

12. [Percents]

Skill 12.1 Writing a number out of 100 as a percent.

MMBlue 1 1 2 2 3 3 4 4
MMGreen 1 1 2 2 3 3 4 4

"Percent" means "per - hundred" or "of each hundred". The symbol used is " % "

Q. Write as a percent:
75 out of 100.

A. $\frac{75}{100} = 75\%$

Percent means out of 100.
75 out of 100 is 75 percent.

Q. Write as a percent:
30 out of 100.

A. $\frac{30}{100} = 30\%$

Percent means out of 100.
30 out of 100 is 30 percent.

a) Write as a percent:
50 out of 100.

50%

b) Write as a percent:
96 out of 100.

.....

c) Write as a percent:
6 out of 100.

.....

d) Write as a percent:
100 out of 100.

.....

e) Write as a percent:
14 out of 100.

.....

f) Write as a percent:
5 out of 100.

.....

g) Write as a percent:
25 out of 100.

.....

h) Write as a percent:
60 out of 100.

.....

i) Write as a percent:
20 out of 100.

.....

j) Write as a percent:
15 out of 100.

.....

k) Write as a percent:
80 out of 100.

.....

l) Write as a percent:
75 out of 100.

.....

Q. 17% of 100 =

A. 17% of 100
= 17

17% means 17 of each 100 parts.
17% of 100 is equal to 17.

Q. 4% of 300 =

A. 4% of 300
= 12

4% means 4 of each 100 parts.
4% of 3 lots of 100 is
 $4 + 4 + 4 = 12$
OR
 $4 \times 3 = 12$

Q. 59% of \$1.00 =

A. 59% of \$1.00
= 59% of 100c
= 59c

59% means 59 of each 100 parts.
\$1.00 can be written as 100c.
59% of 100 cents is equal to 59 cents.

Q. 8% of \$4.00 =

A. 8% of \$4.00
= 8% of 400c
= 32c

8% means 8 of each 100 parts.
\$4.00 can be written as 400c.
8% of 400 cents is equal to
8% of 4 lots of 100c or
 $8c + 8c + 8c + 8c = 32c$
OR
 $8c \times 4 = 32c$

a) 52% of 100 =
= 52

b) 25% of 100 =
=

c) 8% of 100 =
=

d) 40% of 100 =
=

e) 30% of 400 =
= 30×4
= 120

f) 60% of 500 =
=
=

g) 40% of 200 =
=
=

h) 20% of 600 =
=
=

i) 30% of \$1.00 =
= 30 c

j) 69% of \$1.00 =
= c

k) 25% of \$1.00 =
= c

l) 7% of \$1.00 =
= c

m) 12% of \$4.00 =
= $12c \times 4$
= 48 c

n) 10% of \$8.00 =
=
= c

o) 6% of \$9.00 =
=
= \$

p) 75% of \$6.00 =
=
= \$

Percent questions can be simplified using fractions.

<p>Q. 12% of 50 =</p>	<p>A. 12% of 50</p> $= \frac{12}{100} \times \frac{50}{1}$ $= \frac{600}{100}$ $= 6$	<p>Since:</p> <ul style="list-style-type: none"> • 12% is $\frac{12}{100}$ • "of" means \times • 50 is $\frac{50}{1}$ <p>rewrite the question as a multiplication.</p> <p>Multiply the numerators together and denominators together. Simplify, if possible.</p> <p>OR</p> <p>We know 12% of 100 is 12. So, 12% of 50 would be half that.</p>
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<p>Q. 30% of 80 =</p>	<p>A. 30% of 80</p> $= \frac{30}{100} \times \frac{80}{1}$ $= \frac{2400}{100}$ $= 24$	<p>Since:</p> <ul style="list-style-type: none"> • 30% is $\frac{30}{100}$ • "of" means \times • 80 is $\frac{80}{1}$ <p>rewrite the question as a multiplication.</p> <p>Multiply the numerators together and denominators together. Simplify, if possible.</p>
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- | | | | |
|-----------------------|-----------------------|-----------------------|------------------------|
| a) 20% of 50 = | b) 10% of 60 = | c) 30% of 20 = | d) 60% of 200 = |
|-----------------------|-----------------------|-----------------------|------------------------|

$$= \frac{20}{100} \times \frac{50}{1}$$

$$= \frac{1000}{100} = 10$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

- | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| e) 70% of 60 = | f) 50% of 40 = | g) 80% of 90 = | h) 40% of 80 = |
|-----------------------|-----------------------|-----------------------|-----------------------|

