1 (B)

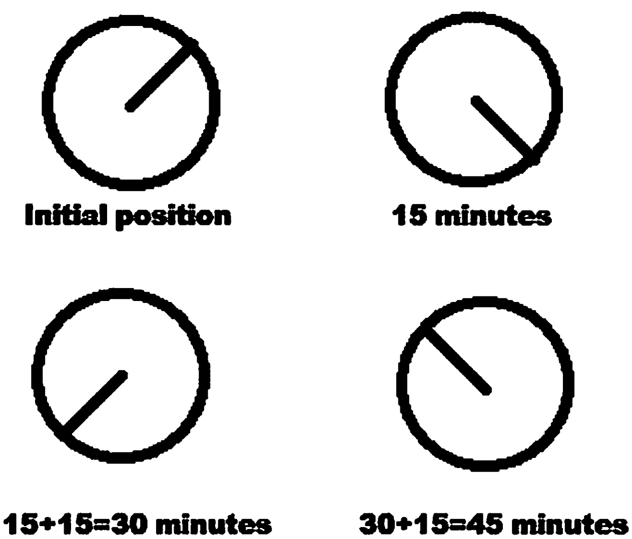
Since four chocolate bars are three more than one chocolate bar, the price difference of 6 dollars corresponds to three chocolate bars.

2 (D)

$11.11 - 1.11 = 10.00$, so $11.11 - 1.111 = 10.00 - 0.001 = 9.999$.

3 (A)

Every 15 minutes, the watch will move 90 degrees, or go to a new direction. In 15 minutes it will go from northeast to southeast, in another 15 it will go from southeast to southwest, and in a third interval of 15 minutes it will go from southwest to northwest. So, in all, it will take 45 minutes for the minute hand of the watch to point northwest.



4 (E)

The O can only be cut into two different pieces. The F, S, and H can each be cut so that they fall apart into at most four pieces, and the M can be cut so that it falls apart into five pieces.

5 (C)

Each time a head is chopped off, one is removed and five are added, so that the total change is the addition of four new heads. If five heads are there to begin with, and $4 \times 6 = 24$ new heads are added in this way, then 29 heads will be the final number.

6 (E)

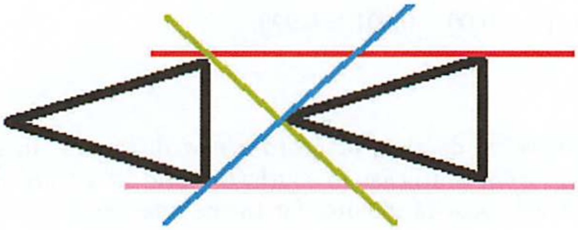
In the expression corresponding to E, we have the form: $(X + X - X) : X = X : X = 1$. This means that for any number given, the expression will be equal to 1.

7 (C)

If Ann starts at A and ends at B, then she must only travel along one of the two paths touching A, and only one of the two paths touching B, or else she will either not make it to her destination, or have to retrace her steps. With two paths eliminated in this way, seven remain for her to cross in a variety of different ways. Since each path is 100m long, the total length of a longest possible route is $100 \times 7 = 700$m.

8 (D)

There are four different ways. One could either choose the top right vertex of each triangle, the bottom right vertex of each triangle, the top right vertex of the left-hand triangle and the left vertex of the right-hand triangle, or the bottom right vertex of the left-hand triangle and the left vertex of the right-hand triangle. Any other combination of two vertices will either be on the same triangle, or determine a line which crosses through one or both triangles.



9 (D)

Figure D is the only figure which would require four straight cuts to make, given that the piece of paper has been folded over just once.

10 (D)

We are shown two white pieces, and must determine the locations of two more to solve this problem. Since the black piece must have four cubes, and only three are shown, the fourth one must be below the right-hand white cube shown. This means that one of the white cubes must be below the left-hand white cube shown, as this is the only cube touching either of the white cubes shown that is not necessarily taken by another cube. Since we are also shown four dark grey cubes, the last white cube must be below the gray cube which only has its top face visible, since this is the only space not accounted for by this point.

11 (C)

To minimize the sum of the two numbers, the 1 and 2 digits need to be used in the thousands places of the two numbers being summed, the 3 and 4 in the hundreds places, the 5 and 6 in the tens, and the 7 and 8 are left over for the ones places. Since addition is commutative, the specific combinations of numbers do not matter. Any numbers of the from $abcd$ work, where $a = 1$ or 2, $b = 3$ or 4, $c = 5$ or 6, and $d = 7$ or 8.

