Unit Conversions Practice Questions

YOU MAY USE YOUR CALCULATOR ON ALL OF THE FOLLOWING QUESTIONS.

1. FREE RESPONSE: Theodore can ride his electric scooter up to 15 kilometers on a single charge before it runs out of power. Rounded to the nearest tenth of a mile, approximately how many miles can Theodore ride his scooter on a single charge? (1 mile = 1.6093 kilometers)

2. Horatio is planning a party. He has a punch bowl that can hold three gallons of punch. However, the punch bowl doesn't fit in his refrigerator, so he had to divide the three gallons of punch into twelve equally-sized jugs. To the nearest fluid ounce, how many fluid ounces of punch is each jug holding? (1 gallon = 128 fluid ounces).

   (A) 6

   (B) 11

   (C) 32

   (D) 512

3. FREE RESPONSE: Samantha is mailing donation request letters for a grassroots political campaign. Each envelope requires 4 centimeters of tape to be sealed securely. If the rolls of tape she is using each contain 5 meters of tape, what is the maximum number of envelopes that can be sealed with two rolls of tape? (1 meter = 100 centimeters)

4. FREE RESPONSE: Two obsolete units of length are furlongs and rods. A furlong is equivalent to 40 rods. A rod is equivalent to $5\frac{1}{2}$ yards. A yard is equivalent to 3 feet. How many feet is equivalent to 2 furlongs?

5. FREE RESPONSE: Historically used to measure the weight of precious metals, a pennyweight is a unit of mass that is equal to $\frac{1}{240}$ of a troy pound. There are 12 troy ounces in a troy pound. A certain bank holds stock in silver bars that each weigh 600 pennyweights. If there are five of these bars in the bank's vault, representing the bank's entire stock of silver, how many troy ounces of silver are in the bank's vault?

6. FREE RESPONSE: On a certain date in 2019, platinum was worth $925 per ounce, and a large metals company spent $70,300 purchasing platinum at that rate. What was the weight,in pounds, of this stock of platinum? (16 ounces = 1 pound)

7. Watts and horsepower are both units of measure of power. They are directly proportional to each other, and 15 horsepower is equivalent to 11,190 watts. If a motorcycle's engine produces 195 horsepower, how many watts is this equivalent to, rounded to the nearest watt?

(A) 4

(B) 145,470

(C) 2,182,050

(D) 32,730,750

8. Which of the following equations could be used to solve for the number of seconds, s, equivalent in duration to y years?

(A) $s = 31{,}536{,}000y$

(B) $s = \frac{54{,}750}{y}$

(C) $s = \frac{y}{54{,}750}$

(D) $s = \frac{y}{31{,}536{,}000}$

9. The pood is an obsolete unit of mass once used in Russia. One pood is equivalent to 40 funt. A zolotnik is equivalent to $\frac{1}{96}$ of a funt. Which of the following equations would allow you to solve for the number of zolotniks, z, equivalent to p poods?

(A) $z = \frac{5p}{12}$

(B) $z = \frac{12p}{5}$

(C) $z = \frac{p}{3840}$

(D) $z = 3840p$

10. FREE RESPONSE: The daktylos (plural: "daktyloi"), orthodoron, and pygon were three distance units of Ancient Greek measurement. An orthodoron was equivalent to 11 daktyloi. A pygon was equivalent to 20 daktyloi. What is the equivalent of 440 pygons in orthodorons?

d=rt Practice Questions

YOU MAY USE YOUR CALCULATOR ON ALL OF THE FOLLOWING QUESTIONS.

1. FREE RESPONSE: A jogger sets out on her daily run, which is always four miles long. She jogs at a consistent speed of 5 miles per hour. How long does her daily jog take her in hours?

2. It is currently 6:30 pm and Manuel needs to get home by 7:30 pm. If he can run at seven miles per hour without slowing, and his home is eight miles away, will Manuel make it home on time - and if so, how many minutes early will he be? If not, how many minutes late will he be?

   (A) Yes, Manuel will be approximately 9 minutes early.

   (B) Yes, Manuel will arrive exactly on time.

