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## CARB COUNTING QUIZ ANSWERS

Below are the answers to our *Carb Counting Quiz* handout, with an explanation of how we came to each answer. We have also included additional teaching points to address common questions we receive about the finer points of carb counting.

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### (1) Which of the following is the fastest way to treat a low blood sugar?

- A.  $\frac{1}{2}$  can (6 fl. oz, 180 mL) of pop (15-20 g carbs)
- B. 3-4 Dex4® glucose tablets (12-15 g)
- C. 1 tube (31 g) of Insta-Glucose® gel (24 g)
- D. A fun-sized bag (15 g, 15 pieces) of Skittles® (14 g)
- E.  $\frac{1}{2}$  cup (4 fl. oz, 120 mL) of orange or apple juice (15 g)

*The correct answer is B. The carb counts are from the [CalorieKing](#) and manufacturers' websites. While all of the products are commonly used to treat lows, it is important to know that glucose tablets are the fastest way to raise the blood sugar. Glucose gel must be swallowed to work and is not as fast as tablets. Juice, pop and candy contain other sugars (fructose and sucrose) that are slowly and incompletely converted into glucose, which makes them slower to work. Other foods such as chocolate bars (which contain a lot of fat) and cookies (which contain starch and fat) are also very slow to raise the blood sugar and are **not** appropriate to use as the initial treatment for lows.*

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### (2) Which of the following veggies are *not* considered "free" if you eat $\frac{1}{2}$ cup or less?

- A. Carrots (4 g carbs per  $\frac{1}{2}$  cup)
- B. Celery (1 g per  $\frac{1}{2}$  cup)
- C. Peas (7 g per  $\frac{1}{2}$  cup)
- D. Broccoli (3 g per  $\frac{1}{2}$  cup)
- E. Tomatoes (3 g per  $\frac{1}{2}$  cup)

*The correct answer is C. According to the [Canadian Diabetes Association's 2005 Beyond the Basics choices](#) (where these carb counts come from), most Vegetables choices are considered "free" if eaten in normal portions. However, peas, parsnips, squash and a few other vegetables contain enough carbs that they should be included in carb counting. Corn is considered a Starch & Grains choice, and legumes such as lentils and chickpeas are considered Meat & Alternatives choices. Carb counts are available for most vegetables.*

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**(3) Which of the following snacks would *not* require an injection or a bolus of insulin?**

- A. 1 cup (8 fl. oz, 240 mL) of low-fat milk (12 g carbs)
- B. 1 cup (8 fl. oz, 240 ml) of vegetarian chili (30 g)
- C. 1 tall (12 fl. oz, 360 mL) Starbucks® Skinny Vanilla Latte (14 g)
- D. 1 serving (3 spears) of broccoli with lemon vinaigrette (less than 5 g)
- E. 1 handful (1 cup, 5½ oz) of grapes (28 g)

The correct answer is D. The carb counts are from the [CalorieKing](#) and [Starbucks Canada](#) websites. In general, unless you are going to be exercising right away, you need to take insulin whenever you are going to consume 5-10 g of carbs or more. Remember that milks, starches, fruits, sugars, legumes and some vegetables all contain carbohydrates.

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**(4) Which of the following has the most carbs per serving?**

- A. 2 cups of strawberries (24 g carbs + 0 g fat)
- B. 1 bottle (16 fl. oz, 480 mL) Snapple® Lemon Ice Tea (48 g carbs + 0 g fat)
- C. 2 Oreo® cookies (24 g carbs + 7 g fat)
- D. ½ cup (3.3. oz, 100 g) Dairy Queen® Chocolate Soft Serve ice cream (22 g carbs + 5 g fat)
- E. 4 medium pieces of California Roll sushi (24 g carbs + 4 g fat)

The correct answer is B. The carb (and fat) counts are from the [CalorieKing](#). The amount of carbs in soda pop, juice, bottled iced tea, energy drinks and sports drinks is often underestimated when carb counting. The other food servings are nearly all the same with respect to carbs, but they vary quite a bit in regards to fats and calories.

