N.Q.A.1: Conversions 1

1 The following conversion was done correctly:

$$\frac{3\text{ miles}}{1\text{ hour}} \bullet \frac{1\text{ hour}}{60\text{ minutes}} \bullet \frac{5280\text{ feet}}{1\text{ mile}} \bullet \frac{12\text{ inches}}{1\text{ foot}}$$

What were the final units for this conversion?

1) minutes per foot
2) minutes per inch
3) feet per minute
4) inches per minute

2 Morgan read that a snail moves about 72 feet per day. He performs the calculation $\frac{72\text{ feet}}{1\text{ day}} \bullet \frac{1\text{ day}}{24\text{ hours}} \bullet \frac{1\text{ hour}}{60\text{ minutes}} \bullet \frac{12\text{ inches}}{1\text{ foot}}$ to convert this rate to different units. What are the units for the converted rate?

1) hours/inch
2) minutes/inch
3) inches/hour
4) inches/minute

3 Peyton is a sprinter who can run the 40-yard dash in 4.5 seconds. He converts his speed into miles per hour, as shown below.

$$\frac{40\text{ yd}}{4.5\text{ sec}} \cdot \frac{3\text{ ft}}{1\text{ yd}} \cdot \frac{5280\text{ ft}}{1\text{ mi}} \cdot \frac{60\text{ sec}}{1\text{ min}} \cdot \frac{60\text{ min}}{1\text{ hr}}$$

Which ratio is *incorrectly* written to convert his speed?

1) $\frac{3\text{ ft}}{1\text{ yd}}$
2) $\frac{5280\text{ ft}}{1\text{ mi}}$
3) $\frac{60\text{ sec}}{1\text{ min}}$
4) $\frac{60\text{ min}}{1\text{ hr}}$

4 Olivia entered a baking contest. As part of the contest, she needs to demonstrate how to measure a gallon of milk if she only has a teaspoon measure. She converts the measurement using the ratios below:

$$\frac{4\text{ quarts}}{1\text{ gallon}} \bullet \frac{2\text{ pints}}{1\text{ quart}} \bullet \frac{2\text{ cups}}{1\text{ pint}} \bullet \frac{\frac{1}{4}\text{ cup}}{4\text{ tablespoons}} \bullet \frac{3\text{ teaspoons}}{1\text{ tablespoon}}$$

Which ratio is *incorrectly* written in Olivia's conversion?

1) $\frac{4\text{ quarts}}{1\text{ gallon}}$
2) $\frac{2\text{ pints}}{1\text{ quart}}$
3) $\frac{\frac{1}{4}\text{ cup}}{4\text{ tablespoons}}$
4) $\frac{3\text{ teaspoons}}{1\text{ tablespoon}}$

5 It takes Tim 4.5 hours to run 50 kilometers. Which expression will allow him to change this rate to minutes per mile?

1) $\frac{4.5\text{ hr}}{50\text{ km}} \bullet \frac{1.609\text{ km}}{1\text{ mi}} \bullet \frac{60\text{ min}}{1\text{ hr}}$
2) $\frac{50\text{ km}}{4.50\text{ hr}} \bullet \frac{1\text{ mi}}{1.609\text{ km}} \bullet \frac{60\text{ min}}{1\text{ hr}}$
3) $\frac{50\text{ km}}{4.50\text{ hr}} \bullet \frac{1\text{ mi}}{1.609\text{ km}} \bullet \frac{1\text{ hr}}{60\text{ min}}$
4) $\frac{4.5\text{ hr}}{50\text{ km}} \bullet \frac{1\text{ mi}}{1.609\text{ km}} \bullet \frac{60\text{ min}}{1\text{ hr}}$

6 Wayde van Niekerk, a runner from South Africa, ran 400 meters in 43.03 seconds to set a world record. Which calculation would determine his average speed, in miles per hour?

