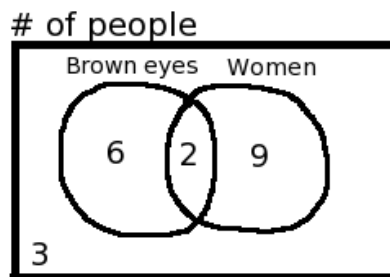


Practice Test Answer Key

1. (10 points) There are 20 people in a room. 8 of them have brown eyes. 11 of them are women. 6 of them are men who have brown eyes. Draw a two set Venn Diagram for this situation. On your Venn diagram, label the contents of each region clearly.



2. (a) How many situation comedies are there on Channel 1?
Sum up all four numbers in the circle labeled "Situation comedies."
 $3+3+2+1=9$

- (b) How many new series do not air on Tuesdays?
Sum up all the numbers that are NOT in the circles labeled "Returning Series" or "Air on Tuesdays." This includes the number 5 that is outside of all three circles.
 $5+3=8$

- (c) How many TV shows that are not situation comedies air on Tuesdays?
Sum up the numbers that are in the "Air on Tuesday" circle but are not in the "Situation Comedy circle."
 $1+4=5$

3. (9 points) State whether the following arguments are inductive or deductive.

- (a) All dairy products contain protein. Soybeans contain protein. Soybeans are dairy products.

This statement is deductive since we start with a general premise (All dairy) and give a more specific conclusion (soybeans). Also note that this argument is invalid. Check this by using the Venn Diagram validity test.

- (b) Sparrows are birds and they can fly. Eagles are birds and they can fly. Pigeons are birds and they can fly too. All birds can fly.

This statement is inductive since we give two specific examples (sparrows and eagles) and conclude with a more general statement (all birds).

- (c) The last three times I drove on 13th East the traffic was light on Saturday afternoon and heavy on Tuesday and Thursday mornings. Weekdays must have heavier traffic than weekends.

This one is inductive because we start with a more specific premise (Tuesdays and Thursdays) and conclude with a more general statement with respect to the premises (all weekdays).

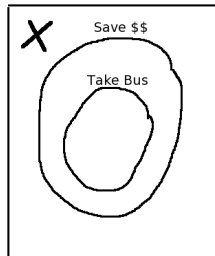
4. (9 points) Conditional Deductive Arguments

Premise 1: If I take the bus to school for a week, then I will save money on gasoline.

Premise 2: I didn't save money on gasoline this week.

Conclusion: I didn't take the bus to school this week.

The first premise is of the form "If p then q." The bus circle should lie inside of the saving money circle. Using the second premise, we place the X outside of the larger circle (saving money). Looking at the conclusion, we know that the argument is valid since the X is definitely outside of the bus circle. This is an example of denying the conclusion. The premises sound reasonable and could be true, and therefore the argument is sound.



5. (9 points) A car is driving at 100 kilometers per hour. What is its speed in meters per second?

Remember that 1 kilometer = 1,000 meters and 1 hour = 60 minutes = 3,600 seconds. We can now use these facts as conversion factors.

$$\frac{100 \cancel{\text{km}}}{1 \cancel{\text{hr}}} \times \frac{1,000 \text{ m}}{1 \cancel{\text{km}}} \times \frac{1 \cancel{\text{hr}}}{60 \cancel{\text{min}}} \times \frac{1 \cancel{\text{min}}}{60 \text{ sec}} = \frac{100,000 \text{ meters}}{3,600 \text{ 1 second}} = 28 \frac{\text{meters}}{\text{second}}.$$

6. (9 points) Your dinner bill is \$24.95, and you want to leave a 15% tip. How much will you end up paying for your meal?

We can calculate the tip amount $0.15 \times 24.95 = \$3.74$ and then add this to the dinner bill ($3.74 + 24.95 = \$28.69$). Alternatively we can note that the reference value is 24.95 and the relative change is 15%. This problem is asking you to solve for the new value. We can use the “of” formula ($RV \times (100\% + 15\%) = NV$) to solve the problem. $24.95 \times 1.15 = 28.69$. Either way, we arrive at the same answer.

7. (10 points) You just had a pool built in your backyard. It is 21 feet long, 15 feet wide, and 6 feet deep. How many cubic yards of water will you need to fill your new pool?

