MATH STRATEGY & REVIEW: KLM - Key

Answers:

1) C	2) C	3) B	4) E	5) B	6) B
7) B	8) B	9) B	10) D	11) K	12) F
13) B	14) C	15) E	16) C	17) A	18) A
19) E	20) C	21) B	22) H	23) G	24) E
25) A	26) B	27) A	28) B	29) A	30) B
31) B	32) E	33) B	34) C	35) B	36) F
37) B	38) B	39) D	40) C	41) D	42) E
43) B	44) B	45) D	46) A	47) C	48) D
49) D	50) B	51) A	52) E	53) D	54) E
55) D	56) D	57) B	58) E	59) B	60) C

Solutions:

1) Answer: C Strategies to Use: Draw a Picture, Work Backwards

Since x + y = 8, the corresponding values of y for each of the x values offered in the answer choices are: (x, y); (1, 7), (2, 6), (4, 4), (6, 2), and (7, 1).

Quickly calculate each area using A = 1/2bh.

You will see that the area of the triangle with x =4, y = 4, is larger than the other choices. Since all combinations are multiplied by each other then by 1/2, multiplying by 1/2 can be skipped, and the largest product selected for the correct answer.

You may notice that the resulting triangles for choices A & E and B & D are exactly the same -- meaning that none of them can be the correct answer. The correct answer is (C).

2) Answer: C Strategy to Use: Determine What is Being Asked

1st. You should note that you are interested in the fewest number of socks in drawer C. Since 30% of his shirts are in drawer A and 25% are in B, then 45% of his shirts must be in drawer C.

2nd: We now know that the ratio of drawers A : B : C is 30 : 25 : 45. Simply this ratio (by dividing by the largest common denominator, 5) and get 6 : 5 : 9. That means that drawer C must have 9 shirts in it. (Or a multiple of 9 if 9 is not a choice.) The answer is (C).

3) Answer: B Subject Area Tested: Percentages

If Ms. Walker withdraws 1/4 of her savings (x), or 25%, she then has 75% of her savings as a remainder, 75% of x.

She then spends 1/5, or 20%, which leaves 80% of the remaining 75%.

Solve

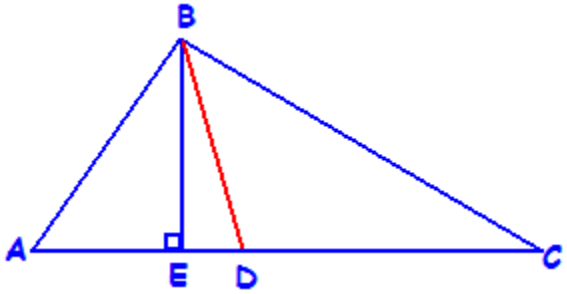
$3000 = (.75)(.80)x$

$3000 = .60x$

$x =$ $5000

4) Answer: E Strategy to Use: Draw a Picture

1st: Draw the picture:



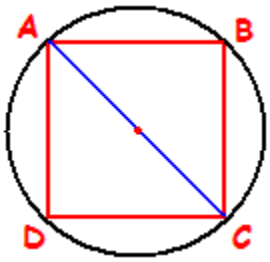
Now, which answer must be true at all times?

Answer choices (A), (B), (C), and (D) all could be true, but they could also NOT be true.

Only Choice (E) must be true at all times. By looking at the picture, the slanting segment BD is obviously longer than the segment BE, and it always will be because the shortest distance between point B and AC is a perpendicular segment (BE). Choice (E) is the correct answer.

5) Answer: B Strategy to Use: Draw a Picture

1st: Draw a picture, making sure that you draw the chords as segments connecting the points on the circle. Since the fours chords, AB, BC, CD, and DA are all equal, they form a square within the circle.

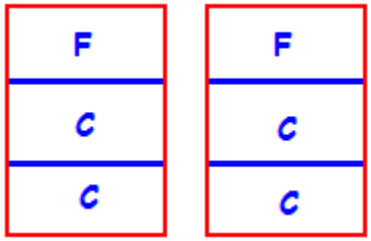


2nd: A diameter passes through the CENTER of a circle. None of the chords in the drawing pass through the center of the circle, so eliminate choices (A) and (C). A diameter can be drawn from A to C or from B to D. The correct answer is B, segment AC. The other diameter is BD, but BD is not listed in the answer choices.

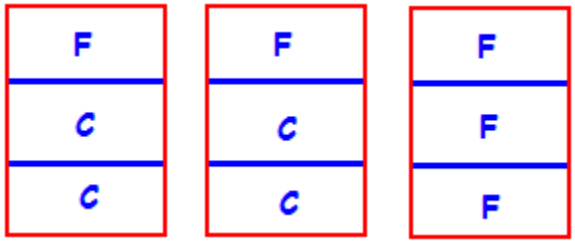
6) Answer: B Strategy to Use: Draw a Picture

This is an excellent example of making a difficult problem simple by drawing a picture.

