

1 Exam Directions From Canvas Assignments

1.1 Exam Directions

Students must use Respondus Monitor with LockDown Browser, with a webcam on the relevant area for the duration of this exam. Before beginning the exam, the webcam should be placed at a location at which the entire work area can be seen, including the student's face and hands, at all times. No electronic devices other than a calculator should be brought into the testing environment; this includes smart watches. Communication of any kind with another person during this exam will be considered a violation of the academic integrity policy.

Once the webcam for Respondus Monitor is on, but before beginning the exam, students must clearly show their blank pages to the webcam, front and back.

This exam will consist of two sections: the Multiple Choice (MC) and Free Response (FR) sections.

MC Section: This Canvas assignment will include all MC questions, and they will be graded automatically in this assignment.

FR Section: It will appear as a single question on this exam; that question will include a list of all of the FR questions. You must write your work and answers on paper, and then scan all pages and upload them together as a single pdf (via an app such as Adobe Scan or CamScanner: NOT simply a phone picture) to the "Exam 1 pdf Upload" Canvas assignment (the assignment after this one on Canvas). This portion must be uploaded within 15 minutes of finishing the exam. Before logging off of this Respondus Monitor, you must hold up all sheets with your written work to the webcam so they can be read on the video. You also need to follow the directions given in the FR section during the exam. The FR portion will be graded by the grading team, and your score will be entered manually into this assignment.

Failure to follow any of the above guidelines will result in you losing 2 points on the exam (which is the final Free Response Question). Significant failure to follow these guidelines may result in the exam not being accepted and you being granted a score of zero for the exam.

Before beginning this exam, make sure that you have the following:

- tablet/laptop/similar device with Respondus Monitor and LockDown Browser (NOT a smartphone);
- a webcam in, or capable of being integrated into, the device in #1 (you will need to show your face, your picture ID, and your testing environment to begin the exam);
- device capable of scanning (with Adobe Scan or CamScanner), saving, and uploading pdf files (no other file type);
- sufficient internet connection;
- an approved calculator (TI-83, TI-84, or "Plus" versions of these);
- pencil and paper.

This exam is made available a little early and a little late on Canvas so that you have sufficient time to read these directions and perform the RM/LDB checks. However, note the time limit once you start the exam.

In the event of technical difficulties, contact your instructor immediately. You should continue to complete the exam if possible.

1.2 FR Directions

There are 5 (content-carrying) free response questions, each with multiple parts. Show all necessary work on your handwritten page (which you will scan and upload as a pdf).

Verify that the answers carry the appropriate units. Partial credit may be given for work towards the correct solution. However, if answers are shown without necessary work, you may receive little or no credit for the correct answer.

Free Response Questions: [Image Embedded]

Type your free response answers (ANSWERS ONLY) into the answer area for this question, marked with the question number. For example, your response should be formatted something like this:

#1) (a) your answer

(b) your answer

(c) your answer

#2) etc. ...

If your answer involves a chart, table, or diagram, type the appropriate word (e.g. "diagram") as your answer to this question.

Write your work and answers on a sheet of paper (remember to always include appropriate units, including % and \$ symbols when appropriate). Round answers to two decimal places unless otherwise instructed. When finished the exam, but before logging off of Respondus Monitor, show all of the pages of your work/answers to FR questions to the webcam so that they can be clearly read. Then log off of Respondus Monitor, scan the pages to create a single pdf, and upload the scanned pdf to the corresponding "Exam 1 pdf Upload" assignment.

1.3 Exam 1 pdf Upload Directions

Upload, as a single pdf, your handwritten work and answers to the Free Response section of the exam here.

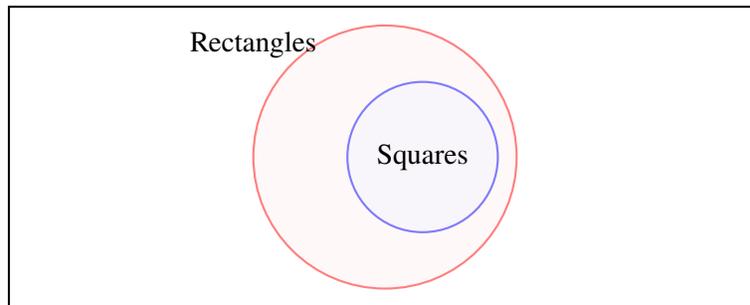
After uploading, confirm that your upload has completed by downloading it again to make sure it is readable. A late upload or one that cannot be read/downloaded will result in a deduction of 10 points, and it might not be accepted at all at the instructor's discretion.

