

a large difference in the similarity of the two quantities. For example, if you move the parentheses from the two quantities (x - 2)(x - 2) and $x^2 - 4x + 4$ by squaring (x - 2), you can clearly see that they are equal.

- ✓ Let's play Operation[™]. Sometimes the best way to solve the question is to perform an operation on both columns. This is especially useful when working with fractions. Often, on finding a LCD and multiplying that number in both columns helps to make the comparison easier. Just keep in mind that, like working in an equation, the operation performed must be exactly the same in each column.
- Timing is everything. Use your time wisely. Try to solve each problem, or be close to a solution, after one minute. It is not necessary to complete every problem on the test unless you want to be the next math genius honored by the Educational Testing Service. It is best just to focus on the problems you know how to do. It is a good idea to practice timing yourself as you solve the practice problems. See how close you can get to a solution in one minute per problem.

2	3	5	7	11	13	17	19	23	29
31	37	41	43	47	53	59	61	67	71
73	79	83	89	97	101	103	107	109	113
127	131	137	139	149	151	157	163	167	173
179	181	191	193	197	199	211	223	227	229
233	239	241	251	257	263	269	271	277	281
283	293	307	311	313	317	331	337	347	349
353	359	367	373	379	383	389	397	401	409
419	421	431	433	439	443	449	457	461	463
467	479	487	491	499	503	509	521	523	541
547	557	563	569	571	577	587	593	599	601
607	613	617	619	631	641	643	640	N53	659
661	673	677	683	691	701	S	719	727	733
739	743	751	757	751	769	773	28	797	809
811	821	128	327	829	875	855	857	859	863
871	6381	883	887	907	911	919	929	937	941
947	953	-JE 0		977	983	991	997	1009	1013
947	953	260	<u>971</u>	977	983	991	997	1009	1013

	Column A	Column B		
1.	the number of even integers between 1 and 13	the number of even integers between 2 and 14		
2.	$\sqrt{0.16}$	$\sqrt{0.0016}$		
3.	Amy, Megan, and Sharon divid selves. Amy took 30% of the co cookies. Amy ate $\frac{1}{3}$ of the cook cookies she took.	ed a batch of cookies among them pokies and Sharon took 40% of the ies she took and Sharon ate $\frac{1}{4}$ of th		
	number of cookies Amy ate	number of cookies Sharon ate		
4.	<i>p</i> – 8	p + 8		
5.	31 <i>x</i>	35 <i>x</i>		
6.	<i>a</i> < 0	ale.cu.		
	<i>a</i> ²	dtesar		
8.	the percepting of the percepting of the percepting of the percepting of the perception of the percepti	the percent increase from 54 cm to 58 cm		
9.	$\frac{1}{25}$	$\frac{.016}{4}$		
10.	$\sqrt{8} + \sqrt{13}$	$\sqrt{19} + \sqrt{9}$		
11.	$5 + \sqrt{32}$	$\sqrt{23} + 4$		
12.	Marvin sells candy bars at a rate of 3 bars for \$4.			
	at this rate, the cost of <i>x</i> candy bars	<i>x</i> dollars		
13.	$(x + 2)^2$	$(x-2)^2$		
	8.7×368	9×368		
14.	$18 \frac{4}{1} \cdot \frac{1}{1}$	$18 - \frac{1}{2} + \frac{4}{5}$		
14. 15.	$10 - \frac{1}{5} + \frac{1}{2}$	2 5		