A two cup mixture: (1/3 Flour & 2/3 Cornmeal)



Now add a cup of Flour (divide it into thirds like the previous two cups):

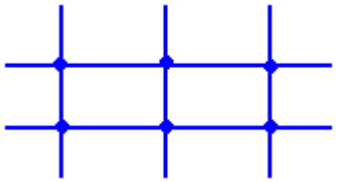


It is now easy to see that the 3 cup mixture consists of 4/9 Cornmeal and 5/9 Flour. If you convert 5/9 to a percentage (by dividing 5 by 9), you will get 55%, answer B.

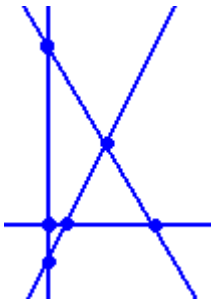
7) Answer: B Strategy to Use: Avoid Obvious Solutions

On questions such as this one, NEVER choose the most obvious answer. Pick one number higher or one number lower, depending upon the wording in the question. This question asks for the least number of lines. Therefore, pick one number lower than the most obvious answer.

The most obvious answer is 5, since the easiest way to draw these lines with 6 intersections is:



Thus, you know that 5 is not correct -- too easy. You should pick one number lower. The correct answer is B, 4. The correct diagram looks like the following drawing (6 points of intersection with only 4 lines):



8) Answer: B Strategy to Use: Take Out the Garbage

In this question, Factory X and 1977 are garbage -- extra numbers and variables placed in the problem to confuse the reader. In the table, what is the garbage? The garbage is the row for Metal and its percentage.

To solve the problem, you only need the percentage of money spent on Paper (28%), the percentage spent on Wood (32%), and the total amount of money spent on Wood and Paper ($277,200).

28% + 32% = 60% of total money spent was on Wood and Paper

$$\frac{\text{Paper}}{\text{Paper \& Wood}} = \frac{28}{60} = \frac{P}{277,200}$$

Solve the proportion for p to determine the amount of $ spent on paper alone. The answer is B, $129,360.

9) Answer: B Strategy to Use: Shortcut

There is no need to solve for k. If there are 2 buttons left over when k are available, then when k + 5 buttons are available, there will be 5 more, or 7 left over.

The correct answer is choice (B) 7.

10) Answer: D Strategy to Use: Substitute Numbers for Letters

We are told that X is an odd integer and Y is an even integer. Substitute an odd number for X and an even number for Y. Let's use X = 3 and Y = 2.

Now, by substituting these numbers for X and Y, we can determine which of the equations in the answer choices COULD BE an even integer.

(A) X + Y = 3 + 2 = 5 Not an even integer -- ELIMINATE

(B) X - Y = 3 - 2 = 1 Not an even integer -- ELIMINATE

(C) X/2 + Y = 3/2 + 2 = 3 1/2 Not an even integer -- ELIMINATE

(D) X + Y/2 = 3 + 2/2 = 4 An even integer -- The ANSWER!

(E) X/2 + Y/2 = 3/2 + 2/2 = 2 1/2 Not an even integer -- ELIMINATE

If necessary, you should try two sets of numbers to substitute for the variables. In this problem, if you used X = 5 and Y = 4, answer choice D would produce 7, which is not an even integer. The key words to this problem are COULD BE an even integer. The other choices will never produce an even integer.

11) Answer: K Subject Area Tested: Coordinate Geometry

1st: Use the slope formula , y = mx + b; where m is the slope and b is the y-intercept.

The formula for line A is y = 3/4 x + b. A perpendicular line would have a slope that is the negative reciprocal of 3/4, which is - 4/3. Therefore, the equation for the perpendicular line is:

y = - 4/3 x + b. The question tells that it passes through point (0, 1), so we know that the y-intercept is 1. Now we have y = - 4/3 x + 1.

Finally, we need to get the equation into the form that appears in the answer choices, the x and y on the right side and the y-intercept on the left side of the equation. So, first add 4/3 to both sides, then multiply through by 3. The result: 4x + 3y = 3, answer choice K.

12) Answer: F Subject Area Tested: Special Word Problems

(Consecutive Integers)

Short cut: Three odd numbers will add up to another odd number. This eliminates choices D and E. The remaining choices are 33, 31, and 29. The three consecutive odd numbers must each be very close to 10. Try 9-11-13. These add to 33, so the answer must be F. Do not waste time checking that twice the smaller plus 15 equals the sum, it does.

Longer method: Set up the formula for consecutive integers, remembering that all consecutive odd numbers must be 2 apart:

N + (N + 2) + (N + 4) = 2(N) + 15

3N + 6 = 2N + 15

N = 9

N + 2 = 11

N + 4 = 13

Now add up the three numbers: 9 + 11 + 13 = 33, choice F.

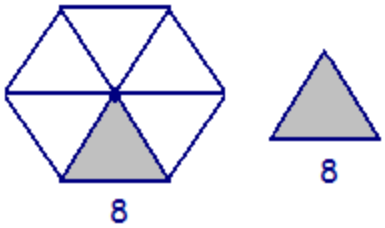
13) Answer: B Strategy to Use: Educated Guessing

1st: Use the Majority Rule, look at the three answer choices which have something in common and then eliminate the choices which do not share this common trait. In this question, the majority of the answers share the square root of 3. Eliminate choices A and D because they are in the minority -- they have the square root of 2.

