Lesson master answers trigonometry

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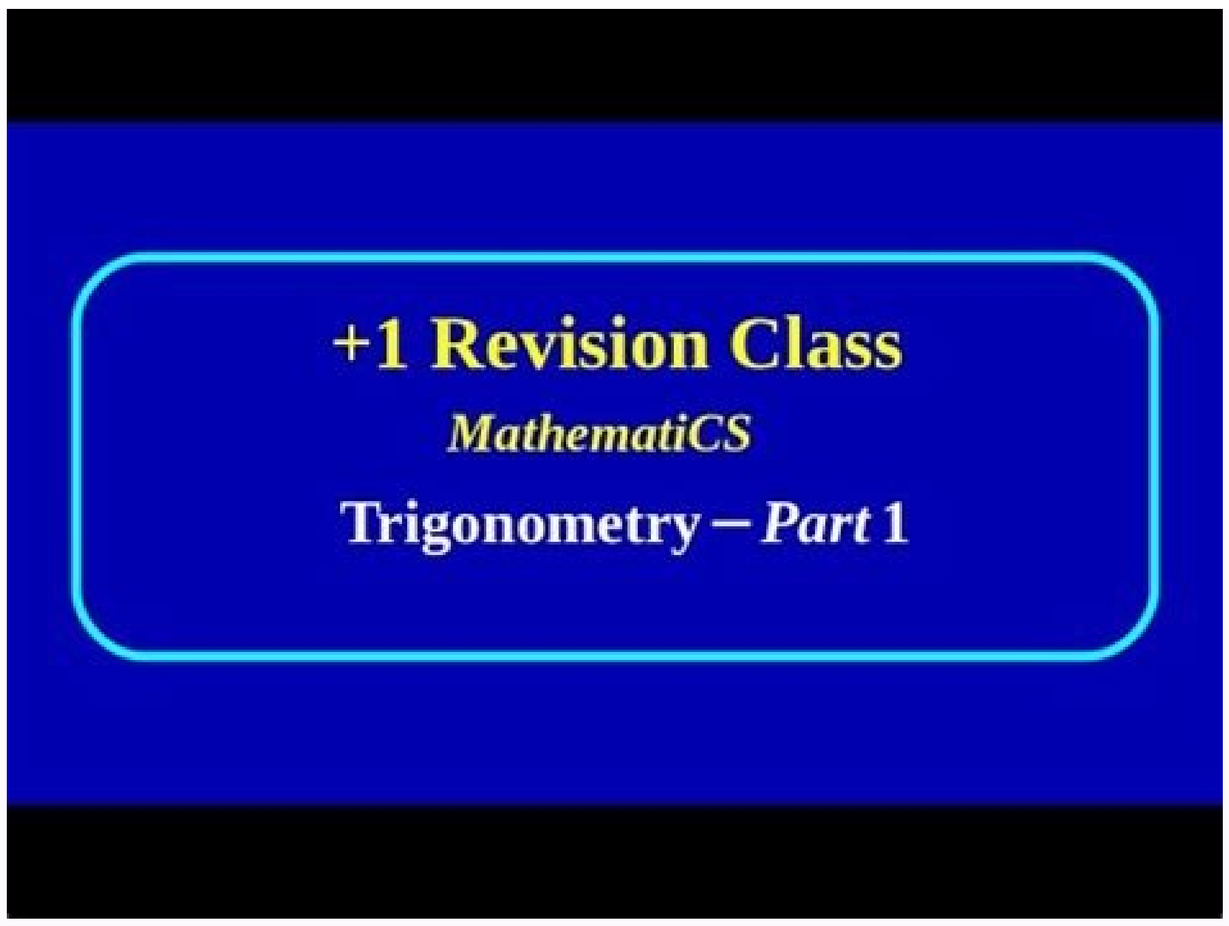

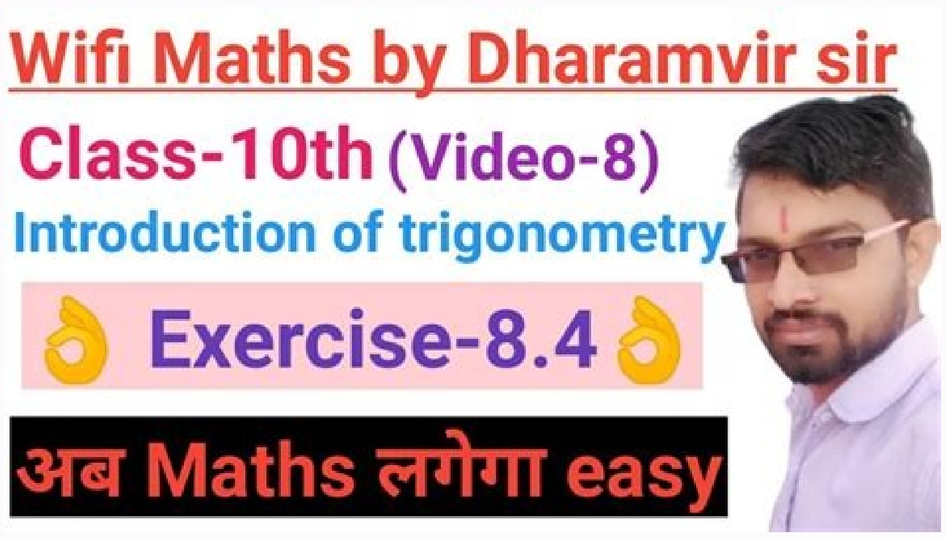

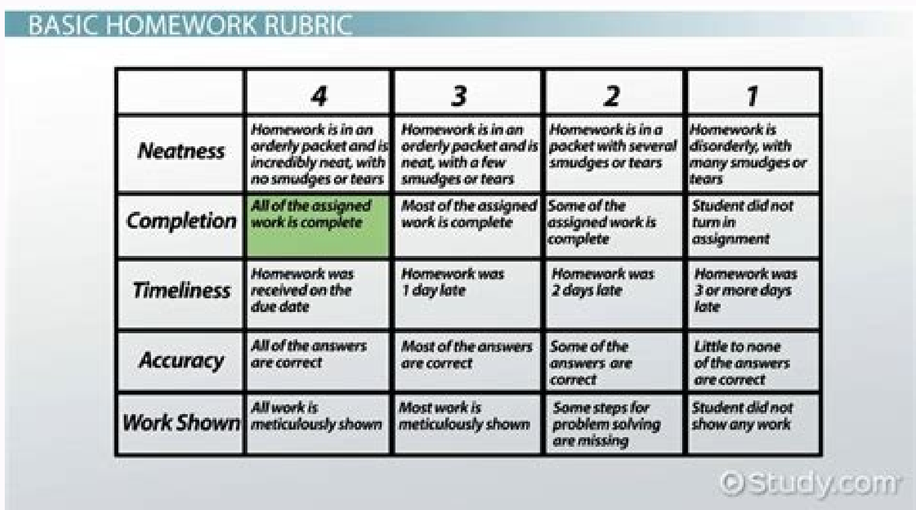

BASIC HOMEWORK RUBRIC

	4	3	2	1
Neatness	Homework is in an orderly packet and is incredibly neat, with no smudges or tears	Homework is in an orderly packet and is neat, with a few smudges or tears	Homework is in a packet with several smudges or tears	Homework is disorderly, with many smudges or tears
Completion	All of the assigned work is complete	Most of the assigned work is complete	Some of the assigned work is complete	Student did not turn in assignment
Timeliness	Homework was received on the due date	Homework was 1 day late	Homework was 2 days late	Homework was 3 or more days late
Accuracy	All of the answers are correct	Most of the answers are correct	Some of the answers are correct	Little to none of the answers are correct
Work Shown	All work is meticulously shown	Most work is meticulously shown	Some steps for problem solving are missing	Student did not show any work

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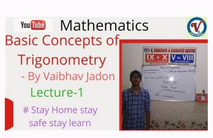

Chapter 1: Chapter 2: Chapter 3: Lesson Master 1-1.pdf Lesson Master 2.1.pdf LM3-1.pdf Lesson Master 1-2.pdf Lesson Master 2.2.pdf LM3-2.pdf Lesson Master 1-3.pdf Lesson Master 2.3.pdf LM3-3.pdf Lesson Master 1-4.pdf Lesson Master 2.4.pdf LM3-4.pdf Lesson Master 1-5.pdf Lesson Master 2.5.pdf LM3-5.pdf Lesson Master 1-6.pdf Lesson Master 2.6.pdf LM3-6.pdf Lesson Master 1-7.pdf Lesson Master 2.7.pdf LM3-7.pdf Lesson Master 1-8.pdf Lesson Master 2.8.pdf LM3-8.pdf LM3-9.pdf Answers to Lesson Masters 1->4.doc Answers to Lesson Masters 2-1 to 2-3.doc Answers to LM 3-1 to 3-4.doc Answers to Lesson Masters 4 and 5.doc Answers to Lesson Masters 2-4 to 2-7.doc Answers to LM 3-5 to 3-8.doc Answers to Lesson Masters 6->8.doc Answers to Lesson Masters 2-8.doc Answer to LM 3-9.doc Chapter 4: Chapter 5: Chapter 6: Lesson Master 4-1.pdf LM5-1.pdf LM6-1.pdf Lesson Master 4-2.pdf LM5-2.pdf LM6-2.pdf Lesson Master 4-3.pdf LM5-3.pdf LM6-3.pdf Lesson Master 4-4.pdf LM5-4.pdf LM6-4.pdf Lesson Master 4-5.pdf LM5-5.pdf LM6-5.pdf Lesson Master 4-6.pdf LM5-6.pdf LM6-6.pdf Lesson Master 4-7.pdf LM5-7.pdf LM6-7.pdf Lesson Master 4-8.pdf LM5-8.pdf LM6-8.pdf Lesson Master 4-9.pdf LM5-9.pdf LM6-9.pdf Lesson Master 4-10.pdf LM5-10.pdf Answers to LM 4-1 to 4-3.doc Answers to LM 5-1 to5-3.doc Answers to LM 6-1 to 6-3.doc Answers to LM 4-4 to 4-7.doc Answers to LM 5-4 to 5-6.doc Answers to LM 6-4 to 6-7.doc Answers to LM 4-8 to 4-10.doc Answers to LM 5-6 to 5-9.doc Answers to LM 6-8 to 6-9.doc Answers to LM 5-10.doc LM 7-1.pdf LM 8-1.pdf LM 9-1.pdf LM 7-2.pdf LM 8-2.pdf LM 9-2.pdf LM 7-3.pdf LM 8-3.pdf LM 9-3.pdf LM 7-4.pdf LM 8-4.pdf LM 9-4.pdf LM 7-5.pdf LM 8-5.pdf LM 9-5.pdf LM 7-6.pdf LM 8-6.pdf LM 9-6.pdf LM 7-7.pdf LM 8-7.pdf LM 9-7.pdf LM 7-8.pdf Answers to 8-1 and 8-2.pdf Answers 9-1 to 9-3.pdf Answers 7-1 to 7-4.pdf Answers to 8-3 to 8-6.pdf Answers 9-4 to 9-7.pdf Answers to 7-5 to 7-8.pdf Answers to 8-7.pdf LM 10-1.pdf LM 10-2.pdf LM 10-3.pdf LM 10-4.pdf LM 10-5.pdf LM 10-6.pdf LM 10-7.pdf LM 10-8.pdf Answers 10-1 to 10-3.pdf Answers 10-4 to 10-7.pdf Answers 10-8.pdf Home Name Name 1-1 © Questions on SPUR Objectives Uses Objective D In 1 and 2, consider the following scenario: A soft-drink company tests its new strawberry lemonade by releasing it to a mid-size city. After a 2-month trial period, the acceptance of the lemonade is evaluated. 5. In 1993, there were approximately 42,000 deaths due to motor-vehicle accidents. Estimate the total number of deaths caused by unsafe speeds or right-of-way accidents. National or world population Population of mid-size city Strawberry lemonade 1. a. Identify the population. b. Identify the sample. c. Identify the variable. Per-Capita Food Consumption of Selected Products: 1970 to 1994 Pounds Sample: It would be risky to distribute a new product to such a large group. Uses Objective E In 3–5, use this table of percents. yyyy @@@@ €€€€ ÀÀÀÀ ,,,, @@@@ €€€€ ÀÀÀÀ ,,,, yyyy @@@@ €€€€ ÀÀÀÀ ,,,, yyyy @@@@ €€€€ ÀÀÀÀ ,,,, yyyyy @@@@@ €€€€€ ÀÀÀÀÀ ,,,,, yyyyy @@@@@ €€€€€ ÀÀÀÀÀ ,,,,, yyyyy yyyyy @@@@@ €€€€€ ÀÀÀÀÀ ,,,,, @@@@@ €€€€€ ÀÀÀÀÀ ,,,,, yyyyy