- **52. d.** The relationship cannot be determined. If x = 0.5, quantity A is $(0.5)^2 + 1 = .25 + 1 = 1.25$ and quantity B is 0.5 + 1 = 1.5. When x = 0.5, quantity B is greater. If x = 6, quantity A is $6^2 + 1 = 36 + 1 = 37$ and quantity B is 6 + 1 = 7. Quantity A is greater when x = 6.
- **53.** a. $\frac{x}{x}$ always equals 1. Since x < y and x is positive, $\frac{x}{y} < 1$.
- **54. b.** If 70% of students passed, 30% of students failed. Therefore, the ratio of failed to passed is 30 to 70, which simplifies to $\frac{3}{7}$. $\frac{3}{5} > \frac{3}{7}$.
- **55. c.** Add the numbers inside the parentheses. (84 + 12)(15 + 91) = (96)(106) and (74 + 22)(20 + 86) = (96)(106).
- **56. c.** "Of" means multiply; 75% of 30 = .75 × 30 = 22.5 and 30% of 75 = .30 × 75 = 22.5.
- 57. a. Since the bases are equal, just compare the exponents to $\frac{1}{3}$.
- **58.** c. 4x is an even number because an under highlight of 4 is even. The remainder when an even number is divided by 2 is 0.
- **60.** a. $\sqrt{17}$ x pure **()**, therefore, $\sqrt{17} + \sqrt{5} > 6$. Since $\sqrt{25} = 5$, $\sqrt{22} < 5$. Quantity A is greater.
 - **61.** a. $\frac{a}{b} \times \frac{b}{c} = \frac{a}{c}$ and $\frac{4}{5} \times \frac{9}{7} = \frac{36}{35}$; $\frac{36}{35} > 1$.

59. b. A

- **62.** b. $\frac{3}{4}\% = 0.75\% = .0075; \frac{3}{4}$ as a decimal is 0.75. To change 0.75% to a decimal, move the decimal point two places to the left. .0075 < .75.
- 63. b. The only pair of numbers that adds to 12 and is prime is 7 and 5. Therefore, *x* and *y* are 5 and 7; *xy* = (5)(7) = 35. 35 < 38.
- **64.** a. For any positive numbers *a* and *b*, a + b > b a. Therefore, (a + b)(a + b) > (b - a)(b - a).
- **65. b.** Combine the terms of quantity A; $\sqrt{10} + \sqrt{10} = 2\sqrt{10}$. To get rid of the square root, square both quantities (A and B); $(2\sqrt{10})^2 = 4(10) = 40$ and $7^2 = 49$. 40 < 49.

	Column A	Column B
151.	The ratio of rabbits to squ There are a total of 225 rabbit	irrels is 2:3. ts and squirrels.
	the number of squirrels	90
152.	To mail an envelope first class plus \$0.17 for each additiona envelope	costs \$0.34 for the first ounce, al ounce. The cost to mail an was \$1.53.
	8 ounces	weight of the envelope
153.	Carlos has 14 coins in his pe and nickels only. The monetar	ocket, consisting of quarters y value of these coins is \$2.30.
	the number of quarters	the number of nickels
154.	The drama club collected \$9 Adult tickets cost \$5.00 and They sold 63 more stu	07.50 from the sale of tickets. I student tickets cost \$2.50. dent tickets than adult.
155.	the number of student tickets There are 146 athletes and a competition. They travel in I the patheet of buses need to	163 the hes taking a tab to buses that sear 49 people.
re.	Monique Page Society 85 points on her ma	ct out of a total of ath test.
	Monique's percentage grade	68%
157.	A bus leaves the station traveli per hour. A second bus lea in the same direction one ho speed of 50	ng at a constant speed of 45 miles aves the same station heading our later traveling at a constant miles per hour.
	8 hours	The number of hours after first bus left that the buses will pass each other
158.	$\frac{8+2x}{x} = 50$	
	x	$\frac{1}{6}$
159.	5x + 3 = 18	



