TECEP® Test Description for MAT-105-TE

APPLIED LIBERAL ARTS MATHEMATICS

This exam assesses students' knowledge and application of a broad based overview of mathematics intended for non-mathematics majors. The exam assesses students' competency of various mathematical topics with an emphasis on the application of real-world problems. The applications will span many disciplines in order to support the theme that mathematics is everywhere and impacts much of our everyday lives. Topics include organizing data using Venn diagrams, tree diagrams, vertex edge graphs and sets, logic, the real number system, algebra, functions, numbers of different bases, the metric system, consumer mathematics, probability, statistics, and applications to voting and graph theory. (3 credits)

- **Test format:** 75 multiple choice questions (1 point each).
- **Passing score:** 70% (53/75 points).Your grade will be reported as CR (credit) or NC (no credit).
- **Time limit:** 3 hours.

Note: The exam is a closed-book exam. But you are permitted to use a calculator (scientific, graphing, or financial) but ***may not*** use a calculator on a phone, PDA, or any similar device. The use of **blank** scratch paper for doing math calculations is permitted during online test administrations.

OUTCOMES ASSESSED ON THE TEST

- Analyze and apply problem solving techniques
- Organize and draw conclusions about data using a variety of methods
- Summarize/debate mathematical concepts and problems
- Design and analyze graphs
- Organize/represent data using logic and set notation
- Apply properties of real numbers

TOPICS ON THE TEST AND THEIR APPROXIMATE DISTRIBUTION

The table below indicates the main topics covered by this exam and the approximate percentage of the exam devoted to each main topic. Under the main topic heading is a list of related–but more specific–topics. It is important to review these topics to determine how much prior knowledge you have and/or how much additional study is necessary.

Topic	Percentage
Critical Thinking ● Inductive and deductive reasoning ● Problem solving	**5%**
Sets and Statements ● Set concepts ● Subsets ● Venn diagrams and set operations ● Venn diagrams with three sets ● Application of sets	**22%**
Logic and Systems of Numeration ● Statements and logical connectives ● Truth tables for negation ● Other bases	**10%**
Number Theory and The Real Number System ● Number theory ● Integers ● Rational numbers ● Irrational numbers ● Real numbers and their properties ● Rules of exponents	**23%**
Algebra, Graphs, and Functions ● Order of operations and solving equations ● Formulas ● Linear inequalities ● Graphing linear equations ● Linear inequalities and systems of linear inequalities ● Solving systems of linear equations	**13%**
The Metric System and Consumer Mathematics ● Basic terms and conversions within the metric system ● Length, area and volume ● Dimensional analysis and conversion to and from the metric system ● Percent, personal loans and simple interest ● Compound interest ● Buying a house with a mortgage	**17%**

Probability and Statistics • Empirical and theoretical probabilities • Odds • Expected value (Valuation) • Tree diagrams • Sampling techniques and misuses of statistics • Frequency distributions and statistical graphs	**10%**

STUDY MATERIALS

Below is a list of recommended study materials to help prepare you for your exam. Most textbooks in this subject include the topics listed above and will prepare you for the test. If you choose another text, be sure to compare its table of contents against the topic list to make sure all topics are covered.

Title
Angel, A., Abbott, C., & Runde, D. *A Survey of Mathematics with Applications* (current edition). Upper Saddle River, NJ: Pearson.

SAMPLE QUESTIONS

The questions below are designed to help you study for your TECEP. Answering these questions does not guarantee a passing score on your exam.

Please note that the questions below **will not** appear on your exam.

1. Use inductive reasoning to predict the next line in the pattern below:

   (8 x 1) x (2 x 1) = 16
   (8 x 10) x (2 x 2) = 320
   (8 x 100) x (2 x 3) = 4800

   a. (8 x 1000) x (2 x 4) = 6400
   b. (8 x 1000) x (2 x 4) = 56,000
   c. (8 x 1000) x (2 x 4) = 64,000
   d. (8 x 1000) x (2 x 4) = 72,000

2. An airport parking lot charges $3.50 for the first 2 hours of parking and $1.00 for each additional half hour. How much does it cost to park for 6 hours?