10, 3, 2, 4, 5, 7, 2, 5 b. -6, 1, -2, 0, -1, 8, 3, 1 9. The following data give the total amount of snowfall, in inches, recorded at New York's JFK Airport in the month of January for the years 1965 to 1996. Var.: ≈ 16.29; s: ≈ 4.04 1965 1966 1967 1968 1969 1970 2. Consider the following two data sets. {1, 2, 3, 4, 5, 6, 7, 8} {1, 1, 1, 1, 8, 8, 8, 8} a. Without using a calculator, tell how the means and the standard deviations of the two data sets compare. Means are equal; standard deviation of second b. Use a calculator to find the mean and the standard set is greater. Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley x : 4.5; s: ≈ 3.74 3. o (xi 2 x) 2 4. i51 III Ï n 5. n21 V 6. i51 Airport City Atlanta Boston Charlotte Chicago (O'Hare) Cincinnati Dallas/Ft. Worth Denver Detroit Houston Las Vegas Los Angeles Miami Minneapolis/St. Paul Nashville o xi i51 n I n 7. n21 o (xi 2 x) i51 IV II Properties Objective C a. the mean c. the variance 1983 1984 1985 1986 1987 1988 1.0 10.1 12.4 3.0 11.8 15.7 1989 1990 1991 1992 1993 1994 4.7 1.4 5.7 1.9 0.8 7.1 1995 1996 0.1 23.0 6.164 ≈ 66% ≈ 2.6 1st qtr. 3rd qtr. 75.2 59.0 78.7 73.8 77.7 77.5 71.9 80.3 77.1 79.5 75.0 73.3 81.4 84.2 78.2 75.1 82.2 85.9 83.7 84.9 86.8 86.9 85.9 84.1 83.7 78.7 87.0 88.8 Airport City Newark NY (Kennedy) NY (LaGuardia) Orlando Philadelphia Phoenix Pittsburgh Raleigh/Durham St. Louis Salt Lake City San Diego San Francisco Seattle-Tacoma Tampa Washington, D.C. 1st qtr. 3rd qtr. 53.5 67.0 70.3 72.8 70.0 80.7 69.9 82.0 79.0 82.3 78.5 71.4 72.9 72.5 72.4 74.3 70.2 77.9 80.2 77.3 87.4 82.0 87.2 89.9 86.0 87.5 84.3 84.4 78.6 81.6 Source: Statistical Abstract of the United States, 1995 8. Tell whether the statistic may be negative. Write yes or no. yes no 13.4 20.1 7.4 3.0 7.7 12.5 In 10 and 11, use the following table, which lists the percents of on-time flight arrivals and departures at major U.S. airports in 1994. n o (xi 2 x) 2 1977 1978 1979 1980 1981 1982 b. What percent of these data are within 1 standard deviation of the mean? c. The blizzard of January, 1996, which hit the East Coast was one of the worst in history. How many standard deviations above the mean was the snowfall for January of 1996? n o (xi 2 x) 2 i51 11.6 1.7 0 6.7 0.6 6.9 a. Find the mean and the standard deviation of x : 7.225; s: ≈ the snowfall data using a statistics utility. Properties Objective B In 3–7, match each expression with a descriptor of the data set {x1, x2 , . . . , xn}. I. mean IV. variance II. sum of the deviations V. standard deviation III. sum of the deviations squared n 1971 1972 1973 1974 1975 1976 Source: National Climate Data Center deviation of each set to check your answer to part a. x : 4.5; s: ≈ 2.45 17.4 10.1 2.8 4.5 0.6 5.5 b. a deviation d. the standard deviation 10. Find the mean and the standard deviation yes no a. of the first-quarter percents. b. of the third-quarter percents. x : ≈ 74.48; s: ≈ 6.72 x : ≈ 82.78; s: ≈ 4.82 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Var.: ≈7.51; s: ≈ 2.74 c. Which set of percents is more variable? Explain why this seems reasonable. 1st-quarter; weather is more severe in winter. 13 © Name 14 Name LESSON MASTER 2-1 © Questions on SPUR Objectives L E S S O N M A S T E R 2-1 page 2 See pages 152–157 for objectives. Vocabulary Representations Objective J In 8–11, a relation is graphed. a. State the relation's domain. b. State the relation's range. c. Is the relation a function? 1. True or false. Justify your answer. The following set of ordered pairs is a function: {(1, 1), (1, 2), 1, 3), 1, 4)}. False; the x-value is paired with more than one y-value. 8. Skills Objective A 9 -4 -2 () 9 b. h(-4) c. h 1 4 33 32 9. False; 0 ? h (4) 5 0, h (0 ? 4) 5 1 False; h (- 4) 5 9, - h(4) 5 - 9 b. For all a, h(- a) 5 h(a). False; 4 > - 4, h(4) ò h(- 4) c. If a > b, then h(a) > h(b). -2 c. 2 4 x y a. 20 b. 10 -20 -10 -10 c. 10 20 15 4 b. g(2 1 1) d. g(2 ? 3) 12 4 9 , or 3 12 1 36 , or 3 10. x y a. 1 b. 0.5 Properties Objective B -1 -0.5 -0.5 In 5–7, an equation for a function is given. a. State the function's domain. b. State the function's range. c. 0.5 1 All real numbers b. 6. y 5 7x 2 1 z All real numbers 7. f(x) 2 a. b. 1 x2 2 1 All real numbers except 1 and -1 {x : x ≥ -1} {y : y ≥ -0.5} No x -1 5. y 5 7x 2 1 a. {-15, -10, 0, 5, 10, 15, 20} {-15, -10, -5, 5, 10, 15} No -20 12 4. Let g(x) 5 2 . Evaluate. x a. All real numbers {y : y > -2} Yes All real numbers 11. y a. 20 b. 10 {y : y ≥ 0} -20 -10 -10 c. 10 20 All real numbers {y : -20 ≤ y ≤ 5} No x -20 b. {y : y > 0 or y ≤ -1 15 © 16 127 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley a. 0 ? h(4) 5 h(0 ? 4) c. g(2) ? g(3) b. -4 3. True or false. Justify your answer. a. g(2) 1 g(1) a. 2 In 2 and 3, let h(x) 5 21x2 1 1. 2. Evaluate. a. h(4) y 4 Home Name Name 2-2 © Questions on SPUR Objectives L E S S O N M A S T E R 2-2 page 2 See pages 152–157 for objectives. Properties Objective C e. Give a reason why your estimate in part d might not be accurate. Sample:The model is not linear for ropes with large diameters. 1. Suppose r is a correlation coefficient for a line of best fit. Give each value. 