Detailed Solution Model Test I
General Study Paper II

1. (b) suggest more careful evaluation of a type of business investment (Because investment in service might not lead to any advanage as suggested by the example of the bank)

2. (c) basis on which they need to be weighed (Because "Investments in service, like those in production and distribution, must be balanced against other types of investments")

3. (a) It enabled the bank to retain customers at an acceptable rate (Because the regional bank invested " in reducing the time a customer had to wait for a teller" and as such the bank was providing service reasonably which was acceptable to the customers)

4. (d) was an innovation that competing banks could have imitated (Because the last para tells that the bank did not analyze "their service improvement to determine whether it would attract new customers by producing a new standard of service that would excite customers or by proving difficult for competitors to copy")

5. (d) It provides an example of the point about investment in service made in the first paragraph (Because the first para tells that the investment in service might not be advantageous and in the second para he gives the example of one regional bank)
6. (b) emphasize the relatively low value of the investment in service improvement (Because the investment in service improvement did not prove to be advantageous to banks by way of acquiring new customers so the only advantage is that they can explain their service improvement to their existing customers)

7. (b) explaining two different kinds of immunological reactions (Because the first reaction is the typical "antigen-antibody immunological reaction") and the second reaction as suggested by para 2 is "cell-mediated immunity")

8. (d) antigens have no apparent mechanism to direct the formation of an antibody (Because "When molecular biologists discovered, moreover, that such information cannot flow from protein to protein, but only from nucleic acid to protein, the theory that an antigen itself provided the mold that directed the synthesis of an antibody had to be seriously qualified")

9. (d) is a partial explanation (Because the author does not discard this theory but goes on to discuss the second king of immunological reaction i.e., cell mediated immunity)

10. (c) destruction of antibodies (Because the second para tells that "the primary difficulty with the antigen-antibody explanation is the informational problem of how an antigen is recognized and how a structure exactly complementary to it is then synthesized" and the third para suggests that "Such lymphocytes do not give rise to antibody-producing plasma cells but themselves bring about the death of the foreign-tissue cells")

11. (a) I only (Because the third para tells that "Such lymphocytes do not give rise to antibody-producing plasma cells")

12. (b) proteins could have been shown to direct the synthesis of other proteins (Because "When molecular biologists discovered, moreover, that such information cannot flow from protein to protein, but only from nucleic acid to protein, the theory that an antigen itself provided the mold that directed the synthesis of an antibody had to be seriously qualified.")

13. (a) I only (Because the first para tells that "antigenic particles are engulfed by and very often digested by macrophages and polymorphs." and the third para tells that "Such lymphocytes do not give rise to antibody-producing plasma cells but themselves bring about the death of the foreign-tissue cells")

14. (b) explaining how cell mediation accounts for phenomena that the antigen-antibody theory cannot account for (Because the second para tells that "the theory that an antigen itself provided the mold that directed the synthesis of an antibody had to be seriously qualified" and then "realize that a second immunological reaction is mediated through the lymphocytes that are hostile to and bring about the destruction of the antigen")

15. (a) The Origins and Effects of Supernovas (Because the author starts with the origin of Supernova and then proceeds explaining the effects of Supernovas)

16. (c) about once every fifty years (Because "About twice every century" means once in 50 years)

17. (a) are caused by the collision of large galaxies (Because "one of the massive stars in our galaxy blows itself apart in a supernova explosion" collision of galaxy is not the reason for Supernova)

18. (a) Analogy (Because "The general picture that has been developed for the supernova explosion and its aftermath goes something like this" shows the use of analogy with some other phenomenon)

19. (c) include material not created in the normal development of our solar system (Because the use of anomalous in "Recent discoveries of meteorites with anomalous concentrations of certain isotopes")

20. (a) it is sometimes easier to detect supernovas by observation of the X-ray spectrum than by observation of visible wavelengths of light (Because "This gas will emit most of its energy at X-ray wavelengths, so it is not surprising that X-ray observatories have provided some of the most useful insights into the nature of the supernova phenomenon")
21. (d) An ordinary star exhausts its supply of nuclear fuel and begins to collapse (Because the first para tells that "Eventually the nuclear fuel is exhausted, and the pressure drops in the core. With nothing to hold it up, the matter in the center of the star collapses inward")

22. (b) an intermediate stage between an ordinary star and a supernova (Because the first para tells about the formation of neutron star from the ordinary star and the second para tells about the consequent formation of the supernova)

23. (d) describing the sequence of scientific events (Because the author has focused on the sequence of the formation of the supernova from the ordinary star)

24. Cannot say
The improvement is given in the passage as a percentage, and it is true to say that
the numbers of test-takers has increased (indeed, to record levels). However the passage does not tell us explicitly why the results have improved.