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**(5) Kimmi goes to her friend's house for dinner, and she's having vegetarian lasagne (cheese, spinach, pasta) and a glass of milk. Kimmi's new to carb counting, and she hasn't learned how to count lasagne. But she does remember from earlier that a similar piece of lasagne was 3 starches, 4 proteins, 2 vegetables and 1 fat choice (using the CDA's 2005 *Beyond the Basics* choices). How can Kimmi estimate the carbs for her meal?**

- A. 15 g each only for starches
- B. 15 g each only for starches and milks
- C. 15 g each only for starches and fruits
- D. 15 g each only for starches, milks, and fruits
- E. 15 g each for starches, milks, fruits, and vegetables

The correct answer is D. The [CDA's 2005 Beyond the Basics choices](#) were updated so that the Grains & Starches, Fruits, Milk & Alternatives, and Other choices each contain 15 g of carbs. The Vegetables (with a few exceptions), Meat & Alternatives, and Fats choices are all considered carb-free. So a piece of this lasagne would be estimated to have (3 × 15 g), or 45 g of carbs.

[Note: if you learned the CDA's 1999 Good Health Eating Guide choices, these are equal to 15 g carbs for Starch choices, 10 g for Fruits and Sugars choices, and 6 g for Milk choices.]

(6) Andre is going to have a small bag of potato chips. At the store, he's comparing the labels on regular and baked chips. Which of the following statements is true?

- A. Baked chips are higher in salt.
- B. Baked chips are fat-free.
- C. Both chips are a good source of protein.
- D. Baked chips are higher in calories.
- E. Baked chips would require more insulin.

REGULAR			
Nutrition Facts			
Per 1 bag (43 g)			
Amount	% Daily Value		
Calories	225		
Fat	15 g	24 %	
Saturated 1.5 g + Trans 0 g			
Cholesterol 0 mg			
Sodium	270 mg	11 %	
Carbohydrate	22 g	8 %	
Fibre 1 g			
Sugars 0 g			
Protein 3 g			
Vitamin A	0 %	Vitamin C	15 %
Calcium	0 %	Iron	3 %

BAKED			
Nutrition Facts			
Per 1 bag (43 g)			
Amount	% Daily Value		
Calories	165		
Fat	2.3 g	3 %	
Saturated 0 g + Trans 0 g			
Cholesterol 5 mg			
Sodium	225 mg	9 %	
Carbohydrate	35 g	12 %	
Fibre 3 g			
Sugars 3 g			
Protein 3 g			
Vitamin A	0 %	Vitamin C	3 %
Calcium	6 %	Iron	3 %

The correct answer is E. You have to be very careful when looking at foods labeled "low-carb", "low-calorie", "low-fat" and "no-sugar-added". "Low-carb" foods may contain artificial sweeteners; "low-fat" foods may be quite high in sugars or other carbs; and "no-sugar-added" foods (such as juice) may have a lot of natural sugar in them. When comparing the potato chip labels, the baked chips are certainly lower in fats and total calories, but they are 50% higher in carbs and would therefore require more insulin. Both are relatively high in salt and low in protein.

(7) Little Chloe has had her morning insulin, and now she's not feeling well. She's supposed to have 1 starch,  $\frac{1}{2}$  protein,  $\frac{1}{2}$  milk and  $\frac{1}{2}$  fruit for lunch (30 g carbs). She doesn't feel like eating her lunch, so Mom is looking for alternatives. All of the following contain about 30 g of carbs *except*:

- A. 2 cups (16 fl. oz, 480 mL) of fruit-flavoured Pedialyte® (12 g carbs)
- B.  $\frac{3}{4}$  cup (6 fl. oz, 180 mL) of Jell-O® (29 g)
- C. 1 cup (8 fl. oz, 240 mL) of Sprite® (26 g)
- D. 1 cup (8 fl. oz, 240 mL) of chocolate milk (26 g)
- E. 13 saltine crackers (29 g)

The correct answer is A. The carb counts are from the [CalorieKing](#) and [Pedialyte Canada](#) websites. When children are getting ill and won't eat, you can try substituting other carbs for their regular meals (you don't have to worry about proteins in the short term). In general, you can use whatever you feel your child will take and can tolerate. Particularly if your child is vomiting or has diarrhea, you need to prevent them from getting dehydrated. Fluid-replacement preparations such as Pedialyte® are ideal for this, but you need to remember that the carb content of these solutions is kept quite low, since more concentrated sources of sugar (such as juice or pop) can make diarrhea worse. See our [Managing Sick Days and Preventing Ketoacidosis](#) handout for further information.

