

Ratios, Rates, Proportions and Units

CollegeBoard Question Bank

Abstract

This exercise sheet contains

- an **Easy** category with 12 questions;
- a **Medium** category with 6 questions;
- a **Hard** category with 14 questions

for you to attempt. A digital copy of this sheet is available for you on [moodle](#). Feel free to utilize [the Question Space on Teams](#) to ask for guidance.

Best,
Omar :)

Ratios, Rates, Proportions and Units

Easy

- (1) **3f5398a6** MULTIPLE CHOICE One answer only

For a person m miles from a flash of lightning, the length of the time interval from the moment the person sees the lightning to the moment the person hears the thunder is k seconds. The ratio of m to k can be estimated to be 1 to 5 . According to this estimate, the person is how many miles from a flash of lightning if the time interval is 25 seconds?

- a. 6
- b. 9
- c. 5
- d. 10

(2) **000259aa**

MULTIPLE CHOICE

One answer only

A group of monarch butterflies migrated from Chicago, Illinois, to Michoacán, Mexico, flying a total of 2,100 miles. It took a single butterfly in the group 120 days to travel this route one way. On average, how many miles did the butterfly travel per day?

- a. 17.5
- b. 0.057
- c. 24
- d. 0.729

(3) **be35c117**

MULTIPLE CHOICE

One answer only

A wind turbine completes 900 revolutions in 50 minutes. At this rate, how many revolutions per minute does this turbine complete?

- a. 950
- b. 18
- c. 850
- d. 1,400

(4) 3f236a64 MULTIPLE CHOICE One answer only

x	y
1	4
3	12
5	20
40	k

In the table above, the ratio of y to x for each ordered pair is constant.
What is the value of k ?

- a. 80
- b. 160
- c. 28
- d. 36

(5) **6310adb**

MULTIPLE CHOICE

One answer only

The ratio of t to u is 1 to 2 , and $t = 10$. What is the value of u ?

- a. 10
- b. 2
- c. 5
- d. 20

(6) **e9841407** MULTIPLE CHOICE One answer only

Shaquan has 7 red cards and 28 blue cards. What is the ratio of red cards to blue cards that Shaquan has?

- a. 7 to 1
- b. 1 to 7
- c. 1 to 4
- d. 4 to 1

(7) **ba62b0b0** MULTIPLE CHOICE One answer only

A kangaroo has a mass of 28 kilograms. What is the kangaroo's mass, in grams? (1 kilogram =1,000 grams)

- a. 784
- b. 972
- c. 1,028
- d. 28,000

(8) **24ad9dcb** MULTIPLE CHOICE One answer only

The weight of an object on Venus is approximately $\frac{9}{10}$ of its weight on Earth. 23 The weight of an object on Jupiter is approximately 10 of its weight on Earth. If an object weighs 100 pounds on Earth, approximately how many more pounds does it weigh on Jupiter than it weighs on Venus?

- a. 111
- b. 140
- c. 90
- d. 230

(9) **06a152cd** MULTIPLE CHOICE One answer only

To make a bakery's signature chocolate muffins, a baker needs 2.5 ounces of chocolate for each muffin. How many pounds of chocolate are needed to make 48 signature chocolate muffins? (1 pound = 16 ounces)

- a. 120
- b. 50.5
- c. 7.5
- d. 10

(10) **3ac09984** MULTIPLE CHOICE One answer only

Marta has 7,500 pesos she will convert to US dollars using a currency exchange service. At this time, the currency exchange rate is 1 peso = 0.075 US dollars. The exchange service will charge Marta a 2% fee on the converted US dollar amount. How many US dollars will Marta receive from the currency exchange after the 2% fee is applied?

- a. \$551.25
- b. \$98,000.00
- c. \$5,625.00
- d. \$562.50

(11) **99550621**

MULTIPLE CHOICE

One answer only

Makayla is planning an event in a 5,400-square-foot room. If there should be at least 8 square feet per person, what is the maximum number of people that could attend this event?

- a. 588
- b. 15,274
- c. 675
- d. 43,200

(12) 808f7d6c

MULTIPLE CHOICE

One answer only

If $t = 4u$, which of the following is equivalent to $2t$?

- a. $2u$
- b. $8u$
- c. u
- d. $\frac{1}{2}u$

Medium

- (1) **d28c29e1** MULTIPLE CHOICE One answer only

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. 17,136.0
- b. 285.6
- c. 571.2
- d. 856.8

(2) **b4912cc5** MULTIPLE CHOICE One answer only

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. 132,330
- b. 125,312
- c. 80,200
- d. 330,825

(3) **8e528129** SHORT ANSWER Case-Insensitive

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?

