

Workshop: Arithmetic, Fractions, Standard Form, Conversion of Units – Answers and Solutions

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Arithmetic

1. $125 + 200 + 50 + 75 = 450$
2. $500 - 250 = 250$
3. $250 - 500 = -250$
4. $40 + 120 - 30 + 500 - 300 = 330$
5. $50 \times 7 = 350$
6. $30 \times 0.8 = 24$
7. $240 \times 0.12 = 28.8$
8. $3368 \div 8 = 421$
9. $2862 \div 6 = 477$
10. $1170 \div 12 = 97.5$

Fractions

11. Write each of these fractions in their lowest terms:

$$\frac{25}{30} \quad \frac{25}{75} \quad \frac{18}{42} \quad \frac{45}{60} \quad \frac{81}{90} \quad \frac{90}{81} \quad \frac{64}{48}$$

$$\frac{25}{30} = \frac{5 \times 5}{5 \times 6} = \frac{5}{6}$$

$$\frac{25}{75} = \frac{25 \times 1}{25 \times 3} = \frac{1}{3}$$

$$\frac{18}{42} = \frac{6 \times 3}{6 \times 7} = \frac{3}{7}$$

$$\frac{45}{60} = \frac{15 \times 3}{15 \times 4} = \frac{3}{4}$$

$$\frac{81}{90} = \frac{9 \times 9}{9 \times 10} = \frac{9}{10}$$

$$\frac{90}{81} = \frac{9 \times 10}{9 \times 9} = \frac{10}{9}$$

$$\frac{64}{48} = \frac{16 \times 4}{16 \times 3} = \frac{4}{3}$$

12. Perform the following calculations, and give the answer in the lowest terms:

$$\text{a. } \frac{4}{9} + \frac{2}{9} = \frac{4+2}{9} = \frac{6}{9} = \frac{2}{3}$$

$$\text{b. } \frac{5}{8} - \frac{1}{8} = \frac{5-1}{8} = \frac{4}{8} = \frac{1}{2}$$

$$\text{c. } \frac{5}{8} \times \frac{3}{4} = \frac{5 \times 3}{8 \times 4} = \frac{15}{32}$$

$$\text{d. } \frac{4}{9} \times \frac{6}{11} = \frac{4 \times 6}{9 \times 11} = \frac{4 \times 2}{3 \times 11} = \frac{8}{33}$$

$$\text{e. } \frac{2}{7} \times 3 = \frac{2}{7} \times \frac{3}{1} = \frac{2 \times 3}{7 \times 1} = \frac{6}{7}$$

$$\text{f. } \frac{5}{12} \div \frac{2}{9} = \frac{5}{12} \times \frac{9}{2} = \frac{5 \times 9}{12 \times 2} = \frac{5 \times 3}{4 \times 2} = \frac{15}{8}$$

$$\text{g. } \frac{3}{10} \div \frac{6}{7} = \frac{3}{10} \times \frac{7}{6} = \frac{3 \times 7}{10 \times 6} = \frac{1 \times 7}{10 \times 2} = \frac{7}{20}$$

$$\text{h. } \frac{5}{8} \div 4 = \frac{5}{8} \times \frac{1}{4} = \frac{5 \times 1}{8 \times 4} = \frac{5}{32}$$

Standard Form

13. Express the following numbers in standard form (scientific notation)

$$\text{a. } 52000 = 5.2 \times 10^4$$

$$\text{b. } 420000 = 4.2 \times 10^5$$

$$\text{c. } 642 \text{ million} = 642 \times 10^6 = 6.42 \times 10^8$$

$$\text{d. } 452 \times 10^{64} = 4.52 \times 10^2 \times 10^{64} = 4.52 \times 10^{66}$$

$$\text{e. } 0.05 = 5 \times 10^{-2}$$

- f. $0.000234 = 2.34 \times 10^{-4}$
g. $0.603 = 6.03 \times 10^{-1}$
h. $300 \times 10^{-8} = 3 \times 10^2 \times 10^{-8} = 3 \times 10^{-6}$

Converting Units

14. Convert each of the following, into the given unit:

- a. 3 kilograms into grams
 $3 \times 10^3 = 3 \times 1000 = 3000 \text{ g}$
- b. 16 litres into millilitres
 $16 \times 10^3 = 16 \times 1000 = 16000 \text{ ml}$
- c. 0.42 grams into milligrams
 $0.42 \times 10^3 = 0.42 \times 1000 = 420 \text{ mg}$
- d. 1.63 milligrams into micrograms
 $1.63 \times 10^3 = 1.63 \times 1000 = 1630 \text{ mcg}$
- e. 0.0034 grams into micrograms
 $0.0034 \times 10^6 = 3.4 \times 10^3 = 3400 \text{ mcg}$
- f. 420 milligrams into grams
 $420 \times 10^{-3} = 420 \div 1000 = 0.42 \text{ g}$
- g. 24000 millilitres into litres
 $24000 \times 10^{-3} = 24 \text{ l}$
- h. 650000 micrograms into grams
 $650000 \times 10^{-6} = 0.65 \text{ g}$

Mixed Questions

15. A patient requires 25 ml of drug, twice a day for 7 days. What is the total volume of drug that is required?

$$25 \times 2 \times 7 = 50 \times 7 = 350 \text{ ml}$$

16. A patient requires 400 mg of a drug, three times a day for 10 days. How many grams of the drug are required in total?