Your upload is due within 15 minutes of the exam ending. Failure to follow this policy may result in your exam responses not being accepted and you being given a score of zero for the Free Response portion of the exam.

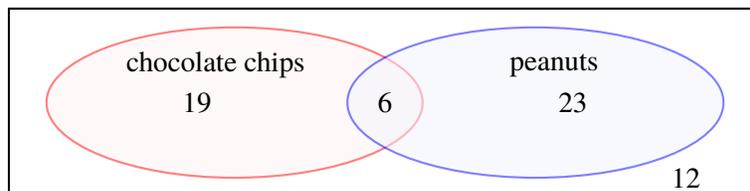
Points earned on the free response section will be manually added to the Exam assignment on Canvas, not to this assignment.

2 MC: 3 points each, 60 points total. Correct answer is option (a).

- Which of the following is a correct way to write out the set that is the days in the month of April?
 - $\{1, 2, 3, \dots, 30\}$
 - $\{1, 2, 3, \dots\}$
 - $\{\dots 28, 29, 30\}$
 - $\{\dots 16, 17, 18, \dots\}$
- Which of the categorical propositions below is illustrated by the Venn diagram?



- All Squares are Rectangles.
 - No Rectangles are Squares.
 - Some Squares are not Rectangles.
 - All Rectangles are Squares.
- A bakery has 60 cookies to sell. Some of the cookies have chocolate chips, some have peanuts, and some have both ingredients. Use the given Venn diagram describing the cookies to answer the question: how many of the cookies are safe for you to eat if you are allergic to peanuts?



- 31
- 12
- 25
- 41
- 19

4. Consider the following argument: “Cardinals are birds which lay eggs and fly. Hawks are birds which lay eggs and fly. Therefore, all birds lay eggs and fly.” This argument is:
- (a) An inductive argument
 - (b) A deductive argument that is neither valid nor sound
 - (c) Complete proof of its conclusion
 - (d) True because the premises are true
 - (e) A valid and sound deductive argument
5. Which of the following is a true statement about inductive arguments?
- (a) An inductive argument can have true premises and a false conclusion.
 - (b) They always prove their conclusion.
 - (c) They start with a general principle and use logic to arrive at a specific conclusion.
 - (d) If it is a strong inductive argument, the conclusion must be true.
 - (e) They are evaluated in terms of their validity and soundness.
6. Evaluate the following argument.
P. All musicians play the trumpet.
P. Josh does not play the trumpet.
C. Josh is not a musician.
- (a) The argument is valid, but not sound.
 - (b) The argument is valid and sound.
 - (c) The argument is sound, but not valid.
 - (d) The argument is neither valid nor sound.
 - (e) The argument is a weak inductive argument.
7. Every Sunday as part of a training regimen, Kay runs 7 miles and then walks 9 miles. How many furlongs does she travel in total each Sunday?
- (a) 128 furlongs
 - (b) 2 furlongs
 - (c) 56 furlongs
 - (d) 72 furlongs
8. Bill and Sam go out for dinner and decide to split the bill evenly. If the total cost for the two is \$50 (US dollars), how much does Bill pay for his half of the bill in Mexican pesos?
- (a) 485.5 pesos
 - (b) 971 pesos
 - (c) 1.29 pesos
 - (d) 2.57 pesos