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

- | | | | |
|------------------------|-----------------------|------------------------|-----------------------|
| i) 75% of 200 = | j) 15% of 60 = | k) 25% of 120 = | l) 10% of 35 = |
|------------------------|-----------------------|------------------------|-----------------------|

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

- | | | | |
|-------------------------|----------------------|------------------------|-----------------------|
| m) 12% of 1000 = | n) 5% of 12 = | o) 15% of 300 = | p) 35% of 20 = |
|-------------------------|----------------------|------------------------|-----------------------|

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

$$= \dots\dots\dots$$

Skill 12.4 Finding 12.5%, $33\frac{1}{3}\%$ or $66\frac{2}{3}\%$ of a number.

For the following percents it is worth remembering their equivalent fractions.

$$12.5\% = \frac{12.5}{100} \times \frac{2}{2} = \frac{25}{200} = \frac{1}{8}$$

$$25\% = \frac{25}{100} = \frac{1}{4}$$

$$33\frac{1}{3}\% = \frac{33\frac{1}{3}}{100} = \frac{100}{3} \div 100 = \frac{1}{3}$$

$$33\frac{1}{3}\% = \frac{(33 \times 3) + 1}{3} = \frac{100}{3}$$

$$50\% = \frac{50}{100} = \frac{1}{2}$$

$$66\frac{2}{3}\% = \frac{66\frac{2}{3}}{100} = \frac{200}{3} \div 100 = \frac{2}{3}$$

$$75\% = \frac{75}{100} = \frac{3}{4}$$

$$66\frac{2}{3}\% = \frac{(66 \times 3) + 2}{3} = \frac{200}{3}$$

<p>Q. 12.5% of 400 =</p>	<p>A. 12.5% of 400</p> $= \frac{1}{8} \times \frac{400}{1}$ $= \frac{400}{8} = 50$	<p>Since $12.5\% = \frac{1}{8}$, substitute 12.5% with $\frac{1}{8}$.</p> <p>Multiply the numerators together and denominators together.</p> <p>Simplify, if possible.</p>
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<p>Q. $33\frac{1}{3}\%$ of 60 =</p>	<p>A. $33\frac{1}{3}\%$ of 60</p> $= \frac{1}{3} \times \frac{60}{1}$ $= \frac{60}{3} = 20$	<p>Since $33\frac{1}{3}\% = \frac{1}{3}$, substitute $33\frac{1}{3}\%$ with $\frac{1}{3}$.</p> <p>Multiply the numerators together and denominators together.</p> <p>Simplify, if possible.</p>
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a) $66\frac{2}{3}\%$ of 60 =

$$= \frac{2}{3} \times \frac{60}{1}$$

$$= \frac{120}{3} = 40$$

b) $33\frac{1}{3}\%$ of 30 =

$$=$$

$$=$$

c) 12.5% of 800 =

$$=$$

$$=$$

d) $33\frac{1}{3}\%$ of 540 =

$$=$$

$$=$$

e) $66\frac{2}{3}\%$ of 450 =

$$=$$

$$=$$

f) 12.5% of 344 =

$$=$$

$$=$$

g) 25% of 800 =

$$=$$

$$=$$

h) 75% of 400 =

$$=$$

$$=$$

i) 50% of 170 =

$$=$$

$$=$$

Q. Write as a percent:
48 out of 50.

A. $\frac{48}{50} = \frac{?}{100}$
 $\frac{48 \times 2}{50 \times 2} = \frac{96}{100}$
 $\frac{96}{100} = 96\%$

Complete the equivalent fractions.
To get from 50 to 100 you must multiply by 2.
Do the same operation to the numerator. $48 \times 2 = 96$
96 out of 100 is 96%.

OR
Divide 48 by 50 to get 0.96, which can be written as 96%.

Q. Write as a percent:
45 out of 60.

A. $\frac{45}{60} = \frac{?}{100}$
 $= \frac{9}{12} = \frac{3}{4}$
 $\frac{3 \times 25}{4 \times 25} = \frac{?}{100}$
 $\frac{75}{100} = 75\%$

Simplify by dividing 45 and 60 by a common factor till you reach the simplest form.
5 goes into 45 and 60.
3 goes into 9 and 12.