1) $\frac{400\text{ m}}{43.03\text{ sec}} \cdot \frac{1000\text{ m}}{0.62\text{ mi}} \cdot \frac{1\text{ hr}}{3600\text{ sec}}$
2) $\frac{400\text{ m}}{43.03\text{ sec}} \cdot \frac{0.62\text{ mi}}{1000\text{ m}} \cdot \frac{1\text{ hr}}{3600\text{ sec}}$
3) $\frac{400\text{ m}}{43.03\text{ sec}} \cdot \frac{0.62\text{ mi}}{1000\text{ m}} \cdot \frac{3600\text{ sec}}{1\text{ hr}}$
4) $\frac{400\text{ m}}{43.03\text{ sec}} \cdot \frac{1000\text{ m}}{0.62\text{ mi}} \cdot \frac{3600\text{ sec}}{1\text{ hr}}$

7 Joe is ordering water for his swimming pool. He determines the volume of his pool to be about 3240 cubic feet. There are approximately 7.5 gallons of water in 1 cubic foot. A truck load holds 6009 gallons of water. Which expression would allow Joe to correctly calculate the number of truck loads of water he needs to fill his pool?

1) $\frac{3240\ \text{ft}^3}{1\ \text{pool}} \bullet \frac{1\ \text{ft}^3}{7.5\ \text{gal}} \bullet \frac{6000\ \text{gal}}{1\ \text{truck load}}$

2) $\frac{3240\ \text{ft}^3}{1\ \text{pool}} \bullet \frac{1\ \text{ft}^3}{7.5\ \text{gal}} \bullet \frac{1\ \text{truck load}}{6000\ \text{gal}}$

3) $\frac{3240\ \text{ft}^3}{1\ \text{pool}} \bullet \frac{7.5\ \text{gal}}{1\ \text{ft}^3} \bullet \frac{6000\ \text{gal}}{1\ \text{truck load}}$

4) $\frac{3240\ \text{ft}^3}{1\ \text{pool}} \bullet \frac{7.5\ \text{gal}}{1\ \text{ft}^3} \bullet \frac{1\ \text{truck load}}{6000\ \text{gal}}$

8 Joe compared gas prices in England and New York State one day. In England, gas sold for 1.35 euros per liter, and one dollar equaled 0.622 euros. A correct way to figure out this cost, in dollars per gallon, is

1) $\frac{1.35\ \text{euros}}{1\ \text{L}} \bullet \frac{1\ \text{L}}{0.264\ \text{gal}} \bullet \frac{\$1.00}{0.622\ \text{euros}}$

2) $\frac{1.35\ \text{euros}}{1\ \text{L}} \bullet \frac{\$1.00}{0.622\ \text{euros}} \bullet \frac{0.264\ \text{gal}}{1\ \text{L}}$

3) $\frac{1.35\ \text{euros}}{1\ \text{L}} \bullet \frac{1\ \text{L}}{0.264\ \text{gal}} \bullet \frac{0.622\ \text{euros}}{\$1.00}$

4) $\frac{1.35\ \text{euros}}{1\ \text{L}} \bullet \frac{0.622\ \text{euros}}{\$1.00} \bullet \frac{0.264\ \text{gal}}{1\ \text{L}}$

9 A swimmer set a world record in the women's 1500-meter freestyle, finishing the race in 15.42 minutes. If 1 meter is approximately 3.281 feet, which set of calculations could be used to convert her speed to miles per hour?

1) $\frac{1500\ \text{meters}}{15.42\ \text{min}} \bullet \frac{60\ \text{min}}{1\ \text{hour}} \bullet \frac{1\ \text{meter}}{3.281\ \text{feet}} \bullet \frac{1\ \text{mile}}{5280\ \text{feet}}$

2) $\frac{1500\ \text{meters}}{15.42\ \text{min}} \bullet \frac{60\ \text{min}}{1\ \text{hour}} \bullet \frac{3.281\ \text{feet}}{1\ \text{meter}} \bullet \frac{1\ \text{mile}}{5280\ \text{feet}}$

3) $\frac{1500\ \text{meters}}{15.42\ \text{min}} \bullet \frac{3.281\ \text{feet}}{1\ \text{meter}} \bullet \frac{1\ \text{mile}}{5280\ \text{feet}}$

4) $\frac{1500\ \text{meters}}{15.42\ \text{min}} \bullet \frac{60\ \text{min}}{1\ \text{hour}} \bullet \frac{1\ \text{mile}}{5280\ \text{feet}}$

10 A construction worker needs to move 120 ft^3 of dirt by using a wheelbarrow. One wheelbarrow load holds 8 ft^3 of dirt and each load takes him 10 minutes to complete. One correct way to figure out the number of hours he would need to complete this job is

