

Question ID f5b329a4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: f5b329a4

The speed of a vehicle is increasing at a rate of **7.3** meters per second squared. What is this rate, in **miles per minute squared**, rounded to the nearest tenth? (Use **1 mile = 1,609 meters**.)

- A. **0.3**
- B. **16.3**
- C. **195.8**
- D. **220.4**

ID: f5b329a4 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that the speed of a vehicle is increasing at a rate of **7.3** meters per second squared. It's given to use **1 mile = 1,609 meters**. There are **60** seconds in **1** minute; therefore, **60²** or **3,600** seconds squared is equal to **1** minute squared. It follows that the rate of **7.3** meters per second squared is equivalent to $\left(\frac{7.3 \text{ meters}}{1 \text{ second squared}}\right)\left(\frac{1 \text{ mile}}{1,609 \text{ meters}}\right)\left(\frac{3,600 \text{ seconds squared}}{1 \text{ minute squared}}\right)$, or approximately **16.33 miles per minute squared**. The rate, in **miles per minute squared**, rounded to the nearest tenth is **16.3**.

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: Hard

Question ID 9dd5d775

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 9dd5d775

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: 9dd5d775 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 square inches)** $\left(\frac{19 \text{ pounds}}{1 \text{ square inch}}\right)$, or **16,606** pounds.

Question Difficulty: Hard

Question ID 60b279a2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 60b279a2

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: 60b279a2 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: Hard

Question ID 701ecc09

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 701ecc09

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: 701ecc09 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 ℓ 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 ℓ 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: Hard

Question ID d847e839

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: d847e839

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: d847e839 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 people) $\left(\frac{1 \text{ square mile}}{230 \text{ people}}\right)$, or 370 square miles.**

Question Difficulty: Hard

Question ID 49dbf54c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 49dbf54c

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: 49dbf54c 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: Hard

Question ID 95bad03b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 95bad03b

A landscaper uses a hose that puts $88x$ ounces of water in a bucket in $5y$ minutes. Which expression represents the number of ounces of water the hose puts in the bucket in $9y$ minutes at this rate?

- A. $\frac{9x}{440}$
- B. $\frac{440x}{9}$
- C. $\frac{5x}{792}$
- D. $\frac{792x}{5}$

ID: 95bad03b Answer

Correct Answer: D

Rationale

Choice D is correct. It’s given that a hose puts $88x$ ounces of water in a bucket in $5y$ minutes. Therefore, the rate at which the hose puts water in the bucket, in ounces per minute, can be represented by the expression $\frac{88x}{5y}$. Let w represent the number of ounces of water the hose puts in the bucket in $9y$ minutes at this rate. It follows that the rate at which the hose puts water in the bucket, in ounces per minute, can be represented by the expression $\frac{w}{9y}$. The expressions $\frac{88x}{5y}$ and $\frac{w}{9y}$ represent the same rate, so it follows that $\frac{88x}{5y} = \frac{w}{9y}$. Multiplying both sides of this equation by $9y$ yields $\frac{792xy}{5y} = w$, or $\frac{792x}{5} = w$. Therefore, the number of ounces of water the hose puts in the bucket in $9y$ minutes can be represented by the expression $\frac{792x}{5}$.

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: Hard

Question ID 0401c1ec

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 0401c1ec

The density of a certain solid substance is **813** kilograms per cubic meter. A sample of this substance is in the shape of a cube, where each edge has a length of **0.60** meters. To the nearest whole number, what is the mass, in kilograms, of this sample?

- A. **176**
- B. **488**
- C. **1,355**
- D. **3,764**

ID: 0401c1ec Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the sample is in the shape of a cube with edge lengths of **0.60** meters. Therefore, the volume of the sample is **0.60³**, or **0.216**, cubic meters. It's also given that the sample has a density of **813** kilograms per **1** cubic meter. Therefore, the mass of this sample is **(0.216 cubic meters) ($\frac{813 \text{ kilograms}}{1 \text{ cubic meter}}$)**, or **175.608** kilograms. Rounding this mass to the nearest whole number gives **176** kilograms. Therefore, to the nearest whole number, the mass, in kilograms, of this sample is **176**.