9. A certain dump truck can carry 7 tons of rocks. A construction company is willing to pay the dump truck 2 Euros per kilogram of rock delivered. If the dump truck delivers a full load of rocks, how much does the construction company owe? Round to the nearest whole number.
- (a) 12,701 Euros
 - (b) 6,350 Euros
 - (c) 30,864 Euros
 - (d) 61,728 Euros
10. The highest temperature ever recorded in South Carolina is 113° Fahrenheit (June 29, 2012). Convert it into Celsius and Kelvin.
- (a) 45° Celsius, 318.15 Kelvin.
 - (b) 235.4° Celsius, 508.55 Kelvin.
 - (c) 45° Celsius, -228.15 Kelvin.
 - (d) 45° Celsius, 508.55 Kelvin.
 - (e) 235.4° Celsius, -37.75 Kelvin.
11. How many square kilometers are there in 3 square miles?
- (a) 7.77 square kilometers.
 - (b) 1.16 square kilometers.
 - (c) 1.86 square kilometers.
 - (d) 2.59 square kilometers.
 - (e) 4.83 square kilometers.
12. New York City has a population of about 8.8 million and an area of about 468.48 square miles; Paris has a population of about 10.79 million and an area of about 2853.5 square kilometers; London has a population of about 8.96 million and an area of about 607 square miles. Choose the correct statement about the density of these three cities.
- (a) New York City is the most densely populated; Paris is the least densely populated.
 - (b) New York City is the most densely populated; London is the least densely populated.
 - (c) London is the most densely populated; Paris is the least densely populated.
 - (d) Paris is the most densely populated; New York City is the least densely populated.
 - (e) Paris is the most densely populated; London is the least densely populated.
13. Of the 1,026 professional baseball players in the USA, 35% are left-handed. How many of these players are left-handed?
- (a) 359
 - (b) 29
 - (c) 667
 - (d) 997
 - (e) 35

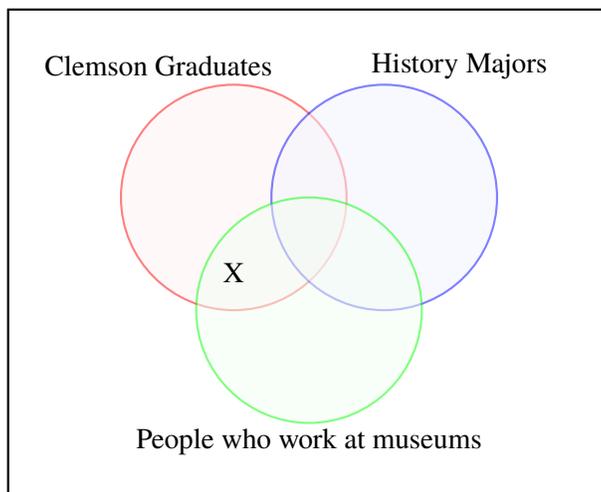
14. In 1940, the percentage of women in the United States with a college degree was 3.8%. In 2020, the percentage was 38.3%. The absolute change (with correct units) in this percentage is:
- (a) 34.5% points
 - (b) 34.5%
 - (c) 907.9% points
 - (d) 907.9%
 - (e) 90.1% points
 - (f) 90.1%
15. Brandon has a vintage record collection which is 28% larger than Brianna's vintage record collection. The size of Brandon's collection is _____ of the size of Brianna's collection.
- (a) 128%
 - (b) 72%
 - (c) 100%
 - (d) -128%
 - (e) -72%
16. Express 4,728.13 in scientific notation.
- (a) 4.72813×10^3 .
 - (b) 4.72813×10^{-3} .
 - (c) $472,813 \times 10^2$.
 - (d) $472,813 \times 10^{-2}$.
 - (e) $4,728.13 \times 10^0$.
17. The diameter of an oxygen atom is estimated to be 152 picometers, where 1 picometer is 1×10^{-12} meters. Express the diameter of an oxygen atom in meters in scientific notation.
- (a) 1.52×10^{-10} meters.
 - (b) 1.52×10^{-12} meters.
 - (c) 1.52×10^{-14} meters.
 - (d) 1.52×10^{-1} meters.
18. The distance from Berlin to Amsterdam is about 650 km. The number of significant digits in this measurement is:
- (a) 2
 - (b) 3
 - (c) 1
 - (d) 4

19. Perform the following computation, and give the answer to the correct number of significant digits.
 $214.5 + 72,300 = ?$
- (a) 72,500
 - (b) 72,514
 - (c) 72,514.5
 - (d) 73,000
20. You are baking a cake from scratch, and the recipe calls for milk. Using a measuring cup that measures to the nearest tenth of a pint, you dump a certain amount of milk into a bowl. The cup measured the amount of milk to be 2.2 pints. The bowl, which can measure liquid in 0.25 pint increments, measures the milk to be 2.25 pints. If you actually dumped 2.23 pints into the bowl, which measuring device was more accurate?
- (a) Bowl
 - (b) Cup
 - (c) They are equally accurate.
 - (d) There is not enough information to answer this question.

3 FR: Points as marked, 40 points total.

1. Answer the following questions about sets.

(a) (2 points) What does the X in the following Venn Diagram represent?



