Question ID d28c29e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: d28c29e1

2.1

The International Space Station orbits Earth at an average speed of 4.76 miles per second. What is the space station's average speed in miles per hour?

A. 285.6

B. 571.2

C. 856.8

D. 17,136.0

ID: d28c29e1 Answer

Correct Answer: D

Rationale

Choice D is correct. Since 1 minute = 60 seconds and 1 hour = 60 minutes, it follows that 1 hour = (60)(60), or 3,600 seconds. Using this conversion factor, the space station's average speed of 4.76 miles per second is equal to an average speed of $\frac{4.76 \text{ miles}}{\text{second}} \times \frac{3{,}600 \text{ seconds}}{\text{hour}} = \frac{17,136 \text{ miles}}{\text{hour}}$, or 17,136 miles per hour.

Choice A is incorrect. This is the space station's average speed in miles per minute. Choice B is incorrect. This is double the space station's average speed in miles per minute, or the number of miles the space station travels on average in 2 minutes. Choice C is incorrect. This is triple the space station's average speed in miles per minute, or the number of miles the space station travels on average in 3 minutes.

Question Difficulty: Medium

Question ID b4912cc5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: b4912cc5 2.2

The population density of Iceland, in people per square kilometer of land area, increased from 2.5 in 1990 to 3.3 in 2014. During this time period, the land area of Iceland was 100,250 square kilometers. By how many people did Iceland's population increase from 1990 to 2014?

A. 330,825

B. 132,330

C. 125,312

D. 80,200

ID: b4912cc5 Answer

Correct Answer: D

Rationale

Choice D is correct. The increase in Iceland's population can be found by multiplying the increase in population density, in people per square kilometer, by the area, in square kilometers. It's given that the population density of Iceland was 2.5 people per square kilometer in 1990 and 3.3 people per square kilometer in 2014. The increase in population density can be found by subtracting 2.5 from 3.3, which yields 0.8. It's given that the land area of Iceland was 100,250 square kilometers. Thus, the increase in population is $0.8(100{,}250)$, or 80,200.

Alternate approach: It's given that the population density of Iceland, in people per square kilometer of land area, in 1990 was 2.5. Since the land area of Iceland was 100,250 square kilometers, it follows that the population of Iceland in 1990 was $2.5(100{,}250)$, or 250,625. Similarly, the population of Iceland in 2014 was $3.3(100{,}250)$, or 330,825. The population increase is the difference in the population from 1990 to 2014, or $330{,}825 - 250{,}625$, which yields 80,200. Therefore, Iceland's population increased by 80,200 from 1990 to 2014.

Choice A is incorrect. This is the population of Iceland in 2014. Choice B is incorrect and may result from dividing 3.3 by 2.5, instead of subtracting 2.5 from 3.3. Choice C is incorrect and may result from dividing the population of Iceland in 1990 by 2.

Question Difficulty: Medium

Question ID 8e528129

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 8e528129

2.3

Pure beeswax has a density of 0.555 ounce per cubic inch. An online company sells pure beeswax at a price of $8.00 per ounce. What is the selling price, in dollars per cubic inch, for pure beeswax purchased from this company?

ID: 8e528129 Answer

Rationale

The correct answer is 4.44. The selling price, in dollars per cubic inch, is found by multiplying the density, in ounces per cubic inch, by the unit price, in dollars per ounce: $\left(\frac{0.555 \text{ ounce}}{1 \text{ cubic inch}}\right)\left(\frac{\$8.00}{1 \text{ ounce}}\right)$ yields $\frac{\$4.44}{1 \text{ cubic inch}}$. Thus, the selling price, in dollars per cubic inch, is 4.44.

Question Difficulty: Medium

Question ID fea831fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: fea831fc

2.4

On April 18, 1775, Paul Revere set off on his midnight ride from Charlestown to Lexington. If he had ridden straight to Lexington without stopping, he would have traveled 11 miles in 26 minutes. In such a ride, what would the average speed of his horse have been, to the nearest tenth of a mile per hour?