- (4) **fea831fc** SHORT ANSWER Case-Insensitive

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?

(5) **181cc4d6**

MULTIPLE CHOICE

One answer only

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. $w + 5$
- d. $\frac{3}{4}w$

(6) **445dd032** MULTIPLE CHOICE One answer only

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. $13.50(z + 3)$
- d. $3z + 13.50z$

(7) **939c46d1** MULTIPLE CHOICE One answer only

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 k 1 gallon of water? (1 gallon = 128 fluid ounces)

- a. 3
- b. 8
- c. 4
- d. 16

(8) **8917ce38** MULTIPLE CHOICE One answer only

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

- a. 324 meters per second
- b. 25 meters per second
- c. 250 meters per second
- d. 32 meters per second

(9) **ec787383** SHORT ANSWER Case-Insensitive

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

(10) 7e6c745f MULTIPLE CHOICE One answer only

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. 2 : 3
- b. 3 : 4
- c. 1 : 2
- d. 2 : 1

(11) **89c39d77** SHORT ANSWER Case-Insensitive

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)

(12) **f6cbb04a**

MULTIPLE CHOICE

One answer only

$$d = 55t$$

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. 6
- b. $3k$
- c. $6k$
- d. 3

(13) **1180401d**

MULTIPLE CHOICE

One answer only

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. 55,000
- c. 7,690
- d. 76,000

(14) **eb672707** SHORT ANSWER Case-Insensitive

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

Hard

(1) **c9fb15ad**

MULTIPLE CHOICE

One answer only

Species of tree	Growth factor
Red maple	4.5
River birch	3.5
Cottonwood	2.0
Black walnut	4.5
White birch	5.0
American elm	4.0
Pin oak	3.0
Shagbark hickory	7.5

One method of calculating the approximate age, in years, of a tree of a particular species is to multiply the diameter of the tree, in inches, by a constant called the growth factor for that species. The table above gives the growth factors for eight species of trees. If a white birch tree and a pin oak tree each now have a diameter of 1 foot, which of the following will be closest to the difference, in inches, of their diameters 10 years from now? (1 foot = 12 inches)

- a. 1.3
- b. 1.2
- c. 1.0
- d. 1.4

(2) **3638f413** SHORT ANSWER Case-Insensitive

Jeremy deposited x dollars in his investment account on January 1, 2001. The amount of money in the account doubled each year until Jeremy had 480 dollars in his investment account on January 1, 2005. What is the value of x ?

(3) 3f775bbf

MULTIPLE CHOICE

One answer only

State	Power capacity			
	Low	Medium	High	Total
Texas	4	2	3	9
California	1	0	1	2
Oregon	1	0	1	2
Indiana	0	2	0	2
Colorado	1	1	0	2
Iowa	2	0	0	2
Oklahoma	1	0	0	1
Total	10	5	5	20

The table shows the distribution, by location and power capacity (maximum rate of power generation) of the twenty largest wind projects in the United States in 2013. The total power capacity of the nine wind projects located in Texas was 4,952 megawatts (MW), and the total power capacity of the twenty wind projects was 11,037 MW in 2013. The amount of energy produced in one hour at a rate of one megawatt is one megawatt-hour. If each of the nine Texas wind projects in 2013 had operated continuously for 24 hours at the maximum rate of power generation, approximately how many megawatt-hours of energy would the nine projects have produced?

- a. 120,000
- b. 11,000
- c. 5,000
- d. 200

(4) **8637294f** SHORT ANSWER Case-Insensitive

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

(5) **20b69297**

MULTIPLE CHOICE

One answer only

Anita created a batch of green paint by mixing 2 ounces of blue paint with 3 ounces of yellow paint. She must mix a second batch using the same ratio of blue and yellow paint as the first batch. If she uses 5 ounces of blue paint for the second batch, how much yellow paint should Anita use?

- a. Exactly 5 ounces
- b. 3 ounces more than the amount of yellow paint used in the first batch
- c. 1.5 times the amount of yellow paint used in the first batch
- d. 1.5 times the amount of blue paint used in the second batch

(6) **7d721177** MULTIPLE CHOICE One answer only

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. 0.99
- b. 1.01
- c. 1.02
- d. 0.98

Total of marks: 32