1) $\frac{120\ \text{ft}^3}{1} \bullet \frac{10\ \text{min}}{1\ \text{load}} \bullet \frac{60\ \text{min}}{1\ \text{hr}} \bullet \frac{1\ \text{load}}{8\ \text{ft}^3}$

2) $\frac{120\ \text{ft}^3}{1} \bullet \frac{60\ \text{min}}{1\ \text{hr}} \bullet \frac{8\ \text{ft}^3}{10\ \text{min}} \bullet \frac{1}{1\ \text{load}}$

3) $\frac{120\ \text{ft}^3}{1} \bullet \frac{1\ \text{load}}{10\ \text{min}} \bullet \frac{8\ \text{ft}^3}{1\ \text{load}} \bullet \frac{1\ \text{hr}}{60\ \text{min}}$

4) $\frac{120\ \text{ft}^3}{1} \bullet \frac{1\ \text{load}}{8\ \text{ft}^3} \bullet \frac{10\ \text{min}}{1\ \text{load}} \bullet \frac{1\ \text{hr}}{60\ \text{min}}$

11 A company ships an average of 30,000 items each week. The approximate number of items shipped each minute is calculated using the conversion

1) $\frac{30{,}000\ \text{items}}{1\ \text{week}} \bullet \frac{7\ \text{days}}{1\ \text{week}} \bullet \frac{60\ \text{min}}{1\ \text{hr}} \bullet \frac{1\ \text{day}}{24\ \text{hrs}}$

2) $\frac{30{,}000\ \text{items}}{1\ \text{week}} \bullet \frac{1\ \text{week}}{7\ \text{days}} \bullet \frac{1\ \text{day}}{24\ \text{hrs}} \bullet \frac{1\ \text{hr}}{60\ \text{min}}$

3) $\frac{1\ \text{week}}{30{,}000\ \text{items}} \bullet \frac{1\ \text{week}}{7\ \text{days}} \bullet \frac{1\ \text{day}}{24\ \text{hrs}} \bullet \frac{1\ \text{hr}}{60\ \text{min}}$

4) $\frac{1\ \text{week}}{30{,}000\ \text{items}} \bullet \frac{7\ \text{days}}{1\ \text{week}} \bullet \frac{24\ \text{hrs}}{1\ \text{day}} \bullet \frac{60\ \text{min}}{1\ \text{hr}}$

12 When the temperature is 59°F, the speed of sound at sea level is 1225 kilometers per hour. Which process could be used to convert this speed into feet per second?

1) $\frac{1225\text{ km}}{1\text{ hr}} \bullet \frac{0.62\text{ mi}}{1\text{ km}} \bullet \frac{1\text{ hr}}{60\text{ min}} \bullet \frac{1\text{ mi}}{5280\text{ ft}} \bullet \frac{1\text{ min}}{60\text{ sec}}$

2) $\frac{1225\text{ km}}{1\text{ hr}} \bullet \frac{0.62\text{ mi}}{1\text{ km}} \bullet \frac{5280\text{ ft}}{1\text{ mi}} \bullet \frac{1\text{ hr}}{60\text{ min}} \bullet \frac{1\text{ min}}{60\text{ sec}}$

3) $\frac{1225\text{ km}}{1\text{ hr}} \bullet \frac{1\text{ km}}{0.62\text{ mi}} \bullet \frac{5280\text{ ft}}{1\text{ mi}} \bullet \frac{1\text{ hr}}{60\text{ min}} \bullet \frac{1\text{ min}}{60\text{ sec}}$

4) $\frac{1225\text{ km}}{1\text{ hr}} \bullet \frac{0.62\text{ mi}}{1\text{ km}} \bullet \frac{5280\text{ ft}}{1\text{ mi}} \bullet \frac{60\text{ min}}{1\text{ hr}} \bullet \frac{1\text{ min}}{60\text{ sec}}$

13 Bamboo plants can grow 91 centimeters per day. What is the approximate growth of the plant, in inches per hour?

1) 1.49
2) 3.79
3) 9.63
4) 35.83

14 Dan took 12.5 seconds to run the 100-meter dash. He calculated the time to be approximately

1) 0.2083 minute
2) 750 minutes
3) 0.2083 hour
4) 0.52083 hour

15 Sarah travels on her bicycle at a speed of 22.7 miles per hour. What is Sarah's approximate speed, in kilometers per minute?

