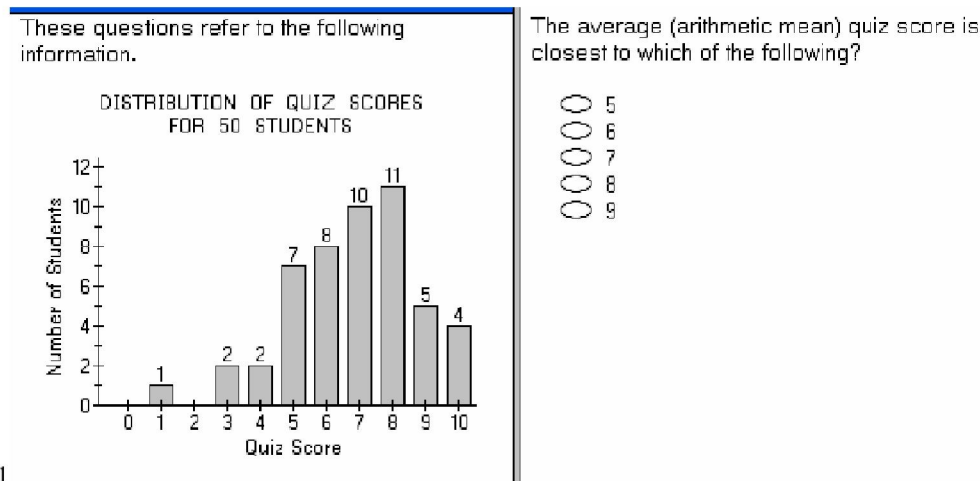


【尚友制作】数学猴哥难题 112 讲解 31-40

NO 31



31

@C

解答：average quiz score = total quiz score / total number of students = $\text{sum}(\text{score} * \text{number of student get that score}) / \text{total number of students}$
 $= (1*1 + 3*2 + 4*2 + 5*7 + 6*8 + 7*10 + 8*11 + 9*5 + 10*4) / 50 = 345 / 50 = 6.9$

最接近 7 选 C

NO 32

From the set of 6 letters A, B, C, D, E, and F, there are 20 different 3-letter subsets that could be selected.

Column A

Column B

The number of 3-letter subsets that include the letter F

10

32

@C

解答：ABCDEF 的三项子集，包括 F，也就是说在 ABCDE 中 任选两个，有多少种组合

$$nC_r = \frac{5!}{2!3!} = 10$$

解释：第一个字母有 5 种可能性，第二个有 4 种（因为已经选走一个），但是 AB 和 BA 是一样的，要去掉重复的可能性，所以除以 2

因此，答案是 10，选 C

NO 33

These questions refer to the following information.

Thirty hospital patients who had been treated for the same illness were given a new treatment in a research study. They were then asked to evaluate whether five symptoms, H , L , P , T , and V , were made better or worse by the new treatment compared to the old treatment. For each symptom, each patient used one of five ratings:

- 2: much better
- 1: somewhat better
- 0: neither better nor worse
- 1: somewhat worse
- 2: much worse

For each symptom, the sum and standard deviation of the ratings are listed below.

Symptom	Sum of 30 Ratings	Standard Deviation of 30 Ratings
H	12	1.40
L	35	0.69
P	-33	0.79
T	-26	0.43
V	2	0.89

RATINGS FOR SYMPTOM H

Rating	2	1	0	-1	-2
Number of Patients	7	12	r	s	t

In the Ratings for Symptom H table shown, which of the following could be r , s , and t , respectively?

- ☐ 0, 7, 6
- ☐ 1, 1, 9
- ☐ 1, 10, 4
- ☐ 2, 19, 0
- ☐ 2, 4, 5

@E

由图二可知，

$$\text{sum of 30 rating} = 12$$

$$\text{所以 } \text{sum of 30 rating} = 2*7 + 1*12 + 0*r + (-1)*s + (-2)*t$$

$$\text{所以 } s + 2t = 14$$

已经可以把 A,B,C,D 排除了。。所以答案就是 E

如果要 check 的话，还有两个条件

$$1. \text{ total 人数是 } 30, \quad 7+12+r+s+t=30$$

$$\text{所以 } r+s+t=11$$

$$2. \text{ SD}=1.4$$

$$\text{这个就要涉及 Expectation} = 12/30 = 0.4$$

SD=根号 variation

$$\text{variation} = \sum (p * (x - E)^2)$$

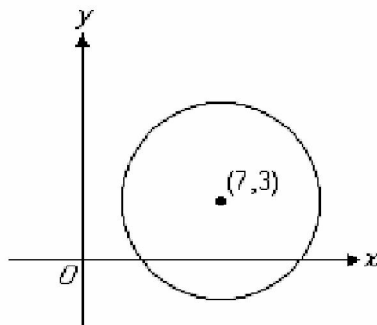
$$1.96 = 7/30 * (2 - 0.4)^2 + 12/30 * (1 - 0.4)^2 + r/30 * (0 - 0.4)^2 + s/30 * (-1 - 0.4)^2 + t/30 * (-2 - 0.4)^2$$

可得出一个关于 r , s , t 的等式。结合上述条件，和解出 r , s , t 的值

但是在这道题中，只要知道 sum of 30 rating 就可以作出正确答案了

NO 34

~



If $(7, 3)$ is the center of the circle, then the radius of the circle could be equal to which of the following?

