**1.** 100 students appeared for two examinations. 60 passed the first, 50 passed the second and 30 passed both. Find the probability that a student selected at random has failed in both the examinations?

|  |  |
| --- | --- |
| a. 1/5 | b. 5/6 |
| c. 1/7 | d. 5/7 |

Answer: a  
Explanation:  
n(A∪B)n(A∪B) = n(A)n(A) + n(B)n(B) - n(A∩B)n(A∩B)  
n(A∪B)n(A∪B) = 60 + 50 - 30 = 80  
So 80 passed in atleast one of the exams. 100 - 80 = 20 failed in both.  
Probability = 20/100 = 1/5  
  
**2.** What is the greatest power of 143 which can divide 125! exactly

|  |  |
| --- | --- |
| a. 12 | b. 11 |
| c. 8 | d. 9 |

Answer: d  
Explanation:  
143 = 11 × 13.  So highest power of 13 should be considered in 125!.

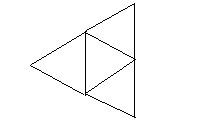
[http://3.bp.blogspot.com/-QT9SyI6LPv4/VfES2bSIkMI/AAAAAAAAN5g/mIrGtlPzdFM/s1600/Untitled1.png](http://3.bp.blogspot.com/-QT9SyI6LPv4/VfES2bSIkMI/AAAAAAAAN5g/mIrGtlPzdFM/s1600/Untitled1.png)

Highest power of 11 in 125! is 12 but highest power of 13 is only 9. That means, 125!=1112×139×....1112×139×....  
So only nine 13's are available. So we can form only nine 143's in 125!. So maximum power of 143 is 9.  
  
**3.** Three containers A, B and C are having mixtures of milk and water in the ratio of 1:5, 3:5, 5:7 respectively.  If the capacities of the containers are in the ratio 5:4:5, find the ratio of milk to water, if all the three containers are mixed together.

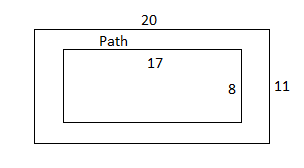
|  |  |
| --- | --- |
| a. 53:115 | b. 53:113 |
| c. 54:115 | d. 54:113 |

Answer: a  
Explanation:  
Weighted average rule can be applied = 5×16+4×38+5×5125+4+55×16+4×38+5×5125+4+5 = 5316853168  
So milk and water concentration = 53 : (168 - 53) = 53 : 115

4. The sticks of same length are used to form a triangle as shown below.If 87 such sticks are used then how many triangles can be formed?



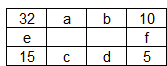
Explanation:  
First triangle is formed by using 3 sticks, but any subsequent triangle may be formed by using 2 sticks.  Therefore, If 1st triangles uses 3 sticks, Remaining sticks = 87 - 3 = 84.  With these 84, we can form 42 triangles. So total = 42 + 1 = 43  
**Shortcut:**  
To solve questions like these, use formula, 2n + 1 = k.  Here n = triangles, k = sticks  
2n+1 = 87 ⇒⇒ n = 43.  
  
5. 17 × 8 m rectangular ground is surrounded by 1.5 m width path. Depth of the path is 12 cm. Gravel is filled and find the quantity of gravel required.  
a. 5.5  
b. 7.5  
c. 6.05  
d. 10.08  
Explanation:



Area of the rectangular ground = 17×8=136m217×8=136m2  
Area of the big rectangle considering the path width = (17+2×1.5)×(8+2×1.5)=220m2(17+2×1.5)×(8+2×1.5)=220m2  
Area of the path = 220−136=84m2220−136=84m2  
Gravel required = 84m2×12100m=10.08m384m2×12100m=10.08m3

6.  Assume that f(1)=0 and f(m+n)=f(m)+f(n)+4(9mn-1).  For all natural numbers (Integers>0)m and n.  What is the value of f(17)?   
a. 5436  
b. 4831  
c. 5508  
d. 4832  
Explanation:  
f(1) = 0  
f(2) = f(1+1) = f(1)+f(1)+4(9×1×1 – 1) = 0+0+4×8 = 32  
f(4) = f(2+2) = f(2)+f(2)+4(9×2×2 – 1) = 32+32+4×35 = 204  
f(8) = f(4+4) = f(4)+f(4)+4(9×4×4 – 1) = 204+204+4×143 = 980  
f(16) = f(8+8) = f(8)+f(8)+4(9×8×8 – 1) = 980+980+4×575 = 4260  
f(17) = f(1+16) = f(16)+f(1)+4(9×16×1 –1) = 4260+0+ 4×143 = 4832

7. In the given figure, If the sum of the values along each side is equal. Find the possible values a, b, c, d, e, and f.

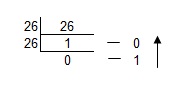


a. 9, 7, 20, 16, 6, 38  
b. 4, 9, 10, 13, 16, 38  
c. 4, 7, 20, 13, 6, 38  
d. 4, 7, 20, 16, 6, 33  
Correct option: c  
Explanation:  
From the above table, 42 + a + b = 47 + e.  Therefore,  a + b = 5 + e.  Option a, b ruled out.  
47 + e = 15 + f.   Therefore, 32 + e = f. Option d ruled out.  
4 men throw a die each simultaneously. Find the probability that at least 2 people get the same number  
a. 5/18  
b. 13/18  
c. 1/36  
d. ½

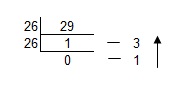
Star mark question:

8. In particular language if A=0, B=1, C=2,…….. ..     , Y=24, Z=25 then what is the value of  ONE+ONE (in the form of alphabets only)

a. BDAI     
b. ABDI     
c. DABI     
d. CIDA  
Answer: a  
Explanation:  
This problem is based on Base 26 rather than regular base 10 (decimal system) that we normally use.  In base 10 there are 10 digits 0 to 9 exist.  In base 26 there are 26 digits 0 to 25 exist.  To convert any number into base 26, we have to divide the number with 26 and find the remainder. ([Study this Base system chapter](http://www.campusgate.co.in/2012/09/base-system.html)).  
Here, ONE + ONE =  
E has value of 4. So E + E = 8 which is equal to I.  
Now N + N = 13 + 13 = 26.  But in base 26, there is no 26.  So *[Math Processing Error](26)10=(10)26*

[](https://2.bp.blogspot.com/-Q9fNjY6T3IA/VtphP_2N1eI/AAAAAAAAUF8/xWvzCBMas94/s1600/base1.jpg)

So we put 0 and 1 carry over. But 0 in this system is A.  
Now O + O + 1 = 14 + 14 + 1 = 29

[](https://3.bp.blogspot.com/-erzPatkE0i0/VtphrV2zYmI/AAAAAAAAUGA/s0m2u-l5Qds/s1600/base1.jpg)

Therefore, *[Math Processing Error](29)10=(13)26*  
But 1 = B and 3 = D in that system. So ONE + ONE = BDAI

9. Find the number of perfect squares in the given series 2013, 2020, 2027,................, 2300  (Hint 44^2=1936)

a. 1    
b. 2     
c. 3    
d. Can’t be determined  
Answer: a  
Explanation:  
The given series is an AP with common difference of 7. So the terms in the above series are in the form of 2013 + 7k.  We have to find the perfect squares in this format in the given series.  
Given that 44^2 = 1936.  
Shortcut: To find the next perfect square, add 45th odd number to 44^2.  
So 45^2 = 1936 + (2 x 45 -1) = 2025  
46^2 = 2025 + (2 x 46 - 1) = 2116  
47^2 = 2116 + (2 x 47 - 1) = 2209  
Now subtract 2013 from the above numbers and divide by 7. Only 2209 is in the format of 2013 + 7k.  One number satisfies.

10.  What is in the 200th position of 1234 12344 123444 1234444....?

Answer: 4  
Explanation:  
The given series is 1234, 12344, 123444, 1234444, .....  
So the number of digits in each term are 4, 5, 6, ... or (3 + 1), (3 + 2), (3 + 3), .....upto n terms = *[Math Processing Error]3n+n(n+1)2*  
So *[Math Processing Error]3n+n(n+1)2≤200*  
For n = 16, We get 184 in the left hand side. So after 16 terms the number of digits equal to 184.  And 16 them contains 16 + 3 = 19 digits.  
Now 17 term contains 20 digits and *[Math Processing Error]123444......4⏟17times*.  So last digit is 4 and last two digits are 44.

11. 2345 23455 234555 234555........... what was last 2 numbers at 200th digit?

Answer: 55  
Explanation:  
Proceed as above.  The last two digits in the 200th place is 55.

12. There are equal number of boys and girls in a class. If 12 girls entered out, twice the boys as girls remain. What was the total number of students in a class?

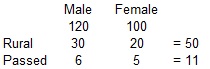
Answer: 48  
Explanation:  
Let the boys = b and girls = g  
Given *[Math Processing Error]bg−12=21*  
Substitute b = g in the above equation. g = 24. So total students = 24 + 24 = 48

13. a bb ccc dddd eeeee .........What is the 120th letter?

Answer: O  
Explanation:  
Number of letters in each term are in AP. 1, 2, 3, ...  
So *[Math Processing Error]n(n+1)2≤120*  
For n = 15, we get LHS = 120. So 15th letter in the alphabet is O. So 15th term contains 15 O's.

14. There are 120 male and 100 female in a society. Out of 25% male and 20% female are rural. 20% of male and 25% of female rural people passed in the exam. What % of rural students have passed the exam?

Answer: 22%  
Explanation:

[](https://4.bp.blogspot.com/-l5L9OyrrwQw/Vtpq4xfTOsI/AAAAAAAAUGg/BREar92mzrw/s1600/base1.jpg)

From the above data, Rural male = 25%(120) = 30, Rural female = 20%(100) = 20.  
Passed students from rural: male = 20%(30) = 6, female = 25%(20) = 5  
Required percentage = *[Math Processing Error]1150×100=22%*

15. 1/7 th of the tank contains fuel. If 22 litres of fuel is poured into the tank the indicator rests at 1/5th mark. What is the quantity of the tank?

Answer: 385  
Explanation:  
Let the tank capacity = *[Math Processing Error]v* liters.  
Given, *[Math Processing Error]v7+22=v5*  
*[Math Processing Error]v5−v7=22⇒v=385*

16. What is the probability of getting sum 3 or 4 when 2 dice are rolled

Answer: 5/36  
Explanation:  
Required number of ways = (2, 1), (1, 2), (1, 3), (3, 1), (2, 2) = 5  
Total ways = *[Math Processing Error]62=36*  
Probability = *[Math Processing Error]536*

17. On the fabled Island of Knights and Knaves, we meet three people, A, B, and C, one of whom is a knight, one a knave, and one a spy. The knight always tells the truth, the knave always lies, and the spy can either lie or tell the truth.A says: "C is a knave."B says: "A is a knight."C says: "I am the spy."Who is the knight, who the knave, and who the spy?

Answer:  
Explanation: A= Knight, B= Spy, C = Knave  
Let us say A is Knight and speaks truth.  So C is Knave and B is spy. So C's statement is false and B's statement is true.  This case is possible.  
Let us say B is Knight. This is not possible as A also becomes Knight as B speaks truth.  
Let us say C is Knight. This is clearly contradicted by C's statement itself.