1) 0.2
2) 0.6
3) 36.5
4) 36.6

16 The Utica Boilermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs:

I. 10 miles
II. 44,880 feet
III. 15,560 yards

Which run(s) are at least 15 kilometers?

1) I, only
2) II, only
3) I and III
4) II and III

17 Faith wants to use the formula $C(f) = \frac{5}{9}(f - 32)$ to convert degrees Fahrenheit, f, to degrees Celsius, $C(f)$. If Faith calculated $C(68)$, what would her result be?

1) 20° Celsius
2) 20° Fahrenheit
3) 154° Celsius
4) 154° Fahrenheit

18 A news report suggested that an adult should drink a minimum of 4 pints of water per day. Based on this report, determine the minimum amount of water an adult should drink, in fluid ounces, per week.

19 A typical marathon is 26.2 miles. Allan averages 12 kilometers per hour when running in marathons. Determine how long it would take Allan to complete a marathon, to the *nearest tenth of an hour*. Justify your answer.

20 A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

N.Q.A.1: Conversions 1
Answer Section

1 ANS: 4 REF: 011924ai
2 ANS: 4 REF: 012323ai
3 ANS: 2 REF: 011502ai
4 ANS: 3 REF: 081812ai
5 ANS: 1 REF: 062222ai
6 ANS: 3 REF: 062423ai
7 ANS: 4 REF: 082424ai
8 ANS: 1 REF: 082324ai
9 ANS: 2 REF: 082221ai
10 ANS: 4 REF: 061720ai
11 ANS: 2 REF: 062309ai
12 ANS: 2 REF: 012422ai
13 ANS: 1

$$\frac{91\text{ cm}}{\text{day}} \times \frac{1\text{ day}}{24\text{ hrs}} \times \frac{1\text{ inch}}{2.54\text{ cm}} \approx \frac{1.49\text{ in}}{\text{hr}}$$

REF: 061924ai
14 ANS: 1

$$12.5\text{ sec} \times \frac{1\text{ min}}{60\text{ sec}} = 0.208\overline{3}\text{ min}$$

REF: 061608ai
15 ANS: 2

$$\frac{22.7\text{ m}}{\text{hr}} \times \frac{1\text{ hr}}{60\text{ min}} \times \frac{1.609\text{ km}}{1\text{ m}} = \frac{0.6\text{ km}}{\text{min}}$$

REF: 062123ai
16 ANS: 1

I. $10\text{ mi}\left(\frac{1.609\text{ km}}{1\text{ mi}}\right) = 16.09\text{ km}$; II. $44880\text{ ft}\left(\frac{1\text{ mi}}{5280\text{ ft}}\right)\left(\frac{1.609\text{ km}}{1\text{ mi}}\right) \approx 13.6765\text{ km}$; III. $15560\text{ yd}\left(\frac{3\text{ ft}}{1\text{ yd}}\right)\left(\frac{1\text{ mi}}{5280\text{ ft}}\right)\left(\frac{1.609\text{ km}}{1\text{ mi}}\right) \approx 14.225\text{ km}$

REF: 061815ai
17 ANS: 1

$$C(68) = \frac{5}{9}(68 - 32) = 20$$

REF: 011710ai

18 ANS:

$$\frac{4 \text{ pints}}{\text{day}} \times \frac{2 \text{ cups}}{1 \text{ pint}} \times \frac{8 \text{ ounces}}{1 \text{ cup}} \times \frac{7 \text{ days}}{\text{week}} = \frac{448 \text{ ounces}}{\text{week}}$$

REF: 012027ai

19 ANS:

$$12 \text{ km}\left(\frac{0.62 \text{ m}}{1 \text{ km}}\right) = 7.44 \text{ m} \quad \frac{26.2 \text{ m}}{7.44 \text{ mph}} \approx 3.5 \text{ hours}$$

REF: 011726ai

20 ANS:

$$\frac{2}{40} = \frac{5.75}{x} \quad \frac{5280}{115} \approx 46$$

$$x = 115$$

REF: 081730ai