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: Hard

Question ID 012d2a43

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 012d2a43

The density of a certain type of wood is **353** kilograms per cubic meter. A sample of this type of wood is in the shape of a cube and has a mass of **345** kilograms. To the nearest hundredth of a meter, what is the length of one edge of this sample?

- A. **0.98**
- B. **0.99**
- C. **1.01**
- D. **1.02**

ID: 012d2a43 Answer

Correct Answer: B

Rationale

Choice B is correct. It’s given that the density of a certain type of wood is **353** kilograms per cubic meter (kg/m^3), and a sample of this type of wood has a mass of **345 kg**. Let x represent the volume, in m^3 , of the sample. It follows that the relationship between the density, mass, and volume of this sample can be written as $\frac{353 \text{ kg}}{1 \text{ m}^3} = \frac{345 \text{ kg}}{x \text{ m}^3}$, or $353 = \frac{345}{x}$. Multiplying both sides of this equation by x yields $353x = 345$. Dividing both sides of this equation by **353** yields $x = \frac{345}{353}$. Therefore, the volume of this sample is $\frac{345}{353} \text{ m}^3$. Since it’s given that the sample of this type of wood is a cube, it follows that the length of one edge of this sample can be found using the volume formula for a cube, $V = s^3$, where V represents the volume, in m^3 , and s represents the length, in m, of one edge of the cube. Substituting $\frac{345}{353}$ for V in this formula yields $\frac{345}{353} = s^3$. Taking the cube root of both sides of this equation yields $\sqrt[3]{\frac{345}{353}} = s$, or $s \approx 0.99$. Therefore, the length of one edge of this sample to the nearest hundredth of a meter is **0.99**.

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

Question Difficulty: Hard

Question ID 10271e0b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 10271e0b

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: 10271e0b 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: Hard

Question ID a09944fe

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: a09944fe

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 mile = 1,760 yards**)

ID: a09944fe Answer

Correct Answer: 35728

Rationale

The correct answer is **35,728**. It's given that **1 mile = 1,760 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: Hard

Question ID 13f5630a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 13f5630a

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: 13f5630a 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: Hard

Question ID 11356bb9

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 11356bb9

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: 11356bb9 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 **26** x . Therefore, the expression **26** x 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: Hard

Question ID 5db19db6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 5db19db6

A distance of **61** furlongs is equivalent to how many feet? (**1 furlong = 220 yards** and **1 yard = 3 feet**)

ID: 5db19db6 Answer

Correct Answer: 40260

Rationale

The correct answer is **40,260**. It's given that **1 furlong = 220 yards** and **1 yard = 3 feet**. It follows that a distance of **61** furlongs is equivalent to **(61 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: Hard

Question ID 141b4719

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 141b4719

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 mile = 1,760 yards**)

ID: 141b4719 Answer

Correct Answer: 34672

Rationale

The correct answer is **34,672**. It's given that **1 mile = 1,760 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: Hard

Question ID 8f3dbeec

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 8f3dbeec

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

- A. $\frac{1}{20}$
- B. $\frac{9}{20}$
- C. **6**
- D. **20**

ID: 8f3dbeec Answer

Correct Answer: A

Rationale

Choice A is correct. It’s given that **3 feet = 1 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: Hard

Question ID b8043845

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: b8043845

A distance of **112** furlongs is equivalent to how many feet? (**1 furlong = 220 yards** and **1 yard = 3 feet**)

ID: b8043845 Answer

Correct Answer: 73920

Rationale

The correct answer is **73,920**. It's given that **1 furlong = 220 yards** and **1 yard = 3 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: Hard

Question ID f5caf84d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: f5caf84d

If $\frac{4a}{b} = 6.7$ and $\frac{a}{bn} = 26.8$, what is the value of n ?