   (C) No, Manuel will be approximately 1 minute late.

   (D) No, Manuel will be approximately 9 minutes late.

3. If a tiger can run at 20 miles per hour for up to thirty minutes at a time, how far can a tiger travel in that time in miles?

   (A) 10

   (B) 40

   (C) 600

   (D) 1200

4. A certain race car can sustain a top speed of 250 miles per hour on a straight road. If this car had an infinitely-long straight road to drive upon, how many miles could this race car travel at top speed in 45 seconds?

   (A) .555

   (B) 3.125

   (C) 187.5

   (D) 11,250

5. Christian took a three-day motorcycle road trip. On Monday, Christian rode his motorcycle 200 miles in 3 hours. On Tuesday, he rode 250 miles in 6 hours. On Wednesday, he rode 100 miles in 2 hours. What was Christian's average speed, to the nearest mile per hour, for the time he spent riding his motorcycle on his road trip?

(A) 45

(B) 50

(C) 53

(D) 55

6. FREE RESPONSE: On September 15th, 2012, Hannah took a glider plane trip. If the glider plane sailed a distance of 15 miles in 25 minutes, what would the average speed of the glider have been, to the nearest tenth of a mile per hour?

7. FREE RESPONSE: Harold walks 600 feet in 2 minutes. At that rate, which of the following is closest to the number of feet he will walk in 132 seconds?

8. A small model car is powered by an electric motor. After starting from rest, the car travels n inches in t seconds, where $n = 8t\sqrt{2t}$. Which of the following gives the average speed r of the car, in inches per second, over the first t seconds after it starts?

(A) $r = 8t\sqrt{2t}$

(B) $r = \frac{t\sqrt{2t}}{8}$

(C) $r = 8\sqrt{2t}$

(D) $r = 8t^2\sqrt{2t}$

QUESTIONS 9 AND 10 RELATE TO THE FOLLOWING TABLE AND WORD PROBLEM:

Sarah's Family Vacation

Segment of trip	Distance (miles)	Average Speed (mph)
From home to Airport A	15	60
From Airport A to Airport B	1375	550
From Airport B to hotel	8	25

Sarah and her family are taking a vacation. On the journey to their destination, they drive from their home directly to Airport A, then board an airplane that flies directly to Airport B, and then they take a cab directly from Airport B to their hotel.

9. What was Sarah's family's average speed in miles per hour for their entire one-way journey for the time during which they were traveling ? Note: round your answer to the nearest mile per hour.

10. Airplanes can often fly faster or slower than normal depending on the strength and direction of the prevailing winds. If their airplane had encountered a headwind and flown at an average speed of 520 miles per hour, how many more minutes would this one-way journey have taken the family? (Round your answer to the nearest minute.)

Averages with Algebra Practice Questions

YOU MAY USE A CALCULATOR FOR ALL OF THE FOLLOWING PRACTICE PROBLEMS.

200, 300, 1100, 1300, x

1. FREE RESPONSE: If the mean of the five numbers above is 900, what is the value of x?

{6, a, 11, 14, 14, b, 37}

2. FREE RESPONSE: If the mean of the data set above is 15, what is the value of $a+b$?

3. A car club holds a restoration contest for classic cars. Each car is scored on a scale of 1 to 10. There are six cars entered into the competition. If these six cars received scores of 1, 2, 3, 5, 9, and 10, how many cars received a score that exceeded the mean score?

(A) Two

(B) Three

(C) Four

(D) Five

4. Christian is preparing to run a marathon. His goal is to run an average of at least 85 miles per week for 4 weeks. He ran 65 miles the first week, 75 miles the second week, and 85 miles the third week. Which inequality can be used to represent the number of miles, n, that Christian could run on the fourth week to meet his goal?