Complete the equivalent fractions. To get from 4 to 100 you must multiply by 25.
Do the same operation to the numerator. $3 \times 25 = 75$

a) Write as a percent:
30 out of 50.

$$= \frac{30 \times 2}{50 \times 2}$$

$$= \frac{60}{100} = 60\%$$

b) Write as a percent:
20 out of 80.

$$= \frac{20 \div 20}{80 \div 20}$$

$$= \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 25\%$$

c) Write as a percent:
6 out of 10.

$$=$$

$$=$$

d) Write as a percent:
40 out of 80.

$$=$$

$$=$$

e) Write as a percent:
24 out of 30.

$$=$$

$$=$$

f) Write as a percent:
6 out of 300.

$$=$$

$$=$$

g) Write as a percent:
12 out of 48.

$$=$$

$$=$$

h) Write as a percent:
12 out of 30.

$$=$$

$$=$$

i) Write as a percent:
14 out of 200.

$$=$$

$$=$$

Skill 12.6 Writing a decimal as a percent.

To write a decimal as a percent multiply by 100 and add the % sign.
To multiply by 100 move the decimal point two places to the right.

Q. Write 0.68 as a percent.

A. $0.\widehat{68} = 68\%$

To write 0.68 as a percent move the decimal point two places to the right and add the % sign.

Q. Write 0.3 as a percent.

A. 0.3
 $= 0.\widehat{30}$
 $= 30\%$

For decimals with one digit after the decimal point, add a 0 in the hundredths column to fill the gap.

a) Write 1.60 as a percent.

$\underline{1.\widehat{60} = 160\%}$

b) Write 0.08 as a percent.

$\underline{0.\widehat{08} = 8\%}$

c) Write 0.65 as a percent.

.....

d) Write 0.5 as a percent.

.....

e) Write 0.32 as a percent.

.....

f) Write 0.75 as a percent.

.....

g) Write 1.4 as a percent.

.....

h) Write 0.24 as a percent.

.....

i) Write 0.05 as a percent.

.....

j) Write 0.02 as a percent.

.....

k) Write 0.15 as a percent.

.....

l) Write 0.6 as a percent.

.....

m) Write 0.25 as a percent.

.....

n) Write 0.4 as a percent.

.....

o) Write 1.2 as a percent.

.....

Percent means out of one hundred, so any percent can be written as a fraction with a denominator of 100.

<p>Q. Write 60% as a fraction in simplest form.</p>	<p>A. 60% $= \frac{60 \div 20}{100 \div 20}$ $= \frac{3}{5}$</p>	<p>Sixty percent means 60 out of 100. Simplify the top and bottom of the fraction by dividing both 60 and 100 by their GCF, which is 20.</p>
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<p>Q. Write 2% as a fraction in simplest form.</p>	<p>A. 2% $= \frac{2 \div 2}{100 \div 2}$ $= \frac{1}{50}$</p>	<p>Two percent means 2 out of 100. Simplify top and bottom of the fraction by dividing both 2 and 100 by their GCF, which is 2.</p>
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a) Write 55% as a fraction in simplest form.

$$55\% = \frac{55 \div 5}{100 \div 5} = \frac{11}{20}$$

.....

b) Write 6% as a fraction in simplest form.

$$6\% = \frac{6 \div 2}{100 \div 2} =$$

.....

c) Write 30% as a fraction in simplest form.

.....

d) Write 25% as a fraction in simplest form.

.....

e) Write 40% as a fraction in simplest form.

.....

f) Write 15% as a fraction in simplest form.

.....

g) Write 4% as a fraction in simplest form.

.....

h) Write 24% as a fraction in simplest form.

.....

i) Write 50% as a fraction in simplest form.

.....

j) Write 72% as a fraction in simplest form.

.....

k) Write 60% as a fraction in simplest form.

.....

l) Write 32% as a fraction in simplest form.

.....

Skill 12.8 Writing a fraction as a percent.Percent means: fraction of one hundred OR fraction \times 100%

(See Skill Builder 12.5 for an alternative method.)