Answer:

Students who graduated from Clemson, with a major other than history, who work at a museum.

0.5 point each for each of the three characteristics being correctly identified.

0.5 point for not adding extra characteristics.

(b) (3 points) A Certified Public Accountant has 500 clients. Each client is either a doctor or an attorney. Some are citizens of the United States, and others are not. Complete the two-way table. Then answer the question: how many U.S. Citizens are not attorneys?

| | U.S. Citizens | Non- U.S. Citizens | Total |
|-----------|---------------|--------------------|-------|
| Attorneys | | 150 | |
| Doctors | | | 300 |
| Total | 275 | | 500 |

Answer:

| | U.S. Citizens | Non- U.S. Citizens | Total |
|-----------|---------------|--------------------|-------|
| Attorneys | 50 | 150 | 200 |
| Doctors | 225 | 75 | 300 |
| Total | 275 | 225 | 500 |

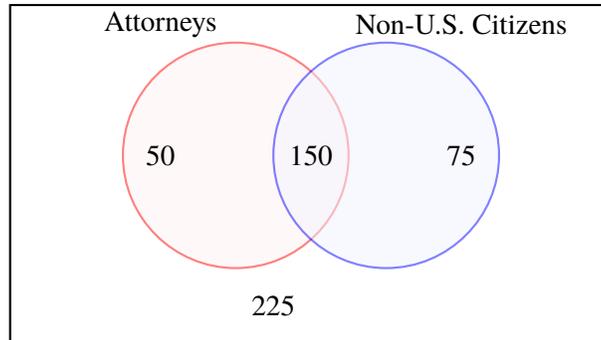
There are 225 U.S. Citizens who are not attorneys.

0.5 point for each table entry.

0.5 point for choosing correct answer to the question (following work).

- (c) (3 points) Using the two-way table from part (b), draw a Venn diagram showing the relationship between the attorneys and the non-U.S. citizens.

Answer:



0.5 point for overall layout (overlapping circles with rectangle surrounding them).
0.5 point for proper labels of the circles.
0.5 point for each number in diagram.

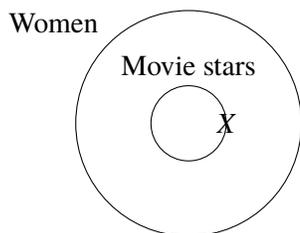
2. Consider the following argument.

- P. All movie stars are women.
 P. Leah (X) is a woman.
 C. Leah is a movie star.

(a) (3 points) Is the argument valid? Clearly write “YES” or “NO,” draw a Venn Diagram to support your answer, and explain your answer.

Answer:

NO, as shown by the Venn Diagram test for validity. X is on the border of the movie star circle, not necessarily inside of the circle.



1 point for Venn diagram which matches the argument.

1 point for correct explanation

1 point for correct answer.

(b) (2 points) Is the argument sound? Clearly write “YES” or “NO” and explain your answer.

Answer:

NO, it is invalid and has a false premise.

1 point for correct explanation

1 point for correct answer.

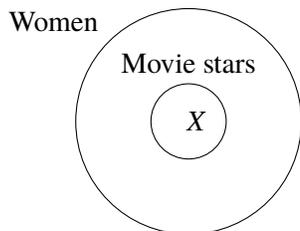
(c) (3 points) If the second proposition and the conclusion were switched, the argument would read:

- P. All movie stars are women.
 P. Leah (X) is a movie star.
 C. Leah is a woman.

Is this argument valid? Clearly write “YES” or “NO,” draw a Venn Diagram to support your answer, and explain your answer.

Answer:

YES, it is valid, as shown by the Venn diagram. The X is on the inside of the women circle, which forces the conclusion to be true.



1 point for Venn diagram which matches the argument.

1 point for correct explanation

1 point for correct answer.

3. Gadzooks is looking to sell a plot of land that is 100 ft long and 50 ft wide. He will not sell the land for less than \$40 per square meter.

- (a) (3 points) Calculate the total area of the land in square meters. Make sure to give units in your answer. Round to the nearest tenth.

Answer:

The total area of the land is

$$100\text{ft} \times 50\text{ft} \times \frac{0.3048 \text{ m}}{1 \text{ ft}} \times \frac{0.3048 \text{ m}}{1 \text{ ft}} \approx 464.5\text{m}^2.$$

1 point for computing area in square feet (as its own step or implicitly as above).
0.5 point for using correct conversion factor (or equivalent).
1 point for using conversion factor twice (equivalently, squaring it).
0.5 point for correct answer with units.