25. Cannot say
Some people have expressed concerns that the exams are getting easier, but no evidence of this notion is given in the passage.

26. Cannot say
This suggestion was made by the general secretary of the Association of Teachers
and Lecturers. Although the secretary of the University and College Union (Sally Hunt) defended the results, the passage does not explicitly tell us that Sally Hunt did
or did not state students are being spoon-fed to pass examinations (it might be implied she did not say this but it is not stated). For example she could have said this
at another time but we do not know for sure given just the information in the passage.

27. ‘The Great Stink’ occurred in London.
True

28. Cannot say
First of all the project referred to in the passage relates to developing countries,

whereas the statement is broad, about all people in general. So immediately we cannot say. But also we are told about developing countries that there are 1 billion
people who have no toilet and that “more than 50 million” toilets will be built – that is a
ratio of above 20 to 1.

29. True
The last sentence in the passage states that “This plan is part of the department’s
broader strategy to help poor countries in Africa and Asia...”.So if they have a strategy for a broader action, we can infer they intend to do more.

30. Step 1 - Put the 3 countries into a ratio
Austria (Quarter 4) : Portugal (Quarter 1): Greek (Quarter 4)
= 35,000: 28,000: 21,000
Step 2 – simplify the ratio (recognize that 7 is a common denominator)
5:4:3
Thus the correct answer is (D), 5:4:3

31. Tip: Notice that all the available answers have just one country, so we know that as soon as we have found one country that exceeded its target, we have the correct answer and we can move on.
Step 1 – Calculate the total unit sales for each country
Greece = 108,300
Portugal = 104,200
Austria = 105,800
Ireland = 102,400
Crotia = 105,200

Step 2 – Compare each total to the Yearly Target (Unit sales)
Targets are either 105,000 or 110,000.
Only Austria has exceeded its 105,000 target.
Thus the correct answer is (C), Austria

32. Step 1 – calculate this year’s average number of Portuguese units sold per quarter
(28,000 + 33,200 + 22,600 + 20,400) / 4 = 104,200 /4 = 26,050
Step 2 – calculate a 20% increase to get last year’s average number of Portuguese units
sold per quarter
26,050 x 1.2 = 31,260
Thus the correct answer is (B), 31,260

33. Step 1 – Calculate the Total value of Austrian unit sales
Total Austrian unit sales = 105,800

Total value of Austrian unit sales = 105,800 x €3.5 = €370,300
Step 2 - Calculate the corporation tax for the first €200,000 of Austrian unit sales
€200,000 x 22% = €44,000
Step 3 - Calculate the tax for sales exceeding €200,000
€370,300 - €200,000 = €170,300
€170,300 x 20% = €34,060
Step 4 – calculate the total tax
€44,000 + €34,060
Thus the correct answer is (D), €78,060

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Thus the correct answer is (D), €78,060

35. *The information that you need is shown in the table.*
Step 1 – Calculate the number of daily customers for each competitor, as shown below:

Per month	*4.2*	*2.2*	*4.5*	*3.1*	*2.4*
Per day (millions)	*/30 = 0.14*	*/30 = 0.073*	*/30 = 0.073*	*/30 = 0.103*	*/30 = 0.08*

These figures are in millions.
Thus the correct answer is (D), Competitors B and E

36. *The information that you need is shown in the table.*
Calculate the average number of staff per country of operation for each Competitor, as
shown below

	A	B	C	D	E
Staff / Countries of operation	*325,000/38*	*180,000/30*	*295,000/22*	*204,000/28*	***154,000/32***
	= 8,553	*= 6,000*	*= 13,409*	*= 7,286*	***= 4,813***