(8) Kenyon is on the soccer team, and the dietitian has advised him that, for a boy his size, he should have 15 g of carbs for every 30 minutes of exercise. Which of the following does *not* contain about 15 g of carbs?

- A. 1 cup (8 fl. oz, 240 mL) Gatorade® (14 g carbs)
- B.  $\frac{1}{2}$  cup (4 fl. oz, 120 mL) unsweetened apple juice (13 g)
- C. 1 medium orange (15 g)
- D. 1 small can ( $8\frac{1}{2}$  fl. oz, 250 mL) Red Bull® (40 g)
- E.  $\frac{1}{2}$  packet of PowerBar® Gel (14 g)

The "correct" answer is D. The carb counts are from the [CalorieKing](#) and manufacturers' websites. When exercising, it is often necessary to provide the body with a modest, but continuous supply of carbs to prevent hypoglycemia. As well, the athlete needs to drink lots of water to prevent dehydration. Sports drinks such as Gatorade® and POWERade® were designed to provide both the necessary carbs and water for athletes during exercise. Fruit juices can also be used, but it is best to dilute them 50:50 with water, as they can cause nausea and diarrhea in athletes because of their higher sugar concentration. Sports gels contain roughly  $\frac{1}{3}$  simple sugars and  $\frac{2}{3}$  complex carbs, and they're designed to provide longer-lasting coverage for athletes; they do *not* work fast enough to treat lows. So-called "energy drinks" such as Red Bull® and Full Throttle® contain very high concentrations of sugars and caffeine and are *not* appropriate for children.

(9) Angela is looking at the following nutrition label. She has just eaten 7 crackers. How many g of carbs are in 7 crackers?

- A. 10 g
- B. 16 g
- C. 18 g
- D. 25 g
- E. 40 g

Nutrition Facts	
Per 4 crackers (14 g)	
Amount	% Daily Value
Calories 56	
Fat 1.0 g	2 %
Saturated 0 g	
+ Trans 0 g	
Cholesterol 0 mg	
Sodium 150 mg	4 %
Carbohydrate 10 g	4 %
Fibre 0 g	
Sugars 1 g	
Protein 1 g	
Vitamin A 1 %	Vitamin C 0 %
Calcium 0 %	Iron 0 %

The correct answer is C. You need to be good at math to carb count accurately. Since a serving of 4 crackers has 10 g of carbs, this calculates to (10 g ÷ 4 crackers), or 2.5 g per cracker. Likewise, 7 crackers would have (2.5 g × 7), or 17.5 g, which rounds up to 18. A calculator will come in quite handy when learning to carb count.

(10) Tamara is going to make basmati rice for dinner, and she's trying to figure out the carb counts for this. She looks at the nutrition label, which she doesn't find particularly handy, since she doesn't have a kitchen scale. Instead of weighing the uncooked rice, she can use all of the following alternatives to figure out the carb count for basmati rice *except*

- A. Remember that  $\frac{1}{2}$  cup of cooked rice is 1 *Starches & Grains* choice, or about 15 g carbs
- B. Use a label from a similar product (e.g. short-grain rice)
- C. Use another reference which lists carbs for cooked rice by the cup
- D. Use another reference which lists carbs for uncooked rice by the cup
- E. Use another reference which lists carbs for 100 g of cooked rice

Nutrition Facts	
Per 100 g uncooked	
Amount	% Daily Value
<b>Calories</b> 349	
<b>Fat</b> 0.8 g	0 %
Saturated 0.0 g	0 %
+ Trans 0 g	
<b>Cholesterol</b> 0 mg	
<b>Sodium</b> 0 mg	0 %
<b>Carbohydrate</b> 78.5 g	24 %
Fibre 2.4 g	0 %
Sugars 0 g	
<b>Protein</b> 7 g	
Vitamin A 0 %	Vitamin C 0 %
Calcium 0 %	Iron 13 %