Again, there is more than one way to approach the problem. We can either convert the three lengths into yards and then multiple all three to get the volume of water in cubic yards, or we can multiply 6 times 21 times 15 to get the volume of the pool in cubic feet, and then convert this measurement to cubic yards.

$$\left(21 \text{ ft} \times \frac{1 \text{ yd}}{3 \text{ ft}}\right) \times \left(15 \text{ ft} \times \frac{1 \text{ yd}}{3 \text{ ft}}\right) \times \left(6 \text{ ft} \times \frac{1 \text{ yd}}{3 \text{ ft}}\right) = 70 \text{ yd}^3.$$

$$(21 \text{ ft} \times 15 \text{ ft} \times 6 \text{ ft}) \times \left(\frac{1 \text{ yd}}{3 \text{ ft}}\right)^3 = 1890 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} = 70 \text{ yd}^3.$$

8. (8 points) If the temperature outside is 47 degrees Fahrenheit, what is the temperature in degrees Celsius? degrees Kelvin? Use the conversions:

$$^{\circ}F = 1.8 \times ^{\circ}C + 32 \text{ and } K = ^{\circ}C + 273.$$

For this problem, we can't just use the formula for temperature because we are given Fahrenheit and asked to find Celsius.

$$\begin{aligned} 47 &= 1.8 \times ^{\circ}C + 32 \\ 47 - 32 &= 1.8 \times ^{\circ}C + 32 - 32 \\ 15 &= 1.8 \times ^{\circ}C \\ 15/1.8 &= 1.8 \times ^{\circ}C / 1.8 \\ 8.33 &= ^{\circ}C \end{aligned}$$

By rearranging the temperature conversion equation, we find that the temperature is 8.33° Celsius outside. For the last conversion, we just add 273 to 8.33 and get that it is 281.33 Kelvin outside.

9. (8 points) A store is having a 30% off sale. If the regular price of an item is \$60, how much is it on sale for?

30% of \$60 is $60 \times 0.3 = \$18$. So the sale price is $\$60 - \$18 = \$42$.

10. (10 points) The population of Utah in 2005 was 2,520,000. This is a 10.3% increase from the population in the year 2000. Determine the reference value, new value, absolute change and relative change in this statement.

First note that the population given is in 2005, which is after the year 2000. So in this problem, the population of 2,520,000 is the new value and we are being asked to solve for the reference value (the population 5 years before that) and the absolute value. The 10.3% increase is the relative change. Using the formula

$$RV \times (100 + 10.3)\% = RV \times 1.103 = NV = 2,520,000.$$

So we need to divide both sides of this equation by 1.103 in order to get the reference value. Doing this we find that

$$RV = 2,284,678.$$

The last step here is to find the absolute change,

$$AC = NV - RV = 2,520,000 - 2,284,678 = 235,322.$$

11. (9 points) Multiply (or divide) the following numbers and leave your answers in scientific notation:

(a) $(3.2 \times 10^3) \times (1.8 \times 10^{-5})$

$$(3.2 \times 10^3) \times (1.8 \times 10^{-5}) = (3.2 \times 1.8) \times (10^3 \times 10^{-5})$$

$$(3.2 \times 10^3) \times (1.8 \times 10^{-5}) = (5.76) \times 10^{3-5}$$

$$(3.2 \times 10^3) \times (1.8 \times 10^{-5}) = (5.76) \times 10^{-2}.$$

(b) $(7 \times 10^{-4}) \times (8 \times 10^{-1})$

$$(7 \times 10^{-4}) \times (8 \times 10^{-1}) = (7 \times 8) \times (10^{-4} \times 10^{-1})$$

$$(7 \times 10^{-4}) \times (8 \times 10^{-1}) = 56 \times 10^{-5}$$

$$(7 \times 10^{-4}) \times (8 \times 10^{-1}) = (5.6 \times 10^1) \times 10^{-5}$$

$$(7 \times 10^{-4}) \times (8 \times 10^{-1}) = 5.6 \times 10^{1-5}$$

$$(7 \times 10^{-4}) \times (8 \times 10^{-1}) = 5.6 \times 10^{-4}$$

$$(c) \frac{2 \times 10^3}{4 \times 10^{-2}}$$

$$\frac{2 \times 10^3}{4 \times 10^{-2}} = \frac{2}{4} \times \frac{10^3}{10^{-2}}$$

$$\frac{2 \times 10^3}{4 \times 10^{-2}} = 0.5 \times 10^{3-(-2)}$$

$$\frac{2 \times 10^3}{4 \times 10^{-2}} = (5 \times 10^{-1}) \times 10^5$$

$$\frac{2 \times 10^3}{4 \times 10^{-2}} = 5 \times 10^4$$