Math 30 Study Guide • Module Objective • Correlation

Program of Studies	Question Bank Module Objective (Mod.Obj)	Resources
Polynomial Functions		
1. Students will be expected to demonstrate an understanding that a polynomial function is a function of the form $f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \ldots + a_2 x^2 + a_1 x + a_0$, where a_0, a_1, a_2,... a_n are real numbers and $n \in$ N.	11.1, 11.2 12.1	**Rinehart and Winston** 90-91, 104-107 **Nelson** 142-144, 151-156 **Addison Wesley** 42-48, 63-78
2. Students will be expected to demonstrate an understanding that a polynomial function can be graphed on a Cartesian plane and that such graphs will have particular characteristics depending on the function.		
2.1 Students will be expected to sketch the graphs of integral polynomial functions.		
2.1.1 Students will be expected to draw the graphs of integral polynomial functions using calculators or computers.	14.1 14.1	
2.1.2 Students will be expected to investigate the characteristics of the graphs of polynomial functions of different degrees and determine the effects of a multiplicity of zeros on the graphs of polynomial functions.	14.2, 14.3	
2.1.3 Students will be expected to find approximations for the zeros of integral polynomial functions using calculators or computers.		
2.1.4 Students will be expected to analyze points on the graphs of polynomial functions using calculators or computers.	14.4	
2.1.5 Students will be expected to solve problems that can be represented by polynomial functions.		
3. Students will be expected to demonstrate an understanding that many polynomial functions can have the same zeros.		
3.1 Students will be expected to derive an equation of an integral polynomial function given its zeros.		
3.2 Students will be expected to derive the equation of an integral polynomial function given its zeros and an ordered pair that satisfies it.	13.4	
3.2.1 Students will be expected to find the equation of a polynomial function given its zeros and any other information that will uniquely define it.		
Polynomial Functions		

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4. Students will be expected to demonstrate an understanding of the following form of the division algorithm for polynomials: If any polynomial $P(x)$ is divided by a binomial of the form $(x - a)$ (called $D(x)$), the result will be a polynomial quotient $Q(x)$ and a remainder R.	11.3, 11.4	**Rinehart and Winston** 92-95, 98-103
4.1 Students will be expected to divide integral polynomial functions in one variable by a binomial.		**Nelson** 149-153
4.2 Students will be expected to write the division operation on a polynomial function by a binomial in the form of the Division Algorithm: $P(x) = D(x)Q(x) + R$.		**Addison Wesley** 49-63
5. Students will be expected to demonstrate an understanding that when a polynomial $P(x)$ is divided by a binomial of the form $(x - a)$, the remainder R is equal to $P(a)$ (Remainder Theorem).		
5.1 Students will be expected to use the Remainder Theorem to evaluate polynomial functions for rational values of the variable.	12.3	
5.1.1 Students will be expected to prove the Remainder Theorem.		
5.1.2 Students will be expected to use the Remainder Theorem to prove that if a number a is a zero of a polynomial function $P(x)$ then $(x - a)$ will be a factor of $P(x)$ (Factor Theorem).	12.2	
5.2 Students will be expected to use the Factor Theorem to factor an integral polynomial function completely and to determine all of its real zeros.		
5.2.1 Students will be expected to use a technology to factor polynomial functions.	12.4	
5.2.2 Students will be expected to recognize that all rational zeros of a polynomial function will be of the form $\frac{p}{q}$ where p is a factor of a_0 and q is a factor of a_n.	13.1, 13.2 13.3	
Trigonometric and Circular Functions		
1. Students will be expected to demonstrate an understanding that the radian measure of an angle is the ratio of the arc it subtends to the radius of a circle in which it is a central angle, and that one radian is the measure of a central angle subtended in a circle by an arc whose length is equal to the radius of the circle.	41.1, 41.2 41.3, 42.1	**Rinehart and Winston** 287-288, 294-295, 316-319
1.1 Students will be expected to identify the radian measure of a central angle in a circle.		**Nelson**