$$400 \times 3 \times 10 = 400 \times 30 = 12000 \text{ mg} = 12 \text{ g}$$

17. A patient requires 300 mg of a drug, twice a day for 4 days and then reduce the dose to a third and take it twice a day for 3 days. How many grams of the drug are required in total in grams?

$$300 \times 2 \times 4 = 300 \times 8 = 2400 \text{ mg}$$

$$300 \times \frac{1}{3} = 100 \text{ mg}$$

$$100 \times 2 \times 3 = 100 \times 6 = 600 \text{ mg}$$

Total:

$$2400 \text{ mg} + 600 \text{ mg} = 3000 \text{ mg} = 3 \text{ gr}$$

18. During a day, a patient takes in water on 4 occasions. The amounts taken in are: 250 ml, 500 ml, 150 ml, and 125 ml. During the day they lose 785 ml of water. What is their net water intake?

$$250 + 500 + 150 + 125 - 785 = 1025 - 785 = 240 \text{ ml}$$

19. A patient is currently taking 500 mg of a drug daily. It is decided that the patient should now only take three-quarters of what they are now taking. What is the patient's new dose?

$$\frac{3}{4} \times 500 = \frac{3}{4} \times \frac{500}{1} = \frac{3 \times 500}{4 \times 1} = \frac{3 \times 125}{1 \times 1} = 375 \text{ mg}$$

20. To celebrate a pharmacist's birthday, their colleagues get them a cake. It is put out before the start of the celebration. When the celebration starts, they find that someone has been in and eaten $\frac{1}{4}$ of the cake. They moan a bit and then decide to start eating what is left. The pharmacist with the birthday takes $\frac{1}{3}$ of the remaining cake. The other 5 guests then share the remainder equally between them.

- a. What fraction of the total cake does the birthday pharmacist get?

$$\text{Fraction at start of celebration is } 1 - \frac{1}{4} = \frac{4}{4} - \frac{1}{4} = \frac{3}{4}$$

$$\text{Birthday pharmacist takes } \frac{1}{3} \times \frac{3}{4} = \frac{1 \times 3}{3 \times 4} = \frac{1 \times 1}{1 \times 4} = \frac{1}{4} \text{ of the total cake}$$

- b. What fraction of the total cake do the other guests each get?

$$\text{Birthday thief + birthday pharmacist has eaten } \frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2} \text{ of cake.}$$

$$\text{Remaining is } 1 - \frac{1}{2} = \frac{2}{2} - \frac{1}{2} = \frac{1}{2} \text{ of the cake}$$

5 guests share this: $\frac{1}{2} \div 5 = \frac{1}{2} \times \frac{1}{5} = \frac{1}{10}$ of the cake each

21. The human body has between 4500 ml to 5700 ml of blood. If a person, at the upper end of this scale, loses 1.2 litres of blood, how many ml of blood would they now have (assuming new blood hasn't had time to be created within the body).

$$1.2 \text{ l} = 1.2 \times 10^3 = 1200 \text{ ml}$$

$$5700 - 1200 = 4500 \text{ ml or } 4.5 \text{ l}$$

22. If a mixture is to be 15mg/ml (15 mg in 1ml), how many mg are required to make 50 ml?

$$\frac{15}{1} \times 50 = 150 \times 5 = 750 \text{ mg}$$

23. If a medicine is described as 8 g in 100 ml, how many mg are given if a patient receives a dose of 25 ml?

$$\frac{8}{100} \times 25 = \frac{8 \times 25}{100} = \frac{8 \times 1}{4} = 2\text{g}$$

24. You have the following formula to create 300 ml of a particular medications X:

Ingredient A: 30 mg

Ingredient B: 180 mg

Ingredient C: 15ml

Water to 300 ml

- a. How much of each ingredient you need to make 30ml. of the medication.

Since Water to $\frac{300}{10}=30 \text{ ml}$

Then

Ingredient A: $\frac{30}{10} = 3 \text{ mg}$

Ingredient B: $\frac{180}{10} = 18\text{mg}$

Ingredient C: $\frac{15}{10} = 1.5\text{ml}$

- b. How much of each ingredient you need to make two thirds of the medication.

$$\text{Ingredient A: } \frac{2}{3} \times 30 = 20 \text{ mg}$$

$$\text{Ingredient B: } \frac{2}{3} \times 180 = 120 \text{mg}$$

$$\text{Ingredient C: } \frac{2}{3} \times 15 = 10 \text{ml}$$

$$\text{Water to } \frac{2}{3} \times 300 = 200 \text{ ml}$$

- c. How much of the ingredients is needed to make 1 l of the medication X.
Express your answers in grams and litres.

Note that if we multiply the water by $\frac{10}{3}$ we have 1 litre

$$\text{Water to } \frac{10}{3} \times 300 = 1000 \text{ ml} = 1 \text{ l}$$

Then

$$\text{Ingredient A: } \frac{10}{3} \times 30 = 100 \text{ mg}$$

$$\text{Ingredient B: } \frac{10}{3} \times 180 = 600 \text{mg}$$

$$\text{Ingredient C: } \frac{10}{3} \times 15 = 50 \text{ml}$$