1 -1 1 0 a. the greatest possible value for r b. the least possible value for r c. the greatest possible value for r 2 d. the least possible value for r 2 2. For a set of data, the line of best fit is y 5 - 3x 2 4 and r 2 ø 0.22. What is the correlation coefficient? Representations Objective I In 5–7, graph each function over the domain {x: -5 ≤ x ≤ 5}. 5. y 5 1 x 6. y 5 2x 1 1 7. y 5 - x 1 5 3 ≈ 0.5 10 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley 3. Dinah conducted an experiment in which she measured the time it took to boil a certain quantity of water. She noticed that the greater the volume of water, the longer it took to boil. Using her statistics utility, she calculated a regression line for her data and found that r2 ø 0.87. However, she was not sure whether r ø Ï0.87 or r ø - Ï0.87. How could Dinah determine which value of r is correct? 5 6 8 10 12 14 16 -10 y 8. B 7500 6000 4500 3000 1500 0 y 5 562.5x 2 3000 d. Use the equation found in part c to estimate the breaking strength of a 25-mm-diameter rope. -10 9. y 18 Breaking strength (lb) 780 1,125 1,710 2,430 3,150 3,780 4,590 5,580 7,650 a. Make a scatterplot of the data with the diameters on the horizontal axis. b. Draw a line that fits the data reasonably well. c. Use two points on the line in part b to write an equation for the line in the form y 5 m x 1 b. 10 x -10 Representations Objective K In 8–11, suppose a linear relation is used to model the data in the given scatterplot. State whether the correlation coefficient is likely to be negative, positive, or approximately zero. Sample answers are given. 11 10 x -10 -10 Uses Objective E Diameter (mm) y 10 x 10 -10 Since boiling time and volume increase together, the slope of the line is positive and r ≈ Ï0.87. 4. The table below contains breaking strength data for new 3-strand polypropylene fiber rope. y 10 y Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley LESSON MASTER x x Positive Negative y 10. 11. y x 4 8 12 16 20 D 11,062.5 lb x Approximately zero 17 © Name Positive 18 Name LESSON MASTER 2-3 © Questions on SPUR Objectives L E S S O N M A S T E R 2-3 page 2 See pages 152–157 for objectives. Vocabulary Representations Objective K In 6 and 7, a student fit a line < to the data points (2, 6), (4, 6), (5, 5), and (8, 1), as shown below. y 6. a. What is the observed value of y at x 5 4? 7 1. Why is the process of finding the line of best fit sometimes called the "method of least squares"? Sample: Because the line of best fit will give the least value for the sum of the squares of the errors. (n 6 n yi o xi io 51 i 51 n , n 2. Use o-notation to write an expression for the center of gravity of the data set {(x1, y1), (x2, y2), K , (xn, yn)}.) b. What is the predicted value of y at x 5 3? 4. If all the points in the data set lie on m1, then the sum of the squares of the deviations for this model is ? (greater than 0, less than 0, equal to 0). equal to 0 8 10 11 12 14 16 18 780 1,125 1,710 2,430 3,150 3,780 4,590 5,580 7,650 a. Use a statistics utility to find an equation for the line of best fit to model this data. -87.2 lb a. Graph the four data points and the line of best fit. y 7 b. Find the sum of the squares of the deviations. 6 2.48 y ≈ 501.7x 2 2153.2 c. Verify that the center of gravity is on this line. b. Find the error in the values predicted by the linear regression model for the breaking strength of ropes with diameters of 12 mm and 18 mm. 12 mm 1 18 mm (194 , 184) 18 19 4 5 0.88(4) 1 8.68 C. of g. is 772.6 lb c. Use the equation in part a to estimate the breaking strength of ropes with diameters of 13mm and 25 mm. 4370 lb 13 mm 25 mm 10,389 lb d. Which estimate in part c do you think is more accurate? Why? 3 4 5 6 7 8 x 5.39 5 4 3 2 1 1 2 3 4 5 6 7 d. How do you know that this line is a better fit line than line < ? The sum of the squares of the deviations is less for this line than for line 1 a. Estimate the population of Las Vegas in each year. 1,146,000 1,220,000 1,300,000 1995 1996 1997 5 1,076,000 c. Estimate the population of Las Vegas in the year 2020. x -6 -4 -2 2 4 6 x Representations Objective J True b. Express the population P as a function of n, the number of years after 1994. P 2 4 6 c. Find a. a 5 10 (1.065n) d. Does g represent exponential growth or exponential decay? 5,532,000 e. Give an equation for an asymptote of the graph of g. 8. A paticular prescription drug has an initial concentration in the blood of 50 mg/ml and is absorbed by the body so that each day its concentation drops by 68%. What is the drug's concentration in the blood after the given amount of time? 16 mg/ml 5.12 mg/ml 50(0.32d) mg/ml 1 day 2 days d days 21 © Name y 20 15 g (x) 10 5 -4 -3 -2 -1 -5 -10 -15 1 2 3 4 x -20 Exponential growth y50 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley LESSON MASTER 22 Name LESSON MASTER 2-5 © Questions on SPUR Objectives L E S S O N M A S T E R 2-5 page 2 See pages 152–157 for objectives. Uses Objective F 3. The half-life of one isotope of the element lithium (8Li) is 0.855 second. a. How many seconds are in three half-life 2.565 sec periods? 