

Respond to each item, giving sufficient detail. Neatly handwrite your responses. *This should be very helpful to you as you prepare for exams.*

1. Complete the following truth table for the various types of propositions.

(1) Negation

p	not p
T	
F	

(2) And statements (Conjunctions)

p	q	p and q
T	T	
T	F	
F	T	
F	F	

(3) Or statements (Disjunctions)

p	q	p or q
T	T	
T	F	
F	T	
F	F	

(4) If . . . then statements (Conditionals)

p	q	if p, then q
T	T	
T	F	
F	T	
F	F	

2. Write the general form for each variation of the conditional statement, along with the example (using the given conditional statement).

Conditional: If p, then q. If hawks are birds, then they can fly.

Converse: _____

Inverse: _____

Contrapositive: _____ If hawks cannot fly, then they aren't birds.

3. For the following number sets, list either the “complete set” (using the ellipsis notation) or several examples of elements of the set.

Natural numbers = { _____ }

Whole numbers = { _____ }

Integers = { _____ }

Rational numbers, examples _____ , _____ , _____ , _____ , _____

Irrational numbers, examples _____ , _____ , _____ , _____ , _____

4. Given the universal set $\mathbf{U} = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, give the meaning of and an example for each of the following set symbols. You make up the value for x , and you make up sets A , B and C to make each given statement true. The goal is to show correct use of the set symbols.

(a) $x \in A$ Let $x = 1$ and $A = \{1, 3, 5\}$. $1 \in \{1, 3, 5\}$ or $1 \in A$

(b) $x \notin A$ _____

(c) $A \subset B$ _____

(d) $A \cap C$ _____

(e) \bar{A} _____

5. Draw Venn diagrams illustrating the following set operations. In the $A \cup B$, $A \cap B$, and $A - B$ cases, assume that A and B overlap (i.e., the sets are not disjoint or subsets). Just shade the appropriate region for each operation.

$A \cap B$	\bar{B}	$A \cup B$	$A - B$

6. For the following propositions, draw a Venn diagram and label all regions of the diagram.

(a) All whales are mammals.

(b) No dogs are cats.



A(n) _____ argument makes the case for a general conclusion for more specific premises.

For example, Premise: $2 + 3 = 5$

Premise: $5 + 4 = 9$

Premise: $7 + 6 = \underline{\hspace{1cm}}$

Conclusion: The sum of an even integer and an odd integer is an _____ integer.

A(n) _____ argument makes the case for a specific conclusion from more general premises.

For example, Premise: All politicians are married.

Premise: Senator Harris is a politician.

Conclusion: Senator Harris is _____ .

Complete the table of conditional arguments.

	Affirming the Hypothesis	Affirming the Conclusion	Denying the Hypothesis	Denying the Conclusion
Structure	If p, then q.	If p, then q.	If p, then q.	If p, then q.
Premises	p is true.	q is true.	p is not true.	q is not true.
Conclusion	q is true.	p is true.	q is not true.	
Validity	Valid			Valid

7. Complete the following unit analysis conversions. Be sure to include all units.

(a) Convert 24 inches to feet.

$$24 \text{ in.} \cdot \frac{1 \text{ ft}}{\underline{\hspace{1cm}} \text{ in.}} = \underline{\hspace{2cm}}$$

(b) Convert 15 gallons to quarts.

$$15 \text{ gal} \cdot \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$$

8. Complete the following basic customary measurement facts for length, capacity, mass and time.

$$\begin{array}{llll} \underline{12} \text{ in} = 1 \text{ ft} & \underline{\hspace{1cm}} \text{ qt} = 1 \text{ gal} & \underline{\hspace{1cm}} \text{ oz} = 1 \text{ lb} & \underline{60} \text{ s} = 1 \text{ min} \\ \underline{\hspace{1cm}} \text{ ft} = 1 \text{ yd} & & \underline{\hspace{1cm}} \text{ lb} = 1 \text{ T} & \underline{\hspace{1cm}} \text{ min} = 1 \text{ hr} \\ \underline{\hspace{1cm}} \text{ ft} = 1 \text{ mi} & & & \underline{\hspace{1cm}} \text{ s} = 1 \text{ hr} \\ \underline{1760} \text{ yd} = 1 \text{ mi} & & & \end{array}$$

Complete the metric prefix chart (from Tera to pico), using abbreviations (e.g., T for Tera).

T	-	-	-	-	M	-	-	-	-	da	Root	-	-	-	-	mc	-	-	-	-	-	p
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Also give the °F-to-°C and °C-to-°F temperature conversion formulas.

$$C = \frac{F - 32}{1.8} \qquad F = 1.8C + 32$$

9. We want you to be familiar enough with the customary and metric systems of measurement to complete statements like the following ones. Feel free to use abbreviations for the customary and metric units.

- (a) The foot and yard are used for situations in which the _____ is used in the metric system.
- (b) Which is larger? 1 m 1 yd
- (c) The liter in the metric system is comparable to (though slightly larger than) the _____ in the customary system.
- (d) The kilogram is used for many situations in which the _____ is used in the customary system.
- (e) Which is larger? 1 kg 1 lb
- (f) Complete the following conversion. The speed of light is given as 672,000,000 mph. Express your answer both in normal notation and in scientific notation.

$$1 \text{ Light Year} = \frac{672,000,000 \text{ mi}}{\text{hr}} \times \frac{\text{hr}}{1 \text{ day}} \times \frac{\text{days}}{1 \text{ year}} \times 1 \text{ year} = \underline{\hspace{2cm}} \text{ mi}$$

$$= \underline{\hspace{2cm}} \text{ mi}$$

This is the distance that light travels in 1 year (using the Earth year). By the way, this is approximately 9.5×10^{12} kilometers. Astronomers estimated that the nearest star to Earth after the Sun (93,000,000 miles away) is the triple-star system known as Alpha Centauri, which is about 4.24 light years away from the Earth. They also approximate the diameter of the Milky Way galaxy at 100,000 light years across. We live in a vast and amazing universe!

10. Write a few sentences describing something you learned that was new for you in class this unit. You may include a favorite activity, an interesting application, a teaching and learning technique, or a specific concept that you better understand as a result of this unit.

Do your best! Rise to the challenge! Live and learn!