

1 Arithmetic with Ratio and Proportion Nov 2019 (No Calculators)

3 pts 1. If $\frac{5}{x} = \frac{15}{x+20}$, what is the value of $\frac{x}{5}$?

Ans. _____

4 pts 2. If there are 5280 ft. in a mile, change 50mi/hr to ft/sec.

Ans. _____

5 pts 3. Philip is very particular about some of the things he does. You could say he is an odd duck. The number of hours of sleep he gets is directly proportional to the number of calories in his snack on that day, and inversely proportional to the number of sleep hours he got the night before. On Monday he slept for 5 hours. On Tuesday he slept 10 hours and ate a 100 calorie snack. On Wednesday he ate a 200 calorie snack. How many hours of sleep did he get on Wednesday? Philip only eats one snack a day.

Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. $\frac{5}{x} = \frac{15}{x+20} \rightarrow 5x + 100 = 15x \rightarrow 100 = 10x$, so $x = 10$. $\frac{x}{5} = \frac{10}{5} = 2$.

Ans. 2

2. $\frac{50 \cancel{mi}}{hr} \cdot \frac{5280 \cancel{ft}}{mi} \cdot \frac{1 \cancel{hr}}{60 \cancel{min}} \cdot \frac{1 \cancel{min}}{60 \cancel{sec}} = \frac{5 \cdot 88 \cancel{ft}}{6 \cancel{sec}} = \frac{5 \cdot 44 \cancel{ft}}{3 \cancel{sec}} = \frac{220 \cancel{ft}}{3 \cancel{sec}}$.

Ans. $\frac{220 \cancel{ft}}{3 \cancel{sec}}$

3. $\frac{\text{sleep-hrs-that-day}}{\text{number-cal-snack}} \cdot (\text{hrs-slept-day-before}) \rightarrow \frac{10}{100} \cdot 5 = \frac{x}{200} \cdot 10 \rightarrow \frac{1}{2} = \frac{x}{20}$, $x = 10$. **Ans. 10**

1 Arithmetic with Ratio and Proportion Nov 2018 (No Calculators)

3 pts 1. Find x if the ratio of 7 to 399 is the same as the ratio of x to 627.

Ans. _____

4 pts 2. Find the value of e , if $\frac{a}{b} = \frac{2}{5}$, $\frac{b}{c} = \frac{7}{9}$, $\frac{c}{d} = \frac{9}{4}$, $\frac{d}{e} = \frac{2}{3}$, and $\frac{bc}{ade} = \frac{3}{32}$.

Ans. _____

5 pts 3. Let a be the least positive rational number such that each element of set S is an integer.

Set S is $\left\{\frac{2}{3}a, \frac{8}{9}a, \frac{14}{15}a\right\}$. Find the sum of the elements of S when a has this value.

Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. $\frac{7}{399} = \frac{x}{627}$, $\frac{1}{57} = \frac{x}{627}$. $x = \frac{627}{57} = 11$.

Ans. 11

3. $\frac{bc}{ade} = \frac{b}{a} \cdot \frac{c}{d} \cdot \frac{1}{e} = \frac{5}{2} \cdot \frac{9}{4} \cdot \frac{1}{e} = \frac{3}{32}$. $e = \frac{5 \cdot 9 \cdot 32}{2 \cdot 3 \cdot 4} = 60$.

Ans. 60

2. $a = \frac{LCM\{3,9,15\}}{GCF\{2,8,14\}} = \frac{45}{2} \cdot \frac{2 \cdot 45}{3 \cdot 2} = 15$; $\frac{8 \cdot 45}{9 \cdot 2} = 20$; $\frac{14 \cdot 45}{15 \cdot 2} = 21$. $15 + 20 + 21 = 56$.

Ans. 56

1 Arithmetic with Ratio and Proportion Nov 2017 (No Calculators)

3 pts 1. A rope 115 ft. long is to be cut into three lengths with a ratio of 5:7:11. What is the length of the middle-sized piece?

Ans. _____

4 pts 2. A merchant purchased a model of bikes from a dealer at a cost of \$540 each. On June 1st he put a selling price on the bikes so as to make a 30% profit over the cost. The bikes did not sell well, so on July 1st he offered a 10% discount sale of the selling price. The bikes started selling well, so on August 1st he boosted the July 1st selling price by 5%. The bikes continued to sell well. What was this final selling price?

Ans. _____

5 pts 3. a and b are in the ratio of 3 to 8. b and c are in the ratio of 2 to 5. c and d are in a ratio of 7 to 11. What is the ratio of a to d in simplest form?

Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. $\frac{7}{23}(115) = 7(5) = 35.$

Ans. 35 ft

2. $540(1.3) = 702. .9(702) = 631.8. 631.8(1.05) = 663.39$

Ans. \$663.39

3. $\frac{a}{b} = \frac{3}{8} \rightarrow 8a = 3b \rightarrow b = \frac{8}{3}a. \frac{b}{c} = \frac{2}{5} \rightarrow 5b = 2c, c = \frac{5}{2}b = \frac{5}{2} \cdot \frac{8}{3}a = \frac{20}{3}a. \frac{c}{d} = \frac{7}{11} \rightarrow 11c = 7d$

$d = \frac{11}{7}c = \frac{11}{7} \cdot \frac{20}{3}a = \frac{220}{21}a. \text{ So } 21d = 220a \rightarrow \frac{a}{d} = \frac{21}{220}.$

Ans. 21:220

1 Arithmetic with Ratio and Proportion Nov 2015 (No Calculators)

3 pts 1. The ratio of green, blue and orange m & m's is 5 to 3 to 4, respectively. If there are 156 m & m's altogether, how many are orange?

Ans. _____

4 pts 2. The ratio of x to y is 3 to 4. Let S be the result when y is increased by 2 and let R be the result when x is decreased by 6. The ratio of R to S is 3 to 5. Find the numerical value of $x + y$.

Ans. _____

5 pts 3. In the enchanted land of Mathtinicus, the intelligence of any man is inversely proportional to his shoe size and jointly proportional to his age and the square of his height. Albert is 2 meters tall, 15 years old and his shoe size is 8. Steve is 3 meters tall and has shoe size 12. How old is Steve, if he and Albert have equal intelligence?

Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. $5x + 3x + 4x = 156 \rightarrow 12x = 156$ so $x = 13$. $4x = 4(13) = 52$ **Ans. 52**

2. $\frac{x}{y} = \frac{3}{4}$, $4x = 3y$, $y = 4/3x$. Thus $\frac{x-6}{(4/3)x+2} = \frac{3}{5} \rightarrow 5x - 30 = 4x + 6$, $x = 36$, thus $y = 48$.

$36 + 48 = 84$. **Ans. 84**

3. Intelligence = $\frac{(\text{height})^2(\text{age})}{(\text{shoesize})} \rightarrow \frac{(2^2)(15)}{(8)} = \frac{(3^2)(x)}{(12)} \rightarrow x = \frac{60(12)}{8(9)} = 10$. **Ans. 10**

1 Arithmetic with Ratio and Proportion Nov 2014 (No Calculators)

3 pts 1. If you add up all the whole numbers from 1 to 7, you get 28. The ratio of 28 to 7 is 4:1. What is the ratio of the sum of all the whole numbers from 1 to 13 to the number 13?

Ans. _____

4 pts 2. If a varies directly with b , b varies inversely with c , and c varies directly with the square of d , by what is d multiplied, if a doubles?

Ans. _____

5 pts 3. Let k be the smallest real number, greater than 0, such that the product of k and each member of the set $\left\{\frac{25}{18}, \frac{80}{27}, \frac{5}{12}\right\}$ is a whole number. Find $\frac{25}{18}k + \frac{80}{27}k + \frac{5}{12}k$.

Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. Sum is 91. $91:13 = 7:1$.

Ans. 7:1

2. The ratios are: $\frac{a}{b}$, bc , $\frac{c}{d^2}$. Letting $a = 2$, $b = 3$, $c = 8$, and $d = 5$: if a were to change to 4, then b would change to 6 to have same ratio. Since bc was $3(8)$, now bc is $6(4)$.

$\frac{c}{d^2}$ was $\frac{8}{25}$, now it is $\frac{4}{d^2}$. Thus $8d^2 = 100$ and $d^2 = \frac{100}{8} = \frac{25}{2}$ or $5\left(\frac{\sqrt{2}}{2}\right)$. Ans. $\frac{\sqrt{2}}{2}$

3. $k = \frac{LCM\{18,27,12\}}{GCF\{25,80,5\}} = \frac{108}{5} \cdot \frac{25}{18} \left(\frac{108}{5}\right) + \frac{80}{27} \left(\frac{108}{5}\right) + \frac{5}{12} \left(\frac{108}{5}\right) = 30 + 64 + 9$. Ans. 103

1 Arithmetic with Ratio and Proportion Nov 2013 (No Calculators)

3 pts 1. Five line segments are drawn such that:

$$\text{length of segment 2} = \frac{1}{2} \text{ length of segment 1}$$

$$\text{length of segment 3} = \frac{2}{3} \text{ length of segment 2}$$

$$\text{length of segment 4} = \frac{3}{4} \text{ length of segment 3}$$

$$\text{length of segment 5} = \frac{4}{5} \text{ length of segment 4}$$

Find the ratio of the length of segment 5 to the length of segment 1. **Ans.** _____

4 pts 2. A carpet installation company offers a sale such that if the largest room is carpeted at full price, then it will include the installation in 2 smaller rooms free of charge. A homeowner takes advantage of the offer. The two smaller rooms each need $\frac{1}{3}$ of the carpet as the homeowner's largest room. What fractional part of the cost of installing the carpet at full price in all three rooms did the customer pay?