- (b) (2 points) If he sells the land for \$40 per square meter, for how much money will the plot of land sell? Use your rounded answer from part (a). Give your answer to the nearest dollar.

Answer:

Following the answer in part (a), the plot of land will sell for

$$464.5\text{m}^2 \times \$40/\text{m}^2 = \$18,580$$

1 point for performing the correct computation.
1 point for correct answer (following work from part (a)).

- (c) (3 points) Charles offers Gadzooks 15,000 British pounds for the plot of land. Should Gadzooks sell the land to Charles? Why or why not?

Answer:

$$15,000 \text{ pounds} \times 1.202 \text{ \$/pound} = \$18,030 < \$18,580.$$

Since this offer is below the minimum that Gadzooks has decided to sell the land for, Gadzooks should not sell the plot of land to Charles.

1 point for performing a relevant computation (like the above or an equivalent).
1 point for correct answer (sell or not sell).
1 point for sound reasoning.

4. Tom has a clothes dryer that uses 3000 watts of power and he runs it for an average of 2 hours each day. Suppose Tom pays the utility company 15 cents per kilowatt-hour of electricity.

(a) (3 points) What is the average daily cost for Tom to run the dryer?

Answer:

$$3000\text{watts} \times \frac{1\text{kw}}{1000\text{watt}} \times 2\text{hr} \times \frac{15\text{cents}}{\text{kw-hr}} = \$0.90$$

Note: 2 hr could be replaced by 2 hr/day, which would give final units of \$/day.

2 points (0.5 point each) for inclusion of each factor in computation above (or equivalent).
1 point for correct answer with appropriate units.

- (b) (3 points) How much would Tom save in a year if he replaced the dryer with a more efficient model that uses only 2000 watts?

Daily savings:

$$1000\text{watts} \times \frac{1\text{kw}}{1000\text{watt}} \times 2\text{hr} \times \frac{15\text{cents}}{\text{kw-hr}} = \$0.30$$

Note: 2 hr could be replaced by 2 hr/day, which would give final units of \$/day.

Yearly savings

$$\frac{\$0.30}{\text{day}} \times \frac{365\text{days}}{\text{year}} = \frac{\$109.50}{\text{year}}.$$

2 points for inclusion of each factor in computation above (or equivalent).

Note: Daily savings and yearly savings do not have to be computed separately. It could all be done in one computation so long as it is mathematically equivalent.

1 point for correct answer with appropriate units (following work from part (a)).

5. Suppose the price of a Mercedes is \$65,000, and the price of a Lexus is \$55,000. For all answers below, round to the nearest whole number.

- (a) (3 points) Find the absolute difference in price and the relative difference in price, using the Lexus as the reference.

Answer:

Absolute: $\$65,000 - \$55,000 = \$10,000$

Relative: $\frac{\$65,000 - \$55,000}{\$55,000} \times 100\% \approx 18\%$.

0.5 point for correct absolute difference formula.
 0.5 point for correct absolute difference computation and answer.
 0.5 point for correct relative difference formula.
 1 point for correct relative difference computation with numbers in correct places (writing the $\times 100\%$ is optional).
 0.5 point for correct relative difference answer, including % units and rounding.

- (b) (2 points) Find the absolute difference in price and the relative difference in price, using the Mercedes as the reference.

Answer:

Absolute: $\$55,000 - \$65,000 = -\$10,000$

Relative: $\frac{\$55,000 - \$65,000}{\$65,000} \times 100\% \approx -15\%$.

0.5 point for correct absolute difference formula.
 0.5 point for correct absolute difference computation and answer.
 0.5 point for correct relative difference formula (writing the $\times 100\%$ is optional).
 0.5 point for correct relative difference answer, including % units and rounding.

- (c) (3 points) Fill in the blanks in the following sentences:

- (1) The Mercedes price is _____ % higher than the Lexus price.
- (2) The Lexus price is _____ % less than the Mercedes price.
- (3) The Lexus price is _____ % of the Mercedes price.

Answer:

From (a), blank (1) is 18%.

From (b), blank (2) is -15%.

Since $\frac{55,000}{65,000} \approx 85\%$, then blank (3) is 85%.