12 (C)

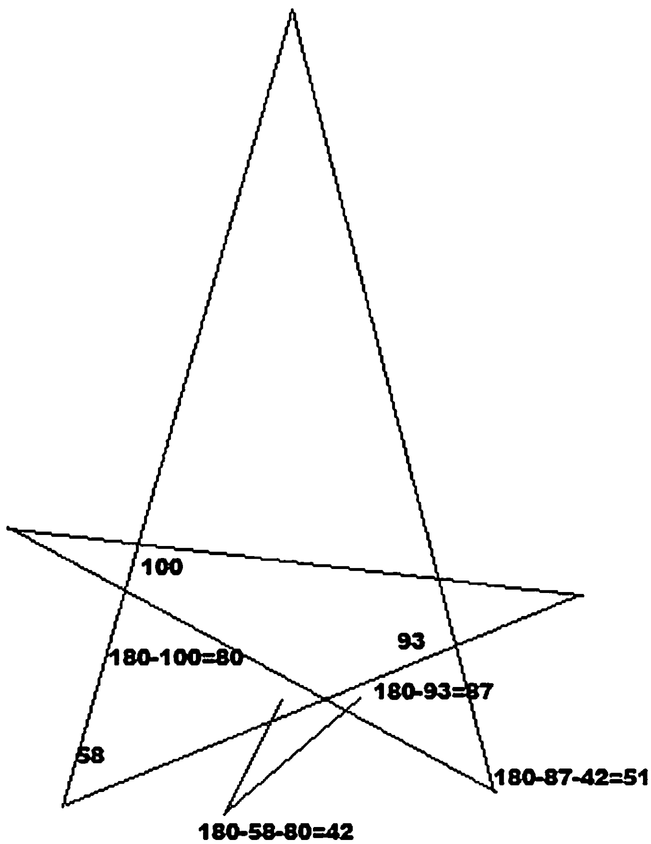
The diagram in this problem is misleading and purposely not drawn to scale. Since we are given that the area of the strawberry bed has been reduced by 15 square meters by having one of the sides shortened by 3 meters, we know that the length of the other side must be $15/3 = 5$ meters. This length is also the length of one of the sides of the square which is the pea bed in this current year. Since the pea bed has been lengthened by three meters this year, in the previous year it measured 5 meters by $5 - 3 = 2$ meters, which would have made its area equal to $5 \times 2 = 10$ square meters.

13 (B)

If we call the three inserted numbers a, b, and c, respectively, then we know the following facts about them: $10+a+b = 100$, so $a + b = 100 - 10 = 90$, $a + b + c = 200$, and $b + c + 130 = 300$, so $b + c = 300 - 130 = 170$. To solve the problem, we need to combine the various equations. For example, since $a + b = 90$, and $a + b + c = 200$, we know that c alone must be equal to 110, since when you subtract $a + b$ from $a + b + c$, you also subtract 90 from the 200 that it is equal to. If c is equal to 110, then $b + c = 170$ means that $b = 170 - 110 = 60$.

14 (C)

To solve this problem, one must recognize that the supplement of 100 degrees is 80 degrees, and that this is the measure of one of the angles of the triangle which has one angle equal to 58 degrees. Therefore, the third angle in this triangle must measure $180 - 80 - 58 = 42$ degrees. Because vertical angles have the same measure, the triangle containing angle x will also have one angle measuring 42 degrees. Since we can also see that it will contain 87, the supplement to 93 degrees, we can figure out that x is $180 - 87 - 42 = 51$ degrees.



15 (C)

Since it is true that the number 7 is prime, odd, and divisible by 7, the only phrase which can be on the back of the card which has 7 on one side is “greater than 100.”

16 (D)

Since the perimeters are the same, we can look at one of the long edges of the remaining hexagon, and compare it to two of the three edges of one of the small triangles, since there are 3 such long edges, which must be equal to 6 small edges of the triangles. (The other smaller edges of the hexagon cancel out one edge on each of the small triangles, since they are the same edges used in both figures.) Since this tells us that two small edges of one white triangle are equal to one big gray edge of the hexagon, we know that the original triangle had edges equal to 2 white edges plus a gray edge, or also equal to 2 white edges plus (a gray edge is 2 white edges) = 4 white edges, which was equal to 6cm. Therefore, one white edge, which is the side length of a small triangle, is $6/4 = 1.5$cm.

