# Question ID 10fd67a3

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

## ID: 10fd67a3

An object has a mass of $168$ grams and a volume of $24$ cubic centimeters. What is the density, in grams per cubic centimeter, of the object?

A. $7$

B. $144$

C. $192$

D. $4{,}032$

## ID: 10fd67a3 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the object has a mass of $168$ grams and a volume of $24$ cubic centimeters. Dividing the mass, in grams, of the object by the volume, in cubic centimeters, of the object gives the density, in grams per cubic centimeter, of the object. It follows that the density of the object is $\frac{168 \text{ grams}}{24 \text{ cubic centimeters}}$, which is equivalent to $\frac{168}{24}$ grams per cubic centimeter, or $7$ grams per cubic centimeter.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

# Question ID 34f7cb5d

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

**ID: 34f7cb5d**

A distance of $354$ furlongs is equivalent to how many feet? $(1\ \text{furlong} = 220\ \text{yards and}\ 1\ \text{yard} = 3\ \text{feet})$

A. $306$

B. $402$

C. $25{,}960$

D. $233{,}640$

**ID: 34f7cb5d Answer**

Correct Answer: D

Rationale

Choice D is correct. It's given that $1\ \text{furlong} = 220\ \text{yards}$ and $1\ \text{yard} = 3\ \text{feet}$. It follows that a distance of $354$ furlongs is equivalent to $(354\ \text{furlongs})\left(\frac{220\ \text{yards}}{1\ \text{furlong}}\right)\left(\frac{3\ \text{feet}}{1\ \text{yard}}\right)$, or $233{,}640$ feet.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

# Question ID 8ce82ad5

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

**ID: 8ce82ad5**

At a particular track meet, the ratio of coaches to athletes is $1$ to $26$. If there are $x$ coaches at the track meet, which of the following expressions represents the number of athletes at the track meet?

A. $\frac{x}{26}$

B. $26x$

C. $x + 26$

D. $\frac{26}{x}$

**ID: 8ce82ad5 Answer**

Correct Answer: B

Rationale

Choice B is correct. It's given that at a particular track meet, the ratio of coaches to athletes is $1$ to $26$. If one number in a ratio is multiplied by a value, the other number must be multiplied by the same value in order to maintain the same ratio. If there are $x$ coaches at the track meet, multiplying both numbers in the ratio by $x$ yields $1(x)$ to $26(x)$, or $x$ to $26x$. Therefore, the expression $26x$ represents the number of athletes at the track meet.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

# Question ID 77c4a10b

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

**ID: 77c4a10b**

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: 77c4a10b 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 8dd9d75e

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

**ID: 8dd9d75e**

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

**ID: 8dd9d75e 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 $(76\ \text{quarts})\left(\frac{4\ \text{cups}}{1\ \text{quart}}\right)$, or $304$ cups. It's also given that $8\ \text{fluid ounces} = 1\ \text{cup}$. It follows that $304$ cups is equivalent to $(304\ \text{cups})\left(\frac{8\ \text{fluid ounces}}{1\ \text{cup}}\right)$, or $2{,}432$ fluid ounces.

Question Difficulty: Medium

# Question ID b6843bc7

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

**ID: b6843bc7**

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: b6843bc7 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 664315f9

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

**ID: 664315f9**

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: 664315f9 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 58f4cf97

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

**ID: 58f4cf97**

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: 58f4cf97 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 $\left(\frac{\frac{3}{20} \text{ feet}}{1 \text{ second}}\right)\left(\frac{1 \text{ yard}}{3 \text{ feet}}\right)$, which is equivalent to $\left(\frac{3}{20}\right)\left(\frac{1}{3}\right)$, 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 e9fe7acd

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

**ID: e9fe7acd**

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: e9fe7acd 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 bf75726f

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

**ID: bf75726f**

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: bf75726f 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 adf742ae

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

**ID: adf742ae**

If $\frac{x}{y} = 4$ and $\frac{24x}{ny} = 4$, what is the value of $n$?

**ID: adf742ae Answer**

Correct Answer: 24

Rationale

The correct answer is $24$. The equation $\frac{24x}{ny} = 4$ can be rewritten as $\left(\frac{24}{n}\right)\left(\frac{x}{y}\right) = 4$. It's given that $\frac{x}{y} = 4$. Substituting $4$ for $\frac{x}{y}$ in the equation $\left(\frac{24}{n}\right)\left(\frac{x}{y}\right) = 4$ yields $\left(\frac{24}{n}\right)(4) = 4$. Multiplying both sides of this equation by $n$ yields $(24)(4) = 4n$. Dividing both sides of this equation by $4$ yields $24 = n$. Therefore, the value of $n$ is $24$.