	501 Quantitative Com	parison Questions		
	Column A	Column B		
237.	Point (x, y) is located in Quadran	nt II.		
	the opposite of <i>x</i>	the reciprocal of y		
238.	The equation of line <i>l</i> is <i>y</i> Line <i>m</i> is perpendicular to the l	$=\frac{2}{3}x - 1.$ ine $y = -\frac{3}{2}x + 1.$		
	the slope of line <i>l</i>	the slope of line <i>m</i>		
239.	Points (4, <i>c</i>) and (0, <i>d</i>) are on lin The slope of line <i>n</i> is $\frac{3}{4}$.	e <i>n</i> .		
	c-d	3		
240.	y = -2x - 3			
	the y-intercept of the equation	the x-intercept of the equation		
241.	the slope of the equation $2y - 4x = 6$	the slope of the equation -3y + 3x = 9		
242.	the distance between the points $(0, 0)$ and $(-3, 4)$	otesale.		
243.	the difference between 26 and the product of 4 and 2	the som of 80.42		
245.	six less than no Q The square of a number	the square root of four		
	the square root of the number	4		
246.	the quotient of ten and two	the quotient of sixty-five and thirteen		
247.	One-half of y is x . One-half of z	is $y. x + y + z = 35$.		
	z	15		
248.	Two cars leave the same city traveling in opposite directions. Car A is traveling at 60 miles per hour and car B is traveling at 55 miles per hour.			
	the number of hours it takes for the cars to be 460 miles apart	4		
	39			

- 172. d. The answer cannot be determined. It is given that the quantity *a* multiplied by *b* multiplied by *c* is greater than zero. This can be true if all of *a*, *b*, and *c* are positive numbers, or if any two, but not all, of the three variables are negative. If all three variables were positive, then column A would be greater. If, however, both *b* and *c* were negative, then the quantity in column A would be less than zero, the value of column B.
- 173. b. Simplify the expression in column A. The square root of x to the fourth power is x squared. Any number squared, whether positive or negative, is a positive number. Also, the square root of 16 is four. Column A is 4x². Therefore, the quantity in column B, 8x², is greater than 4x².
- **174.** c. The quantity is column A becomes *a* + 4 when simplified, since squaring and square root are inverse operations.
- 175. d. The answer cannot be determined. Simplify the expression incolumn B, by first applying the distributive put forty eo (a + b)², to get a² + 2ab + b². Column B istance a > 2ab + b² 2ab. Combining like terms receives in a + b². Since Os not equal to zero, and any nor ther squared is positive to quantity in column B is greater if a > 1.16 a > 1, column B is also greater. If, however, a = 1 column L is equal to column B. If 0 < a < 1, column L is greater.
- 176. a. The words in column A translate in algebra to x 5. Since it is given that x is greater than five, the quantity in column A will be a positive number. The quantity in column B will be a negative number.
- **177.** c. The words in column A translate into algebra as $\frac{2(b+14)}{2}$ since it is twice the sum of *b* and 14, then divided by 2. The twos can cancel, leaving *b* + 14.
- 178. d. The answer cannot be determined. For column A, the product of *a* and *b* is *ab*. The expression in column B is the absolute value of *ab*, which is always positive, regardless of the sign of the quantity *ab*. Since there is no indication as to whether *a* or *b* is positive or negative, the answer cannot be determined.
- **179.** c. The words in column A translate into algebra as $\frac{1}{3}x \div 4 = \frac{x}{3} \div \frac{4}{1} = \frac{x}{3} \times \frac{1}{4} = \frac{x}{12}.$