1. The table below contains breaking strength data for new 3-strand polypropylene fiber rope. Diameter (mm) Breaking strength (lb) 5 8 12 14 16 22 30 36 40 48 780 1,710 3,780 4,590 5,580 10,350 19,350 27,350 31,950 46,800 a. Use the data points (12, 3780) and (14, 4590) and a system of equations to determine an exponential model for the data. y ≈ 1179(1.1019x) b. Using the entire data set and a statistics utility, y determine an exponential model for the data. ≈ 1042(1.0922x) b. How much of an 8-gram sample of 8Li will be left after three half-life periods? 1 gram c. Use a statistics utility to find the regression equation which models the decay of an 8-gram sample of 8Li. y ≈ 8(0.445x) d. Use the equation found in part c to determine how much of an 8-gram sample will be left after 15 seconds. 4.25 3 10-5 grams c. Which of these models better represents the data? Defend your answer. Representations Objective K 4. Is a linear or exponential model more suitable for the data graphed at the right? Justify your answer. y d. Use the model you chose for part c to estimate the breaking strength of 44-mm-diameter 3-strand polypropylene fiber rope. Is your estimate consistent with the data in the table? Explain your answer. x ≈ 50,500 lb; Sample:Yes, since the breaking strength of 44-mm rope is not between those for 40-mm and 48-mm ropes Sample: An exponential model, because the data points seem to approach the x-axis asymptotically 2. In 1995, Edith purchased a $50 U.S. Savings Bond for $25. Assume the bond has a constant annual yield of 4.75%. (Note: The annual yield on bonds is not always constant. $50 is the amount the bond is worth when it reaches maturity.) a. Express the value of the bond A as a function A 5 25(1.0475n) of n, the number of years after 1995. b. Use a calculator and the equation found in part a to estimate the doubling time for the value of the bond. ≈ 15 years 23 © 24 129 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Sample:The equation in part b, because it is the exponential regression model for the entire data set Home Name Name 2-6 © Questions on SPUR Objectives Properties Objective B In 1 and 2, a quadratic function is described. Identify each. a. the independent variable b. the dependent variable c. its domain d. its range 2 1. z 5 4x 2 8 2. T 5 6.4 2 v 2 a. b. c. d. L E S S O N M A S T E R 2-6 page 2 See pages 152–157 for objectives. x z All real numbers {z : z ≥ -8} a. b. c. d. Representations Objective I In 5 and 6, graph the function over the given domain. 5. g(x) 5 0.2x2 1 x 2 3, {x: - 5 ≤ x ≤ 5} 6. V 5 - 0.3s2 1 2s 1 4, {s: 0 ≤ s ≤ 10} v T All real numbers {T: T ≤ 6.4} y 10 V 10 8 6 4 2 x 10 -10 -10 Properties Objective D -2 3. Consider the function f with equation f(x) 5 2x2 1 x 2 15. a. Find its y-intercept. -15 (Min., -14 , -121 8 c. Tell whether the graph has a maximum or minimum point and find its coordinates. Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Representations Objective J In 7 and 8, a quadratic relation is graphed. a. State its domain. b. State its range. c. Tell whether the relation is a function. y y 7. 8. 10 5 4 , or 2 b. Find its x-intercepts.) 300 200 100 4 2 Uses Objective G -20 -10 -2 4. The inner surface of a round wooden bowl is carved so that the depth measured from the top of the bowl is given by d 5 0.5x2 2 4x 1 2, where x (in inches) is the horizontal distance from the outer edge of the bowl. a. Graph the equation for the inner surface of the bowl on an automatic grapher. What is an appropriate domain for this function? 10 20 x -6 -4 -2 {x: x ≥ -20} a. b. No c. b. How deep is the bowl at x 5 2? a. All real numbers b. Bowl Cross Section d 2 4 6 x -200 -300 -4 x Sample: {x: 0 ≤ x ≤ 8} 2 4 6 8 10 s Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley LESSON MASTER c. All real numbers {y : y ≤ -100} Yes Representations Objective K 4 inches 6 inches ≈ 12 inch c. How deep is the bowl at its deepest point? d. How wide (thick) is the wood at the top of the bowl? e. What is the interior diameter at the top of the bowl? y 9. Multiple choice. Which equation best models the data in the b scatterplot at the right? (a) y 5 - x2 2 5x 2 2 (b) y 5 3x2 2 2x 2 4 (c) y 5 6x2 1 7 (d) y 5 x2 1 5x 1 6 x ≈ 7 inches 25 © Name 26 Name LESSON MASTER 2-7 © Questions on SPUR Objectives L E S S O N M A S T E R 2-7 page 2 See pages 152–157 for objectives. Skills Objective A Representations Objective I 3 c. f(2.3) 2. Let c(x) 5 ⌈x⌉ 1 ⌊x 2 1⌋. Evaluate. 