

Name _____

Date _____

7.3 Multiplying fractions — worked answers

Multiply fractions by fractions and by whole numbers, and find a fraction of a quantity. · 46 questions

A · Fluency — Multiply, and simplify.

1 Work out $\frac{1}{2} \times \frac{1}{3}$

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

Multiply the numerators and multiply the denominators: $1 \times 1 = 1$ and $2 \times 3 = 6$, giving $\frac{1}{6}$.

2 Work out $\frac{2}{3} \times \frac{3}{4}$

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

Multiply the numerators and multiply the denominators: $2 \times 3 = 6$ and $3 \times 4 = 12$, giving $\frac{6}{12}$, which simplifies to $\frac{1}{2}$.

3 Work out $\frac{3}{5} \times \frac{5}{6}$

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

Multiply the numerators and multiply the denominators: $3 \times 5 = 15$ and $5 \times 6 = 30$, giving $\frac{15}{30}$, which simplifies to $\frac{1}{2}$.

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

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

Multiply the numerators and multiply the denominators: $1 \times 2 = 2$ and $4 \times 5 = 20$, giving $\frac{2}{20}$, which simplifies to $\frac{1}{10}$.

5 Work out $\frac{3}{4} \times \frac{2}{9}$

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

Multiply the numerators and multiply the denominators: $3 \times 2 = 6$ and $4 \times 9 = 36$, giving $\frac{6}{36}$, which simplifies to $\frac{1}{6}$.

6 Work out $\frac{5}{8} \times \frac{4}{5}$

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

Multiply the numerators and multiply the denominators: $5 \times 4 = 20$ and $8 \times 5 = 40$, giving $\frac{20}{40}$, which simplifies to $\frac{1}{2}$.

7 Work out $\frac{2}{7} \times \frac{7}{8}$

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

Multiply the numerators and multiply the denominators: $2 \times 7 = 14$ and $7 \times 8 = 56$, giving $\frac{14}{56}$, which simplifies to $\frac{1}{4}$.

8 Work out $\frac{3}{10} \times \frac{5}{9}$

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

Multiply the numerators and multiply the denominators: $3 \times 5 = 15$ and $10 \times 9 = 90$, giving $\frac{15}{90}$, which simplifies to $\frac{1}{6}$.

9 Work out 4×5

Answer: 1/3

Multiply the numerators and multiply the denominators: $4 \times 5 = 20$ and $5 \times 12 = 60$, giving $20/60$, which simplifies to $1/3$.

10 Work out 7×3

Answer: 1/6

Multiply the numerators and multiply the denominators: $7 \times 3 = 21$ and $9 \times 14 = 126$, giving $21/126$, which simplifies to $1/6$.

11 Work out 1×6

Answer: 3

$6 \div 2 = 3$, and $3 \times 1 = 3$.

12 Work out 2×9

Answer: 6

$9 \div 3 = 3$, and $3 \times 2 = 6$.

13 Work out 3×20

Answer: 15

$20 \div 4 = 5$, and $5 \times 3 = 15$.

14 Work out 2×35

Answer: 14

$35 \div 5 = 7$, and $7 \times 2 = 14$.

15 Work out 5×18

Answer: 15

$18 \div 6 = 3$, and $3 \times 5 = 15$.

16 Work out 3×24

Answer: 9

$24 \div 8 = 3$, and $3 \times 3 = 9$.

17 Work out 4×21

Answer: 12

$21 \div 7 = 3$, and $3 \times 4 = 12$.

18 Work out 5×27

Answer: 15

$27 \div 9 = 3$, and $3 \times 5 = 15$.

19 Work out 1×1

Answer: 1/4

Square the top and square the bottom: $1/4$.

20 Work out 2×2

Answer: 4/9

Square the top and square the bottom: $4/9$.

21 Work out 3×3

Answer: 9/16

Square the top and square the bottom: $9/16$.

- 22 Work out $2^2_5 \times 2^2_5$

Answer: 4/25

Square the top and square the bottom: $4/25$.

- 23 Work out $5^2_6 \times 5^2_6$

Answer: 25/36

Square the top and square the bottom: $25/36$.

- 24 Work out $3^2_8 \times 3^2_8$

Answer: 9/64

Square the top and square the bottom: $9/64$.

B · Reasoning — Why multiplying can shrink a number.

- 25 How do you multiply two fractions?

- ☐ Find a common denominator first
- ☐ Multiply the numerators, and multiply the denominators
- ☐ Multiply the numerators only
- ☐ Cross-multiply

Answer: Multiply the numerators, and multiply the denominators

No common denominator is needed — that is only for adding and subtracting.

- 26 What does “of” mean in “ $1/2$ of $3/4$ ”?

- ☐ add
- ☐ subtract
- ☐ multiply
- ☐ divide

Answer: multiply

“Of” is multiplication: $1/2$ of $3/4 = 1/2 \times 3/4 = 3/8$.