- 196. b. Notice that the points A, B, and C form a right triangle in the figure. The base of this triangle is 3 units (by counting), and the height is 4 units. The formula for the area of a triangle is ¹/₂bb. This is ¹/₂(3)(4), which is six units.
- **197. b.** If the circle has its center at the origin and passes through the point (0,8), then the radius of the circle is 8.
- **198.** c. The slope of a line that passes through two given points is determined by the formula $\frac{\text{change in } y}{\text{change in } x} = \frac{y_2 y_1}{x_2 x_1} = \frac{4 2}{2 1} = \frac{2}{1} = 2.$
- 199. b. The point given by the coordinates (*a*,*b*) is on the *y*-axis, and above the *x*-axis. This indicates that *a* = 0 and that *b* is positive. Therefore the quantity in column A is 0 *b*, which will be a negative number since *b* is greater than zero. Column B is greater.
- **200.** a. The points (-8,c) and (0,0) and (4,3) all lie on the same line. Determine the slope of this line, using the points (0,0) and (4,3). After the slope is determined, use into find one value of *c*. The slope of the line can be inverted by $\frac{ch}{change} \frac{y_1}{x_1} = \frac{y_2}{4-0} = \frac{3}{4}$. To find the value of *a* use the given slope, which is $4 = \frac{c}{-8}$. Using error nultiplication, 4 = -24. Divide both sides by 4, and
 - **01.** a. Since the given figure is a rectangle, and a rectangle has right angles, then as the figure is drawn, the *x*-coordinate of point D equals the *x*-coordinate of point A. Therefore, q = 2. Similarly, the *y*-coordinate of point C equals the *y*-coordinate of point D, and p = 3. Column A will be 3 2 = 1. Column B is 2 3 = -1.
- 202. b. If *ab* < 0, then *a* × *b* is negative. Since *b* > 0, *b* is a positive number. Thus, *a* must be a negative number to make the product negative. Therefore *b*, the positive value, is larger.
- **203. d.** The relationship cannot be determined. If y < -1, column A is greater. For example, $\frac{1}{-4}$ is greater than -4. If 0 < y < 1, column A is greater. For example, $\frac{1}{\frac{1}{5}} = 3$ which is larger than $\frac{1}{3}$. If y = 1, then both columns simplify to 1. If y > 1, then column B is greater; $\frac{1}{5} < 5$.

- **247.** a. If one-half of y is x, let y = 2x. If one-half of y is z, let z = 2y. By substitution, z = 4x. Using the given equation x + y + z = 35, substituting gives an equation of x + 2x + 4x = 35. Combine like terms to get 7x = 35, which results in x = 5. Since z = 4x then z = 4(5) = 20.
- **248.** c. Use *distance* = *rate* × *time*. The distance of car A can be expressed as 60t and the distance of car B can be expressed as 55t. Add the two distances and set the result equal to 460 miles. 60t + 55t = 460. Combine like terms. 115t = 460. Divide both sides by $115; \frac{115t}{115} = \frac{460}{115} = 4; t = 4$ hours. The columns are equal.
- 249. c. Two consecutive integers are integers that are one number apart like 4 and 5 or -22 and -23. Two consecutive integers whose sum is 83 are 41 and 42. Twenty-three less than three times the smaller is 100 and 16 more than two times the greater is 100. The columns are equal.
- 250. b. The only possibilities have an odd number order tere because the total amount ends in a 5, which is impossible to get with dimes. There can be 1 quarter and 9 dimes of equarters and 4 dimes. Five quarters is too much money. Effer way, there are more dimes than quarters, So the on-wer is column B.

these problems by estimating or by measurement, but by using your knowledge of mathematics.

Common Information: In a question, information concerning one or both of the quantities to be compared is centered above the two columns. A symbol that appears in both columns represents the same thing in Column A as it does in Column B.

Directions: Each of the following questions consists of two quantities, one in Column A and one in Column B. Compare the two quantities and choose:

- a. if the quantity in Column A is greater
- **b.** if the quantity in Column B is greater
- **c.** if the two quantities are equal
- Colump Bale.CO.UK **d.** if the relationship cannot be determined from the information given

Examples:

Column A

1. the sum of the measures of two acute angle

ver is **d.** The only oning you can infer about the acute angles in column A is that they are, by definition, each less than 90 degrees. However, depending on their measures, column A could be smaller (two 30-degree angles = 60 degrees) or larger (an 80degree and a 45-degree angle = 125 degrees) than column B. The answer cannot be determined from the information you are given here.