17 (C)

The largest number of mice is 6. To see this, note that three of the mice could have stolen 5, 7, and 9 pieces of cheese without one having stolen twice the number as any other. Two mice cannot have stolen both 3 and 6 pieces of cheese, but one might have stolen 3 (or perhaps 6). Considering 1, 2, 4, and 8 pieces of cheese, if any *three* of these numbers of pieces of cheese were stolen, then one mouse would have stolen twice as many pieces as another. However, two of these numbers of pieces of cheese could have been stolen (1 and 4, 1 and 8, or 2 and 8). This gives a maximum of six different numbers of pieces of cheese that could have been stolen.

18 (E)

Anne has a total speed of $6 + 4 = 10$km/hour, which is two-and-a-half times faster than Bill, who only has a speed of 4km/hour. This means that Bill only covers 40 percent of the distance that Anne does in a given period of time. This means that when Anne has covered 500 meters, Bill has only covered $500 \times (40/100) = 200$ meters, leaving him $500 - 200 = 300$ meters behind Anne.

19 (D)

If a square's perimeter is doubled, then each of the side lengths must be doubled. To achieve the maximum final perimeter, the two doublings from lying must come first, and the two true statements must follow, to shorten each side by 4cm. So, after quadrupling and then shortening each side by 4cm, we have a final length of $8 \times 4 - 4 = 28$cm. This means that the square, which has 4 sides, has a total perimeter of $28 \times 4 = 112$cm.

20 (B)

If one views the cube from directly above, with the top of the page being "north" and the bottom "south," then the first two flips, from 1 to 2, and from 2 to 3, flip the cube upside-down. Flipping it from 3 to 4 then turns it on its side so that the face which was originally pointing vertically up is flipped from pointing vertically down to pointing "south." The flip from 4 to 5 simply rotates this face, so that when it is flipped from position 5 to position 6, it is pointing vertically up again. Therefore, if the same face was pointing vertically up in positions 1 and 6, then the same face, which is opposite of the one pointing vertically up, must have been occupying both of these positions.

21 (E)

Let h be the height of the smallest cube, so that the five cubes have heights h, $h + 2$, $h + 4$, $h + 6$, and $h + 8$. From the conditions of the problem, we must have $h + h + 2 = h + 8$, so that $h = 6$. Thus, the tower made from all five cubes is $6 + 8 + 10 + 12 + 14 = 50$ cm tall.

22 (D)

Since the triangles ABC and ADC are reflections of each other over the line AC, they are equal in area, and since the triangles DMC and AMC both have base length equal to $AD/2$ and height equal to DC, they are also equal in area. This means that the fraction of space which triangle CMN occupies in triangle AMC is one-fourth of the fraction of the space which it occupies in the entire square, since triangle AMC is a half of a half of the entire square. Since MN is perpendicular to AC, we know that N must be quarter of the way to C, since if M were at D, N would be at the center of the square, and M is only halfway to D, so N must be only halfway to the center from A. Thus, if we rotate triangles AMN and CMN 45 degrees clockwise and compare them, we see that they have the same height, and that CMN has a base length three times greater than AMN. This means that triangle CMN takes up three quarters of the area of triangle AMC. Therefore, it takes up $(3/4)/4 = 3/16$ of the area of the entire square.

23 (B)

If we say that the number of men is equal to M and the number of women is equal to W, then we know that $M + W$ is less than or equal to 50. We also know that $3M/4 = 4W/5$, or that $M = 16W/15$. This means that for every 15 women, there are 16 men. Since people cannot be paired up in fractions, there must be some multiple of 31 people at the dance. 31 is therefore the number of people at the dance, since 62, 93, or any other multiple of 31 is greater than 50. This means that there are 16 men and 15 women. If there are $3/4 \times 16 = 12$ men dancing, then there must also be 12 women dancing. This means that there is a total of 24 people dancing.

24 (D)

Begin by considering the number 1. It must be the case that 3 and 4 are on either side of 1 given the conditions of the problem – it doesn't matter in which order, so assume that reading clockwise we have 4, 1, 3. Now 2 must be next to both 4 and 5, so this gives us the arrangement 5, 2, 4, 1, 3. Proceeding in this fashion, we see that the only arrangement of numbers which works (starting at 1, and going either direction through the other 11) is: 1, 3, 6, 8, 11, 9, 12, 10, 7, 5, 2, 4.