ID: fea831fc Answer

Rationale

The correct answer is 25.4. The average speed is the total distance divided by the total time. The total distance is 11 miles and the total time is 26 minutes. Thus, the average speed is $\frac{11}{26}$ miles per minute. The question asks for the average speed in miles per hour, and there are 60 minutes in an hour; converting miles per minute to miles per hour gives the following:

$$\text{Average speed} = \frac{11 \text{ miles}}{26 \text{ minutes}} \times \frac{60 \text{ minutes}}{1 \text{ hour}}$$

$$= \frac{660}{26} \text{ miles per hour}$$

$$\approx 25.38 \text{ miles per hour}$$

Therefore, to the nearest tenth of a mile per hour, the average speed of Paul Revere's ride would have been 25.4 miles per hour. Note that 25.4 and 127/5 are examples of ways to enter a correct answer.

Question Difficulty: Medium

Question ID 181cc4d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 181cc4d6 2.5

Rectangle *A* has length 15 and width *w*. Rectangle *B* has length 20 and the same length-to-width ratio as rectangle *A*. What is the width of rectangle *B* in terms of *w* ?

A. $\frac{4}{3}w$

B. $w+5$

C. $\frac{3}{4}w$

D. $w-5$

ID: 181cc4d6 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that rectangle A has length 15 and width w. Therefore, the length-to-width ratio of rectangle A is 15 to w. It's also given that rectangle B has length 20 and the same length-to-width ratio as rectangle A. Let x represent the width of rectangle B. The proportion $\frac{15}{w}=\frac{20}{x}$ can be used to solve for x in terms of w. Multiplying both sides of this equation by x yields $\frac{15x}{w}=20$, and then multiplying both sides of this equation by w yields $15x=20w$. Dividing both sides of this equation by 15 yields $x=\frac{20w}{15}$. Simplifying this fraction yields $x=\frac{4}{3}w$.

Choices B and D are incorrect and may result from interpreting the difference in the lengths of rectangle A and rectangle B as equivalent to the difference in the widths of rectangle A and rectangle B. Choice C is incorrect and may result from using a length-to-width ratio of w to 15, instead of 15 to w.

Question Difficulty: Medium

Question ID 445dd032

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 445dd032

2.6

Tanya earns $13.50 per hour at her part-time job. When she works z hours, she earns $13.50z$ dollars. Which of the following expressions gives the amount, in dollars, Tanya will earn if she works $3z$ hours?

A. $3(13.50z)$

B. $3+13.50z$

C. $3z+13.50z$

D. $13.50(z+3)$

ID: 445dd032 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that when Tanya works z hours, she earns $13.50z$ dollars. Since her hourly rate is constant, if she works 3 times as many hours, or $3z$ hours, she will earn 3 times as many dollars, or $3(13.50z)$.

Choice B is incorrect. This expression represents adding 3 dollars to the $13.50z$ dollars Tanya will earn. Choice C is incorrect. This expression can be rewritten as $16.50z$, which implies that Tanya earns $16.50 per hour, not $13.50. Choice D is incorrect. This expression adds 3 to the number of hours Tanya works, rather than multiplying the hours she works by 3.

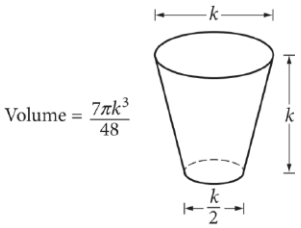
Question Difficulty: Medium

Question ID 939c46d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 939c46d1

2.7



The glass pictured above can hold a maximum volume of 473 cubic centimeters, which is approximately 16 fluid ounces. Jenny has a pitcher that contains 1 gallon of water. How many times could Jenny completely fill the glass with 1 gallon of water? (1 gallon = 128 fluid ounces)

A. 16

B. 8

C. 4

D. 3

ID: 939c46d1 Answer

Correct Answer: B

Rationale

Choice B is correct. It is given that the volume of the glass is approximately 16 fluid ounces. If Jenny has 1 gallon of water, which is 128 fluid ounces, she could fill the glass $\frac{128}{16} = 8$ times.

Choice A is incorrect because Jenny would need 16×16 fluid ounces = 256 fluid ounces, or 2 gallons, of water to fill the glass 16 times. Choice C is incorrect because Jenny would need only 4×16 fluid ounces = 64 fluid ounces of water to fill the glass 4 times. Choice D is incorrect because Jenny would need only 3×16 fluid ounces = 48 fluid ounces to fill the glass 3 times.