2. the circumference of a circle the area of a circle with with radius 2 radius 1.5

The answer is **a**. This problem is solved by substituting the values into the formulas for the circumference and area of a circle— $2\pi r$ and πr^2 , respectively. In column A, $2(\pi)(2) = 4\pi$. In column B, $\pi(1.5)^2 = 2.25\pi$. 4π is greater than 2.25π , so **a** is correct.







Therefore the measures of the three angles in column A are 180°, 100°, and 80°, which add up to 360°. This is the same as the sum in column B, so the answer is **c**.

- 266. c. Vertical angles are congruent (equal). Vertical angles are defined as angles, formed by 2 intersecting lines, which are directly across or opposite from each other. Angles 1 and 3 are vertical and therefore congruent. The answer is c.
- 267. c. When a transversal line intersects two parallel lines, the resulting corresponding angles are congruent. Corresponding angles are defined as the angles on the same side of the transversal and either both above or below the parallel lines. Angles 1 and 5 are corresponding and therefore congruent, so the answer is c.
- **268. c.** Angles 7 and 3 are corresponding and therefore congruent. The answer is **c**.
- 269. c. Angles 5 and 8 are supplementary because any combine to form a straight line. The same start of angles 2 and 3. Supplementary angles always as 1 up to 180°, so the meta area of both sets of angles are the same and the answer is c.

Angles 2 and 8 are neither corresponding nor vertical. How Per a types 2 and 6 are corresponding, so their measures are equal. Angles 6 and 8 are vertical, so their measures are also equal. This information can be used to determine that angles 2 and 8 are congruent because $m\angle 2 = m\angle 6 = m\angle 8$. In fact, angles 2 and 8 are called *alternate exterior angles*. Alternate exterior angles are always congruent, so the answer is **c**.

271. d Angles 3 and 6 are *same side interior angles*. This means that they are both inside the parallel lines and on the same side of the transversal. Same side interior angles are always supplementary, so their measures add up to 180°. However, this relationship says nothing about the specific values of each angle, and even though the drawing makes it look like one angle might be larger than the other, no information is given that could determine the actual value of either angle. Therefore, there is not enough information to solve the problem and the answer is **d**.

280. c. You can use the formula S = 180(n - 2) to find the sum of the angles in a convex polygon, where *n* represents the number of sides in the polygon. A four-sided polygon such as this one has an angle sum of S = 180(4 - 2) = 180(2) = 360, which is equal to the amount in column A, so the answer is c.

- **281. a.** You can use the formula S = 180 (n 2) to determine that the angle sum of this polygon is 900. The exterior sum of any convex polygon is always 360, so the answer is **a**.
- **282. c.** A heptagon is a seven-sided polygon. This polygon also has seven sides, so the values in the two choices are equal. The answer is **c**.
- **283.** a. Though the formula S = 180 (n 2) can be used to determine that the angle sum of this polygon is 900 and the angle sum of a hexagon is 720, an understanding of the nature of convex polygons provides an easier way to solve the problem A polygon's angle sum increases as the number of orders of the polygon increases. Since this polygon we have sides (7) than a hexagon (6), the sum of its medior angle sum we be greater, so the answer is it.

284. I. C. M. Ligure is an 8-sided polygon, so the value of choices are equal. The answer is c.

285. a. Though you can use the formula S = 180 (n - 2) to determine that $\frac{1}{2}$ of the angle sum of this polygon is 540 (the entire sum is 1,080) and the angle sum of a triangle is 180, you should more quickly be able to determine that since this is an 8-sided polygon, its angle sum will be more than double that of a 3-sided triangle. In either case, the answer is **a**.

286. d. This figure is an 8-sided polygon with all sides of length 8. Though the math is a bit involved, you do have enough information to determine its area. However, while the sum of the interior angles of a convex polygon can be used to determine how many sides the figure has, the area of the second polygon cannot be calculated without more information. Therefore this problem cannot be fully solved and the answer is d.