The "correct" answer is E: 100 g of cooked rice has 28 g of carb, compared to 79 g for uncooked rice (the difference is the water, of course)! When looking up carb counts, it's important to ensure that you're looking at the counts for the raw or the prepared food, since they can be quite different. It is sometimes difficult to estimate carb counts unless you accurately weigh or measure out the food, particularly foods like rice, cereal, mashed potatoes, etc. Kitchen scales are widely available which can weigh foods and calculate the carbs using an integrated food database. In general, it is easiest just to memorize the carb counts for common foods. It is also handy to learn a few U.S.-to-metric conversions (1 cup = 240 mL, 1 fl. oz = 30 mL, 1 oz = 30 g), since many carb-counting resources such as the [CalorieKing website](#) and [pocket book](#) are U.S.-based.

(11) Tina is on MDI and has an insulin-to-carbohydrate ratio of 8 (that is, she takes 1 unit of rapid-acting insulin for every 8 g of carbs she eats). How many units of insulin does she need to take for an Oatmeal Raisin PowerBar®?

- A. 3 units
- B.  $3\frac{1}{2}$  units
- C. 4 units
- D.  $4\frac{1}{2}$  units
- E. 5 units

The correct answer is E. According to the [PowerBar® Canada website](#), there are 42 g total carbs and 2 g fibre per bar, so she needs to bolus for (42 g - 2 g), or 40 g "available carbs". Dividing (40 g ÷ 8), this gives 5 units. With a pen, you can give insulin to the nearest  $\frac{1}{2}$  unit, with a pump to the nearest 0.05-0.1 units. With intensive insulin management, it's all about the decimal points!

- (12) Johnny wants to eat a big bowl of Shreddies®. First he looks at the label on the box. Then, for practice, he actually measures out  $1\frac{1}{2}$  cups of cereal. How many g of carbs in his cereal does he need to give insulin for (not including the milk)?

- A. 35 g  
 B. 41 g  
 C. 47 g  
 D. 53 g  
 E. 62 g

Nutrition Facts		
Per 1 cup (50 g)		
Amount	Cereal only	With $\frac{1}{2}$ cup skim milk
Calories	180	230
% Daily Value		
Fat 1.0 g	2 %	2 %
Saturated 0.2 g + Trans 0 g	1 %	2 %
Cholesterol 0 mg	0 %	1 %
Sodium 310 mg	14 %	15 %
Carbohydrate 41 g	14 %	16 %
Fibre 6 g	24 %	24 %
Sugars 8 g		
Protein 5 g		
Vitamin A	0 %	8 %
Vitamin C	0 %	0 %
Calcium	2 %	15 %
Iron	50 %	50 %

The correct answer is D. The food label above gives the carb amounts for the cereal only. You only give insulin for "available carbs", i.e. the total carbs in the food, less the amount of fibre (which doesn't raise the blood sugar). The "available carbs" in 1 cup of Shreddies® is (41 g - 6 g), or 35 g. Since Johnny is going to eat  $1\frac{1}{2}$  cups, he needs to give insulin for ( $1\frac{1}{2} \times 35$  g), or 53 g. Of course, he also needs to measure out his milk (12 g carbs per cup or 240 mL) and give insulin for that.

- (13) Kyle is on the road with his rugby team, and the coach has decided to stop at Subway® for dinner. Kyle doesn't eat a lot of fast food, but he is prepared for this. He chooses a 6" Turkey Breast & Ham Sub (lots of veggies, Swiss cheese, hold the mayo), a 10-oz (295-mL) bowl of Minestrone, a Chocolate Chunk Cookie and a diet pop (he's hungry after the big match!). His carb ratio is 10. How many units of rapid-acting insulin does he need for his meal?