149 a. c(75) 13 6 c. c 4 ( ) 5 -2 d. f(- 0.1) 150 -2 b. c(75.3) 3 d. c - 5 ( ) Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley b. c. All real numbers Nonnegative integers Integral values of x a. b. c. 6 4 2 -6 -4 -2 2 4 6 Representations Objective J In 8 and 9, a graph of a step function is given. a. State the domain of the function. b. State the range of the function. c. Identify any points of discontinuity. All real numbers Integral multiples of 3 Integral multiplesof 1 2 8. y 300 a. 200 b. 100 Uses Objective H In 5 and 6, multiple choice. -6 -100 c. 2 4 All real numbers Integral multiples of 50 Integral multiples of 2 6 x -200 5. Which of the following gives the number B of 40-seat buses that a field trip for s students will require? s (a) B 5 ⌊40s⌋ (b) B 5 ⌈40 ⌉s (c) B 5 ⌊40 ⌋b -300 9. (d) B 5 40⌈s⌉ 6. A phone company charges 49 cents per minute for calls made from the U.S. to Manchester, England, and rounds all calls up to the nearest 6 seconds. Which formula gives the cost c(t) of a phone call to Manchester lasting t seconds? (a) (t) 5 0.49⌈6t ⌉ (b) c(t) 5 0.49⌊60t ⌋⌈ (c) c(t) 5 0.49⌈10 (d) c(t) 5 0.49⌈106 ⌉t y 6 a. 4 b. c. c -6 -4 -2 -2 -4 -6 t 27 130 x -4 -6 Properties Objective B In 3 and 4, an equation for a step function is given. Identify each. a. its domain b. its range c. any points of discontinuity 3. m(x) 5 ⌈x2⌉ 4. y 5 3⌊2x 1 1⌋a. y 7. Sketch a graph of the function over the given domain. y 5 ⌊x 1 1⌋2 1, {x: - 6 ≤ x ≤ 6} © 28 2 4 6 x All real numbers Non negative integers Integral values of x Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley 1. Let f(x) 5 ⌊x⌋ 1 ⌊x 2 0.5⌋. Evaluate. 1 a. f(1) b. f(3) Home Name Name 2-8 LESSON MASTER Questions on SPUR Objectives See pages 152–157 for objectives. 1. Use the scatterplot at the right showing the relation between diameter and breaking strength of 3-strand polypropylene rope. a. Use a statistics utility to determine the regression equation for each model of the data. linear model: y ≈ 924x 2 7285 quadratic model: y ≈ 18.57x 2 1 88.1x 2 321.4 y Sample: a function from which other related functions can be derived. 2. Describe the asymptotes and point of discontinuity of the graph of the function 1 f (x) 5 2 . Use an automatic grapher if needed. vertical x 2 3x 2 4 20 asymptotes: x 5 4 and x 5 -1; horizontal asymptote: y 5 0; points of discontinuity: x 5 4 and x 5 -1 10 5 10 15 20 25 30 35 40 x Rope Diameter (mm) Representations Objective J In 3–5, give an equation of a parent function whose Samples are graph has the given features. given.y 5 b x 3. an asymptote but no points of discontinuity y 4000 y 4000 4. points of discontinuity but no asymptotes 2000 2000 5. two asymptotes 0 10 20 30 0 40 x -2000 -2000 -4000 -4000 10 20 30 y 5 ⌊x ⌋y 5 1x or y 5 6. a. Give an equation for the parent function of a parabola with equation y 5 3(x 2 2)2 1 2. b. Graph y 5 3(x 2 2)2 1 2 and its parent function on an appropriate viewing window of an automatic grapher. Give the intervals of x- and y-values for your window. 40 x -5 ≤ x ≤ 5 c. From the residual plots in part b, which do you believe is a more appropriate model for this data? Justify your answer. -2 ≤ y ≤ 15 1 x2 y 5 x2 Samples are given. c. In the screen at the right, sketch what you see on your window. d. Describe the relationship between the two graphs. Sample:The quadratic model, since the residuals are much closer to zero and since there appears to be a pattern in the residuals for the linear model The graph of y 5 3(x 2 2)2 1 2 is shifted 2 units right and -5 # x # 5, x -scale = 1 2 units up from the -2 # y # 15, y -scale = 1 graph of its parent function, y 5 x 2. 29 Name 30 Name LESSON MASTER 3-2 LESSON MASTER Questions on SPUR Objectives See pages 225–229 for objectives. Properties Objective C y 5 (x 2 5)3 2 92 I: (x, y) → (x 1 3, y 2 9) I: (x, y) → (x 1 8, y 1 15) Properties Objective D See pages 225–229 for objectives. zero at x 5 4; asymptotes x 5 3 and y 5 - 1 5. True or false. A translation does not change the number of asymptotes of a graph. True Representations Objective K 6. a. Use the Graph-Translation Theorem to write an equation for the graph at the 1 right. An equation for the y 5 2 1 (x 2 2) parent function is y 5 2 . x y 11 y=1 82 81 x=2 7. Consider the function t given by t(x) 5 (x 2 5)3 2 2. a. Give an equation for the parent function of t. b. What transformation maps the T: (x, y) parent function onto t? 1. A data set has a mean of 5 and a standard deviation of 2. Suppose 1,000 is added to each observation. What are the new mean and standard deviation? mean: 1005 st. dev.: 2 2. A data set has a median of 35 and a mode of 30. Suppose 15 is added to each observation. What are the new mode and median? mean: 45 st. dev.: 50 Uses Objective I 3. A meteorologist takes a number of air-temperature readings and finds that the mean temperature is -24.66°C with a standard deviation of 2.27°C. He then decides to convert all of his measurements from degrees Celsius to degrees Kelvin. To do this, he uses the formula K 5 C 2 273.15, where C is the temperature in degrees Celsius and K is the temperature in degrees Kelvin. a. What is the mean air-temperature reading in -297.81°K degrees Kelvin? b. What is the standard deviation of air2.27°K temperature reading in degrees Kelvin? 