

Name _____

Date _____

7.2 Adding and subtracting fractions — worked answers

Add and subtract fractions and mixed numbers, using a common denominator and simplifying the answer. · 50 questions

A · Fluency — Add and subtract, then simplify.

1 Work out $\frac{1}{4} + \frac{1}{4}$

Answer: $\frac{1}{2}$

The lowest common denominator is 4: $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$, which simplifies to $\frac{1}{2}$.

2 Work out $\frac{1}{2} + \frac{1}{4}$

Answer: $\frac{3}{4}$

The lowest common denominator is 4: $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$.

3 Work out $\frac{1}{3} + \frac{1}{6}$

Answer: $\frac{1}{2}$

The lowest common denominator is 6: $\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$, which simplifies to $\frac{1}{2}$.

4 Work out $\frac{2}{5} + \frac{1}{5}$

Answer: $\frac{3}{5}$

The lowest common denominator is 5: $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$.

5 Work out $\frac{1}{2} + \frac{1}{3}$

Answer: $\frac{5}{6}$

The lowest common denominator is 6: $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$.

6 Work out $\frac{3}{4} + \frac{1}{6}$

Answer: $\frac{11}{12}$

The lowest common denominator is 12: $\frac{9}{12} + \frac{2}{12} = \frac{11}{12}$.

7 Work out $\frac{2}{3} + \frac{1}{4}$

Answer: $\frac{11}{12}$

The lowest common denominator is 12: $\frac{8}{12} + \frac{3}{12} = \frac{11}{12}$.

8 Work out $\frac{3}{5} + \frac{1}{2}$

Answer: $\frac{11}{10}$

The lowest common denominator is 10: $\frac{6}{10} + \frac{5}{10} = \frac{11}{10}$.

9 Work out $\frac{5}{8} + \frac{1}{4}$

Answer: $\frac{7}{8}$

The lowest common denominator is 8: $\frac{5}{8} + \frac{2}{8} = \frac{7}{8}$.

10 Work out $\frac{1}{6} + \frac{3}{8}$

Answer: $\frac{13}{24}$

The lowest common denominator is 24: $\frac{4}{24} + \frac{9}{24} = \frac{13}{24}$.

11 Work out $\frac{2}{9} + \frac{1}{3}$

Answer: $\frac{5}{9}$

The lowest common denominator is 9: $\frac{2}{9} + \frac{3}{9} = \frac{5}{9}$.

12 Work out $\frac{5}{12} + \frac{1}{4}$

Answer: $\frac{2}{3}$

The lowest common denominator is 12: $\frac{5}{12} + \frac{3}{12} = \frac{8}{12}$, which simplifies to $\frac{2}{3}$.

13 Work out $\frac{1}{2} - \frac{1}{4}$

Answer: $\frac{1}{4}$

Over 4: $\frac{2}{4} - \frac{1}{4} = \frac{1}{4}$.

14 Work out $\frac{1}{3} - \frac{1}{6}$

Answer: $\frac{1}{6}$

Over 6: $\frac{2}{6} - \frac{1}{6} = \frac{1}{6}$.

15 Work out $\frac{2}{5} - \frac{1}{5}$

Answer: $\frac{1}{5}$

Over 5: $\frac{2}{5} - \frac{1}{5} = \frac{1}{5}$.

16 Work out $\frac{1}{2} - \frac{1}{3}$

Answer: $\frac{1}{6}$

Over 6: $\frac{3}{6} - \frac{2}{6} = \frac{1}{6}$.

17 Work out $\frac{3}{4} - \frac{1}{6}$

Answer: $\frac{7}{12}$

Over 12: $\frac{9}{12} - \frac{2}{12} = \frac{7}{12}$.

18 Work out $\frac{2}{3} - \frac{1}{4}$

Answer: $\frac{5}{12}$

Over 12: $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$.

19 Work out $\frac{3}{5} - \frac{1}{2}$

Answer: $\frac{1}{10}$

Over 10: $\frac{6}{10} - \frac{5}{10} = \frac{1}{10}$.

20 Work out $\frac{5}{8} - \frac{1}{4}$

Answer: $\frac{3}{8}$

Over 8: $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$.