Question Difficulty: Medium

Question ID e21d10a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: e21d10a7

2.8

One of a planet's moons orbits the planet every 252 days. A second moon orbits the planet every 287 days. How many more days does it take the second moon to orbit the planet 29 times than it takes the first moon to orbit the planet 29 times?

ID: e21d10a7 Answer

Correct Answer: 1015

Rationale

The correct answer is $1{,}015$. It's given that the first moon orbits the planet every 252 days. Therefore, it takes the first moon $252(29)$, or $7{,}308$, days to orbit the planet 29 times. It's also given that the second moon orbits the planet every 287 days. Therefore, it takes the second moon $287(29)$, or $8{,}323$, days to orbit the planet 29 times. Since it takes the first moon $7{,}308$ days and the second moon $8{,}323$ days, it takes the second moon $8{,}323 - 7{,}308$, or $1{,}015$, more days than it takes the first moon to orbit the planet 29 times.

Question Difficulty: Medium

Question ID 8917ce38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 8917ce38

2.9

Which of the following speeds is equivalent to 90 kilometers per hour? (1 kilometer = 1,000 meters)

A. 25 meters per second

B. 32 meters per second

C. 250 meters per second

D. 324 meters per second

ID: 8917ce38 Answer

Correct Answer: A

Rationale

Choice A is correct. Since 1 kilometer is equal to 1,000 meters, it follows that 90 kilometers is equal to $90(1{,}000) = 90{,}000$ meters. Since 1 hour is equal to 60 minutes and 1 minute is equal to 60 seconds, it follows that 1 hour is equal to $60(60) = 3{,}600$ seconds. Now $\frac{90 \text{ kilometers}}{1 \text{ hour}}$ is equal to $\frac{90{,}000 \text{ meters}}{3{,}600 \text{ seconds}}$, which reduces to $\frac{25 \text{ meters}}{1 \text{ second}}$ or 25 meters per second.

Choices B, C, and D are incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID ec787383

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: ec787383

2.10

A distance of 61 furlongs is equivalent to how many feet? $(1\ \text{furlong} = 220\ \text{yards and } 1\ \text{yard} = 3\ \text{feet})$

ID: ec787383 Answer

Correct Answer: 40260

Rationale

The correct answer is $40{,}260$. It's given that $1\ \text{furlong} = 220\ \text{yards}$ and $1\ \text{yard} = 3\ \text{feet}$. It follows that a distance of 61 furlongs is equivalent to $(61\ \text{furlongs})\left(\frac{220\ \text{yards}}{1\ \text{furlong}}\right)\left(\frac{3\ \text{feet}}{1\ \text{yard}}\right)$, or $40{,}260$ feet.

Question Difficulty: Medium

Question ID 7e6c745f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 7e6c745f

2.11

Food	Protein	Cost
1 large egg	6 grams	$0.36
1 cup of milk	8 grams	$0.24

The table above shows the amount of protein in two foods and the cost of each food. Based on the table, what is the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk?

A. 1 : 2

B. 2 : 3

C. 3 : 4

D. 2 : 1

ID: 7e6c745f Answer

Correct Answer: D

Rationale

Choice D is correct. The cost per gram of protein in 1 large egg is $0.36 ÷ 6 = $0.06. The cost per gram of protein in 1 cup of milk is $0.24 ÷ 8 = $0.03. It follows that the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk is 0.06:0.03, which can be rewritten as 2:1.

Choice A is incorrect and may result from finding the ratio of the cost per gram of protein in a cup of milk to the cost per gram of protein in a large egg (the reciprocal of the ratio specified in the question). Choices B and C are incorrect and may result from incorrectly calculating the unit rates or from errors made when simplifying the ratio.

Question Difficulty: Medium

Question ID 873d2838

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 873d2838

2.12

The population density of Cedar County is 230 people per square mile. The county has a population of $85{,}100$ people. What is the area, in square miles, of Cedar County?

ID: 873d2838 Answer

Correct Answer: 370

Rationale

The correct answer is 370. It's given that the population density of Cedar County is 230 people per square mile and the county has a population of $85{,}100$ people. Based on the population density, it follows that the area of Cedar County is $(85{,}100 \text{ people})\left(\frac{1 \text{ square mile}}{230 \text{ people}}\right)$, or 370 square miles.