(A) $\frac{65+75+85}{3}+n \geq 85$

(B) $\frac{65}{4}+\frac{75}{4}+\frac{85}{4}+n \geq 85$

(C) $65+75+85+n \geq 340$

(D) $65+75+85+4n \geq 340$

Masses of Pyrite (grams)

Tim	5	7	3	9	4
Ellen	2	12	8	4	6
Jerome	x	13	11	1	3

5. FREE RESPONSE: Tim, Ellen, and Jerome are collecting the mineral pyrite in the river behind their school. Each student collects five chunks of the mineral. The masses of these chunks are shown in the table above. The mean of the masses of the chunks that Jerome collected is 3 grams greater than the average of the mean of the masses of the chunks that Ellen collected and the mean of the chunks that Tim collected. What is the value of x?

6. FREE RESPONSE: The mean lap time of sixteen motorcycle riders in a race was 150 seconds. If the fastest average lap time is removed, the mean lap time of the remaining fifteen racers becomes 153 seconds. What was the fastest lap time, in seconds?

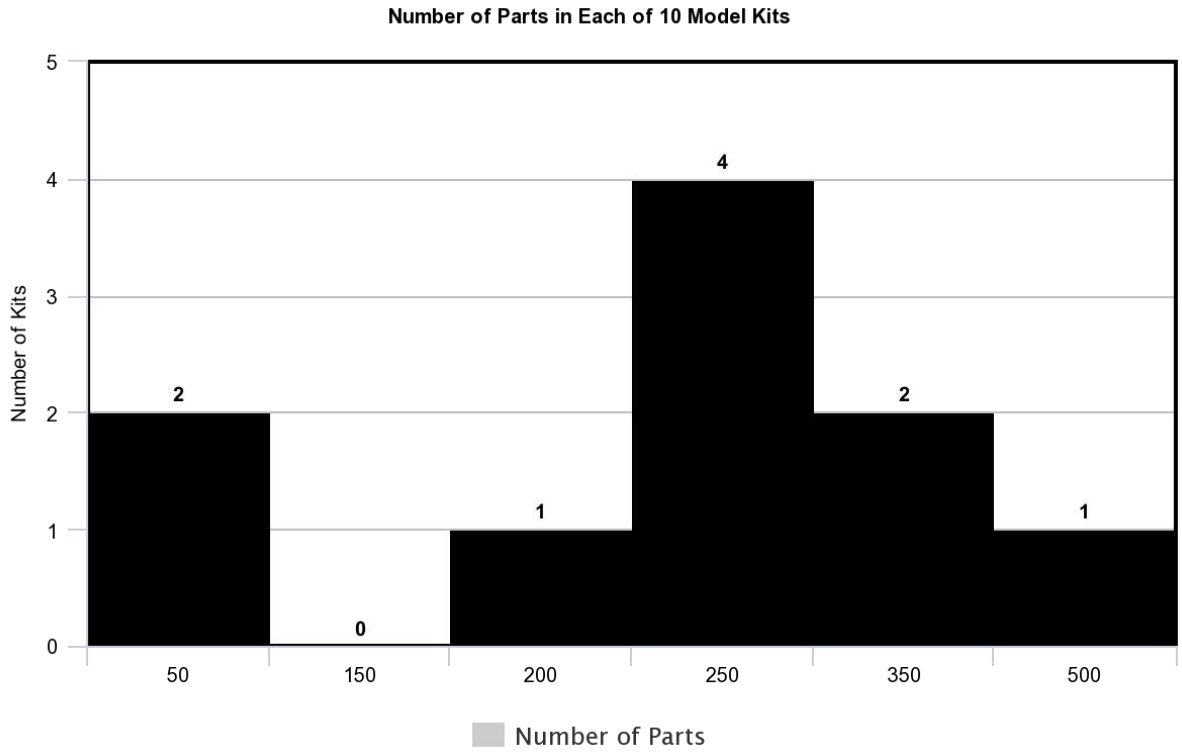
7. If n is the average of t and 15, m is the average of $2n$ and 21, and x is the average of $5n$ and 32, what is the average of m, n, and x in terms of n?

(A) $\frac{3n+53}{9}$

(B) $\frac{9n+83}{3}$

(C) $\frac{9n+53}{3}$

(D) $\frac{9n+53}{6}$



8. Based on the histogram above, of the following, which is closest to the average number of parts per model kit?

(A) 200

(B) 225

(C) 250

(D) 417

9. FREE RESPONSE: Two basketball teams, the City Slickers and the Country Captains, are competing in the playoffs. The City Slickers have 12 players and their average points per player is 6. The Country Captains have 10 players and their average points per player is 17. What are the average points per player for both teams combined?