- A.  $7\frac{1}{2}$  units  
 B. 8 units  
 C.  $8\frac{1}{2}$  units  
 D. 9 units  
 E.  $9\frac{1}{2}$  units

The correct answer is B. According to the [Subway Canada](#) website, the sandwich has 46 g of carbs (including 4 g of fibre), the soup has 15 g of carbs (including 4 g of fibre), and the cookie has 30 g of carbs (including 1 g of fibre). Therefore, the total "available carbs" (total carbs minus the fibre) is (46 g - 4 g + 15 g - 4 g + 30 g - 1 g), or 82 g. With a carb ratio of 10, this means he needs (82 g ÷ 10), or 8.2 units, which he rounds down to 8. Note that Kyle has made a relatively healthy fast-food choice, since his entire meal contains 9 g of fibre and just under 20 g of fat.

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(14) Stefan's family loves Grandma Johnson's lemon pound cake recipe, but they need to figure out the carb count for it. One recipe (which makes 12 servings) calls for 1 cup of white sugar and  $1\frac{1}{2}$  cups of white flour (as well as eggs, oil, and other non-carb-containing ingredients). How many carbs are in a serving of the pound cake?

- A. 27 g
- B. 32 g
- C. 37 g
- D. 42 g
- E. 47 g

The correct answer is A. According to the [CalorieKing](#) website,  $1\frac{1}{2}$  cups of flour has 143.1 g of carbs (including 5.1 g fibre), and 1 cup of sugar has 200 g of carbs (note that [CalorieKing](#) uses U.S. measures for cups, etc.). So the total carbs for this recipe is (143.1 g - 5.1 g + 200 g), or 338 g. Dividing by the total of 12 servings gives (338 g ÷ 12 servings), or 27 g per serving. It's quite easy to calculate the carb counts for many family recipes using this website and a calculator.

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(15) Winnie has a carb ratio of 12. She is very good at carb counting, but she notices that her blood glucose levels 2-3 h after meals are always high (12-14 mmol/L), even when they are in range pre-meal. What should she do?

- A. increase her carb ratio to 14
- B. add an extra 10 g to each of her carb counts
- C. decrease her insulin sensitivity factor (or correction factor) by 1
- D. decrease her carb ratio to 10
- E. add an extra  $\frac{1}{2}$  unit of insulin to each meal bolus

The correct answer is D. If the carb counting is correct and the blood sugars are not back in range 2-3 hours after most meals, then the carb ratio is likely incorrect. So one would **decrease** the ratio, as this results in an **increased** dose of insulin with each meal bolus. The insulin sensitivity factor does not control post-meal blood glucose levels if the pre-meal levels are in range. Just "fudging" the carb count or the insulin dose defeats the purpose of intensive insulin management.

(16) Which of the following foods, if consumed without any other food, will raise the blood sugar the slowest?

- A. White rice (GI 72)
- B. Coca-Cola® (GI 63)
- C. White spaghetti, al dente (GI 48)
- D. Wonder® bread (GI 73)
- E. Whole-wheat spaghetti, al dente (GI 42)

*The correct answer is E. The "glycemic index" (GI) compares how fast the blood glucose rises after 1 serving of food, compared to pure glucose (which has a GI of 100); the lower the GI, the slower a food raises the blood glucose. The GI is affected by the form of carbohydrate (simple sugars vs. complex starches), how it is cooked (fully cooked vs. al dente), how much fat and fibre are in the food (which both slow absorption), and which other foods are being eaten at the same meal. GI values can be obtained from a number of sites, including [GlycemicIndex.com](http://GlycemicIndex.com) and from a recent tabulation in [Diabetes Care](#). While the GI doesn't greatly affect the total amount of insulin one gives for a meal, it may influence how the insulin is delivered. In particular, pumpers may choose to use "combination" or "dual-wave" boluses to account for the delayed absorption of glucose in high-fat meals such as pizza. For people using MDI, the bolus may be extended by splitting it (e.g. giving part of the bolus before the meal and the remainder after the meal). Extra testing will be needed to figure out the timing and effectiveness of this approach for everyone.*

(17) Simran was given a box of Purdy's® "No Sugar Added" Mini Hedgehogs for Halloween. She goes to the Purdy's website to find the nutrition label. She also notices that the candy contains maltitol. If she eats 3 pieces, how many g of carbs does she need to consider when dosing her insulin?