Question Difficulty: Medium

Question ID 73ddfdac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 73ddfdac 2.13

A distance of 112 furlongs is equivalent to how many feet? $(1\ \text{furlong} = 220\ \text{yards and } 1\ \text{yard} = 3\ \text{feet})$

ID: 73ddfdac Answer

Correct Answer: 73920

Rationale

The correct answer is $73{,}920$. It's given that $1\ \text{furlong} = 220\ \text{yards}$ and $1\ \text{yard} = 3\ \text{feet}$. It follows that a distance of 112 furlongs is equivalent to $(112\ \text{furlongs})\left(\frac{220\ \text{yards}}{1\ \text{furlong}}\right)\left(\frac{3\ \text{feet}}{1\ \text{yard}}\right)$, or $73{,}920$ feet.

Question Difficulty: Medium

Question ID 61b87506

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 61b87506

2.14

For the values j and k, the ratio of j to k is 11 to 12. If j is multiplied by 17, what is k multiplied by in order to maintain the same ratio?

ID: 61b87506 Answer

Correct Answer: 17

Rationale

The correct answer is 17. If one value is multiplied by a number, then the other value must be multiplied by the same number in order to maintain the same ratio. It's given that j is multiplied by 17. Therefore, in order to maintain the same ratio, k must also be multiplied by 17.

Question Difficulty: Medium

Question ID eb672707

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: eb672707

2.15

How many tablespoons are equivalent to 14 teaspoons? $(3 \text{ teaspoons} = 1 \text{ tablespoon})$

ID: eb672707 Answer

Correct Answer: 14/3, 4.666, 4.667

Rationale

The correct answer is $\frac{14}{3}$. It's given that 3 teaspoons is equivalent to 1 tablespoon. Therefore, 14 teaspoons is equivalent to $(14 \text{ teaspoons})\left(\frac{1 \text{ tablespoon}}{3 \text{ teaspoons}}\right)$, or $\frac{14}{3}$ tablespoons. Note that 14/3, 4.666, and 4.667 are examples of ways to enter a correct answer.

Question Difficulty: Medium

Question ID cb4894f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: cb4894f9

2.16

A triathlon is a multisport race consisting of three different legs. A triathlon participant completed the cycling leg with an average speed of 19.700 miles per hour. What was the average speed, in yards per hour, of the participant during the cycling leg? $(1 \text{ mile} = 1{,}760 \text{ yards})$

ID: cb4894f9 Answer

Correct Answer: 34672

Rationale

The correct answer is $34{,}672$. It's given that $1 \text{ mile} = 1{,}760 \text{ yards}$. It follows that an average speed of 19.700 miles per hour is equivalent to $\left(\frac{19.700 \text{ miles}}{1 \text{ hour}}\right)\left(\frac{1{,}760 \text{ yards}}{1 \text{ mile}}\right)$, or $34{,}672$ yards per hour.

Question Difficulty: Medium

Question ID 1180401d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 1180401d

2.17

The total area of a coastal city is 92.1 square miles, of which 11.3 square miles is water. If the city had a population of 621,000 people in the year 2010, which of the following is closest to the population density, in people per square mile of land area, of the city at that time?

A. 6,740

B. 7,690

C. 55,000

D. 76,000

ID: 1180401d Answer

Correct Answer: B

Rationale

Choice B is correct. The land area of the coastal city can be found by subtracting the area of the water from the total area of the coastal city; that is, $92.1 - 11.3 = 80.8$ square miles. The population density is the population divided by the land area, or $\frac{621{,}000}{80.8} = 7{,}686$, which is closest to 7,690 people per square mile.

Choice A is incorrect and may be the result of dividing the population by the total area, instead of the land area. Choice C is incorrect and may be the result of dividing the population by the area of water. Choice D is incorrect and may be the result of making a computational error with the decimal place.

Question Difficulty: Medium

Question ID f6cbb04a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: f6cbb04a 2.18

$d = 55t$

The equation above can be used to calculate the distance d, in miles, traveled by a car moving at a speed of 55 miles per hour over a period of t hours. For any positive constant k, the distance the car would have traveled after $9k$ hours is how many times the distance the car would have traveled after $3k$ hours?