ID: f5caf84d Answer

Correct Answer: .0625, 1/16

Rationale

The correct answer is **.0625**. It's given that $\frac{4a}{b} = 6.7$ and $\frac{a}{bn} = 26.8$. The equation $\frac{4a}{b} = 6.7$ can be rewritten as $(4)\left(\frac{a}{b}\right) = 6.7$. Dividing both sides of this equation by 4 yields $\frac{a}{b} = 1.675$. The equation $\frac{a}{bn} = 26.8$ can be rewritten as $\left(\frac{a}{b}\right)\left(\frac{1}{n}\right) = 26.8$. Substituting **1.675** for $\frac{a}{b}$ in this equation yields $(1.675)\left(\frac{1}{n}\right) = 26.8$, or $\frac{1.675}{n} = 26.8$. Multiplying both sides of this equation by n yields **1.675** = **26.8n**. Dividing both sides of this equation by **26.8** yields $n = 0.0625$. Therefore, the value of n is **0.0625**. Note that .0625, 0.062, 0.063, and 1/16 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 0e144428

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 0e144428

To study fluctuations in composition, samples of pumice were taken from **29** locations and cut in the shape of a cube. The length of the edge of one of these cubes is **3.000** centimeters. This cube has a density of **0.230** grams per cubic centimeter. What is the mass of this cube, in grams?

ID: 0e144428 Answer

Correct Answer: 6.21

Rationale

The correct answer is **6.21**. It's given that the samples of pumice were cut in the shape of a cube. It's also given that the length of the edge of one of these cubes is **3.000** centimeters. Therefore, the volume of this cube is **(3.000 centimeters)³**, or **27** cubic centimeters. Since the density of this cube is **0.230** grams per cubic centimeter, it follows that the mass of this cube is $\left(\frac{0.230 \text{ grams}}{1 \text{ cubic centimeter}}\right)(27 \text{ cubic centimeters})$, or **6.21** grams.

Question Difficulty: Hard

Question ID 09457f65

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 09457f65

A distance of **354** furlongs is equivalent to how many feet? (**1 furlong = 220 yards** and **1 yard = 3 feet**)

- A. **306**
- B. **402**
- C. **25,960**
- D. **233,640**

ID: 09457f65 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that **1 furlong = 220 yards** and **1 yard = 3 feet**. It follows that a distance of **354** furlongs is equivalent to **(354 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: Hard

Question ID 60ba4b19

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 60ba4b19

To study the moisture content in a group of trees, samples from the trunk of each tree were taken from **25** trees and cut in the shape of a cube. The length of the edge of one of these cubes is **2.00** centimeters. If this cube has a mass of **2.56** grams, what is the density of this cube, in grams per cubic centimeter?

ID: 60ba4b19 Answer

Correct Answer: 0.32, 8/25

Rationale

The correct answer is **.32**. The volume of a cube is given by the formula $V = s^3$, where s is the length of an edge of the cube. It's given that each edge of the cube has a length of **2.00** centimeters. Substituting **2.00** centimeters for s in the formula $V = s^3$ yields $V = (2.00 \text{ centimeters})^3$, or $V = 8.00$ cubic centimeters. It's given that the cube has a mass of **2.56** grams. Dividing the mass, in grams, of the cube by the volume, in cubic centimeters, of the cube gives its density, in grams per cubic centimeters. Therefore, the density of the cube is $\frac{2.56 \text{ grams}}{8.00 \text{ cubic centimeters}}$, or **.32** grams per cubic centimeter. Note that .32 and 8/25 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 9387e0c6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 9387e0c6

A certain park has an area of **11,863,808** square yards. What is the area, in square miles, of this park? (**1 mile = 1,760 yards**)

- A. **1.96**
- B. **3.83**
- C. **3,444.39**
- D. **6,740.8**

ID: 9387e0c6 Answer

Correct Answer: B

Rationale

Choice B is correct. Since **1** mile is equal to **1,760** yards, **1** square mile is equal to **1,760²**, or **3,097,600**, square yards. It's given that the park has an area of **11,863,808** square yards. Therefore, the park has an area of **(11,863,808 square yards) $\left(\frac{1 \text{ square mile}}{3,097,600 \text{ square yards}}\right)$** , or $\frac{11,863,808}{3,097,600}$ square miles. Thus, the area, in square miles, of the park is **3.83**.