a. $7.50
b. $8.00
c. $11.50
d. $12.00

3. Convert 10010000_2 to a numeral base 10.

a. 4
b. 144
c. 288
d. 20,020,000

4. Find $n(A)$ for the set: A = {x | x is a second in a minute}

a. $n(A)$ = 12
b. $n(A)$ = 60
c. $n(A)$ = 120
d. $n(A)$ = infinite

5. 5. 47 liters = _____ quarts.

a. 21.3
b. 44.5
c. 49.5
d. 56.4

6. Perform the indicated operation and reduce the answer to the lowest terms: $\frac{6}{7} - \frac{1}{3}$

a. $\frac{1}{105}$
b. $\frac{11}{21}$
c. $\frac{55}{7}$
d. $\frac{21}{11}$

7. Evaluate the expression: $(-3)^0$

a. -3
b. -1
c. 1
d. 0

8. Evaluate the expression: (-1)(7)(-3).

    a. 21
    b. -21
    c. 11
    d. -11

9. Evaluate the expression: $(-5)^{-3}$

   a. -125
   b. 125
   c. $-\frac{1}{125}$
   d. $\frac{1}{125}$

10. Three coins are tossed 80 times and the number of heads is observed below. Compute the empirical probability that at most two heads occur.

Outcome	No heads	One head	Two heads	Three heads
Frequency	18	5	7	50

   a. $\frac{2}{15}$
   b. $\frac{3}{8}$
   c. $\frac{3}{4}$
   d. $\frac{23}{2}$

11. The table below shows the number of college students who prefer a given pizza topping. Estimate the indicated probability for: P (juniors prefer meat toppings).

Toppings	Freshman	Sophomore	Junior	Senior
Cheese	12	10	27	26
Meat	27	26	10	12
Veggie	10	12	27	26

   a. 0.044
   b. 0.133
   c. 0.156
   d. 0.355

12. Express the set in roster form: {x| x is a natural number multiple of 5}

   a. {0, 5, 10, 15,…}
   b. {5, 10, 15, …}
   c. {0, 10, 15, 20, …}
   d. Ø

13. Determine whether the sets are equal, equivalent, both or neither: {4, 1, 13}

    a. Equal
    b. Equivalent
    c. Both
    d. Neither

14. Use the Venn Diagram to find A.

    a. {6, z, q, h}
    b. {8, 2, 6, z}
    c. {6}
    d. {8, 2, 6}

15. Write the following compound statement in symbols: If I exercise, then I won't eat too much.

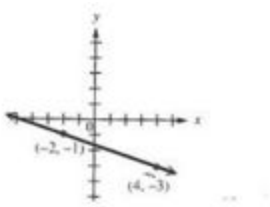
    Let *r* = "The food is good."
    Let *p* = "I eat too much."
    Let *q* = "I'll exercise."

    a. $q \rightarrow \sim p$
    b. $\sim(p \rightarrow q)$
    c. $r \wedge p$
    d. $p \rightarrow q$

16. Fill in the missing value: 7.99m = _____ cm.

    a. 799
    b. 79.9
    c. 0.799
    d. 0.0799

17. Which choice represents the equation for the graph?



a. $f(x) = -\frac{1}{3}x - \frac{5}{3}$
b. $f(x) = -\frac{1}{3}x + \frac{5}{3}$
c. $f(x) = +\frac{1}{3}x - \frac{5}{3}$
d. $f(x) = +\frac{1}{3}x + \frac{5}{3}$

18. Solve the equation: $44(x - 176) = 88$

a. 88
b. 174
c. 176
d. 178

19. A speed limit sign in Canada shows 70 km/h. Determine this speed in miles per hour. Round to the nearest one.

a. 22 mph
b. 36 mph
c. 44 mph
d. 48 mph

20. Convert 20.3 liters to pints.

a. 17.5 pints
b. 29.3 pints
c. 33.7 pints
d. 42.9 pints

21. In 2014, the Major League Baseball team with the most improved record for winning games was Los Angeles Angels. In 2013, the Angels won 78 games. In 2014, the Angels won 98 games. Determine the percent increase in the number of games won by the Angels from 2013 to 2014.

a. 20.4%
b. 25.6%
c. 30.2%
d. 35.4%

22. On May 13, 2014, the price of one share of McDonald's stock was $103.53. On October 16, 2014, the price of one share of McDonald's stock had fallen to $89.91. Determine the percent change in the price of a share of McDonald's stock during this period.

    a. 13.2%
    b. 18.7%
    c. 24.2%
    d. 29.7%

23. Use the day counting table to find the exact number of days from the first date to the second date. Assume the year is NOT a leap year.