A. 3

B. 6

C. $3k$

D. $6k$

ID: f6cbb04a Answer

Correct Answer: A

Rationale

Choice A is correct. Since the distance is equal to the amount of time multiplied by a constant, the given equation $d = 55t$ represents a proportional relationship between distance and time in this situation. Since $9k = 3 \cdot 3k$, the time when $t = 9k$ hours is 3 times the time when $t = 3k$ hours. Therefore, the distance traveled after $9k$ hours is 3 times the distance after $3k$ hours.

Choices B and D are incorrect and may result from interpreting the proportional relationship between time and distance as additive rather than multiplicative. Choice C is incorrect and may result from an arithmetic error.

Question Difficulty: Medium

Question ID 89c39d77

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 89c39d77 2.19

A competition consisted of four different events. One participant completed the first event with an average speed of 20.300 miles per hour. What was this average speed, in yards per hour? $(1 \text{ mile} = 1{,}760 \text{ yards})$

ID: 89c39d77 Answer

Correct Answer: 35728

Rationale

The correct answer is $35{,}728$. It's given that $1 \text{ mile} = 1{,}760 \text{ yards}$. It follows that an average speed of 20.300 miles per hour is equivalent to $\left(\frac{20.300 \text{ miles}}{1 \text{ hour}}\right)\left(\frac{1{,}760 \text{ yards}}{1 \text{ mile}}\right)$, or $35{,}728$ yards per hour.

Question Difficulty: Medium

Question ID 3310c2ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 3310c2ab

2.20

How many fluid ounces are equivalent to 76 quarts? $(8 \text{ fluid ounces} = 1 \text{ cup and } 4 \text{ cups} = 1 \text{ quart})$

ID: 3310c2ab Answer

Correct Answer: 2432

Rationale

The correct answer is 2,432. It's given that $4 \text{ cups} = 1 \text{ quart}$. It follows that 76 quarts is equivalent to $76 \text{ quarts} \frac{4 \text{ cups}}{1 \text{ quart}}$, or 304 cups. It's also given that $8 \text{ fluid ounces} = 1 \text{ cup}$. It follows that 304 cups is equivalent to $304 \text{ cups} \frac{8 \text{ fluid ounces}}{1 \text{ cup}}$, or 2,432 fluid ounces.

Question Difficulty: Medium

Question ID 674a4084

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 674a4084

2.21

An insect moves at a speed of $\frac{3}{20}$ feet per second. What is this speed, in yards per second? $(3 \text{ feet} = 1 \text{ yard})$

A. $\frac{1}{20}$

B. $\frac{9}{20}$

C. 6

D. 20

ID: 674a4084 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that $3 \text{ feet} = 1 \text{ yard}$. It follows that a speed of $\frac{3}{20}$ feet per second is equivalent to $\frac{\frac{3}{20} \text{ feet}}{1 \text{ second}} \frac{1 \text{ yard}}{3 \text{ feet}}$, which is equivalent to $\frac{3}{20}\frac{1}{3}$, or $\frac{1}{20}$, yards per second.

Choice B is incorrect. This is the speed, in feet per second, that's equivalent to $\frac{3}{20}$ yards per second.

Choice C is incorrect. This is the speed, in yards per second, that's equivalent to 18, not $\frac{3}{20}$, feet per second.

Choice D is incorrect. This is the speed, in yards per second, that's equivalent to 60, not $\frac{3}{20}$, feet per second.

Question Difficulty: Medium

Question ID 825b7490

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	■■□

ID: 825b7490

2.22

The ratio 140 to m is equivalent to the ratio 4 to 28. What is the value of m?

ID: 825b7490 Answer

Correct Answer: 980

Rationale

The correct answer is 980. It's given that the ratio 140 to m is equivalent to the ratio 4 to 28. Therefore, the value of m can be found by solving the equation $\frac{140}{m} = \frac{4}{28}$. Multiplying each side of this equation by m yields $140 = \frac{4m}{28}$. Multiplying each side of this equation by 28 yields $3{,}920 = 4m$. Dividing each side of this equation by 4 yields $980 = m$. Therefore, the value of m is 980.

Question Difficulty: Medium