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

Choice C is incorrect. This is the square root of the area of the park in square yards, not the area of the park in square miles.

Choice D is incorrect and may result from converting **11,863,808** yards to miles, rather than converting **11,863,808** square yards to square miles.

Question Difficulty: Hard

Question ID 33bd877c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 33bd877c

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

ID: 33bd877c 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** = **4*m***. Dividing each side of this equation by **4** yields **980** = *m*. Therefore, the value of *m* is **980**.

Question Difficulty: Hard

Question ID d393a8f5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: d393a8f5

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

ID: d393a8f5 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: Hard

Question ID 3e9e1235

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 3e9e1235

The area of a rectangular region is increasing at a rate of **250** square feet per hour. Which of the following is closest to this rate in square meters per minute? (Use **1 meter = 3.28 feet**.)

- A. **0.39**
- B. **1.27**
- C. **13.67**
- D. **23.24**

ID: 3e9e1235 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that **1 meter = 3.28 feet**. It follows that **1² square meter = 3.28² square feet**, or **1 square meter = 10.7584 square feet**. Since **1 hour = 60 minutes**, it follows that **250** square feet per hour is equivalent to $\left(\frac{250 \text{ square feet}}{1 \text{ hour}}\right)\left(\frac{1 \text{ square meter}}{10.7584 \text{ square feet}}\right)\left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right)$, or $\frac{250 \text{ square meters}}{645.504 \text{ minutes}}$, which is approximately **0.3873** square meters per minute. Of the given choices, **0.39** is closest to **0.3873**.

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: Hard

Question ID 108f87f5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 108f87f5

A sample of oak has a density of **807** kilograms per cubic meter. The sample is in the shape of a cube, where each edge has a length of **0.90** meters. To the nearest whole number, what is the mass, in kilograms, of this sample?

- A. **588**
- B. **726**
- C. **897**
- D. **1,107**

ID: 108f87f5 Answer

Correct Answer: A

Rationale

Choice A is correct. It’s given that the sample is in the shape of a cube with edge lengths of **0.9** meters. Therefore, the volume of the sample is **0.90³**, or **0.729**, cubic meters. It’s also given that the sample has a density of **807** kilograms per **1** cubic meter. Therefore, the mass of this sample is **0.729 cubic meters** $\left(\frac{807 \text{ kilograms}}{1 \text{ cubic meter}}\right)$, or **588.303** kilograms. Rounding this mass to the nearest whole number gives **588** kilograms. Therefore, to the nearest whole number, the mass, in kilograms, of this sample is **588**.

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: Hard

Question ID 100494f6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 100494f6

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: 100494f6 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: Hard

Question ID 6998cbf2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 6998cbf2

A certain town has an area of **4.36** square miles. What is the area, in square yards, of this town?
(**1 mile = 1,760 yards**)

- A. **404**
- B. **7,674**
- C. **710,459**
- D. **13,505,536**

ID: 6998cbf2 Answer

Correct Answer: D

Rationale

Choice D is correct. Since the number of yards in **1** mile is **1,760**, the number of square yards in **1** square mile is **(1,760)(1,760) = 3,097,600**. Therefore, if the area of the town is **4.36** square miles, it is **4.36(3,097,600) = 13,505,536**, in square yards.

Choice A is incorrect and may result from dividing the number of yards in a mile by the square mileage of the town.

Choice B is incorrect and may result from multiplying the number of yards in a mile by the square mileage of the town.

Choice C is incorrect and may result from dividing the number of square yards in a square mile by the square mileage of the town.

Question Difficulty: Hard

Question ID dc2b4649

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: dc2b4649

Objects R and S each travel at a constant speed. The speed of object R is half the speed of object S. Object R travels a distance of $4x$ inches in y seconds. Which expression represents the time, in seconds, it takes object S to travel a distance of $24x$ inches?