21 Work out $\frac{5}{12} - \frac{1}{4}$

Answer: $\frac{1}{6}$

Over 12: $\frac{5}{12} - \frac{3}{12} = \frac{2}{12}$, which simplifies to $\frac{1}{6}$.

22 Work out $1\frac{1}{2} + 2\frac{1}{4}$

Answer: $3\frac{3}{4}$

Add the whole numbers: $1 + 2 = 3$. Add the fractions: $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$. Together that is $\frac{15}{4}$ as an improper fraction.

- 23 Work out $2\frac{1}{3} + 1\frac{1}{6}$

Answer: $3\frac{1}{2}$

Add the whole numbers: $2 + 1 = 3$. Add the fractions: $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$. Together that is $\frac{7}{2}$ as an improper fraction.

- 24 Work out $3\frac{3}{4} + 1\frac{1}{2}$

Answer: $5\frac{1}{4}$

Add the whole numbers: $3 + 1 = 4$. Add the fractions: $\frac{3}{4} + \frac{1}{2} = \frac{5}{4}$. Together that is $\frac{21}{4}$ as an improper fraction.

- 25 Work out $2\frac{2}{5} + 1\frac{1}{5}$

Answer: $3\frac{3}{5}$

Add the whole numbers: $2 + 1 = 3$. Add the fractions: $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$. Together that is $\frac{18}{5}$ as an improper fraction.

- 26 Work out $1\frac{5}{6} + 2\frac{1}{3}$

Answer: $4\frac{1}{6}$

Add the whole numbers: $1 + 2 = 3$. Add the fractions: $\frac{5}{6} + \frac{1}{3} = \frac{7}{6}$. Together that is $\frac{25}{6}$ as an improper fraction.

- 27 Work out $4\frac{1}{2} + 2\frac{3}{8}$

Answer: $6\frac{7}{8}$

Add the whole numbers: $4 + 2 = 6$. Add the fractions: $\frac{1}{2} + \frac{3}{8} = \frac{7}{8}$. Together that is $\frac{55}{8}$ as an improper fraction.

B · Reasoning — Common denominators and common errors.

- 28 Why must fractions have the same denominator before you add them?

- ☐ To make the numbers smaller
- ☐ So the parts being added are the same size
- ☐ Because the rule says so
- ☐ To simplify the answer

Answer: So the parts being added are the same size

You cannot add quarters to thirds any more than you can add apples to metres, until you rewrite them as the same kind of part.

- 29 Sofia works out $\frac{1}{2} + \frac{1}{3}$ as $\frac{2}{5}$. What has she done wrong?

- ☐ Nothing
- ☐ She added the numerators and the denominators
- ☐ She used the wrong LCM
- ☐ She forgot to simplify

Answer: She added the numerators and the denominators

Adding bottoms is never a step. $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$, which is more than a half — $\frac{2}{5}$ is less, so it cannot be right.

30 What is the quickest check that $1/2 + 1/3 = 2/5$ must be wrong?

- ☐ $2/5$ is not simplified
- ☐ The answer must be more than $1/2$
- ☐ 5 is not a multiple of 2
- ☐ There is no quick check

Answer: The answer must be more than $1/2$

Adding something positive to $1/2$ must give more than $1/2$, and $2/5$ is less. Estimating first catches most errors.

31 Which denominator should you use for $3/8 + 1/6$?

- ☐ 48
- ☐ 24
- ☐ 14
- ☐ 12

Answer: 24

24 is the LCM of 8 and 6. 48 works but leaves simplifying to do.

32 To add mixed numbers, you may ...

- ☐ only convert to improper fractions
- ☐ add the whole parts and the fraction parts separately, or convert to improper fractions
- ☐ add the whole parts only
- ☐ add the fraction parts only

Answer: add the whole parts and the fraction parts separately, or convert to improper fractions

Both routes are correct. Converting is safer when subtracting.

33 Is $2/7 + 3/7$ equal to $5/7$?

- ☐ Yes
- ☐ No

Answer: Yes

The denominators already match, so just add the numerators.

34 Is $2/7 + 3/7$ equal to $5/14$?

- ☐ Yes
- ☐ No

Answer: No

The denominator stays at 7 — you are counting sevenths, and 2 of them plus 3 of them is 5 of them.