1 4. What are the zeros and the asymptotes of the graph of y 5 x under the translation T(x, y) 5 (x 1 3, y 2 1)? 4. The box plot below displays the annual salaries of employees at Transformation Technologies, Inc., a small biotech company involved in cloning research. x 20 25 30 35 40 45 50 55 60 65 70 Salaries (3 $1,000) y 5 x3 Suppose, due to profit sharing, each employee receives an end-of-year bonus of $5,000. Which, if any, of the following descriptive statistics will change due to this bonus? If they change, give their new values. a. median annual income → (x 1 5, y 1 2) c. Use an automatic grapher to graph t and its parent function on the same window. Choose an appropriate window for viewing key features of both graphs. In the screen at the right, sketch what you see on your window. d. Identify the x- and y-intercepts of t and its parent function. t : x ø 6.26; parent: x 5 0, y 5 0 Questions on SPUR Objectives Properties Objective E 1. Let T be the transformation T: (x, y) → (x 1 5, y 2 6). Find an equation for 3 the image of y 5 x3 1 2 under T. 2. Give an equation for the transformation T which moves each point 9 units down and 3 units to the right. 3. What transformation maps the graph of y 5 zxz onto the graph of y 5 z x 2 8z 1 15? b. Use your equation in part a to find the value of the graphed function at x 5 11. 3-3 b. interquartile range c. range d. outliers $45,000 no change no change $30,000, $72,000 -2 #x # 8, x -scale = 1 -5 # y # 5, y -scale = 1 31 32 131 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley See pages 225–229 for objectives. 1. Explain what is meant by a parent function. 30 b. Plot the residuals for each model in part a. linear model: quadratic model: Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Questions on SPUR Objectives Vocabulary Breaking Strength (3 1,000 pounds) Representations Objective K 3-1 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley LESSON MASTER Home Name Name LESSON MASTER 3-4 LESSON MASTER Questions on SPUR Objectives See pages 225–229 for objectives. Properties Objective F In 1–4, decide whether the function with the given equation is even, odd, or neither. Justify your answer Sample: y(-x) = y(x) Neither; 7(-x) 2 5(-x) 2. f(x) 5 7x 2 5x 2 Even; 9(h) 1 5 5 -9h 2 1 5 3. g(h) 5 - 9h2 1 5 Neither; z7(-m) 1 2 z 2 5 5 z -7m 1 2 z 2 5 4. v(m) 5 z7m 1 2 z 2 5 Representations Objective L In 5 and 6, decide whether the function whose graph is given is even, odd, or neither. y y 5. 6. π S: (x, y) → (x6 , 8y) 2. Find an equation for the image of y 5 Ï x2 1 1 y 5 3Ï9x 2 1 1 (x) under the scale change S: (x, y) → 3 , 3y . 3. Describe two different transformations S1 and S2which Samples are given. S2: (x, y) → x, 94 y 9 map the graph of y 5 x2 onto the graph of y 5 4 x2. S1: (x, y) → (23 x, y) ( ) 2π x (b) S(x, y) 5 ((d) S(x, y) 5 x, 2 y 2 π 2 π) 2 (Ï x, y) 2 π π ((c) S(x, y) 5 x, π y x c (Ï x,)) Properties Objective D odd 5. The graph of an equation has x-intercepts -1.5, 1, and 2, and y-intercept -3. Give the x- and y-intercepts for the image of the graph under the transformation S: (x, y) → (2x, 3y). odd In 7 and 8, describe the symmetries of the graphed function. y 7. (-7, 12) y 8. (-8 -6 -4 -2 2 4 6 -6 -12 -8 (7, -12) 180° rotation symmetry about the origin) 7. Suppose the scale change S: (x, y) → (4x, 3y) is applied to x the graph of y 5 x 2 2 9 . What effect does this transformation 8x -4 (-2, -6) -8 1 of y = [x] under the scale change S: (x, y) → 2x, 3 y . 2 6 10 x 2 integral multiples of 8 6. Describe the points of discontinuity on the image of the graph 8 4 12 8 (2, 6) 4 x-intercepts: -3, 2, 4; y-intercept: -9 have on the graph's asymptotes? reflection symmetry about x 5 1 Horizontal asymptote y 5 0 is unchanged; vertical asymptotes 3 3 x 5 3 and x 5 -3 move to x 5 4 and x 5 - 4 Representations Objective K 8. Sketch graphs of y 5 Ïx and its image under the transformation 1 S: (x, y) → 4 x, y . ( ) Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley 1. Find the scale change S which shrinks a graph 1 horizontally with a factor of 6 and stretches it vertically with a factor of 8. π -1 -10 -6 -2 See pages 225–229 for objectives. Properties Objective C (a) S(x, y) 5 -π Questions on SPUR Objectives 4. Multiple choice. Which scale change will map y 5 2 x2 so that the transformed graph includes the point (1, 1)? 