11. The sum $2\frac{1}{7} + 3\frac{1}{2} + 5\frac{1}{19}$ is between

A) 10 and $10\frac{1}{2}$ B) $10\frac{1}{2}$ and 11 C) 11 and $11\frac{1}{2}$

D) $11\frac{1}{2}$ and 12 E) 12 and $12\frac{1}{2}$

1987 Q11

11. B The desired sum can be rewritten as $2 + 3 + 5 + \frac{1}{7} + \frac{1}{2} + \frac{1}{19}$ which equals $10 + \frac{1}{2} + (\text{a number less than } \frac{1}{2})$ so B is correct.

2 / 12

1996 Q11

11. Let x be the number

$$0.\underbrace{0000\ldots0000}_{\text{1996 zeros}}1,$$

where there are 1996 zeros after the decimal point. Which of the following expressions represents the largest number?

(A) $3+x$ **(B)** $3-x$ **(C)** $3\cdot x$ **(D)** $3/x$ **(E)** $x/3$

11. **(D)** Since x is near zero, $3+x$ and $3-x$ are near 3. Also $3\cdot x$ and $x/3$ are near zero. However, $3/x$ is the number

$$3\underbrace{0000\ldots0000}_{\text{1997 zeros}},$$

which is a 3 followed by 1997 zeros. This number is much larger than any of the other alternatives.

3 / 12

1989 Q12

12. $\dfrac{1-\frac{1}{3}}{1-\frac{1}{2}} =$

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$ D) $\frac{3}{2}$ E) $\frac{4}{3}$

12. E $\dfrac{1-\frac{1}{3}}{1-\frac{1}{2}} = \dfrac{\frac{2}{3}}{\frac{1}{2}} = \frac{2}{3} \times \frac{2}{1} = \frac{4}{3}.$

OR

Multiplying both numerator and denominator by 6 yields

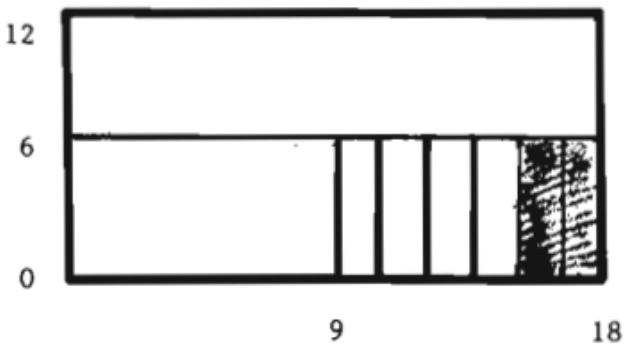
$$\frac{6(1-\frac{1}{3})}{6(1-\frac{1}{2})} = \frac{6-2}{6-3} = \frac{4}{3}.$$

4 / 12

1987 Q12

12. What fraction of the large 12 by 18 rectangular region is shaded?

A) $\frac{1}{108}$ B) $\frac{1}{18}$ C) $\frac{1}{12}$ D) $\frac{2}{9}$ E) $\frac{1}{3}$



12. C The large rectangular region can be subdivided into 24 congruent rectangular regions of which 2 are shaded.

OR

$\frac{1}{3}$ of $\frac{1}{4}$ = $\frac{1}{12}$ of the rectangular region is shaded.

5 / 12

1998 Q12

12. $2(1-\frac{1}{2})+3(1-\frac{1}{3})+4(1-\frac{1}{4})+\ldots+10(1-\frac{1}{10})=$

(A) 45 **(B)** 49 **(C)** 50 **(D)** 54 **(E)** 55

12. **Answer (A):**

$$2(1-\frac{1}{2})+3(1-\frac{1}{3})+4(1-\frac{1}{4})+\ldots+10(1-\frac{1}{10})=$$
$$2(\frac{1}{2})+3(\frac{2}{3})+4(\frac{3}{4})+\ldots+10(\frac{9}{10})=$$
$$1+2+3+\ldots+9=45.$$

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2016 Q12

12. Jefferson Middle School has the same number of boys and girls. Three-fourths of the girls and two-thirds of the boys went on a field trip. What fraction of the students on the field trip were girls?