2nd: Eliminate the distractors from the remaining choices. As you recall, a distractor is an answer choice which contains an identical value/number as the one(s) that appear in the question. These distractors were placed there to mislead you, eliminate them. In this problem, eliminate choice C because it contains the number 48, as given in the problem.

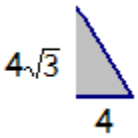
Now we only have choices B and E left -- a 50% chance. The correct choice is B.

To solve, you must know that the hexagon is made up of 6 congruent equilateral triangles as in the diagram below.



Since the perimeter of the hexagon is 48, each side is length 8. To determine that each of the small triangles is an equilateral triangle, first find the sum of the angles of the hexagon by using 180(n-2), where n is the number of sides of the polygon. The sum of the angles of a hexagon is 180(6-2) = 720. Since this is a regular hexagon, each angle measures 120°. Then each triangle must have each angle equal to 60°, which means that each triangle is equilateral.

By examining half of this triangle, we now have a 30-60-90 triangle and can use this pattern to determine the height.



Use A = 1/2bh to find the area of the triangle.

$A = 1/2\ (8)(4\sqrt{3}) = 16\sqrt{3}$

Since the hexagon contains 6 of these triangles, the total area is $6(16\sqrt{3}) = 96\sqrt{3}$.

Since this problem is so time consuming, it is best to make an educated guess when it is first read and return to it later if time permits.

14) Answer: C Strategy to Use: Work Backwards

Make a chart showing the number of fish caught for each boy. Remember: when using the working backwards rule, always to start with choice C. The question asks how many fish Paul caught. So answer C, 60, indicates that Paul caught 60. Using this number, it is easy to fill in Eric's and Steve's catches from the information given in the problem. The total of fish caught among the three boys adds to 95. Quickly try the next higher answer choice to see if the total can get closer to 100 without going over. When trying choice B, 66, it is immediately clear that six more fish for Paul would make the total exceed 100. Choice C must be the correct answer.

Paul	Eric	Steve	TOTAL	
60	20	15	95	YES!
66			over 100	NO!

Eliminate choices D and E; they are too low (their totals will be less than 95.) Since choice B's resulting catch Total is at least 6 fish more (66 - 60 = 6), we know that B is too much (95 + 6 >100). So eliminate A and B. That leaves choice C, the correct answer.

15) Answer: E Strategy To Use: Take Out the Garbage

The sum of the angles of a triangle is 180°. Therefore, the angles of the large triangle in the problem must consist of the following sum: $60° + (x° + 20°) + z° = 180°$. The "garbage" in this problem is the $y°$ in the diagram. Forget it, it is only there to confuse you.

To solve, use the equation above and solve for z.

$60 + (x + 20) + z = 180$

$(x + 20) + z = 120$ (subtract 60 from both sides)

$x + z = 100$ (subtract 20 from both sides)

$z = 100 - x$ (solving for z). The correct answer is choice E.

16) Answer: C Strategy to Use: Shortcut

By the Zero Product Property, we know that for a product to equal zero, one or both of the factors must equal zero. For this to occur, r must equal -1, so that $(r + 1) = 0$. The quotient $(1/a)$ can never equal zero regardless of the value of a. The correct answer is C, -1.

17) Answer: A Subject Area Tested: Special Word Problems

Since three people can complete the job in 5 days, it would take one person 15 days to do all the work alone. So, one person can complete 1/15 of the work in one day.

18) Answer: A Strategy to Use: Substitute Numbers for Letters, Avoid Obvious Solutions

1st: Substitute numbers for pages N and R. Let page N = page 1 and page R = page 2. If Jack reads page 1 and page 2, he has read 2 pages. Now, by substituting 1 and 2 for N and R, we can determine which of the equations in the answer choices equals 2 pages.

(A) R - N + 1 = 2 - 1 + 1 = 2 pages Yes! Choice A is the correct answer.

(B) N - R + 1 = 1 - 2 + 1 = 0 pages Wrong!

(C) N - R - 1 = 1 - 2 - 1 = -2 pages Wrong!

(D) R - N = 2 - 1 = 1 page Wrong!

(E) N - R = 1 - 2 = -1 page Wrong!

Do not automatically choose D (wrong answer) because we know to subtract the last page minus the first page. Test this assumption to discover that after subtracting, one must be added (R – N + 1) to obtain the correct answer.

After finding the correct answer, it is not necessary (and is actually of waste of valuable time) to try all of the answer choices. We did it here for illustration purposes only.

19) Answer: E Strategy to Use: Work Backwards

Remember, when Working Backwards, start with answer choice C so you can eliminate any choices which are too high or too low.

Starting with C, use the following logic with each of the answer choices:

(C) 100 We know that the team played 154 games. If the team won 100 games, how many did they lose? 54 loses. The problem says that the team won 54 more than they lost, however, 100 - 54 = 46, not 54. So eliminate C. Is this number of wins too large or small? Too small, so eliminate A and B and try choices D and E, the larger number of wins.

(D) 102 If the team won 102 games, then it lost 52. 102 wins minus 52 loses = 50, not 54.

Eliminate D and select choice E, the only answer left.

This problem can also be worked with algebra: Set up the following equation and solve for X:

games won + games lost = 154

If we let the # of games won = X, then the # lost = (X - 54)

X + (X - 54) = 154

2 X = 208

X = 104, Choice E

20) Answer: C Subject Areas Tested: Plane Geometry, Fractions

1st: Find the circumference of the circle by using the formula: $C = \pi d$, using 22/7 for π.