1 -2π 3-5 y 6 4 2 33 Name 4 6 8 10 12 x Name 3-6 LESSON MASTER Questions on SPUR Objectives See pages 225–229 for objectives. Properties Objective E In 1–4, suppose each element in a data set is multiplied by -7. Describe the effect of this transformation on each measure. 1. mean 2. mode multiplied by -7 3. median In 1 and 2, let f(x) 5 x2 1 2x 1 7 and g(x) 5 5x 2 3. 1. Evaluate each composite. multiplied by 7 47 b. g(f(1)) 2. Find a formula for each composite. a. f(g(x)) y 5 25x 2 2 20x 1 10 b. g(g(x)) y 5 25x 2 18 3. Let F 5 {(1, 7), (2, 4), (3, 2), (4, 1)} and G 5 {(7, 6), (1, 3), (2, 2), (4, 1)}. Find each composite. a. F ° G b. G ° F a 5 2 and a 5 -2 {(1, 2), (2, 4), (4, 7)} {(1, 6), (2, 1), (3, 2), (4, 3)} Uses Objective I 4. Consider the functions h mapping A to B and j mapping B to C. 4. Neil Vestor is trying to decide whether he should purchase stock in an American or a Japanese manufacturing company. He recorded the price of each stock over a 3-week period and computed the mean and standard deviation for each. American Company Japanese Company $39.60 $ 2.50 ¥6734 ¥ 187 a b c d A h a b c d B j a b c d C Evaluate each composition. a. h(j(a)) To compare the two stocks, Neil rescales his raw data by converting the stock prices in yen to dollars, using the exchange rate $1 = ¥127. If Neil is trying to minimize his risk by choosing the stock with the least variability, which stock should he buy? Justify your answer. b b. j(h(b)) c c. (h ° j)(d) c Properties Objective G 5. Let s(x) 5 Ïx 2 1 and n(x) 5 x2 2 2. Give the domain of each composite. a. n ° s b. s ° x Sample: the Japanese company, as its standard deviation is 187 127 5 $1.47 so it set of all reals > 1 set of all reals > Ï3 1 6. Let p(t) 5 t 2 1. True or false. The domain of p is the same as the domain of p ° p. Justify your answer. is less variable than that of the American company. False;The domain of p is the set of all real numbers except 0; the domain of p ° p is the set of all real numbers except 0 and 1. 35 132 15 a. f(g(1)) multiplied by -7 5. A data set is rescaled so that its variance is multiplied by 4. What are two possible values for the scale factor? Mean stock value Standard deviation Questions on SPUR Objectives See pages 225–229 for objectives. Skills Objective A 4. range multiplied by -7 3-7 36 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley LESSON MASTER Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley 2 34 Home Name Name 3-8 LESSON MASTER Questions on SPUR Objectives See pages 225–229 for objectives. Skills Objective B In 1–3, a function is described. a. Give an equation for the inverse of the function. b. State whether the inverse is a function. y 5 - 12 x 1 32 1. y 5 3 2 2x a. The mean is subtracted from the raw score; the difference is divided by the standard deviation. a function b. not a function b. a function 2. A data set has a mean of 25.6 and a standard deviation of 2.3. Find each for the data set's z-scores. 0 1 a. the mean b. the standard deviation In 3 and 4, a z-score is given. Explain what it means in terms of the mean and the standard deviation of the original data set. (-2.5, 0), (3, 1), (1,3)} 3 of a standard deviation above the mean 3. z 5 0.75 4 4. Let f(x) 5 ⌊x⌋ and g(x) 5 ⌈x⌉. Are functions f and g inverses? Justify your answer. 5 of a standard deviation below the mean 4. z 5 - 1.25 4 f (g (x)) 5 ⌊⌈x⌉⌋ if x 5 2.5, f (g (2.5)) 5 3; so f (g (x)) Þ x and f and g are not inverses. 5. True or false. If a function is an even function, then its inverse is not a function. Uses Objective I 5. The following sets of data show the average number of points scored per game by players on the boys' and girls' basketball teams. True Boys 6. Suppose f is a function such that for all x, f(x) 5 f(x 1 2). Is the inverse of f a function? Justify your answer. Girls No; if x 5 0, then f (0) 5 f (2) and the line y 5 f (0) intersects two points on the graph: (0, f (0)) and (2, f (2)). Representations Objectives L and M In 7–9, determine whether the inverse of the graphed function is a function. If the inverse is a function, sketch its graph on the same set of axes. y y 7. 8. 9. 