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1.2 Students will be expected to convert angle measurements between degree and radian measure and vice versa. 1.3 Students will be expected to determine the exact values of the trigonometric ratios for angles coterminal with $\frac{n\pi}{6}, \frac{n\pi}{4}, \frac{n\pi}{3}, \frac{n\pi}{2}$ and $n \in I$. 2. Students will be expected to demonstrate an understanding that identities are statements of equality that are true for all values of the variable and that trigonometric identities are equations that express relations among trigonometric functions that are valid for all values of the variables for which the functions are defined. 2.1 Students will be expected to use the following fundamental trigonometric Reciprocal Identit $\frac{1}{\sin a} = \csc a$ $\frac{1}{\cos a} = \sec a$ $\frac{1}{\tan a} = \cot a$ Quotient Identitie $\frac{\sin a}{\cos a} = \tan a$ $\frac{\cos a}{\sin a} = \cot a$ Pythagorean Iden $\sin^2 a + \cos^2 a = 1$ $\tan^2 a + 1 = \sec^2 a$ $\cot^2 a + 1 = \csc^2 a$	42.2 42.3 42.4 46.1	172-190, 216-220 **Addison Wesley** 156-173, 230-235
Trigonometric and Circular Functions 2.1.1 Students will be expected to derive the quotient and Pythagorean identities using logical processes. 2.1.2 Students will be expected to use the fundamental trigonometric identities to simplify, evaluate and prove trigonometric expressions involving identities. 2.2 Students will be expected to use the addition and subtraction identities (formulas): $\cos(a \pm b) = \cos a \cos b \pm \sin a \sin b$ $\sin(a \pm b) = \sin a \cos b \pm \cos a \sin b$ 3. Students will be expected to demonstrate an understanding	46.1 47.1, 47.2	**Rinehart and Winston** 296-307, 320-324, 327-329 **Nelson** 191-211, 221-226, 230-234

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that trigonometric functions can be graphed on a Cartesian plane. 3.1 Students will be expected to graph the following forms of the sine, cosine and tangent functions: $y = a \sin [b(\theta + c)] + d$ $y = a \cos [b(\theta + c)] + d$ $y = \tan \theta$ 3.1.1 Students will be expected to use calculators or computers to draw and analyze the graphs of trigonometric functions. 3.1.2 Students will be expected to investigate the effects of the parameters *a*, *b*, *c* and *d* on the graphs of trigonometric functions using calculators or computers. 3.1.3 Students will be expected to state the domain and range of all the trigonometric functions. 4. Students will be expected to demonstrate an understanding of the methods used to solve trigonometric equations. 4.1 Students will be expected to solve first and second degree trigonometric equations involving multiples of angles on the domain $0 \leq \theta < 2\pi$. 4.1.1 Students will be expected to use calculators or computers to solve trigonometric equations by evaluating the graphs of trigonometric functions. 4.2 Students will be expected to demonstrate the relationship between the root of a trigonometric equation and the graph of the corresponding function.	45.2 45.1 43.1, 43.2 43.3 44.1	**Addison Wesley** 178-225, 236-240, 251-255
Statistics 1. Students will be expected to demonstrate an understanding that a bivariate distribution involved two variables that may have some relationship to each other. 1.1 Students will be expected to plot sets of bivariate data on a scatter plot. 1.2 Students will be expected to plot a line of best fit on a scatter plot using the median fit method. 1.3 Students will be expected to develop and use prediction equations of the line of best fit to make inferences for populations. 1.4 Students will be expected to recognize and describe	62.1 62.2 62.3 62.4	**Rinehart and Winston** 393-403 **Nelson** 449-460 **Addison Wesley** 477-498