Since the diameter is given as 1, the circumference is: $C = (22/7)(1) = 22/7$

The circle rolls a distance of 2 (remember the circle is rolling along its circumference of 22/7 .

To calculate the part of the complete rotation that the circle makes by rolling 2, simply take the distance of 2 and divide it by a complete rotation (the circumference of 22/7):

$2 \div (22/7) = 2 \times (7/22) = 14/22 =$ 7/11, Choice C.

Remember, when dividing by a fraction, rewrite to multiply by the reciprocal.

21) Answer: B Strategy to Use: Substitute Numbers for Letters

Substitute any 3 positive numbers for the letters x, y, and z. If we let x = 4, y = 6, and z = 8, then we get the following equation for their average.

4 + 6 + 8 = 18 Their average is 18/3 = 6

The average is what percent of their sum? Divide the average by the sum.

6/18 = 1/3 1/3 is the same as 33 1/3 %, answer B.

22) Answer: H Subject Area Tested: Algebra

Find the product of the three numbers by adding the exponents when multiplying:

$(5x^2y)\ (-2xy^2)\ (-3y^4) = 30x^3y^7$, Choice H.

23) Answer: G Subject Areas Tested: Fractions, Fundamental Operations

1st: Find the common denominator and multiply it by each term in the equation. The least common denominator for the three fractions is 4y:

(3/y)(4y) + (4/2y)(4y) = (3/4)(4y)

(12y/y) + (16y/2y) = (12y/4)

This reduces nicely to 12 + 8 = 3y

20 = 3y

y = 6 2/3, Choice G.

24) Answer: E Strategy to Use: Substitute Letters for Numbers

1st: Substitute any numbers for the wage per hour. Let us make the wage $10 per hour, so overtime (hours worked in excess of 7.5 hours per day) is paid $15 (time and a half).

2nd: Determine the regular wages for a day's work : (7.5 hours) ($10) = $75

3rd: Determine the overtime wages for a 10 hour day's work: (2.5 hrs overtime) ($15) = $37.50

Finally: Determine what percentage $37.50 is of this regular wages of $75.

$37.50 = X% of $75

X % = $37.50 / $75 = 50%, Choice E.

25) Answer: A Strategy to Use: Working Backwards

We know that one of the angles must be 80°, since the average of two of the angles is 50°, meaning that the sum of the degrees of the two angles is 100° (180° - 100° = 80°).

Now, work backwards to quickly solve: For each answer choice, quickly add the second angle which will add up to 100o, then add the known 80o angle. Now, the degrees of each triangle will total to 180o. The correct answer choice will be the one which produces an isosceles triangle, one containing two identical angles.

(A) 20° + 80° = 100°, since the known third angle is 80°, two angles are identical and will form an isosceles triangle.

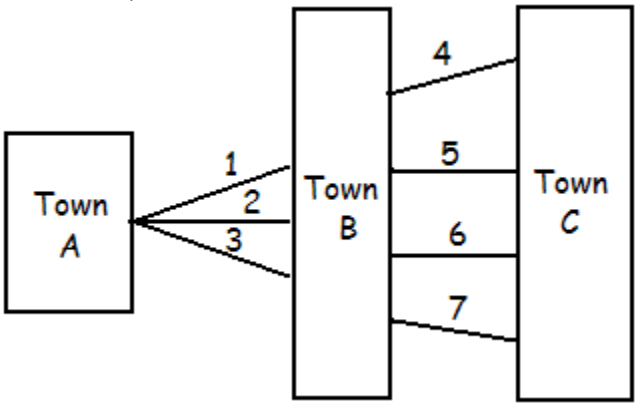
(B) 40° + 60° = 100°, since the known third angle is 80°, no two identical angles exist.

(C) 60° + 40° = 100°, since the known third angle is 80°, no two identical angles exist.

(D) 90° + 10° = 100°, since the known third angle is 80°, no two identical angles exist.

26) Answer: B Strategy to Use: Draw a Picture

Draw a picture.



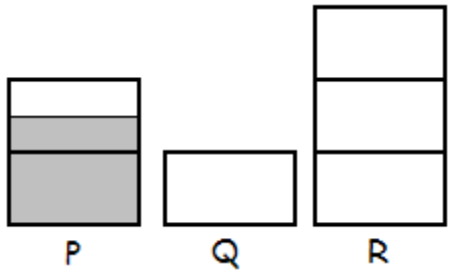
Using the diagram, quickly count the possible routes that Mrs. Smith could take. (1 & 4), (1 & 5), (1 & 6), (1 & 7), (2 & 4), (2 & 5), (2 & 6), (2 & 7), (3 & 4), (3 & 5), (3 & 6), (3 & 7) -- That equals 12 routes, Choice B.