10. FREE RESPONSE: A new computer game receives critical reviews between 0 and 100, inclusive. In the first 12 ratings, the average of the ratings was 82. What is the least value the game can receive for the 17th rating and still be able to have an average of at least 85 for the first 20 ratings?

Ratios & Proportions Practice Questions

YOU MAY USE A CALCULATOR FOR ALL OF THE FOLLOWING PRACTICE PROBLEMS.

1. James swam a lap in 2 minutes. Sarah swam the same distance in 90 seconds. What is the ratio of Sarah's lap time to James's lap time?

   (A) 1 to 2

   (B) 3 to 4

   (C) 5 to 9

   (D) 1 to 7

2. A random sample of a bee farm 400 bees produces 8 bees with unusual coloration. At this rate, how many of the 200,000 bees on the farm will have this unusual coloration?

   (A) 400

   (B) 4,000

   (C) 100,000

   (D) 10,000,000

3. FREE RESPONSE: A breakdancer earns money by performing on Main Street for the passing crowds. Her income is directly proportional to the number of people walking on Main Street. If she makes $30 on a Tuesday evening when 300 people are walking on Main street, how much does she make (in dollars) on a Saturday afternoon when 700 people are walking on Main Street?

4. FREE RESPONSE: A factory produces 40,000 motorcycle throttle bodies per day. A random quality-control sampling of 200 units produces 3 defective units. Assuming this rate of defective units holds true for the day's production, how many defective throttle bodies does the factory produce per day?

5. The superyacht *Sheladia* is approximately 132 meters long, 26 meters wide across the beam (the widest point of the ship), and 22 meters high from the lowest point of its rudder to the tip of its exhaust pipes, which are the highest point of the yacht. If a scale model of the *Sheladia* is built at a $\frac{1}{40}$th scale, how wide, in centimeters, would the model be at its widest point?

(A) .65

(B) 3.3

(C) 65

(D) 330

6. If an artist is mixing blue, teal, yellow, and green paints in a ratio of $1:2:2:3$ by volume respectively, what is the total volume of paint in milliliters if she uses 6 milliliters of green paint?

(A) 16

(B) 18

(C) 24

(D) 48

7. A certain paint is used for painting the exterior of large airplanes. This paint is so effective that a single gallon can up to 4 football fields. If a football field has an area of approximately $1\frac{2}{3}$ acres, about how many acres could 36 gallons of this paint cover? (Round your answer to the nearest acre)

(A) 9

(B) 86

(C) 240

(D) 792

8. FREE RESPONSE: There are two atoms of oxygen and one atom of carbon in one molecule of carbon dioxide. How many atoms of oxygen are there in 73 molecules of carbon dioxide?

Animal	1999	2000	2001	2002
Pheasants	56	72	86	101
Sea Otters	14	18	26	38
Polar Bears	2	2	3	3
African Elephants	6	7	7	9
Bald Eagles	6	9	11	14
Hyenas	43	48	53	57

9. The table above shows the population of four animal species in a wild game reserve for four years in the period 1999 through 2002. Which animal's ratio of its 1999 population to its 2002 population is closest to the sea otters' ratio of its population in 1999 to its population in 2000?

(A) Pheasants

(B) Polar Bears

(C) Bald Eagles

(D) Hyenas

10. A certain line in a coordinate plane passes through the origin and the point (4,12). If Point B lies on the graph of this line at coordinates (n,m), what is the ratio of m to n?

(A) 0

(B) $\frac{1}{3}$

(C) 1

(D) 3

11. A gear ratio $r:s$ is the ratio of the number of teeth of two connected gears. The ratio of the number of revolutions per minute (rpm) of the two gear wheels is $s:r$. Gear X, with 80 teeth, is driven by a motor. Gear X turns Gear Y, which has 400 teeth. Gear Y turns Gear Z, which has 20 teeth. If Gear X turns at 40 rpm, what is the number of revolutions per minute for Gear Z?