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the apparent correlation between the variables of a bivariate distribution from a scatter plot.		
1.5 Students will be expected to collect, organize and analyze sets of bivariate data.	62.5	
1.5.1 Students will be expected to apply statistical processes and statistical reasoning in investigations involving bivariate data.		
2. Students will be expected to demonstrate an understanding that data can be distributed normally, and that a normal distribution has particular characteristics that can be used to describe and analyze many situations.		
2.1 Students will be expected to find and interpret the mean and standard deviation of a set of normally distributed data.	61.1	
2.1.1 Students will be expected to use calculators or computers to calculate the mean and standard deviation of sets of normally distributed data.		
2.2 Students will be expected to apply the characteristics of a normal distribution.	61.2	
2.2.1 Students will be expected to solve problems involving data that are normally distributed.		
2.3 Students will be expected to find and apply the standard normal curve and the *z*-scores of data that are normally distributed.	61.3, 61.4	
2.3.1 Students will be expected to apply *z*-scores to solve problems involving probability distributions.		
Statistics		
3. Students will be expected to demonstrate an understanding that the results of a survey can be interpreted with measurable degrees of confidence.		
3.1 Students will be expected to distinguish between a population and a sample and assess the strengths, weaknesses and biases of given samples.	63.5	
3.2 Students will be expected to collect and organize the results of yes/no surveys taken from defined samples.	63.1	
3.2.1 Students will be expected to design and administer a simple survey.		
3.2.2 Students will be expected to collect and organize the results of a simple survey.		
3.3 Students will be expected to draw box plots of the	63.2	

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results of multiple samples. 3.3.1 Students will be expected to carry out investigations involving multiple samples taken from populations with known and unknown proportions of yes responses. 3.4 Students will be expected to use chars of 90 per cent box plots to find the confidence interval within which such conclusions and inferences are made based on the results of yes/no surveys. 3.4.1 Students will be expected to use statistical inferences to solve problems. 3.5 Students will be expected to draw statistical conclusions, make inferences to populations and explain the confidence with which such conclusions and inferences are made based on the results of yes/no surveys. 3.5.1 Students will be expected to design and administer a survey to a random sample of a population, collect and organize the responses, and analyze the results, including making inferences to the population and evaluating the results for the confidence with which they may be held.	63.3 63.4	
Quadratic Relations 1. Students will be expected to demonstrate an understanding of the physical properties of the conic sections with respect to the intersection of a plane and a cone. 1.1 Students will be expected to describe the conic section formed by the intersection of a plane and a cone. 1.1.1 Students will be expected to identify the point at which each of the conics becomes degenerate. 2. Students will be expected to demonstrate an understanding of the general quadratic relation $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ as the algebraic representation of any conic. 2.1 Students will be expected to describe the conics that would be generated by various combinations of values for the numerical coefficients. 2.1.1 Students will be expected to investigate and describe the effects of the numerical coefficients on the graphs of quadratic relations, using calculators or computers. 3. Students will be expected to demonstrate an understanding of the effects of the numerical coefficients in the general quadratic relation	51.1, 51.2 51.3, 51.4 51.5 52.1, 52.2 52.3, 52.4 52.5, 52.6 53.1, 53.2 53.3, 53.4 53.5 54.1, 54.2 54.3, 54.4 54.5, 54.6	**Addison Wesley** Master Grapher, 3D Grapher, Computer Graphing Experiments 3 **IBM Tool Kit** **Zap-a-Graph**

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$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ where $B = 0$ on the curves of the resulting conics. 3.1 Students will be expected to analyze the graphs of ellipses, parabolas, and hyperbolas, given their equations. 3.1.1 Students will be expected to use calculators or computers to draw the graphs of ellipses, parabolas and hyperbolas. 3.1.2 Students will be expected to recognize which conditions are required for an ellipse to become a circle. 3.1.3 Students will be expected to investigate and describe the effects of the numerical coefficients on the orientation, size and shape of the graph.	55.1, 55.2 55.3, 55.4 55.5, 55.6 55.7, 55.8 55.9	
Quadratic Relations 4. Students will be expected to demonstrate an understanding that a locus is a system of points that satisfies a given condition. 4.1 Students will be expected to recognize that each conic can be described as a locus of points. 4.1.1 Students will be expected to use the locus definition to verify the equations that describe the conics. 4.1.2 Students will be expected to solve problems that involve analyzing and determining the characteristics of a body that follows a conical path. 4.1.3 Students will be expected to solve problems that involve analyzing and determining the characteristics of a conical surface. 5. Students will be expected to demonstrate an understanding that any conic can be described as the locus of point, such that, the ratio of the distance between any point and a fixed point to the distance between the same point and a fixed line is a constant. This ratio is called eccentricity.	56.1, 56.2 56.3, 56.4 56.5, 56.6 56.7 57.1, 57.2 57.3, 57.4 57.5 58.1, 58.2 58.3, 58.4 58.5, 58.6 58.7	
Exponential and Logarithmic Functions 1. Students will be expected to demonstrate an understanding that an exponential function is one in which the variable appears in the	21.1	**Rinehart and Winston**