(A) $\frac{1}{2}$ **(B)** $\frac{9}{17}$ **(C)** $\frac{7}{13}$ **(D)** $\frac{2}{3}$ **(E)** $\frac{14}{15}$

12. Answer (B):

Converting the given fractions to the same denominator, we see that $\frac{9}{12}$ of the girls and $\frac{8}{12}$ of the boys went on the trip. So the ratio of the number of girls to the number of boys was 9 : 8, and it follows that $\frac{9}{17}$ of the students on the trip were girls.

OR

The number of boys and girls must be a common multiple of 4 and 3, the denominators of the fractions given in the problem. Suppose there are 12 boys and 12 girls in Jefferson Middle School. Then 9 girls and 8 boys went on the trip, for a total of 17 students. The fraction of girls on the trip is 9/17.

7 / 12

13. Which of the following fractions has the largest value?

A) $\frac{3}{7}$ B) $\frac{4}{9}$ C) $\frac{17}{35}$ D) $\frac{100}{201}$ E) $\frac{151}{301}$

1987 Q13

13. E If the numerator of a fraction is less than half its denominator, then the value of the fraction is less than $\frac{1}{2}$. Consequently all the fractions other than (E) are less than $\frac{1}{2}$ while $\frac{151}{301} > \frac{1}{2}$.

8 / 12

1989 Q13

13. $\dfrac{9}{7 \times 53} =$

A) $\dfrac{.9}{.7 \times 53}$ B) $\dfrac{.9}{.7 \times .53}$ C) $\dfrac{.9}{.7 \times 5.3}$ D) $\dfrac{.9}{7 \times .53}$ E) $\dfrac{.09}{.07 \times .53}$

13. A To get .9 in the numerator, we must divide it by 10. To maintain equality, we must also divide the denominator by 10. Thus

$$\frac{\frac{9}{10}}{\frac{7 \times 53}{10}} = \frac{\frac{9}{10}}{\frac{7}{10} \times 53} = \frac{.9}{.7 \times 53}.$$

In all other cases, the resulting fraction is $\frac{1}{10}$ or $\frac{1}{100}$ of the original fraction.

9 / 12

1994 Q13

13. The number halfway between $\frac{1}{6}$ and $\frac{1}{4}$ is

(A) $\frac{1}{10}$ (B) $\frac{1}{5}$ (C) $\frac{5}{24}$ (D) $\frac{7}{24}$ (E) $\frac{5}{12}$

13. (C) Since $\frac{1}{6} = \frac{2}{12} = \frac{4}{24}$ and $\frac{1}{4} = \frac{3}{12} = \frac{6}{24}$, it follows that the number halfway between $\frac{1}{6}$ and $\frac{1}{4}$ is $\frac{5}{24}$.

OR

The number halfway between any two numbers is their arithmetic mean (average):

$$\frac{\frac{1}{6}+\frac{1}{4}}{2} = \frac{\frac{4+6}{24}}{2} = \frac{\frac{10}{24}}{2} = \frac{5}{24}.$$

OR

Estimating each fraction to three decimal places and calculating the average yields

$$\frac{\frac{1}{6}+\frac{1}{4}}{2} \approx \frac{0.167+0.250}{2} = \frac{0.417}{2} = 0.2085$$

which is closest to $\frac{5}{24} \approx 0.2083$.

10 / 12

1992 Q14

14. When four gallons are added to a tank that is one-third full, the tank is then one-half full. The capacity of the tank in gallons is

(A) 8 (B) 12 (C) 20 (D) 24 (E) 48

14. (D) Since 4 gallons is the difference between being 1/3 full and 1/2 full, it follows that 4 gallons is $\frac{1}{2} - \frac{1}{3} = \frac{1}{6}$ of the capacity of the tank. Thus the capacity of the tank must be 24 gallons.

11 / 12

15. The reciprocal of $\left(\frac{1}{2}+\frac{1}{3}\right)$ is

A) $\frac{1}{6}$ B) $\frac{2}{5}$ C) $\frac{6}{5}$ D) $\frac{5}{2}$ E) 5

1988 Q15

15. C $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$ and its reciprocal is $\frac{6}{5}$.

12 / 12

1995 Q15

15. What is the 100^{th} digit to the right of the decimal point in the decimal form of $4/37$?

(A) 0 (B) 1 (C) 2 (D) 7 (E) 8