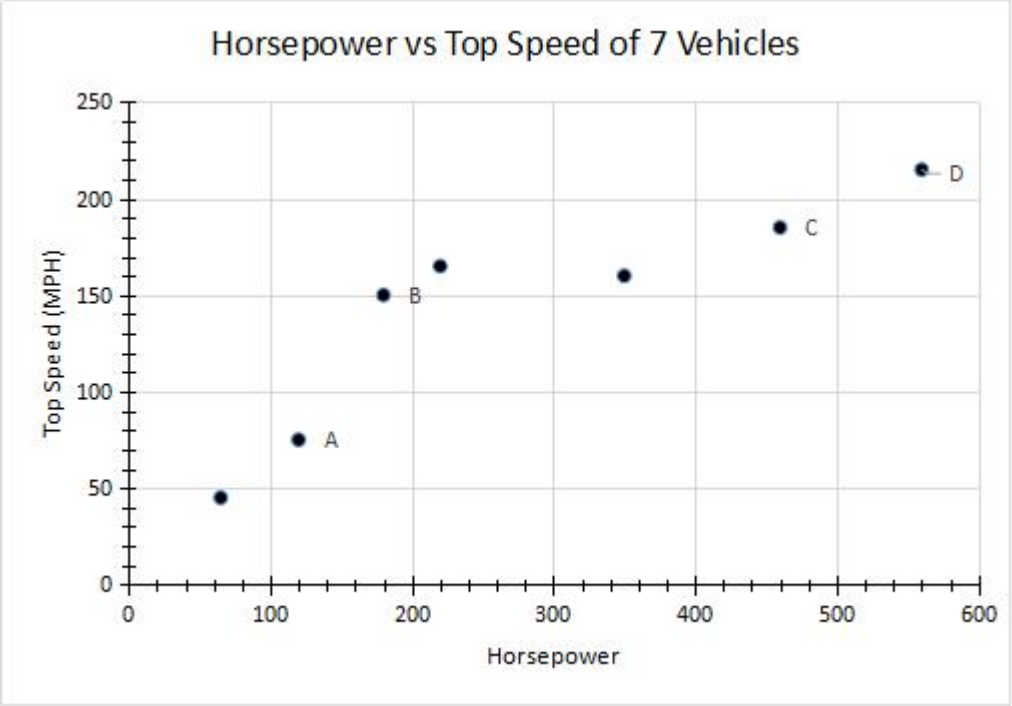
(A) 4

(B) 20

(C) 160

(D) 200

12. FREE RESPONSE: The weight of an object on Mars is approximately $\frac{1}{3}$ of its weight on Earth. The weight of an object on Neptune is approximately $\frac{11}{10}$ of its weight on Earth. If an object weighs 66 pounds on Earth, how many more pounds does it weigh on Neptune than it does on Mars?



13. The scatterplot above charts the relationship of horsepower to top speed for seven different vehicles. Of the labeled points, which represents the vehicle for which the ratio of top speed to horsepower is greatest?

(A) A

(B) B

(C) C

(D) D

Percents Practice Questions

YOU MAY USE YOUR CALCULATOR ON ALL OF THE FOLLOWING QUESTIONS.

1. A packing company has two types of boxes. The smaller boxes contain 30% packing materials by mass and the larger boxes contain 40% of packing materials by mass. 50 smaller boxes and 30 larger boxes contain a total of 120 kilograms of packing materials. Which equation models this relationship, where x is the mass of a single smaller box and y is the mass of a single larger box?

   (A) $15x+12y=120$

   (B) $12x+15y=120$

   (C) $150x+120y=120$

   (D) $120x+150y=120$

2. A computer chip was on sale for 35% off its original price. If the price paid for the chip was \$162.50, what was the original price of the computer chip, rounded to the nearest dollar? (Assume there is no sales tax.)

   (A) \$57

   (B) \$106

   (C) \$219

   (D) \$250

3. Ian bought a pair of motorcycle gloves that cost \$81.00 after an 8% sales tax was added. What was the price of the motorcycle gloves before the sales tax was added?