    April 18 to November 11

Days in Each Month												
Day of Month	31 Jan.	28 Feb.	31 Mar.	30 Apr.	31 May	30 June	31 July	31 Aug.	30 Sept.	31 Oct.	30 Nov.	31 Dec.
Day 1	1	32	60	91	121	152	182	213	244	274	305	335
Day 2	2	33	61	92	122	153	183	214	245	275	306	336
Day 3	3	34	62	93	123	154	184	215	246	276	307	337
Day 4	4	35	63	94	124	155	185	216	247	277	308	338
Day 5	5	36	64	95	125	156	186	217	248	278	309	339
Day 6	6	37	65	96	126	157	187	218	249	279	310	340
Day 7	7	38	66	97	127	158	188	219	250	280	311	341
Day 8	8	39	67	98	128	159	189	220	251	281	312	342
Day 9	9	40	68	99	129	160	190	221	252	282	313	343
Day 10	10	41	69	100	130	161	191	222	253	283	314	344
Day 11	11	42	70	101	131	162	192	223	254	284	315	345
Day 12	12	43	71	102	132	163	193	224	255	285	316	346
Day 13	13	44	72	103	133	164	194	225	256	286	317	347
Day 14	14	45	73	104	134	165	195	226	257	287	318	348
Day 15	15	46	74	105	135	166	196	227	258	288	319	349
Day 16	16	47	75	106	136	167	197	228	259	289	320	350
Day 17	17	48	76	107	137	168	198	229	260	290	321	351
Day 18	18	49	77	108	138	169	199	230	261	291	322	352
Day 19	19	50	78	109	139	170	200	231	262	292	323	353
Day 20	20	51	79	110	140	171	201	232	263	293	324	354
Day 21	21	52	80	111	141	172	202	233	264	294	325	355
Day 22	22	53	81	112	142	173	203	234	265	295	326	356
Day 23	23	54	82	113	143	174	204	235	266	296	327	357
Day 24	24	55	83	114	144	175	205	236	267	297	328	358
Day 25	25	56	84	115	145	176	206	237	268	298	329	359
Day 26	26	57	85	116	146	177	207	238	269	299	330	360
Day 27	27	58	86	117	147	178	208	239	270	300	331	361
Day 28	28	59	87	118	148	179	209	240	271	301	332	362
Day 29	29		88	119	149	180	210	241	272	302	333	363
Day 30	30		89	120	150	181	211	242	273	303	334	364
Day 31	31		90		151		212	243		304		365

Add 1 day for leap year if February 29 falls between the two dates under consideration.

    a. 157 days
    b. 177 days
    c. 207 days
    d. 227 days

24. Joshua uses the Small Business Administration (SBA) Loan Program to obtain a loan to help expand his vending machine business. Joshua borrows $25,000 for 2 years with a simple interest rate of 1.5%. Determine the amount of money Joshua must repay the SBA after 2 years.

    a. $25,750
    b. $28,150
    c. $33,950
    d. $37,450

25. Identify the sampling technique used to obtain a sample in the following example:

    Children in a large city are classified based on the neighborhood school they attend. A random sample of five schools is selected. All the children from each selected school are included in the sample.

    a. Systematic sampling
    b. Cluster sampling
    c. Convenience sampling
    d. Stratified sampling

ANSWERS TO SAMPLE QUESTIONS

1. (**c**)
2. (**c**)
3. (**b**)
4. (**b**)
5. (**c**)
6. (**b**)
7. (**c**)
8. (**a**)
9. (**c**)
10. (**b**)
11. (**c**)
12. (**b**)
13. (**d**)
14. (**d**)
15. (**a**)
16. (**a**)
17. (**a**)
18. (**d**)
19. (**c**)
20. (**d**)
21. (**b**)
22. (**a**)
23. (**c**)
24. (**a**)
25. (**b**)