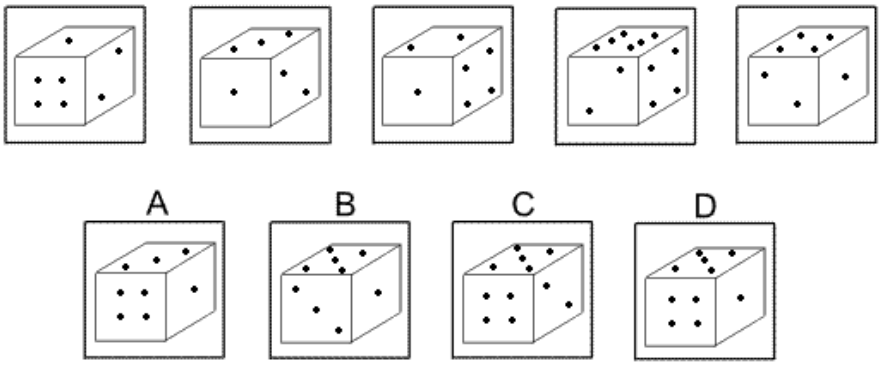
Thus the correct answer is (D), Competitor E

37. *The information that you need is shown in the graph.*
Step 1 – Calculate the total operating profits for Competitors B to E
45.4 + 56.5 + 42.9 + 42.7 = £187.5 million
Step 2 – Calculate operating profits for the entire sector
187.5 ÷ 0.85 = 220.6 million.
Step 3 – Calculate other companies' operating profits
220.6 x 15% = 33.09 million = £33 million approx.
Thus the correct answer is (C), £33 million

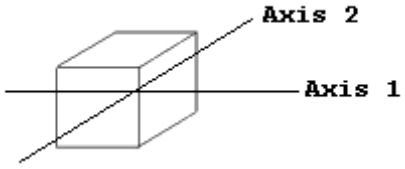
38. *The information that you need is shown in the graph.*
Step 1 – Calculate the additional sales for Competitor B
52.5 x 8% = 4.20
Step 2 – Calculate the additional sales for Competitor A
57.4 x 7% = 4.02
Step 3 – Calculate the additional sales for Competitor C
68.2 x 4% = 2.73
Step 4 – Calculate the total sales
4.20 + 4.02 + 2.73 = 10.95
Step 5 – to the nearest £million
10.95 = £11 million
Thus the correct answer is (C), £11 million

39. *The information that you need is shown in the table.*
Calculate the average number of customers per country of operation for each Competitor
Competitor A = 4.2/38 = 0.111
Competitor B = 2.2/30 = 0.073
Competitor C = 4.5/22 = 0.205
Competitor D = 3.1/28 = 0.111
Competitor E = 2.4/32 = 0.080
Thus the correct answer is (A), Competitor A and Competitor D

40.

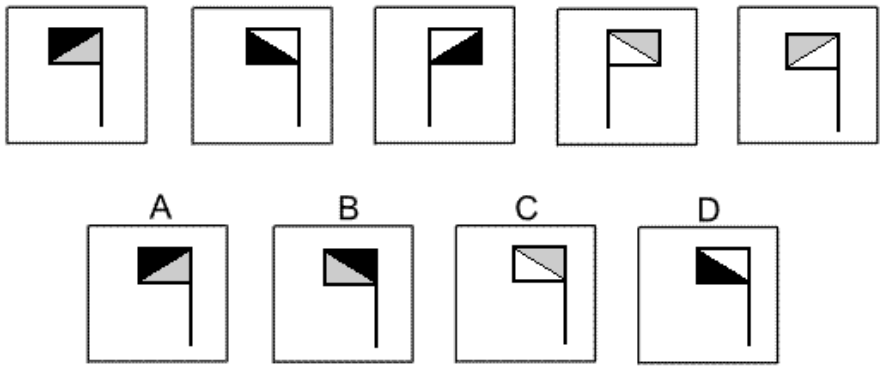


Solution: D
Explanation:
In this question there is a die with six faces containing 1,
2, 3, 4, 5 and 6 dots respectively.