Question Difficulty: Medium

# Question ID 82555d76

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

**ID: 82555d76**

The total mass, in kilograms, of $r$ identical objects is $t$. Which expression represents the total mass, in kilograms, of $146r$ of these objects?

A. $146 - t$

B. $146 + t$

C. $\frac{t}{146}$

D. $146t$

**ID: 82555d76 Answer**

Correct Answer: D

Rationale

Choice D is correct. It's given that the total mass, in kilograms, of $r$ identical objects is $t$. To obtain the expression $146r$, $r$ is multiplied by $146$. Therefore, to find the total mass, in kilograms, of $146r$ of these objects, $t$ must also be multiplied by $146$. The result of multiplying $t$ by $146$ is the expression $146t$. Therefore, the total mass, in kilograms, of $146r$ of these objects, is $146t$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty: Medium

# Question ID 213aaab1

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

**ID: 213aaab1**

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: 213aaab1 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 3e19942b

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

**ID: 3e19942b**

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: 3e19942b 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 f9c3e6a3

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

## ID: f9c3e6a3

One side of a flat board has an area of $874$ square inches. If a pressure of $19$ pounds per square inch of area is exerted on this side of the board, what is the total force, in pounds, exerted on this side of the board?

## ID: f9c3e6a3 Answer

Correct Answer: 16606

Rationale

The correct answer is $16{,}606$. It's given that one side of a flat board has an area of $874$ square inches. If a pressure of $19$ pounds per square inch of area is exerted on this side of the board, the total force exerted on this side of the board is $(874 \text{ square inches})\left(\frac{19 \text{ pounds}}{1 \text{ square inch}}\right)$, or $16{,}606$ pounds.

Question Difficulty: Medium

# Question ID d1c59f81

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

**ID: d1c59f81**

The ratio $x$ to $y$ is equivalent to the ratio $9$ to $5$. If the value of $x$ is $162$, what is the value of $y$?

**ID: d1c59f81 Answer**

Correct Answer: 90

Rationale

The correct answer is $90$. It's given that the ratio of $x$ to $y$ is equivalent to the ratio $9$ to $5$. It follows that $\frac{x}{y} = \frac{9}{5}$. Multiplying each side of this equation by $5y$ yields $\frac{(5y)x}{y} = \frac{9(5y)}{5}$, or $5x = 9y$. Dividing each side of this equation by $9$ yields $\frac{5x}{9} = y$. Substituting $162$ for $x$ in this equation yields $\frac{5(162)}{9} = y$, which is equivalent to $\frac{810}{9} = y$, or $90 = y$. Therefore, if the value of $x$ is $162$, the value of $y$ is $90$.

Question Difficulty: Medium

# Question ID 128d0947

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

**ID: 128d0947**

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

**ID: 128d0947 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 ce901565

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

**ID: ce901565**

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

**ID: ce901565 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

# Question ID 04943c5d

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

## ID: 04943c5d

For a certain rectangular region, the ratio of its length to its width is $35$ to $10$. If the width of the rectangular region increases by $7$ units, how must the length change to maintain this ratio?

A. It must decrease by $24.5$ units.

B. It must increase by $24.5$ units.

C. It must decrease by $7$ units.

D. It must increase by $7$ units.

## ID: 04943c5d Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that the ratio of the rectangular region's length to its width is $35$ to $10$. This can be written as a proportion: $\frac{\text{length}}{\text{width}} = \frac{35}{10}$, or $\frac{\ell}{w} = \frac{35}{10}$. This proportion can be rewritten as $10\ell = 35w$, or $\ell = 3.5w$. If the width of the rectangular region increases by $7$, then the length will increase by some number $x$ in order to maintain this ratio. The value of $x$ can be found by replacing $\ell$ with $\ell + x$ and $w$ with $w + 7$ in the equation, which gives $\ell + x = 3.5(w + 7)$. This equation can be rewritten using the distributive property as $\ell + x = 3.5w + 24.5$. Since $\ell = 3.5w$, the right-hand side of this equation can be rewritten by substituting $\ell$ for $3.5w$, which gives $\ell + x = \ell + 24.5$, or $x = 24.5$. Therefore, if the width of the rectangular region increases by $7$ units, the length must increase by $24.5$ units in order to maintain the given ratio.

Choice A is incorrect. If the width of the rectangular region increases, the length must also increase, not decrease.

Choice C is incorrect. If the width of the rectangular region increases, the length must also increase, not decrease.

Choice D is incorrect. Since the ratio of the length to the width of the rectangular region is $35$ to $10$, if the width of the rectangular region increases by $7$ units, the length would have to increase by a proportional amount, which would have to be greater than $7$ units.

Question Difficulty: Medium