27) Answer: A Strategy to Use: Take out the Garbage

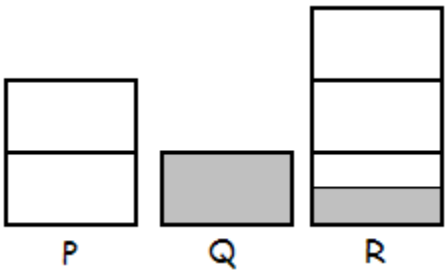
Since the terms x^2 and 6 appear on both sides of the inequality, they can be ignored. Focusing on $-5x > 5x$, decide which value of x would make this true. Since the left side of the inequality must be greater than the right side, a negative number in place of x would make the inequality true. So the correct answer is $x < 0$ (all negative numbers are less than zero).

28) Answer: B Strategies to Use: Draw a Picture

Sketch the three containers:



If P is 3/4 full and you pour from P into Q until Q is full, then P will have 1/4 remaining. If you put that 1/4 into R, then R will be 1/6 full, choice B.



29) Answer: A Strategy to Use: Determine What is Being Asked

What is being asked? The question is: Which answer choice COULD NOT BE the total number of contestants whose standings changed on the second day. With ranking of 1st, 2nd, 3rd, 4th, and 5th place, if one standing changes, at least one other must change. Therefore, one contestant alone can not change his standing. If one contestant changed his standing, say from 1st to 2nd, he would automatically displace the contestant who was in 2nd place. The correct answer is A.

30) Answer: B Strategy to Use: Substitute a Numbers for Letters

1st: Assign numbers for the variables X, Y, and Z. Let X = 2, Y = 3, and Z = 4. So our number must be XYZ, or 234.

2nd: Since our number is 234, it is equal to 2.34 hundreds (simply divide by 100).

3rd: Plug in our numbers for X, Y, and Z in each of the answer choices and see which one equals 2.34.

Following order of operations is essential. Remember to work inside parentheses first, then multiply and divide going left to right then finally adding and subtracting left to right.

(A) 2 + (3 + 4) / 100 = 2 + .07 = 2.07 NO!

(B) 2 + ((10)(3) + 4) / 100 = 2 + 0.34 = 2.34 YES!

31) Answer: B Subject Area Tested: Special Word Problems

(Fundamental Operations)

This is a symbol representation problem. First, you must understand what the symbols represent.

7! represents the product of all positive numbers less than 7. 7!e represents the product of all positive even numbers less than 7. 7!o represents the product of all positive odd numbers less than 7.

7! = 7 x 6 x 5 x 4 x 3 x 2 x 1

7!e = 6 x 4 x 2

7!o = 7 x 5 x 3 x 1

Looking through the answer choices, we find that only B, 7!e x 7!o = 7! can be true.

Alternately, the products may be calculated out and substituted into the answer choices, but this takes a little longer.

7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040

7!e = 6 x 4 x 2 = 48

7!o = 7 x 5 x 3 x 1 = 105

(A) 48/ 105 = 1 , FALSE, Eliminate A

(B) (48) (105) = 5040 - TRUE.

(C) 48 - 105 = 0, FALSE, Eliminate C

(D) 48 + 105 = 5040, FALSE Eliminate D

(E) 105 < 48 , FALSE, Eliminate E

32) Answer: E Strategy to Use: Look for a Shortcut

If a number is divisible by 45, it must be divisible by both 9 and 5. Choices A, B, and E are the only choices divisible by 5 since they end in either 0 or 5. So choices C and D can be eliminated.

Next, check to see if the choices are divisible by 9. You can do this by adding the digits of each answer choice's numbers:

(A) totals to 21, not divisible by 9

(B) totals to 23, not divisible by 9

(E) totals to 27, YES!, divisible by 9 and the correct answer.

33) Answer: B Subject Areas Tested: Percentages, Proportions/Ratios

Given: average annual production per person was 15% greater than annual average consumption. The average daily production (in calories) is 15% greater than 3000 calories.

Calculate 15% of 3000: 3000 (.15) = 450

Therefore, the average daily production is 450 calories more than 3000, or 3450 (Choice B)

34) Answer: C Subject Areas Tested: Proportions/Ratios

Although this problem can easily be solved by finding the sales tax on $1.00 and multiplying by $15, it can also be quickly solved by setting up the following proportion:

$$\frac{.24}{4} = \frac{X}{15}$$

Cross multiply and solve for the variable.

X = $ 0.90, Choice C.

35) Answer: B Strategy to Use: Substitute Numbers for Letters, Estimate

Substitute a number for y, remembering that y must be a number between 4 and 10. Try two numbers for y, the extremes of the range: 4 and 10.

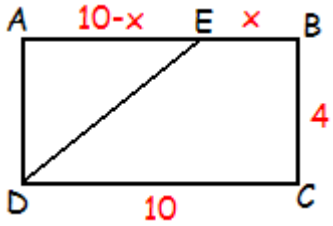
If y = 4, the average is: 2 + 5 + 6 + 8 + 9 + 4 = 34
Now estimate, 34 divided by 6 is about 6.

If y = 10, average is: 2 + 5 + 6 + 8 + 9 + 9 = 40
Now estimate, 40 divided by 6 is about 7.

The correct answer must be between about 6 and 7. The only answer choice which fits is answer choice B, 6.2.