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- 357. b. Both equations are in slope-intercept form, so the *y*-intercepts can be determined from the terms without variables. The *y*-intercept of the line in column A is -6, and in column B it's 4, so the answer is b.
- **358. a.** Both equations are in slope-intercept form, so the *y*-intercepts can be determined from the terms without variables. The *y*-intercept of the line in column A is $\frac{2}{5}$, and in column B it's -4, so the answer is **a**.
- **359. a.** The equation in column A must be put into slope-intercept form in order to determine its *y*-intercept. Dividing both sides of the equation by 2 yields the proper y = mx + b form as $y = \frac{1}{2}x + 4$, so the *y*-intercept is 4. The *y*-intercept of the line in column B is 3, so the answer is **a**.
- 360. c. The equation in column B must be put into slope-intercept form in order to determine its *y*-intercept. Subtracting from both sides and adding *y* to both sides yielde the proper equation y = x 6, with a *y*-intercept of -6. The valuercept of the line in column A is also -6 so the proper value of c.

361. d. The equation is column A must be ut into slope-intercept contain order to determine its *y*-intercept. Simplifying yields $y = -\frac{1}{2}$, so the variable of the point (9,0), and so has no *y*-intercept. The problem has no solution and so the answer is **d**.

362. a. Both equations must be put into slope-intercept form. The first equation simplifies to y = 5, which represents a horizontal line that has a *y*-intercept of 5. The second equation simplifies by dividing both sides by *x*, yielding y = x + 4. The *y*-intercept of this line is 4, so the answer is **a**.



Some important information:

Numbers: All numbers used are real numbers.

Figures: Figures that accompany questions are intended to provide information useful in answering the questions. Unless otherwise indicated, positions of points, angles, regions, etc. are in the order shown; angle measures are positive; lines shown as straight are straight; and figures lie in a plane. Unless a note states that a figure is drawn to scale, you should NOT solve



- **382.** b. Since there are 400 students at Brown High School and 29% are seniors, 29% of 400, or .29 × 400 = 116; 120 > 116, so the answer is b.
- 383. b. The difference between the number of freshmen and sophomores is 24% 22% = 2% of 400; .02 × 400 = 8 students. The difference between the number of juniors and seniors is 29% 25% = 4%. 4% of 400 is 16. 16 > 8.
- **384.** a. The pattern in this series (.25, .5, .75, 1, 1.25, 1.5...) can also be written as $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, $\frac{5}{4}$, $\frac{6}{4}$ Since each term given is equivalent to the term number (its number in the sequence) divided by 4, an *n*th term would be equal to $\frac{n}{4}$. The 53rd term is equal to $\frac{53}{4}$; $\frac{53}{4}$ = 13.25; 13.25 > 13, so the answer is **a**.
- **385.** c. Use the same equation you established in the previous problem. The 82nd term = $\frac{82}{4}$ = 19.5. Column B is also 19.5, so the correct answer is c.

386. a. Note that the first term is 2, the second term s 4, the third term is 6, etc. The term is upgal to two times the term number. Therefore, the 22 of term is 23 × 2 = 46 and in 10 m of the even numbers from 3 to 46 is needed to an over the question. In Sen is questions, an easy shortout is to rewrite the series below the original eliterand add vertically to get consistent sums. In this case,

Since 23 terms were added, there are 23 totals of 48. Each term has been written twice, so 23×48 is double the total needed and must be divided by two; $23 \times (\frac{48}{2}) = 23 \times 24 = 552$; 552 > 550, so column A is greater.

387. c. Following the same procedure as in the previous question, the last term is 100, so there are $\frac{100}{2}$, or 50 terms in the series. The consistent sum would be 102 because the first term plus the last term = 2 + 100 = 102. There would be 50 sums of 102 which would again be double the total needed; $50 \times (\frac{102}{2}) = 50 \times 51 = 2,550$.