- A. $12y$
- B. $3y$
- C. $16y$
- D. $6y$

ID: dc2b4649 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that object R travels a distance of $4x$ inches in y seconds. This speed can be written as $\frac{4x \text{ inches}}{y \text{ seconds}}$. It's given that the speed of object R is half the speed of object S. It follows that the speed of object S is twice the speed of object R, which is $2\left(\frac{4x \text{ inches}}{y \text{ seconds}}\right)$, or $\frac{8x \text{ inches}}{y \text{ seconds}}$. Let n represent the time, in seconds, it takes object S to travel a distance of $24x$ inches. The value of n can be found by solving the equation $\frac{8x \text{ inches}}{y \text{ seconds}} = \frac{24x \text{ inches}}{n \text{ seconds}}$, which can be written as $\frac{8x}{y} = \frac{24x}{n}$. Multiplying each side of this equation by ny yields $8xn = 24xy$. Dividing each side of this equation by $8x$ yields $n = 3y$. Therefore, the expression $3y$ represents the time, in seconds, it takes object S to travel a distance of $24x$ inches.

Choice A is incorrect. This expression represents the time, in seconds, it would take object S to travel a distance of $24x$ inches if the speed of object R were twice, not half, the speed of object S.

Choice C is incorrect. This expression represents the time, in seconds, it takes object S to travel a distance of $128x$ inches, not $24x$ inches.

Choice D is incorrect. This expression represents the time, in seconds, it takes object R, not object S, to travel a distance of $24x$ inches.

Question Difficulty: Hard

Question ID a1d9d0a4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: a1d9d0a4

How many fluid ounces are equivalent to **76** quarts? (**8 fluid ounces = 1 cup** and **4 cups = 1 quart**)

ID: a1d9d0a4 Answer

Correct Answer: 2432

Rationale

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

Question Difficulty: Hard

Question ID 02bf14c3

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: 02bf14c3

For an electric field passing through a flat surface perpendicular to it, the electric flux of the electric field through the surface is the product of the electric field’s strength and the area of the surface. A certain flat surface consists of two adjacent squares, where the side length, in meters, of the larger square is **3** times the side length, in meters, of the smaller square. An electric field with strength **29.00** volts per meter passes uniformly through this surface, which is perpendicular to the electric field. If the total electric flux of the electric field through this surface is **4,640 volts · meters**, what is the electric flux, in **volts · meters**, of the electric field through the larger square?

ID: 02bf14c3 Answer

Correct Answer: 4176

Rationale

The correct answer is **4,176**. It’s given that the side length of the larger square is **3** times the side length of the smaller square. This means that the area of the larger square is **3²**, or **9**, times the area of the smaller square. If the area of the smaller square is represented by ***x***, then the area of the larger square can be represented by **9*x***. Therefore, the flat surface of the two adjacent squares has a total area of ***x* + 9*x***, or **10*x***. It’s given that an electric field with strength **29.00** volts per meter passes uniformly through this surface and the total electric flux of the electric field through this surface is **4,640 volts · meters**. Since it’s given that the electric flux is the product of the electric field’s strength and the area of the surface, the equation **29.00(10*x*) = 4,640**, or **290*x* = 4,640**, can be used to represent this situation. Dividing each side of this equation by **290** yields ***x* = 16**. Substituting **16** for ***x*** in the expression for the area of the larger square, **9*x***, yields **9(16)**, or **144**, square meters. Since the area of the larger square is **144** square meters, the electric flux, in **volts · meters**, of the electric field through the larger square can be determined by multiplying the area of the larger square by the strength of the electric field. Thus, the electric flux is **(144 square meters) ($\frac{29.00 \text{ volts}}{\text{meter}}$)**, or **4,176 volts · meters**.

Question Difficulty: Hard

Question ID db96d7a7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	Hard

ID: db96d7a7

How many tablespoons are equivalent to **14** teaspoons? (**3 teaspoons = 1 tablespoon**)

ID: db96d7a7 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 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: Hard