- ☐ 2
- ☐ 3
- ☐ 5
- ☐ 7
- ☐ 9

34

@C

这个图，我们可以看到。从横向上来说，半径小于 7
从纵向上来说，可以看到 半径大于 3
所以半径就是 5

选 C

NO 35

If $x + 2y = 2$ and $(x + y)^2 = 9$, which of the following is a possible value of y ?

☐ -8

☐ -5

☐ $-\frac{3}{2}$

☐ $\frac{3}{2}$

☐ 5

35

@E

从二式可知 $x+y = +3$ or -3

$x+2y=x+y+y = 2$

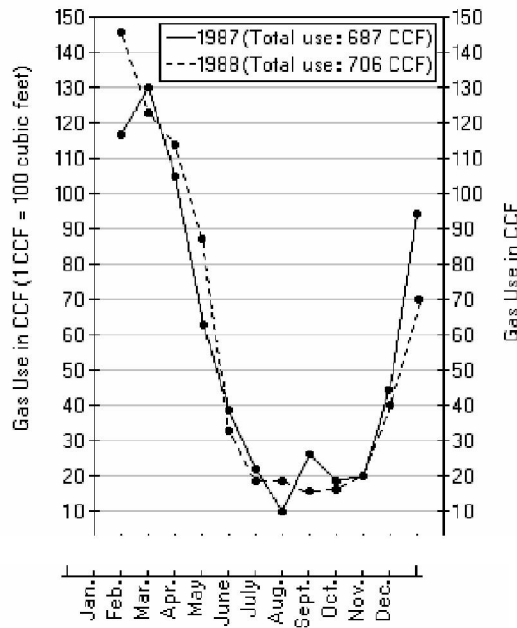
所以 $y=-1$ or 5

选择 E

NO 36

These questions refer to the following graph, which is drawn to scale.

A HOUSEHOLD'S MONTHLY GAS USE FOR 1987 AND 1988



In what month was gas use in one of the years nearly double that for the same month in the other year?

- ☐ February
- ☐ July
- ☐ August
- ☐ September
- ☐ October

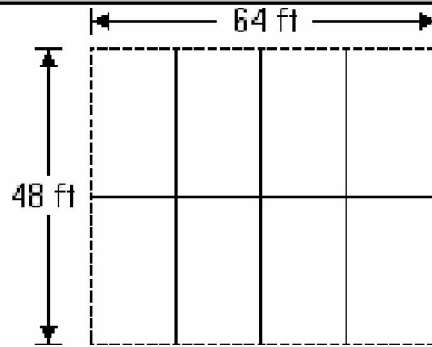
36

@B

问题问的是有没有那个月的用油量，两年的数据相差一倍
可以一个月一个月对点看
可以看到是7月，1987年是10 1988年接近20

所以选B

NO 37



The figure represents a rectangular level plot of land, subdivided into identical rectangular gardens.

Column A

The total number of feet of fencing, indicated by the solid lines, needed to separate each of the gardens

Column B

The total number of feet in the perimeter of the plot

37

@B

A 为实心线的总长, $3 \times 48 + 64$

B 为周长 $2 \times 48 + 2 \times 64$

所以是 B 大

NO 38

The curvature of a circle is defined to be the reciprocal of the radius of the circle.

Column A

The curvature of a circle with circumference 35π

Column B

The curvature of a circle with circumference 36π

38

@A

解答: 重点词汇:

curvature 曲率

reciprocal 倒数

radius 半径

circumference 周长

曲率是半径的倒数，--> 曲率和半径是反比关系，半径和周长是正比关系，所以 曲率和 周长是反比关系。 周长越大，曲率越小~
题中 A 的周长小，所以曲率大。

NO 39

The length of a rectangular box is 4 inches longer than the depth, and the width of the box is 1 inch less than the length. The depth of the box is between 2 inches and 4 inches.

Column A

The volume of the box
in cubic inches

Column B

200

39

@D

解答：假设 高为 x ，
那么长= $x+4$ 宽= $x+4-1=x+3$
 $2 < x < 4$
体积= $x(x+4)(x+3)$
 $60 < x(x+4)(x+3) < 224$
所以不能判断

NO 40

If n is an integer and $99 < n^2 < 200$, then n could have at most how many values?

- ☐ Two
- ☐ Four
- ☐ Six
- ☐ Eight
- ☐ Ten

40

@E

解答：

$$99 < n^2 < 200$$

$n=10, -10, 11, -11, 12, -12, 13, -13, 14, -14,$
共 10 个

这道题，就是不能忘记负数~

但是其实出题人还是挺好的，没有“five”这个选项。。不然很容易上当滴啊

活动详情请参见论坛帖子

<http://www.sharewithu.com/thread-435567-1-3.html>