- 396. b. Since x < y, the sum of the elements in set D < the sum of the elements in set E. When the sums are divided by 5 (the number of elements in each set), the mean of set E will be a larger number.
- 397. d. The answer cannot be determined. Let x = 5 and y = 32. Then the range of set D = 24 5 = 19 and the range of set E = 32 13 = 19. The ranges are equal, which eliminates choices a and b. Now let x = 12 and y = 15. Then the range of set D = 24 12 = 12 and the range of set E = 24 13 = 11. Since in both cases, x < y, the answer cannot be determined.
- 398. c. The only way for the mean of the two sets to be equal is for the sum of the two sets to also be equal. In order for this to happen, *x* must equal *y*.
- **399.** a. Since the mean of set D > the mean of set E, the sum of the elements in E. Therefore, since the remaining elements are all qual, the only way to get a larger sum in set D to Control be > y.
- 400. b. Because the mode of the two sets are equal, there hust be a mode in (a) how, meaning that of C b) the elements must
 Cop a. This implies that x is dy are equal to one of the elements of any shown to be in sets D and E. Since all of these elements are > 12, x must be > 12.
- **401.** c. The mean of set F is 28 + 29 + 30 + 31 + 32 = 150; $\frac{150}{5} = 30$. The median of set G, which is already in numerical order, is the middle element, 30.
- **402. b.** Standard deviation is a measure of the spread of the data from the mean. Since the mean of each set is 30, the data in set F is obviously clustered more closely to the mean than the data in set G; therefore, the standard deviation of set G > the standard deviation of set F.
- **403. c.** The number of possible outcomes containing exactly 2 heads is 3: HHT, HTH, and THH. These are the same three outcomes that contain exactly one tail.

- **404.** a. Since there are two possible outcomes for each toss of the coin, and the coin is being tossed three times, there are $2^3 = 8$ possible outcomes. 8 > 5.
- **405.** b. Only one of the 8 possible outcomes, TTT, contains three tails so the probability of tossing three tails is $\frac{1}{8}$; $\frac{1}{8} < \frac{1}{2}$.
- **406. b.** It appears that there are at most 17 students with black hair and 32 students with brown hair; 32 17 = 15. 15 > 12.
- **407. a.** Since more students have red hair than have gray hair, the percent of students with red hair must be higher than the percent of students with gray hair. The actual percents do not have to be determined.
- 408. b. Even with rough approximations done with the data, rounding up, if there are about 30 blond students, 32 brown-haired students, 18 black-haired students, 4 redheads and 3 with grav hair, that total, 87, is < 90.
- 409. a. There are 6 possible outcomes ce control for the counting to the counting principle for probability, there are therefore, 2× 2 = 12 possible outcomes 12 > 8.
- **c.** The entrem such thich an even number on the cube would be followed by a head on the coin would be: (2, H), (4, H), (6, H). There are three outcomes, so columns A and B are equivalent.
 - **411. b.** The factors of 2 are 1 and 2. The outcomes that meet the condition that there is a factor of 2 on the number cube and a head or a tail on the coin are (1, H), (1, T), (2, H), (2, T). There are four outcomes, and 5 > 4, so the correct answer is b.