- A. 0 g
- B. 3 g
- C. 8 g
- D. 12 g
- E. 13 g

Nutrition Facts	
Serving Size Per 3 Pieces (30 g)	
Amount	% Daily Value
<b>Calories</b> 160	
<b>Fat</b> 13 g	20 %
Saturated 6 g + Trans 0 g	30 %
<b>Cholesterol</b> 5 mg	
<b>Sodium</b> 20 mg	1 %
<b>Carbohydrate</b> 13 g	4 %
Fibre 1 g	4 %
Sugars 2 g	
Sugar alcohols 9 g	
<b>Protein</b> 2 g	
Vitamin A 0 %	Vitamin C 0 %
Calcium 6 %	Iron 4 %

The correct answer is B. While the total carbs in 3 pieces of candy is 13 g, this includes 1 g of fibre and 9 g of maltitol. Maltitol (as well as hydrogenated starch hydrolysates, isomalt, lactitol, mannitol, sorbitol, xylitol and erythritol) belong to a family of sweeteners called "sugar alcohols". Sugar alcohols are only very partially converted into glucose. Carb-counting experts generally suggest that, when there are sugar alcohols in a serving, the total amount is subtracted from the carb count. So this only leaves  $[13\text{ g} - 1\text{ g} - 9\text{ g}]$ , or 3 g of carbs. Since this is such a small amount, Simran may decide not to give any insulin for this treat. It should be noted that eating sugar alcohols can lead to an upset stomach, cramping and diarrhea in some people, and it is recommended to limit sugar alcohols to less than 10 g a day.

(18) Barry eats a large meal of a baked potato with sour cream, a 6-oz sirloin steak, mixed greens with oil and vinegar dressing, and glass of dry red wine. He counts the potato carbs accurately and doses his insulin correctly. His pre-meal blood glucose was 5.7 mmol/L. Yet he notices that he runs high for the next 6 hours. Which of the following reasons best explains this elevated blood glucose?

- A. There are uncounted carbs in the salad
- B. There are uncounted carbs in the sour cream
- C. The protein in the steak can be converted into glucose
- D. The fat in the sour cream can be converted into glucose
- E. The alcohol in the wine can be converted into glucose

*The correct answer is C. There are very few carbs in lettuce, meat, sour cream and dry wine. Fat cannot be "converted into glucose" in significant amounts, although high-fat meals such as this can slow the digestion of carbohydrates and alter the glycemic profile of foods. Alcohol itself does not have an effect on the blood glucose in the short term, although it can lead to delayed lows. However, some protein is normally converted into glucose in the body; high-protein meals can therefore lead to unexpected, prolonged highs. Pumpers in particular have developed some bolusing techniques to help prevent this.*

*One common strategy for high-protein meals is to convert the amount of protein in a meal into a "carb count". As a starting point, you can guess that 60% of the g of protein in a meal will be slowly converted into glucose. In general, 1 Meat & Alternative choice (1 oz or 30 g meat) contains 7 g of protein. So, a 6-oz (180-g) steak has (6 × 7 g) or 42 g protein. You will need to do some extra blood glucose checks to see if this calculation works for you. More frequent blood sugar checks over a 4- to 6-hour period after eating a high-protein meal will also help you decide how well your bolus covered the protein in your meal.*

*For pumpers, using the "square wave" bolus option should decrease the chances of getting low in the first couple of hours after eating a high-protein meal, and it should decrease the chance of becoming high 4-6 hours after the meal as the protein is slowly converted to glucose.*

*For those taking multiple daily injections, it is especially important to check your blood sugar 1-2 hours after your pre-meal bolus to make sure your blood sugar is not falling low before the protein is converted to glucose. You may find that giving the insulin **after** you finish eating—or dividing the meal bolus into two injections—may help even out the blood sugars for high-protein and high-fat meals.*

*It may be helpful to do some homework before you start. (This homework will be interesting and can be fun—after all, how often do you get to eat your homework?) Try eating a protein-only meal without a bolus (e.g. eggs only for breakfast) and then check your blood sugar every 1-2 hours for about 5 hours after eating. Do this on a day when your pre-meal sugar is in range and you can easily do extra blood sugar checks.*