The die is rotated by 90° anticlockwise about each of the two axes of symmetry shown in the diagram. These rotations are performed alternately - first a rotation about
Axis 1, then a rotation about Axis 2, then back to Axis 1, etc. Following these rules, the next rotation should be about Axis 1 and the correct answer is D. (Note that it can be deduced from the previous diagrams which faces of the die are opposite each other. This follows the simple rule that the numbers on opposite faces always add to 7.)

41.

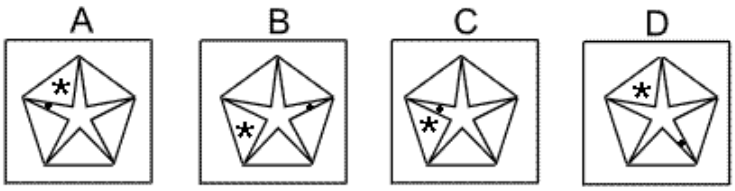


Solution: B
Explanation:
In this question there are two different designs of flag depending on which way the diagonal is
drawn. There are two rules to follow alternately.

The first rule is that the design of flag changes and at the same time the colours change -
black/grey changes to white/black, changes to grey/white, then back to black/grey etc.
The second rule is that the flag is reflected in the vertical axis. In this case the colours do not
change.
For the next diagram of the sequence, therefore, the first rule must be applied. We change to the
other design of flag and the colours change to black/grey. The correct answer, therefore, is B.

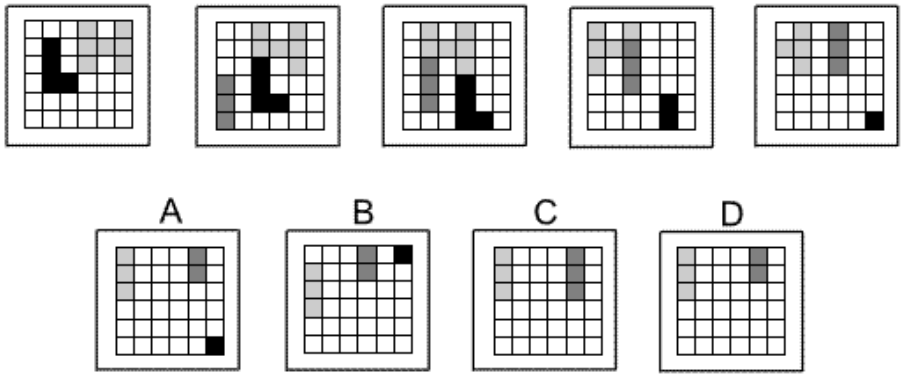
42.

Which of the following replaces the question mark in the sequence?



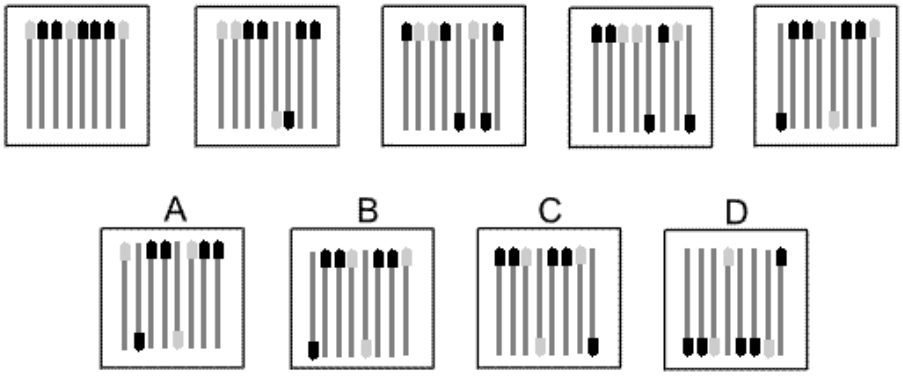
Solution: C
Explanation:
In this question there is a five pointed star inside a regular pentagon. There is also an asterisk
and a dot. The dot moves around the inside points of the five-pointed star, rotating by 72° clockwise each time.
The asterisk moves around the five triangles between the star and the regular pentagon and
rotates by 144° anticlockwise each time.
When both of these rules are applied simultaneously, the missing diagram of the sequence must
be C.

