is the radius of 1 cookie (2 inches); the same below



the triangle. So, the width is $6.93 + 2 + 2 = 10.93$ inches. The length of the container is the same as Carter's, as it is also 4 cookies in length. $4 \times 4 = 16$ inches.

5. Brooke initially made 60 sugar cookies, 80 chocolate chip cookies and 100 peanut butter cookies. She plans to make packages of cookies that each contain an identical assortment of whole cookies. How many cookies are in a package, assuming that she makes as many packages as possible and uses all of the cookies she made?

The number of packages of cookies must be the greatest common factor of 60, 80 and 100, so that all of the cookies are used and so that the types of cookies are evenly distributed to make identical assortments. So, there must be 20 packages of cookies. Thus, there would be $60 / 20 = 3$ sugar cookies in each package, $80 / 20 = 4$ chocolate chip cookies in each package, and $100 / 20 = 5$ peanut butter cookies in each package. Therefore, each package of cookies will contain $3 + 4 + 5 = 12$ cookies.

6. A 75-cookie bag contains 30 oatmeal cookies, 30 chocolate chip cookies and 15 peanut butter cookies. If this same ratio of the three types of cookies is used for a 100-cookie bag, how many peanut butter cookies should be in the bag?

The constant of proportionality in this scenario is $100 / 75 = 1 \frac{1}{3}$. So, $15 \times (1 \frac{1}{3}) = 20$ peanut butter cookies in the 100-cookie bag.

7. Travis contributed 9 dozen cookies to the bake sale. The cookies will be put into bags of 6 cookies and bags of 8 cookies. If all 9 dozen cookies will be put into bags, what is the greatest number of 8-cookie bags that can be made?

9 dozen cookies is $9 \times 12 = 108$ cookies. 1 dozen (12) cookies can fill 2 6-cookie bags, since $12/6 = 2$. This would leave 96 cookies, which could evenly fill 12 8-cookie bags.

8. Still using the scenario above, if there must be more 8-cookie bags than 6-cookie bags and all 9 dozen cookies must be used, what is the smallest number of 8-cookie bags that can be made?

Based on problem 7, the answer must be fewer than 12 8-cookie bags. Reduce the number of bags of 8-cookies by multiples of both 8 and 6 cookies, since all of the cookies still must be used. Reduce the number of 8-cookie bags by 3 bags, or 24 cookies, as 24 is the least common multiple of 8 and 6. This will still ensure all of the cookies are used. This gives 9 8-cookie bags. Reducing by 3 more 8-cookie bags would mean there are no longer more 8-cookie bags than 6-cookie bags.

9. Carter plans to sell a package of two cookies for \$0.50. At this rate, for how much would he sell 3 dozen of these two-cookie packages?

Three dozen packages is $3 \times 12 = 36$ packages. $\$0.50 \times 36$ packages = \$18.

10. Travis plans to sell individual cookies for 30 cents each, but will have a "buy 2, get 1 free" deal available. According to this deal, what is the average cost per cookie, in cents, for a customer who buys 2 and gets 1 free?

If a customer were to take advantage of the “buy 2, get 1 free” deal, he or she would spend $2 \times \$0.30 = \0.60 and get 3 cookies. To find the average, divide \$0.60 by the 3 cookies, which gives **20** cents.

11. Abby received one 30-cookie order. This represents 2.5% of the total number of cookies in all of her orders. What is the total number of cookies in all of her orders?

2.5% can be represented as 0.025. If 30 cookies represents 2.5% of the total number of cookies in all of Abby’s orders, this can be represented as $30 = 0.025x$ (where x = the total number of cookies). Using the inverse operation to solve for x , we would divide 30 by 0.025 to get **1200** cookies.

12. Twelve eighth-graders can buy and eat 50 dozen cookies in 1 day. At the same rate, how many dozens of cookies will 20 eighth-graders buy and eat in 3 days?

Take the dozens of cookies these kids ate in 1 day (50) and multiply it by 3 to get that these 12 eighth-graders could eat 150 dozen cookies in 3 days. In order to figure out how many dozens of cookies 20 eighth-graders could eat, find the constant of proportionality, $20/12 = 1 \frac{2}{3}$. Then, $150 \times 1 \frac{2}{3} = \mathbf{250}$ dozen cookies.