1 point for blank (1), following part (a) (no additional work needed).
 1 point for blank (2), following part (b) (no additional work needed).
 0.5 point for work for blank (3).
 0.5 point for answer to blank (3).

6. (2 points) Follow all testing protocol directions (hold up blank paper to the webcam at the beginning of the exam; show your work to the webcam before submitting; etc.).

Each violation worth 1 or 2 points at discretion of grader, for a maximum of 2 points.

Grading notes for entire FR section:

Minor deductions are the discretion of the grader; deductions can come in increments of 0.25.
 If a problem needs the use of an answer from a previous part, then correct work using incorrect previous answers still earns credit.

Formulas

- **Absolute Change** = new value - old value
- **Relative Change** = $\frac{\text{new value} - \text{old value}}{\text{old value}} \times 100\%$

Conversion Factors

(revised 8/11/19)

| Length | | | | Volume (liquid measure) | | | |
|-----------------|----------------|-----------------------------------|---------------------------|-------------------------|---|--------------------------|----------------|
| 1 in. | 2.54 cm | | | 1 tablespoon (T) | 3 teaspoons (t) | | |
| 1 ft | .3048 m | 12 in. | | 1 fluid oz | 2 tbsp (T) | 1.8047 in. ³ | 29.5735 mL |
| 1 yd | .9144 m | 36 in. | 3 ft | 1 cup (c) | 8 fl oz | | |
| 1 mi | 1.6093 km | 5280 ft | 1760 yds | 1 pint (pt) | 16 fl oz | 28.875 in. ³ | |
| 1 nautical mi | 1.852 km | 6076.1155 ft | | 1 quart (qt) | 2 pts | 57.75 in. ³ | .9463 L |
| 1 cm | .3937 in. | | | 1 gallon (gal) | 4 qts | 3.7853 L | |
| 1 m | 3.2808 ft | 1.0936 yd | | 1 L | 1.0567 qt | .2642 gal | |
| 1 km | .6214 mi | | | 1 ml | 1 cm ³ | | |
| 1 rod | 5.5 yds | | | | | | |
| 1 fathom | 6 ft | | | Volume (dry measure) | | | |
| 1 furlong | 40 rods | .125 mi | | 1 in. ³ | 16.3871 cm ³ | | |
| | | | | 1 ft ³ | 1728 in. ³ | | |
| | | | | 1 yd ³ | 27 ft ³ | | |
| Weight | | | | 1 dry pint | 33.6003 in. ³ | | |
| 1 lb | 16 oz | .4536 kg | | 1 dry quart | 2 dry pts | 67.2006 in. ³ | |
| 1 ton | 2000 lbs | | | 1 peck | 8 dry quarts | | |
| 1 kg | 2.2046 lb | | | 1 bushel | 4 pecks | | |
| Metric Prefixes | | | Energy and Power | | Currency Conversions from US Dollar | | |
| <i>Prefix</i> | <i>Abbrev.</i> | <i>Value</i> | 1 watt | 1 joule/s | British Pound | .8317 £/\$ | 1.202 \$/£ |
| micro | μ | 10 ⁻⁶ (one millionth) | 1 kilowatt-hr | 3.6 million joules | European Euro | .8923 €/€ | 1.121\$/€ |
| milli | m | 10 ⁻³ (one thousandth) | 1 calorie | 4184 joules | Japanese Yen | 105.46 ¥/\$ | .009482 \$/¥ |
| centi | c | 10 ⁻² (one hundredth) | 1 kilowatt | 1000 watts | Canadian Dollar | 1.322 C\$/€ | .7566 \$/C\$ |
| deci | d | 10 ⁻¹ (one tenth) | | | Mexican Peso | 19.42 MexP/\$ | .05149 \$/MexP |
| deca | da | 10 ¹ (ten) | Celsius/Fahrenheit/Kelvin | | Note that these values fluctuate several times per day. Current values are only provided at the beginning of the semester. (Values are rounded to four significant digits.) | | |
| hecto | h | 10 ² (hundred) | F = 1.8C + 32 | | | | |
| kilo | k | 10 ³ (thousand) | $C = \frac{F - 32}{1.8}$ | | | | |
| mega | M | 10 ⁶ (million) | K = C + 273.15 | | | | |
| giga | G | 10 ⁹ (billion) | C = K - 273.15 | | | | |
| tera | T | 10 ¹² (trillion) | | | | | |