   (A) \$73.00

   (B) \$74.52

   (C) \$75.00

   (D) \$80.52

4. FREE RESPONSE: Christian would owe \$23,000 in taxes at the end of the year without any tax deductions. This year, Christian is eligible for tax deductions that reduce the amount of taxes he owes by \$5,060. If these tax deductions reduce the taxes Christian owes this year by $n\%$, what is the value of n?

5. In 2016 the number of cars in Country A and Country B were equal. From 2008 to 2016, the number of cars in Country A increased by 30% and the number of cars in Country B decreased by 20%. If the number of cars in Country A was 280,000 in 2008, what was the number of cars in Country B in 2008, rounded to the nearest whole number?

(A) 172,308

(B) 303,333

(C) 436,800

(D) 455,000

6. An internet provider company charges $52.50 per month for basic internet services. After a rate increase, the monthly charge increases to $64.05. To the nearest percent, by what percent did the monthly rate increase?

(A) 12%

(B) 18%

(C) 22%

(D) 24%

7. Horatio is studying bees and honey production. He notices that Type X bees produced 75% more honey than Type Y bees did. Based on Horatio's observation, if the Type X bees produced 525 grams of honey, approximately how many grams did the Type Y bees produce?

(A) 131

(B) 300

(C) 394

(D) 450

8. FREE RESPONSE: A music festival in Austin featured 80 artists in 2004. The number of artists featured in 2004 was 25% greater than in 2003. The number of artists was x more in 2004 than in 2003. What is the value of x?

9. FREE RESPONSE: A storekeeper is selling candles. On Monday, the storekeeper permanently reduces the price of all candles by 20% discount to encourage business. Once business has increased, the storekeeper finds that one brand of candles is very popular, and on Wednesday she increases the price of this brand of candles by 50% of its discounted price. She then feels a final adjustment is needed, and on Friday she reduces the new price of this brand of candles by 5%. If the sale price of one of these candles on Friday is $6.27 before tax is added, what was the original sticker price *before* the discount was offered on Monday? (Disregard the dollar sign when entering your final answer.)

Year	Users
2010	2,940
2011	3,381

10. FREE RESPONSE: A startup company was growing the user base of their software product. The user base of the software in 2010 and 2011 is shown in the table above. The percent increase in users from 2010 to 2011 was three times the percent increase from 2009 to 2010. How many users did the software have in 2009?

11. FREE RESPONSE: How many liters of a 50% saline solution must be added to 5 liters of a 10% saline solution to obtain a 25% saline solution?

12. FREE RESPONSE: A school is forming a team for a new sport that they've just created. Of the students on the team, 6% play goalie, 24% play defense, 50% play midfield, and the remaining 10 students play forward. How many more students play midfield than play goalie?

13. Jeffery bought a new scooter at a store that gave a 40% discount of its original price. The total amount he paid was p dollars, including an 5% sales tax on the discounted price. Which of the following represents the original price of the scooter in terms of p?

(A) $.65p$

(B) $\frac{p}{.65}$

(C) $(.6)(1.05)p$

(D) $\frac{p}{(.6)(1.05)}$

14. FREE RESPONSE: A certain river in 2012 has an average flow of x liters per hour. In 2013, this flow has grown by 10%. From 2013 to 2014, the flow grows again by 22%. From 2014 to 2015, the flow decreases by 13%. If the average flow in 2015 is 4,000 liters per hour, what was the average flow in 2012? (Round your answer to the nearest whole number.)

15. Christian and Yanik each ordered a plate of a sushi at a restaurant. The price of Christian's sushi was d dollars, and the price of Yanik's sushi was \$6 more than the price of Christian's sushi. If Christian and Yanik split the cost of the sushi plates evenly and each paid a 20% tip, which of the following expressions represents the amount, in dollars, each of them paid? (Assume there is no sales tax.)

(A) $.5d + 1.2$

(B) $1.2d + 3.6$

(C) $2.4d + 1.2$

(D) $2.4d + 7.2$