25 (D)

The numbers which have the described property are numbers whose middle digit is both the first and second digit of two-digit numbers which are perfect squares. All of the two-digit perfect squares are: 16, 25, 36, 49, 64, and 81. Therefore, the only three-digit numbers with the described properties are: 164, 364, 649, and 816. The sum of these four numbers is 1993.

26 (E)

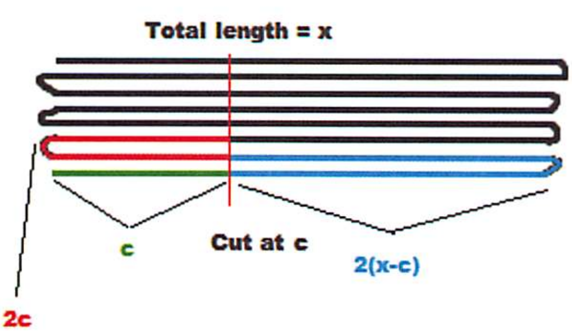
If the first story starts on the first page and has an even number of pages, then the second story will also start on an odd-numbered page, and so on for each next story, as long as the one before it had an even number of pages. In this way, the first 16 stories can each start on an odd-numbered page, by having the first 15 stories being even numbers of pages long, and the 16th starting and ending on an odd-numbered page. After this, the stories will alternate beginning on even- and odd-numbered pages, meaning that stories number 17, 19, 21, 23, 25, 27, and 29 will NOT begin on odd-numbered pages. Since 7 out of 30 stories do not begin on odd-numbered pages, the remaining 23 can begin on odd-numbered pages in the way just described.

27 (B)

If we denote the first position as zero degrees of rotation, then the first few positions will be: 0 degrees, 3 degrees, $3+9=12$ degrees, $3+9+27=39$ degrees, $3+9+27+81=120$ degrees, $3+9+27+81+243=363$ degrees, and so on. If two positions are off by any multiple of 120 degrees, such as positions 1 and 5, or 2 and 6, then they are the same. The first 4 positions are considered unique, because none of the positions are greater than 60, preventing them from being integer multiples of 60. (Zero does not count, as it is the first position, and is considered unique). After these 4 initially unique positions, there are no more unique ones, since adding any higher multiple of 3 degrees is just like adding one of the smaller numbers of degrees. For example, 243 is just $240+3$, and since 240 is 4×60, the 240 does not count, and this movement is just like adding 3 degrees. This means that the rotations end up forming a pattern, where the actual rotation seen (in degrees) is +3, +9, +27, +81 (or −39), +3, +9, +27, +81 (or −39), +3, +9, +27, +81 (or −39), +3, +9, +27, +81 (or −39), ..., and so on.

28 (C)

If the rope was folded three times, then its length was decreased by a factor of 8, into a coil of length x, which was then cut at some spot which was a distance of c away from the end with the loose ends of the rope and a distance of $x-c$ away from the other. Because of the coiling, the lengths of rope which could have resulted from this are c, $2c$, and $2(x-c)$. By considering the possible combinations of two of these four numbers for various original rope lengths, we can rule out the impossible length. For case A, an original rope length of 52 would lead to a coil of length 6.5m. This means that if the rope was cut 2 meters from one end, ($c=2$ and $x-c=4.5$), it would result in pieces of length 2m, 4m, and 9m, which is allowed, since both 4m and 9m lengths of rope appear. For case B, a 68m rope would make a coil of length 8.5m. This could be cut 4 meters away from one side so that $c=4$ and $x-c=4.5$. This would give rope lengths of 4m, 8m, and 9m. This situation is also allowed. For case C, the coil would have to be of length 9m, for which there is no c which gives rope strands of the appropriate lengths. For case D, the coil would be 11m long, and a situation where $c=9$, and $x-c=2$, would lead to rope lengths of 4m, 9m, and 18m, which is allowed.



29 (C)

If one takes the sum of the perimeters of the three quadrilaterals (25cm) and adds to it the perimeter of the four triangles, (20cm) and then subtracts the perimeter of the whole triangle, (19cm) then one is left with double the sum of the lengths of the three straight line segments, which is $20 + 25 - 19 = 26$cm. Therefore, the sum of the lengths of the three straight line segments is 13cm.

30 (A)

First, look at the product of the sixteen numbers in the four 2×2 squares. This product – which is $2^4 = 16$ – uses the corners once each, the edge squares twice each, and the center square four times. Since the product of all the numbers in the square is 1 (consider the three rows), this means the product of the four edge squares with the center square three times is also 16. But the product of the middle column and the middle row is *also* 1, and therefore the center square must be 16.