Ans. _____

5 pts 3. Find the fractional equivalent of $.819\bar{4}$ in simplest form.

Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. If line segment 1 = 1, then line segment 5 = $\left(1 \cdot \frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{5}\right) = \frac{1}{5}$.

Ans. 1 :5

2. $1 + \frac{1}{3} + \frac{1}{3} = \frac{5}{3}$ total carpets. $\frac{1}{\frac{5}{3}} = \frac{3}{5}$.

Ans. 3/5

3. Let $x = .819\bar{4}$, then $10,000x = 8194.\bar{4}$ and $1,000x = 819.\bar{4}$. So $9,000x = 7375$.

$$x = \frac{7375}{9000} = \frac{1475}{1800} = \frac{295}{360} = \frac{59}{72}$$

Ans. 59/72

1 Arithmetic with Ratio and Proportion Nov 2012 (No Calculators)

3 pts 1. A large cylindrical tube is accurately marked from bottom to top in 8ths. When it was $\frac{1}{8}$ full, 15 gallons of liquid were added, making it now $\frac{3}{4}$ full. How many more gallons are needed to fill the tank?

Ans. _____

4 pts 2. Suppose that $\frac{x}{y} = \frac{4}{7}$ and that $\frac{y}{z} = \frac{14}{3}$. What is the numerical value of $\frac{x+y}{z}$?

Express your answer as a fraction in the form $\frac{a}{b}$.

Ans. _____

5 pts 3. In a class of 100 students, 38 students took calculus, 46 took physics and 55 took US History. 22 took physics and history, 16 took calculus and history, 9 took calculus and physics, and 4 students took all three courses. How many took none of the three subjects?

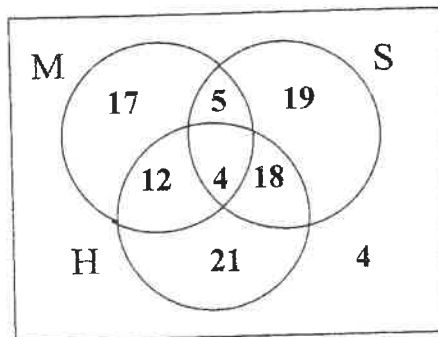
Ans. _____

Solutions – Arithmetic with Ratio and Proportion

1. Change $\frac{3}{4}$ to $\frac{6}{8}$. So 5 parts were filled with 15 gal. $\frac{5}{15} = \frac{2}{x}$, $x = 6$. **Ans. 6 gal**

2. $\frac{x+y}{z} = \frac{x}{z} + \frac{y}{z}$. $x = \frac{4}{7}y$ and $y = \frac{14}{3}z$, so $x = \frac{4}{7} \cdot \frac{14}{3}z = \frac{8}{3}z$ or $\frac{x}{z} = \frac{8}{3}$. $\frac{8}{3} + \frac{14}{3} =$ **Ans. $\frac{22}{3}$**

3. Making a Venn Diagram:



Ans. 4

1 Arithmetic with Ratio and Proportion Nov 2011 (No Calculators)

3 pts 1. For doing chores around the house, Marge gets \$5.00 per week. Her little brother Mark gets \$3.00 per week. After so many weeks Mark has received a total of \$72. How much does Marge earn during the same period of time?

Ans. _____

4 pts 2. Sarah has a collection of dimes and quarters totaling \$24.40. If she has 136 coins in all, what is the value of all the dimes. Give your answer in dollars and cents – such as \$3.50.

Ans. _____

5 pts 3. p varies inversely with the cube of q and directly with the square of m . When p is 4 and q is 16, then m is 8. What is m when p is 16 and q is 4? Assume p , q , and m are each greater than zero.

Ans. _____

Solutions – Arithmetic with Ratio and Percent

1. $\frac{5}{3} = \frac{x}{72} \rightarrow 3x = 5(72) \rightarrow x = 5(24) = 120.$

Ans. \$120

2. $10(136 - x) + 25x = 2440 \rightarrow 1360 - 10x + 25x = 2440 \rightarrow 15x = 1080$ thus $x = 72.$

The number of dimes is $136 - 72 = 64.$ value - \$6.40.

Ans. \$6.40

3. $k = \frac{pq^3}{m^2}$, thus $\frac{4 \cdot 16^3}{8^2} = \frac{16 \cdot 4^3}{m^2} \rightarrow m^2 = \frac{16 \cdot 4^3 \cdot 8^2}{4 \cdot 16^3} \rightarrow m^2 = \frac{4^2 \cdot 8 \cdot 8}{16 \cdot 16} = \frac{4^2}{2 \cdot 2} = 4$

Ans. m = 2