43.



Solution: D
Explanation:
In this question there is a grid of squares with a black L shape, a light grey H shape and a dark
grey I shape. Each time, the L shape moves right one place and down one place. Each time, the H shape moves to the left one place. Where the L intersects with the H, the black
colour of the L obscures the light grey of the H. Where the I intersects with the H, the dark grey of
the I obscures the light grey of the H. The I shape does not appear in the first diagram, but then moves one place right and one place up each time. When any of the shapes reach an edge of the grid, the parts that move off from the grid disappear.
Following these rules, the next diagram of the sequence must be D.

44.



Solution: A
Explanation:
In this question there are eight matchsticks of two different colours.
Each time, the middle two matchsticks are turned upside down and then the matchstick on the far
right is moved to the left.
When these two rules are applied simultaneously, the correct answer is A.

45. **a.** The middle letters are static, so concentrate on the first and third letters. The series involves an alphabetical order with a reversal of the letters. The first letters are in alphabetical order: F, G, H, I, J. The second and fourth segments are reversals of the first and third segments. The missing segment begins with a new letter.

46. **a.** This series consists of a simple alphabetical order with the first two letters of all segments: B, C, D, E, F, G, H, I, J, K. The third letter of each segment is a repetition of the first letter.

47. **d.** There are three series to look for here. The first letters are alphabetical in reverse: Z, Y, X, W, V. The second letters are in alphabetical order, beginning with A. The number series is as follows: 5, 4, 6, 3, 7.

48. **c.** A leopard, cougar, and lion all belong to the cat family; an elephant does not.

49. **b.** The couch, table, and chair are pieces of furniture; the rug is not.

50. **a.** The yarn, twine, and cord are all used for tying. The tape is not used in the same way.

51. **c.** A skein is a quantity of yarn; a ream is a quantity of paper.

52. **b.** To tailor a suit is to alter it; to edit a manuscript is to alter it.

53. **d.** A conductor leads an orchestra; a skipper leads a crew.

54. **a.** Jaundice is an indication of a liver problem; rash is an indication of a skin problem.

55. **b.** A cobbler makes and repairs shoes; a contractor builds and repairs buildings.

56. **e.** To be phobic is to be extremely fearful; to be asinine is to be extremely silly.

57. **b.** Valerie signed a legally binding document that requires her to pay a monthly rent for her apartment and she has failed to do this for the last three months. Therefore, she has violated her apartment lease.

58. **a.** Jake damaged Leslie's camera while it was in his possession and he has agreed to compensate Leslie for the cost of the repair.

59.**d.** This is the only situation in which someone makes an assumption that is not based on conclusive evidence. Choices **a** and **c** reflect situations in which assumptions are made based on evidence. In choice **b**, Mary is not assuming anything to be true. She is simply wishing that she'd made a different decision.

60.**d.** Choices **a**, **b**, and **c** do not describe situations in which a product is guaranteed. Only choice **d** reflects a situation in which a seller attests to the quality of a product by giving the buyer a promise or assurance about its quality.

61. **c.** Malcolm is the only person returning to a social system that he has been away from for an extended period of time.

62.**b.** The realtor is using a clear exaggeration when she states that a house which is eleven blocks away from the ocean is prime waterfront property.

63. **a.** The vice president's car cannot be red, because that is the CEO's car, which is in the first space. Nor can it be purple, because that is the treasurer's car, which is in the last space, or yellow, because that is the secretary's. The president's car must be blue, because it is parked between a red car (in the first space) and a green car, which must be the vice president's.

64. **c.** The CEO drives a red car and parks in the first space. Enid drives a green car; Bert's car is not in the first space; David's is not in the first space, but the last. Alice's car is parked next to David's, so Cheryl is the CEO.

65. **e.** Cheryl cannot be the secretary, since she's the CEO, nor can Enid, because she drives a green car, and the secretary drives a yellow car. David's, the purple car, is in the last space. Alice is the secretary, because her car is parked next to David's, which is where the secretary's car is parked.