- 413. c. Since there are 8 total heads and the objective is to have a minimal quantity of them in the first ten tosses, the last four tosses would have to all be heads. This would leave 8 4 = 4 tosses left for the first ten outcomes.
- 414. b. If the series is examined carefully, it can be noted that the first 41 terms will total zero since every nonzero number in the series, up until 22, can be paired with its opposite. Therefore, the sum of the series is simply the sum of the last two numbers, 22 and 24; 22 + 24 = 46. 50 > 46.
- 415. b. The sums do not need to be found. The first three terms are smaller numbers than than the following three terms; therefore, their sum will automatically be smaller than the sum of terms 4, 5, and 6.
- **416.** a. The 18th, 19th, and 20th terms are 14, 16 and 18; 14 + 16 + 18 = 48. The last two terms are 22 and 24; 22 + 24 = 46, 48 > 46.
- 417. b. This is the Fibonacci sequence in which even term after the first two is found by adding the previous, wo terms. There are nine terms provided in the sequence. The tenth terms found be adding the sighth and ninth terms: 14 + 34 = 55, so the tenth terms 55. The eleventh term is found by adding the ninth and tenth terms: 64 = 55 = 89. Since 90 > 89, column B is greater.
- **418. c.** Since each term is found by adding the previous two terms, the 43rd term is the sum of the 41st and 42nd terms.
- **419. a.** The answer can be found with minimal calculations: Since William bought 4 pairs of pants for \$80, each pair of pants cost an average of \$20. The fifth pair of pants managed to bring his average cost per pair up to \$22.50, so it must have cost more than \$20.
- 420. b. If the five pairs of pants averaged \$22.50 per pair, William's total cost must be \$22.50 × 5 = \$112.50. This cost, minus the \$80 he paid for the first four pairs, leaves \$112.50 \$80 = \$32.50.
- 421. b. \$967 was spent on Housing. \$695 + \$325 = \$1,020 was spent on Food and Clothing. Since more money was spent on Food and Clothing, this accounts for a higher percent of the budget.

squares, dividing by the number of elements in the set, then finding the square root of this quantity. For set P: 1 + 2 + 3 + 4 $+ 5 = 15; \frac{15}{5} = 3$, which is the mean; $1 - 3 = -2; -2 \times -2 = 4;$ $2 - 3 = -1; -1 \times -1 = 1; 3 - 3 = 0; 0 \times 0 = 0; 4 - 3 = 1; 1 \times 1 = 1;$ $5 - 3 = 2; 2 \times 2 = 4$. The sum of these square differences is $4 + 1 + 0 + 1 + 4 = 10; \frac{10}{5} = 2$. The standard deviation is $\sqrt{2}$.

For set Q: 2 + 3 + 6 + 5 = 16; $\frac{16}{4} = 4$, which is the mean; 2 - 4 = -2; $-2 \times -2 = 4$; 3 - 4 = -1; $-1 \times -1 = 1$; 6 - 4 = 2; $2 \times 2 = 4$; 5 - 4 = 1; $1 \times 1 = 1$. The sum of these square differences is 1 + 4 + 4 + 1 = 10; $\frac{10}{4} = 2.5$. The standard deviation is $\sqrt{2.5}$; $\sqrt{2.5} > \sqrt{2}$.

- **481. b.** The mean of set P is 3. The median of set Q is the average of the second and third elements, 3 and 5; 3 + 5 = 8; $\frac{8}{4} = 2$; 4 > 3.
- **482. b.** 1 kilometer is equal to 1,000 meters.
- 483. c. Using scientific notation, 3.46 × 10° means the opcined point in 3.46 would be moved 9 places to the expert outcome the exponent on 10 is a positive 9). The vandyneid 3,460,000000. Likewise, in 34.6 × 10⁸, the fluctual point in 34.6 would be moved 8 places to the right to yield 3,460,00,000 as well.
- 24. a. 1.5 × 10⁻⁶ m a size decimal point would move 6 places to the left (since the exponent on the 10 is a negative 6) to yield .0000015; .0000015 > .00000015.
 - **485.** a. The profit in 1988 was approximately \$4,100. In 1990, the profit was approximately \$4,800. The profit increase was, therefore, about \$700. The profit in 1987 was approximately \$3,250. In 1989, the profit was approximately \$3,600. The profit increase was, therefore, about \$350. \$700 > \$350.
 - 486. b. The profit in 1990 was approximately \$4,800. In 1991, the profit was approximately \$4,600. The profit decrease was, therefore, about \$200. The profit in 1988 was approximately \$4,100. In 1989, the profit was approximately \$3600. The profit decrease was, therefore, about \$500. \$500 > \$200.
 - **487.** a. The profit in 1987 was approximately \$3,250. In 1993, the profit was approximately \$5,250. The profit increase was, therefore, about \$2,000. \$2,000 > \$1,500.