Q. Write the fraction $\frac{3}{5}$ as a percent.

$$\begin{aligned} \mathbf{A.} \quad \frac{3}{5} &= \frac{3}{5} \times 100\% \\ &= \frac{3}{5} \times \frac{100}{1} \% \\ &= \frac{300}{5} \% \\ &= \mathbf{60\%} \end{aligned}$$

Q. Write the fraction $\frac{4}{25}$ as a percent.

$$\begin{aligned} \mathbf{A.} \quad \frac{4}{25} &= \frac{4}{25} \times 100\% \\ &= \frac{4}{25} \times \frac{100}{1} \% \\ &= \frac{400}{25} \% \\ &= \mathbf{16\%} \end{aligned}$$

a) Write the fraction $\frac{3}{20}$ as a percent.

$$\frac{3}{20} = \frac{3}{20} \times \frac{100}{1} \% = \frac{300}{20} \% = \mathbf{15\%}$$

b) Write the fraction $\frac{16}{40}$ as a percent.

$$\frac{16}{40} = \frac{16}{40} \times \frac{100}{1} \% = \frac{1600}{40} \% =$$

c) Write the fraction $\frac{1}{4}$ as a percent.

.....

d) Write the fraction $\frac{1}{2}$ as a percent.

.....

e) Write the fraction $\frac{9}{10}$ as a percent.

.....

f) Write the fraction $\frac{7}{50}$ as a percent.

.....

g) Write the fraction $\frac{6}{10}$ as a percent.

.....

h) Write the fraction $\frac{8}{50}$ as a percent.

.....

<p>Q. Decrease \$60 by 4%</p>	<p>A. 4% of 60 $= \frac{4}{100} \times \frac{60}{1}$ $= \frac{240}{100}$ $= 240 \div 100$ $= \underbrace{240}_{.} \div 100$ $= 2.40$ $\\$60 - \\2.40 $= \\$57.60$</p>	<p><i>First find 4% of 60.</i></p> <p><i>Then decrease or subtract the result from \$60.</i></p>
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<p>Q. Increase \$200 by 30%</p>	<p>A. 30% of 200 $= \frac{30}{100} \times \frac{200}{1}$ $= \frac{6000}{100}$ $= 60$ $\\$200 + \\60 $= \\$260$</p>	<p><i>First find 30% of 200.</i></p> <p><i>Simplify by dividing by 100 and crossing off the respective zeros.</i></p> <p><i>Then increase or add the result to \$200.</i></p>
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a) Increase \$40 by 15%

$$= \frac{15}{100} \times \frac{40}{1} = \frac{600}{100} = 6$$

$$\underline{\$40 + \$6 = \$46}$$

b) Decrease \$90 by 20%

.....

c) Increase \$1000 by 18%

.....

d) Decrease \$75 by 10%

.....

e) Increase \$1000 by 24%

.....

f) Decrease \$60 by 20%

.....

Q. If 10% is to be added to a \$25 book, find the selling price.

A. $10\% \text{ of } 25 = \frac{10}{100} \times 25$
 $= \frac{250}{100}$
 $= 250 \div 100$
 $= \underline{250} \div 100$
 $= 2.5$

First find 10% of \$25.

$\text{Selling price} = \text{Wholesale price} + 10\%$
 $= \$25 + \$2.50 = \mathbf{\$27.50}$

Then add this amount to the wholesale price.

Q. Find the sale price of a \$8.00 calendar, if it is marked down by 10%.

A. $10\% \text{ of } 8 = \frac{10}{100} \times 8$
 $= \frac{80}{100}$
 $= 80 \div 100$
 $= \underline{80} \div 100$
 $= 0.8$

First find 10% of \$8.

$\text{Selling price} = \text{Wholesale price} - 10\%$
 $= \$8.00 - \$0.80 = \mathbf{\$7.20}$

Then subtract this amount from the wholesale price.

a) If 10% is to be added to a \$160 software package, find the selling price.

$10\% \text{ of } 160 = \frac{10}{100} \times \frac{160}{1} = \frac{1600}{100} = 16$

$SP = \$160 + \$16 = \mathbf{\$176}$

b) If 10% is to be added to a \$225 bike, find the selling price.

.....

c) Find the sale price of a \$320 tennis racquet, if it is marked down by 20%.

.....

d) Find the sale price of a \$49 game, if it is marked down by 10%.

.....

e) A shop sells its computers for 20% more than the list price. Find the cost price of a \$1900 computer.

.....

f) A shop sells its cards for 10% more than the list price. Find the cost price of a \$4.00 card.

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