66. c: Total area of disk
Ad = pi * r 2
Angle t in radians of central angle of red sector
t = (360-120)* pi / 180 = (4/3) pi
Area of red sector
As = (1/2) t * r 2
Percentage of total area in red
P = [(1/2) t * r 2] / [pi * r 2]
= 4 / 6 = 66.7% (3 significant digits)

67. b: Amy can travel clockwise or anticlockwise on the diagram.
Clockwise, she has no choice of route from A to B, a choice of one out of two routes from B to C, and a choice of one out of two routes from C back to A. This gives four possible routes.
Similarly, anticlockwise she has four different routes.
Total routes = 8

68. d: If we take AE as the base of triangle AEC, then the height is CD.
The height of the triangle is therefore, 9 (given).
To find the base we need to see that triangles AEB and CDE are similar. The ratio AB: CD, is therefore equal to the ratio AE: ED. The given information shows that the ratio is 3:9, or 1:3.
Now dividing AD (4) in this ratio gives us AE as 1.
The area of AEC = ½ base x height
=1/2 x 9 = 4.5

69. b: The marked angle, ABC must be more than 90 degrees because it is the external angle of triangle BDC, and must be equal to the sum of angles BDC (90) and DCB.
Also ABC is not a straight line and must be less than 180.
Therefore $90 < 5x < 180$
The only value of x which satisfies this relation is 20.

70. d: To determine for which of the five age groups in the options the projected percent

increase in population from 2000 to 2050 is greatest, estimate the ratio of the projection for the year 2050 to the population figure for 2000 for each age group. Each of the ratios described is equal to 1 plus the decimal corresponding to the projected percent increase in population from 2000 to 2050, so the greatest ratio will correspond to the greatest projected percent increase in population.

For the $30-39$ age group, the ratio is less than $\frac{60}{40}=1.5$, since the 2050 projected population is less than 60 million and the 2000 population is greater than 40 million. Thus the projected percent increase in population from 2000 to 2050 for this age group is less than 50 percent.

For the $40-49$ age group, the ratio is less than $\frac{50}{40}=1.25$, since the 2050 projected population is less than 50 million and the 2000 population is greater than 40 million. Thus the projected percent increase in population from 2000 to 2050 for this age group is less than 25 percent.

For the $50-59$ age group, the ratio is less than $\frac{50}{30}=1.6\overline{6}$, since the 2050 projected population is less than 50 million and the 2000 population is greater than 30 million. The projected percent increase in population from 2000 to 2050 for this age group is less than 66 percent.

For the $60-69$ year age group, the ratio is approximately 41 million to 20 million, or as a decimal, 2.05, corresponding to an approximate 105 percent increase in population for this age group.

For the $70-79$ year age group, the ratio is approximately 31 million to 16 million, or as a decimal, approximately 1.94, corresponding to an approximate 94 percent increase in population for this age group.

Therefore, the $60-69$ year age group has the greatest projected percent increase in population from 2000 to 2050 among the given options.

71 . d: Since line ℓ is perpendicular to the line segment with endpoints $(2, 0)$ and $(0, -2)$, the slope of line ℓ must be the negative reciprocal of the slope of the line segment. The line segment has slope $\frac{0-(-2)}{2-0} = 1$, so the slope of line ℓ equals $-\frac{1}{1} = -1$.

72 a: One way to determine the volume of the solid is to determine the length ℓ, width w, and height h of the solid, in centimeters, and then apply the formula $V = \ell wh$ to compute the volume. Let ℓ, w, and h represent the length, width, and height, in centimeters, respectively, of the solid. The area of the front face of the solid is $\ell h = 24$ square centimeters, the area of the side face is $wh = 8$ square centimeters, and the area of the bottom face is $\ell w = 3$ square centimeters. Elimination of h by using the first two equations gives $\frac{\ell h}{wh} = \frac{24}{8}$, which simplifies to $\frac{\ell}{w} = 3$, or $\ell = 3w$. Substitution of $3w$ for ℓ in the third equation gives $(3w)w = 3$, or $3w^2 = 3$, so $w = 1$ (since only positive values of w make sense as measurements of the length of any edge of a rectangular solid). Substitution of 1 for w in the equation $wh = 8$ gives $h = 8$, and substitution of 8 for h in the equation $\ell h = 24$ gives $8\ell = 24$, so $\ell = 3$. Therefore, the volume V of the solid, in cubic centimeters, is $V = (3)(1)(8) = 24$.