36) Answer: F Strategy to Use: Take Difference Between Ordinaries

The shaded region is the "Unusual region; it is a trapezoid. The formula for the area of a trapezoid is $\frac{1}{2}$ (base 1 + base 2)(height). If you do not know this formula, you can still quickly solve this problem by using the strategy "Take the Difference Between the Ordinary Figures to Find the Unusual." In this problem, the two ordinary figures are the rectangle ABCD and the right triangle AED. Simply calculate the areas for the rectangle and the right triangle using the information given and then subtract the smaller area from the larger. This will leave you with the area of the trapezoid, the answer.



Area of rectangle ABCD: A = (length) (width) = (4)(10) = 40

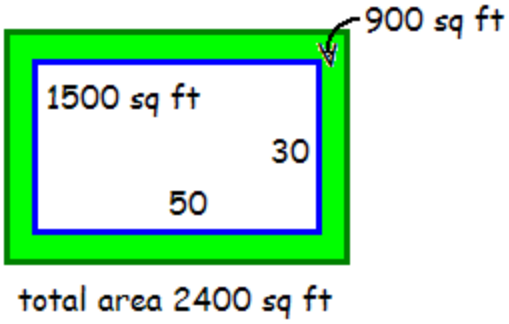
Area of triangle AED: (1/2)(base) (height) = (1/2)(4)(10 - x) = 20 - 2x

Now subtract: 40 - (20 - 2x) = 40 - 20 + 2x = 20 + 2x, choice F, the correct answer.

*NOTE: The problem tells us that BE = X and CD = 10. If CD = 10, then its opposite side, AB, also equals 10. The length of AE, the height of triangle AED, is (AB - BE), or (10 - X).

37) Answer: H Strategy to Use: Take Difference Between Ordinaries and Draw a Picture

1st: Draw a picture. Sketch the basketball court and the grass strip around it, labeling all known measurements.



To find the width of the grass strip, we must first find the areas of the entire larger rectangle (basketball court plus the grass strip) and the area of the basketball court. The method we use to solve this problem is a variation on the strategy of taking the differences.

In this problem, we already know the area of the Unusual figure (900 sq. ft.), but we do not know the area of the larger Ordinary figure (the larger rectangle). Therefore, our formula is:

Larger Ordinary Area - Smaller Ordinary Area = Unusual Figure Area

Larger Ordinary Area - (30 x 50) = 900

Larger Ordinary Area – 1500 = 900

Larger Ordinary Area = 2400

Now, we solve for the width of the grass strip. The grass strip must be the same width all around the basketball court. Therefore, the length of the larger rectangle must be 20 feet longer than its width -- just as with the length of the basketball court. Furthermore, the length time the width must equal an area of 2400 sq. ft. (see above).
Now ask yourself, "What number times what number equals 2400?"
20 X 120, Yes, but 120 feet is more than 20 longer than the width of 20. How about 40 X 60? Yes, and 60 feet is 20 longer than the width of 40 feet. Now return to your sketch and mark the width of the larger rectangle. Note that the width of the grass if 5 feet all the way around. (30 feet court plus two 5 feet strips of grass.) The correct answer is choice H.

38) Answer: D Subject Areas Tested: Motion Problem and Fundamental Operations

Known information:

Distance upstream and downstream are the same, both x.

Rate upstream is boat speed minus current 20 – 4 = 16.

Rate downstream is boat speed plus current 20 + 4 = 24.

Remember the Distance formula from you Math Review handouts.

D = R x T or T = D/R or R = D/T

Since the total time is known, use T = D/R

time upstream + time downstream = 10 hours

$$\frac{x}{16} + \frac{x}{24} = 10$$

To clear the fractions, multiply each term by the LCD, 48. This gives:

$3x + 2x = 480$

$5x = 480$

$x = 96$

The distance up (or down) the river is 96 miles, choice B.

39) Answer: D Subject Areas Tested: Ratios/Proportions

To solve this problem quickly, we can set up a proportion which reflects the given information:

"Food" and "Housing" total to 55¢ per dollar (100¢); x will represent the degree measure of the central angle for these sectors of the whole pie (360°).

$$\frac{\text{part}}{\text{whole}} \quad \frac{55}{100} = \frac{x}{360}$$

Cross-multiply and solve. Choice D is correct, X = 198°

40) Answer: C Subject Areas Tested: Averages

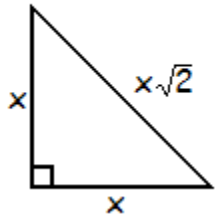
Pat's first two scores are 65 and 70. There are also two unknown scores. One of the scores must be the lowest possible score. Since one of the unknown scores is to be the lowest, the other unknown should be the highest, or 100. So, assign Pat a 100 on the fourth quiz.

Next, find the remaining unknown score which produces an average of 75 on all 4 tests.

In order to have an average of 75 points on 4 quizzes, there must be a total of 300 points (4 x 75 = 300). Pat already has 240 points (65 + 75 + 100 = 240). Therefore, the lowest that she can possibly score on the remaining quiz is 60 (300 - 240 = 60), answer choice C.

41) Answer: D Subject Areas Tested: Geometry

45-45-90 pattern



Since the triangle shown is an isosceles right triangle (45-45-90 pattern), the hypotenuse is equal to the side times $\sqrt{2}$. Therefore the hypotenuse measures $6\sqrt{2}$. In the diagram, the hypotenuse of the triangle is the same segment as the diameter of the circle. The radius of the circle would then be half the diameter, or $3\sqrt{2}$. Based on this, the area of the full circle will

be $\pi r^2 = \pi(3\sqrt{2})^2 = 18\pi$. The semicircle is just half of this, or 9π, choice D.