4 0.3 11.6 0.3 3.6 6.2 1.3 7.6 4.0 20.5 0.8 2.5 3.6 7.0 2.6 9.8 6.3 5.7 0.8 6.5 12.4 7.2 5.3 7.9 9.1 7.6 6.9 1.1 8.5 a. Convert the above data for the 15 boys and 15 girls to z-scores. (When calculating z-scores, use the population standard deviation, not the sample standard deviation.) Boys Girls -0.1 -0.32 0.03 2.05 -0.86 0.55 -1.61 0.11 1.33 -0.14 1.08 -0.60 -0.86 3.06 -0.23 0.37 -0.22 -0.77 -0.45 0.82 0.28 -0.44 -2.28 0.26 -0.67 -0.71 -0.22 -0.15 0.59 0 b. Who did better relative to the rest of the team, the boy who averaged 6.2 points per game or the girl who averaged 7.9 points per game? Justify your answer in terms of z-scores. y 4 4.7 3.1 4 the girl; her z-score was 0.37 and boy's was 0.28 3 x -3 3 x -3 -4 3 x -3 -4 a function 6. A student took two tests. On the first, she scored 87 and on the second she scored 80. If the class mean was 80 and the standard deviation was 10 on the first test and the class mean was 72 with a standard deviation of 5 on the second, on which test did she do better compared to the other students? -4 not a function a function second test (1st z-score: 0.7; 2nd z-score: 1.6) 37 Name Name LESSON MASTER 4-1 LESSON MASTER Questions on SPUR Objectives See pages 303–307 for objectives. Skills Objective A In 1 and 2, the measure of a rotation is given. a. Convert the measure to revolutions. b. On the circle draw a central angle showing the given rotation. 5π 1. 225° 2. - 2 radians 5 , counterclockwise a. 8 a. b. b. 2. Find the area of a sector of a circle of diameter 22 in. if the central angle of the sector is 315°. 1 14 , clockwise 4. Give two other radian measures, one positive and one negative, 4π for a rotation of 3 . 5. James needs to replace the glass of the speedometer on his old car. If the needle can maximally rotate 5π 12 , find the area of the glass that James needs. 10π, or ≈ 31.4, cm2 10π - 2π 3 , 3 3π 4 6. 135° -7π 6 7. -210° 9. π - 10 -18° ≈ 332.62 in2 π , 30° 6 10. 3.14159 11. -42° a. to revolutions ≈ 0.12, clockwise a. to revolutions 95, counterclockwise a. to revolutions ≈ 3.02, counterclockwise 14. 0.33 revolution clockwise a. to radians ≈ 2.073 radians 4Ï3 m 0 10 20 30 40 50 60 70 80 ≈ 359 mi 7. Kaitlin watched her son Dizzy ride a horse 22 ft from the center of a merry-go-round. Dizzy completed one revolution in 45 seconds. a. How far did Dizzy travel in one ≈ revolution? b. to radians ≈ -0.733 3420° c. Kaitlin noted that her son started at the easternmost position. If the merry-go-round rotates counterclockwise and the ride lasts 4 minutes, sketch the position of her son when the ride ended. b. to degrees 1088.620° 138 ft ≈ 184 ft b. How far did Dizzy travel in one minute? b. to degrees N W E b. to degrees S -118.8° 39 90 4 cm 8 cm 6. Austin, TX, and Oklahoma City, OK, have approximately the same longitude, 97°30' W. Austin has latitude 30°16' N. Oklahoma City has latitude 35°28' N. Use 3,960 miles for the radius of the earth to estimate the air distance from Austin to Oklahoma city. ≈ 180° In 11–14, use a calculator to convert the given angle measure to the indicated units. Give your answer correct to the nearest thousandth. 13. 19 ≈ 20.94, m Uses Objective G In 8–10, convert to a degree measure without using a calculator. 12. 19π 847π , or 8 4. A sector in a circle with central angle 12 . has an area of 14π m2. Find the exact length of the radius of the circle. In 5–7, convert to a radian measure without using a calculator. 8. 20π , or 3 3. The arc of a circle of radius 4 cm has a 2π length of 3 cm. Find the measure of the central angle in radians and degrees. 498°, -222° 330° See pages 303–307 for objectives. 7π 3. Give two other degree measures, one positive and one negative, for a rotation of 138°. 11π 6 Questions on SPUR Objectives 1. Find the length of an arc of a circle of radius 8 m if the central angle of the arc is 5π 6. 90° π 3 4-2 Skills Objective B 135° 5. 60° 38 40 133 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley See pages 225–229 for objectives. 1. Explain how a z-score is calculated. Properties Objective G Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley Questions on SPUR Objectives Properties Objective H b. Ïx y56x 2. g(x) 5 12 a. x 3. f 5 {(- 2.5, 0), (0, - 2.5), (1, 3), (3, 1)} -1 5 {(0, -2.5), a. f 3-9 Functions, Statistics, and Trigonometry © Scott Foresman Addison Wesley LESSON MASTER Home Name Name 4-3 See pages 303–307 for objectives. Skills Objective C In 1–6, give the exact value of each without using a calculator. 0 -1 1. cos (-90°) 2. sin(-90°) 3. cos 6π π 4. tan 2 undefined LESSON MASTER Questions on SPUR Objectives 0 5. sin π 6. tan 1260° (-0.707, -0.707) 11. True or false. For some integer values of k, tan k ? 2 5 1. Justify your answer. False; for integral values 5 0 or 1; when ( ) and cos(k ?) sin(k ? 2π) 5 0, cos(k ? 2π) 5 1 and when sin(k ? 2π) 5 1, cos(k ? 2π) 5 0; so tan(k ? 2π) 5 0 or undefined. Sample answers In 12–15, describe an interval between 0 and 2π in which u satisfies the given requirements. are given. 12. cos u > 0 and sin u < 0 13. sin u > 0 and tan u < 0 3π 2 π 2 < u < 2π 14. cos u 5 0 and sin u > 0 u 5 2π h f a j 13π 17. sin 12 18. sin 135° π 19. cos 3 2π 20. sin - 3 15