Alternatively, one can recognize that the square of the volume of a rectangular solid is the product of the areas of the front, side, and bottom faces of the solid. That is, squaring both sides of the formula $V = \ell wh$ gives $V^2 = \ell wh \cdot \ell wh = (lw)(hl)(wh)$. Therefore, in this case, $V^2 = (3)(24)(8) = 576$, so $V = \sqrt{576} = 24$. Note that it is not necessary to solve for the values of ℓ, w, and h.

73 c: The area of the shaded region can be found by subtracting the area of rectangle $ABCD$ from the area of the circle. To determine the area of the circle, first find the radius r, and then compute the area πr^2. Since rectangle $ABCD$ is inscribed in the circle, $\angle ABC$ is an inscribed right angle, and thus $\overline{AC}$ is a diameter of the circle. Applying the Pythagorean theorem to right triangle ABC ,one finds the length of side $\overline{AC}$ is $\sqrt{5^2+12^2}=\sqrt{169}=13$ Thus the radius of the circle is $\frac{13}{2}$, and the area of the circle is $\pi\left(\frac{13}{2}\right)^2=\frac{169}{4}\pi$. The area of rectangle $ABCD$ is $5\times12=60$, and therefore, the area of the shaded region is $\frac{169}{4}\pi-60\approx72.7$.

74. c: The correct answer is 1/2.
There are six numbers on a die: 1, 2, 3, 4, 5, and 6. There are three even numbers on the die: 2, 4, and 6. 3 out of six numbers are even. 3/6 reduces to 1/2.

75. a: The correct answer is 3/4.
A quick way of going about this problem is determining the probability that one of your friend's outcomes will appear. The probability of multiple events happening is equal to the product of the probability of each single event. The probability of flipping heads is 1/2, so the probability of flipping three heads in a row would be (1/2 * 1/2 * 1/2), or 1/8. The same thing occurs in the tails. (1/2 * 1/2 * 1/2) is equal to 1/8. The probability of your friend winning is 2/8, or 1/4. Subtract 1/4 from 1 to get 3/4, the probability of you winning

76. c: The correct answer was 1/5.
Even though the spinner just landed on 1, it doesn't change the outcome of the next spin. There is only one way to spin a 1, and there are five spots for the spinner to land on. The probability is 1/5

77. c: The correct answer was 1/64.
You have to flip heads five times in a row to win $1000. The probability of flipping heads once is 1/2, so the probability of flipping heads five times would be (1/2 * 1/2 * 1/2 * 1/2 * 1/2), or 1/32. However, the game is not over yet. In order to end the game, you must now flip tails. The probability of that is 1/2. 1/2 * 1/32 = 1/64.

78. b: The correct answer was 1/2.
A composite number is a number with more than two factors. We see that 4, 6, 8, 9, 10, and 12 are composite when we look at their factors. 6 out of the 12 numbers are composite. 6/12 simplifies to 1/2.

79. Since the answer doesn't depend on the value of x (the probability will be the same no matter what x is), let x = 1. Then the area of the whole square is 32 = 9. The area of each shaded triangle or of all the white sections can be calculated, but there's an easier way: notice that, if you slide the four shaded triangles

together, they form a square of side 1. Therefore, the total shaded area is 1, and so the shaded area is 1/9 of the total area and the probability that the chosen point is in the shaded area is 1/9 **(A)**.
The idea of subtracting a part from the whole works with line segments as well as areas.

80.

Solution. First use TACTIC 4 and draw some lines. Extend $\overline{AO}$ to form diagonal $\overline{AC}$. Then, since $\triangle ADC$ is an isosceles right triangle, $AC = 2\sqrt{2}$ (KEY FACT J8) and AO is half of that, or $\sqrt{2}$. Then draw in diameter $\overline{EF}$ parallel to $\overline{AD}$. Since the diameter is 2 ($EF = AD = 2$), the radius is 1. Finally, subtract: $AP = AO - PO = \sqrt{2} - 1$ **(E)**.