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exponent. 1.1 Students will be expected to sketch the graph of exponential functions of the form $y = a^x$, $a > 0$ 1.2 Students will be expected to use the graphs of exponential functions to estimate the values of roots and powers. 1.2.1 Students will be expected to draw and analyze the graphs of exponential functions using calculators or computers. 1.2.2 Students will be expected to determine the domain and range of the exponential functions. 1.3 Students will be expected to solve and verify exponential equations.	21.2 21.2 21.3	122-128 **Nelson** 89-94 **Addison Wesley** 262-265, 274-278
Exponential and Logarithmic Functions 2. Students will be expected to demonstrate an understanding that many real-world phenomena exhibit exponential properties. 2.1 Students will be expected to recognize exponential functions describing situations involving exponential growth and decay. 2.1.1 Students will be expected to solve problems involving exponential growth and decay. 3. Students will be expected to demonstrate an understanding of the characteristics and applications of logarithmic functions. 3.1 Students will be expected to draw the graphs of logarithmic functions as the inverses of exponential functions. 3.2 Students will be expected to use the graphs of logarithmic functions to find the values of one of the variables, given the other variable. 3.2.1 Students will be expected to draw and analyze the graphs of logarithmic functions using calculators or computers. 3.2.2 Students will be expected to determine the domain and range of the logarithmic functions. 3.3 Students will be expected to convert functions from exponential form to logarithmic form and vice versa. 4. Students will be expected to demonstrate an understanding that operations with logarithms are subject to basic properties and laws. 4.1 Students will be expected to apply the following laws and properties of logarithms:	21.4 22.1 22.2 22.2, 22.4 22.3 23.1	**Rinehart and Winston** 125-141 **Nelson** 96-103, 110-116, 119-128 **Addison Wesley** 262-265, 279-319

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$\log_a mn = \log_a m + \log_a n$ $\log_a \frac{m}{n} = \log_a m - \log_a n$ $\log_a m^n = n\log_a m$ 4.1.1 Students will be expected to evaluate logarithmic expressions using calculators and computers. 4.2 Students will be expected to solve and verify logarithmic equations. 4.2.1 Students will be expected to solve and verify logarithmic equations using calculators or computers.	23.2 24.1, 24.2	
Exponential and Logarithmic Functions 5. Students will be expected to demonstrate an understanding that a logarithm with a base of 10 is a common logarithm. 5.1 Students will be expected to solve logarithmic equations and evaluate logarithmic expressions using common logarithms. 6. Students will be expected to demonstrate an understanding that many phenomena exhibit characteristics that can be described using logarithmic functions. 6.1 Students will be expected to recognize logarithmic functions that describe situations that have logarithmic characteristics. 6.1.1 Students will be expected to solve problems that exhibit logarithmic properties by developing and solving logarithmic equations.	24.2 24.3	**Rinehart and Winston** 137-139, 142-144 **Nelson** 130-131, 133-137 **Addison Wesley** 279-281, 309-319
Permutations and Combinations 1. Students will be expected to demonstrate an understanding of the Fundamental Counting Principle. 1.1 Students will be expected to calculate the total number of ways that a multiple of tasks can be conducted if each task can be performed in a multiple of ways. 1.1.1 Students will be expected to solve problems that involve the use of the fundamental counting principle. 2. Students will be expected to demonstrate an understanding that a permutation is an arrangement in which the order is important. 2.1 Students will be expected to calculate the number of permutations there are of n things taken r at a time by applying the	71.1 71.2	**Rinehart and Winston** 349-357, 363-371 **Nelson** 402-405, 407-410, 418-432 **Addison Wesley** 500-512