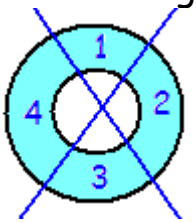
42) Answer: E Strategy to Use: Look for Shortcuts

The shortcut that can be used in this problem works on many similar types of questions. Since the class has been broken down into groups by dividing it by 2/9 and 1/4, then the correct answer must also be divisible by 9 and by 4. The only answer choice which is divisible by 9 and 4 is 36, answer choice E.

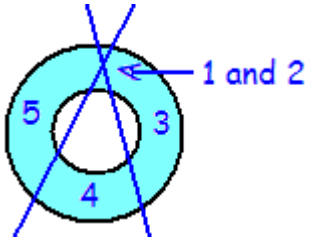
43) Answer: B Strategy to Use: Avoid Obvious Solutions

On a question such as this, NEVER pick the answer choice which seems to be the obvious answer. The questions are difficult questions and have difficult solutions. You should pick one number higher or one number lower than the obvious choice -- depending upon the wording in the question. The wording in this question -- the greatest number of non-overlapping regions -- should signal to you that the correct answer is most likely the choice which is one number greater than the obvious answer.

The obvious answer is 4, choice C. Most students will assume that this drawing is correct:



Since the obvious answer is 4, you should pick the next higher number, 5, choice B. The correct drawing looks like this:



Never waste too much time on these brain teasers! Just follow this strategy and move on.

44) Answer: B Subject Area Tested: Fundamental Operations

(Finding a Common Denominator)

1st: Find a common denominator for the four fractions which measure the bottles' contents.

The four fractions are 1/2, 3/4, 7/8 and 15/16. The common denominator is 16.

Now, express all of the fractions in the form of 16ths:

1/2, 3/4, 7/8 and 15/16 becomes 8/16, 12/16, 14/16 and 15/16.

If you pour from the fourth bottle (15/16 full) until you fill the other three bottles, you pour:

Into bottle one: 8/16 to fill

Into bottle two: 4/16 to fill

Into bottle three: 2/16 to fill

Next, subtract these amounts from 15/16 (the fourth bottle).

15/16 - 8/16 - 2/16 - 4/16 = 1/16, Choice B

45) Answer: D Strategy to Use: Substitute Numbers for Letters

To solve, we need to substitute some actual numbers for the variables (letters) and then see which answer choice matches the resulting number. We know that there are 6 sides to the cube. Let n, the painted surfaces, equal 4. Therefore, the unpainted surfaces = 2.

Since 2 of the 6 sides of the cube are unpainted, the fraction representing the unpainted surface area in relation to the total surface area of the cube is 2/6 or 1/3 .

Next, we must substitute 4 for n in all of the answer choices. The answer choice which equals 1/3 is the correct answer.

(A) n/6 = 4/6 = 2/3 ---- Eliminate!

(B) n/8 = 4/8 = 1/4 ---- Eliminate!

(C) (n – 6)/6 = (4 – 6)/6 = - 2/6 = - 1/3 ---- Eliminate!

(D) (6 – n)/6 = (6 – 4)/6 = 2/6 = 1/3 ---- Correct!

46) Answer: A Strategy to Use: Working Backwards

Since the average age of Sue, Alan, and Joseph is 14, the total age of all three is 42 (14 x 3 = 42). Next, make a quick chart. Since we start with 14, choice C, this will be Sue's age. Since the sum is much too large if Sue is 14, try a much smaller value, 6, choice A. The correct answer is 6, choice A.

Alan	Sue	Joseph	Total	
28	14	56	98	too large!
12	6	24	42	correct!

47) Answer: C Subject Area Tested: Special Word Problems

(Symbol Representation)

You are given that for all real numbers:

p ♉ q = 2pq - (p + q)

Next, you are ask to determine the value for 5 ♉ 4.

To solve this problem, substitute 5 for P and 4 for Q in the given equation and calculate the answer:

5 ♉ 4 = 2(5)(4) - (5 + 4) = 40 - 9 = 31 Choice C.

48) Answer: D Subject Area Tested: Percentages

The team has won 60% of the 20 games played so far, or .60(20) = 12 wins.

If the total number of games played is 50, then there are 30 remaining games (50 - 20 = 30).

80% of the remaining 30 games = .80 (30) = 24 wins out of the remaining games.

12 wins so far + 24 wins of the remaining games = 36 wins in the entire season.

36 wins is what percentage of 50 games?

36/50 = .72, or 72%, Choice D.

49) Answer: D Strategy to Use: Take Out the Garbage

The "garbage" in this problem is 108°. Based corresponding angles, we know that the angle adjacent to angle Y, its supplementary angle, is equal to angle X. Therefore, X° and Y° must equal 180°, Choice D.

50) Answer: B Strategy to Use: Substitute Numbers for Letters

1st: Assign values for the variables a, b, and c --- remember, a, b, and c are positive integers.