- 27 Multiplying by a fraction less than 1 makes a number ...

- ☐ bigger
- ☐ smaller
- ☐ unchanged
- ☐ negative

Answer: smaller

Half of something is less than the something. This surprises people who expect multiplying always to increase.

- 28 Why is $3/4 \times 8 = 6$ rather than 24?

- ☐ Because $8 \div 4 = 2$ and $2 \times 3 = 6$
- ☐ Because $3 \times 8 = 24$ and you halve it
- ☐ Because $8 - 2 = 6$
- ☐ It is 24

Answer: Because $8 \div 4 = 2$ and $2 \times 3 = 6$

$3/4 \times 8 = 24/4 = 6$. Taking three quarters of 8 must give less than 8.

29 Is it worth simplifying before multiplying?

- ☐ Yes
☐ No

Answer: Yes

Cancelling a common factor first keeps the numbers small: $\frac{3}{4} \times \frac{2}{9}$ becomes $\frac{1}{2} \times \frac{1}{3}$... in practice 3 and 9 cancel, and 2 and 4 cancel, leaving $\frac{1}{6}$.

30 Do you need a common denominator to multiply fractions?

- ☐ Yes
☐ No

Answer: No

That step belongs to addition and subtraction only.

31 What is $\frac{2}{3}$ of 1?

- ☐ 1
☐ $\frac{2}{3}$
☐ $\frac{3}{2}$
☐ 0

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

Any fraction of 1 is itself.

32 Marcus says $\frac{1}{2} \times \frac{1}{2} = 1$. What has he done?

- ☐ Nothing
☐ Added instead of multiplied
☐ Squared correctly
☐ Divided

Answer: Added instead of multiplied

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$. Half of a half is a quarter — smaller, not bigger.

C · Challenge — Chains, areas and working backwards.

33 Work out $1^2 \times 2^3 \times 3^4$

Answer: 1/4

Multiply straight across: $\frac{6}{24}$, which simplifies to $\frac{1}{4}$. Cancelling first is quicker.

34 Work out 3^4 of 8^9

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

$3 \times 8 = 24$ and $4 \times 9 = 36$, so $\frac{24}{36} = \frac{2}{3}$.

35 Two thirds of a number is 18. What is the number?

Answer: 27

One third is $18 \div 2 = 9$, so the number is $9 \times 3 = 27$.

36 Three quarters of a number is 30. What is the number?

Answer: 40

One quarter is $30 \div 3 = 10$, so the number is 40.

37 What is 1^2 of 1^2 of 1^2 ?

Answer: $\frac{1}{8}$

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$.

- 38** A square has side $2\frac{2}{3}$ m. What is its area, in m^2 ?

Answer: $\frac{4}{9}$

$$2\frac{2}{3} \times 2\frac{2}{3} = \frac{4}{9} \text{ m}^2.$$

D · Word problems — Fractions of real quantities.

- 39** A jar holds $3\frac{3}{4}$ litre. $2\frac{2}{3}$ of it is used. How many litres are used?

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

$$3\frac{3}{4} \times 2\frac{2}{3} = \frac{6}{12} = \frac{1}{2} \text{ litre.}$$

- 40** A class of 28 has $\frac{3}{4}$ present. How many learners are present?

Answer: 21

$$28 \div 4 = 7, \text{ and } 7 \times 3 = 21.$$

- 41** A 45-minute lesson is $2\frac{2}{3}$ over. How many minutes have gone?

Answer: 30

$$45 \div 3 = 15, \text{ and } 15 \times 2 = 30.$$

- 42** A rectangle is $3\frac{3}{4}$ m by $2\frac{2}{5}$ m. What is its area, in m^2 ?

Answer: $\frac{3}{10}$

$$3\frac{3}{4} \times 2\frac{2}{5} = \frac{6}{20} = \frac{3}{10} \text{ m}^2.$$

- 43** A shop has 60 apples and sells $\frac{5}{6}$ of them. How many are sold?

Answer: 50

$$60 \div 6 = 10, \text{ and } 10 \times 5 = 50.$$

- 44** $2\frac{2}{5}$ of a cake is left and half of that is eaten. What fraction of the whole cake is eaten?

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

$$1\frac{1}{2} \times 2\frac{2}{5} = \frac{2}{10} = \frac{1}{5}.$$

- 45** A tank holds 84 litres and is $\frac{3}{7}$ full. How many litres are in it?

Answer: 36

$$84 \div 7 = 12, \text{ and } 12 \times 3 = 36.$$

- 46** A journey is 120 km and $\frac{2}{5}$ has been driven. How many kilometres is that?

Answer: 48

$$120 \div 5 = 24, \text{ and } 24 \times 2 = 48.$$