35 When subtracting mixed numbers such as $3\frac{1}{4} - 1\frac{3}{4}$, what is the safest method?

- ☐ Subtract the fractions first
- ☐ Convert both to improper fractions
- ☐ Subtract the whole numbers only
- ☐ Round them

Answer: Convert both to improper fractions

Otherwise you have to borrow from the whole number, which is where errors creep in. $13/4 - 7/4 = 6/4 = 3/2$.

C · Challenge — Three at once, and missing addends.

- 36** Work out $\frac{1}{2} + \frac{1}{3} + \frac{1}{6}$

Answer: 1

Over 6: $\frac{3}{6} + \frac{2}{6} + \frac{1}{6} = \frac{6}{6} = 1$.

- 37** Work out $\frac{3}{4} + \frac{5}{6}$

Answer: $\frac{19}{12}$

Over 12: $\frac{9}{12} + \frac{10}{12} = \frac{19}{12}$, which is $1\frac{7}{12}$.

- 38** What must be added to $\frac{3}{8}$ to make 1?

Answer: $\frac{5}{8}$

$1 = \frac{8}{8}$, and $\frac{8}{8} - \frac{3}{8} = \frac{5}{8}$.

- 39** What must be added to $\frac{2}{5}$ to make $\frac{4}{5}$?

Answer: $\frac{2}{5}$

$\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$.

- 40** Work out $\frac{3}{4} - \frac{5}{6}$

Answer: $\frac{11}{12}$

Over 12: $\frac{21}{12} - \frac{10}{12} = \frac{11}{12}$.

- 41** Three pieces of ribbon are $\frac{1}{4}$ m, $\frac{1}{3}$ m and $\frac{1}{2}$ m. What is the total length, in metres?

Answer: $\frac{13}{12}$

Over 12: $\frac{3}{12} + \frac{4}{12} + \frac{6}{12} = \frac{13}{12}$ m, which is $1\frac{1}{12}$ m.

- 42** A tank is $\frac{2}{3}$ full. $\frac{1}{4}$ of the tank is used. What fraction is left?

Answer: $\frac{5}{12}$

Over 12: $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$.

D · Word problems — Lengths, volumes and times.

- 43** Ana walks $\frac{1}{2}$ km then $\frac{1}{4}$ km. How far in total, in km?

Answer: $\frac{3}{4}$

$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$ km.

- 44** A recipe needs $\frac{1}{3}$ cup of milk and $\frac{1}{6}$ cup of cream. How much liquid in total, in cups?

Answer: $\frac{1}{2}$

$\frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$ cup.

- 45** A jug holds $\frac{3}{4}$ litre. $\frac{1}{3}$ litre is poured out. How much is left, in litres?

Answer: $\frac{5}{12}$

Over 12: $\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$ litre.

- 46** Two planks measure $\frac{2}{3}$ m and $\frac{3}{4}$ m. What is the total length, in metres?

Answer: $\frac{17}{12}$

Over 12: $\frac{8}{12} + \frac{9}{12} = \frac{17}{12}$ m, or $1\frac{5}{12}$ m.

- 47** A pupil spends $\frac{1}{4}$ of an hour reading and $\frac{1}{3}$ of an hour writing. What fraction of an hour in total?

Answer: $\frac{7}{12}$

$$\frac{3}{12} + \frac{4}{12} = \frac{7}{12}.$$

- 48** A bottle holds $\frac{5}{6}$ litre and $\frac{1}{2}$ litre is drunk. How much is left, in litres?

Answer: $\frac{1}{3}$

$$\frac{5}{6} - \frac{3}{6} = \frac{2}{6} = \frac{1}{3} \text{ litre.}$$

- 49** A field is $\frac{7}{8}$ of a hectare. $\frac{1}{4}$ of a hectare is sold. How much is left, in hectares?

Answer: $\frac{5}{8}$

$$\frac{7}{8} - \frac{2}{8} = \frac{5}{8} \text{ hectare.}$$

- 50** Two bags weigh $1\frac{1}{4}$ kg and $\frac{7}{8}$ kg. What is the total, in kg?

Answer: $\frac{17}{8}$

$$\text{Over 8: } \frac{10}{8} + \frac{7}{8} = \frac{17}{8} \text{ kg, or } 2\frac{1}{8} \text{ kg.}$$