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following formula: $${}_nP_r = \frac{n!}{(n-r)!}$$ 2.1.1 Students will be expected to calculate the ${}_nP_r$ using calculators and computers. 2.1.2 Students will be expected to solve problems involving linear permutations, permutations with repetitions, circular and ring permutations. 2.1.3 Students will be expected to solve probability questions that involve the use of permutations.	71.3 71.3 71.4 71.5	
Permutations and Combinations 3. Students will be expected to demonstrate an understanding that a combination is an arrangement in which the order is not important. 3.1 Students will be expected to calculate the number of combinations there are of n things taken r at a time by applying the following formula: $${}_nC_r = \frac{n!}{r!(n-r)!}$$ 3.1.1 Students will be expected to calculate ${}_nC_r$ using a calculator or computer. 3.1.2 Students will be expected to solve problems including probability problems that involve the use of combinations. 4. Students will be expected to demonstrate an understanding that the numerical coefficients of the terms in a binomial expansion can be determined using the Binomial Theorem. 4.1 Students will be expected to expand binomials of the form $(x + a)^n$, $n \in$ W using the Binomial Theorem. 4.2 Students will be expected to relate the numerical coefficients in a binomial expansion to the terms of Pascal's Triangle and vice versa.	72.1 72.1 72.2 72.3	**Rinehart and Winston** 358-364, 368-372 **Nelson** 411-415, 417-425 **Addison Wesley** 513-519
Sequences and Series 1. Students will be expected to demonstrate an understanding that a sequence is a set of quantities determined by a rule (function) whose domain is the natural numbers and whose range is the terms of the	31.1, 31.2 32.1, 32.3	**Rinehart and Winston** 418-420,

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sequence. 1.1 Students will be expected to recognize finite and infinite sequences. 1.2 Students will be expected to write the terms of a sequence given the function that defines it. 1.3 Students will be expected to write the terms of a sequence given its recursive definition. 1.4 Students will be expected to determine the functions that describes simple sequences. 2. Students will be expected to demonstrate an understanding that a series is the sum of the terms of a sequence. 2.1 Students will be expected to expand a series that is given in sigma notation.	37.1 31.3 32.3, 32.4 31.4, 31.5 32.5 34.1, 34.2 34.3	432-433 **Nelson** 349-353, 364, 366 **Addison Wesley** 321-328
Sequences and Series 3. Students will be expected to demonstrate an understanding that a series is the sum of the terms of a sequence. 3.1 Students will be expected to apply the general term formula of arithmetic sequences, $t_n = a + (n - 1)d$ 3.1.1 Students will be expected to solve problems involving the use and application of the general term formula for arithmetic sequences. 3.2 Students will be expected to apply the sum formula of arithmetic series, $S_n = \frac{n}{2}(a + t_n); S_n = \frac{n}{2}[2a + (n - 1)d]$ 3.2.1 Students will be expected to solve problems involving the use and application of the sum formula for arithmetic series. 3.2.2 Students will be expected to use technology where applicable. 4. Students will be expected to demonstrate an understanding that geometric sequences are such that each term is equal to the product of the preceding term and a constant and that a geometric series is the indicated sum of the terms of a geometric sequence. 4.1 Students will be expected to apply the general term formula of geometric sequences, $t_n = ar^{n-1}$ 4.1.1 Students will be expected to solve problems involving the use and application of the general term formula for geometric sequences. 4.2 Students will be expected to apply the sum formula	35.2 34.4 35.1 37.2, 37.3 35.3 35.4 33.1, 33.2 33.3 33.4 33.5, 33.6	**Rinehart and Winston** 421-431 **Nelson** 353-363, 367-376 **Addison Wesley** 339-344, 356-359

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of geometric series, $S_n = \frac{a(r^n - 1)}{r - 1}, r \neq 1; S_n = \frac{rt_n - a}{r - 1}, r \neq 1$ 4.2.1 Students will be expected to solve problems involving the use and application of the sum formula for geometric series. 4.2.2 Students will be expected to use technology where applicable.	36.1 36.2 36.3 37.4, 37.5 36.4, 36.5 37.6	