Let's let a = 2, b = 4, and c = 6. Now let's plug the numbers in for the variables in I, II, and III and see which statements are true.

I. (a - b) - c = a - (b + c) - Yes, this is true by the distributive property.

II. (a ÷ b) ÷ c = a ÷ (b ÷ c) - No, division is not associative

III. (a ÷ b) + c = a ÷ (b + c) – No, division is not associative
Only statement I is correct, choice B.

51) Answer: A Subject Area Tested: Special Word Problems

(Motion Problems)

To solve this problem, we must use the formula: R = D/T

We know the total distance, we must calculate total time.

1st step: (from A to B) 180 km at 60 km per hour would take 3 hours.

2nd step: (from B to A) 180 km at 90 km per hour would take 2 hours.

The round trip is 360 km (180 + 180) and takes 5 hours (3 hrs going and 2 hours returning).

R = 360/5 = 72 km per hour, Choice A.

52) Answer: D Strategy to Use: Estimate

Instead of multiplying and dividing all of these numbers to see which is closest to 5, ESTIMATE.

(A) Estimate as 50 x 5 ÷ 0.5. Remember that dividing by 0.5 or 1/2 is the same as multiplying by 2. The simplest expression would be 50 x 5 x 2, which equals 500 ------ Eliminate

(B) Estimate as 5 x 5 x 2, which equals 50 ------ Eliminate

(C) Estimate as 50 x 5 ÷ 5, which equals 50 ------- Eliminate

(D) Estimate as 50 x 50 ÷ 50, which equals 50 ------- Eliminate

(E) Estimate as 0.50 x 50 ÷ 5, which equals 5 ------- Correct!

By estimating, we can quickly eliminate choices A, B, C, and D, leaving choice E as the correct answer. When estimating, consider all choices before marking your answer. At times, two choices may be very close in value.

53) Answer: D Strategy to Use: Substitute Numbers for Letters

The problem tells us that $x \neq 0$ and $x = 3y = 5t$. To make this a true statement, we must substitute two numbers for y and t to make $3y = 5t$. Let's let $y = 5$ and $t = 3$.

Therefore, x will equal 15.
$15 = (3 \times 5) = (5 \times 3)$

Next, we must find the value of x – y, which is 15 - 5 = 10

Forget the part about "in terms of t"; we only have to find the answer choice which produces a value of 10 after we plug in our numbers.

(A) 1/5 t = 1/5 (3) = 3/5 ------- Eliminate

(B) 5/3 t = 5/3 (3) = 5 ------- Eliminate

(C) 2t = 2(3) = 6 ------- Eliminate

(D) 10/3 t = 10/3 (3) = 10 ------- Correct!

54) Answer: E Strategy to Use: Determine What is Being Asked

Always be on the look-out for trick questions such as this one. Read it very carefully. Most students would quickly read the problem, determine that 3/5 of the 20 students is 12 and mark choice A. However, the question asks for the "number of female students in the homeroom", not in the math club. Since we are not told the percentage of female students in the homeroom, we can not determine the number of female students in the homeroom. The correct response is E.

55) Answer: D Subject Area Tested: Special Word Problem

Since 10 meters of fence costs $350, one meter would cost $35. Based on this, 15 meters would cost 15 x 35 = $525, Choice D.

56) Answer: D Subject Area Tested: Percentages

We are told that the first year's rent for the computer is $300. The second year's rent is 10% more, or $300 + (.10)($300) = $330. The third year's rent is 10% more than the second year's rent, or $330 + (.10)($330) = $363. Therefore, the total rent for the three years is $300 + $330 + $363 = $993, Choice D.

57) Answer: B Strategy to Use: Avoid obvious Solutions

It seems obvious that the answer is 105%, but this is not the correct answer. If a problem seems too easy, it probably is more involved then it seems at first.

In this problem, start with 100 to keep things simple.

1st: Let's increase 100 by 25% -- 100 + (.25)(100) = 125

2nd: Let's decrease 125 by 20% -- 125 - (.20)(125) = 125 - 25 = 100

Finally: What percentage of 100 is 100? 100%, Choice B.

58) Answer: E Subject Area Tested: Special Word Problem

1st: Set-up the following proportion: (Ratios and Proportions)

$$\frac{\text{dogs}}{\text{dogs + cats}} \quad \frac{5}{8} = \frac{x}{160}$$

2nd: Cross-multiply and solve for X:

8X = 800 X = 100, Choice E

59) Answer: B Strategy to Use: Substitute Numbers for Letters

To solve, let's substitute the numbers 2 and 3 for the consecutive, positive integers. Therefore, the sum of the consecutive positive integers is 5 (2+ 3 = 5). Now, substitute 5 for X in each of the answer choices. The correct answer will yield a value of 2, the value of the smaller integer.

(A) X/2 - 1 = 5/2 - 1 = 3/2 ------- Eliminate

(B) X/2 – 1/2 = 5/2 – 1/2 = 4/2 = 2 ------- Correct!

60) Answer: C Subject Area Tested: Inequalities

We are told: $-3x + 6 \geq 18$

$-3x \geq 12$ (subtract 6 from both sides)

$x \leq -4$ divide both sides by -3

Remember to reverse the inequality symbol when dividing by a negative number. The correct answer is C.