

6. [Percents]

Skill 6.1 Estimating a percent.

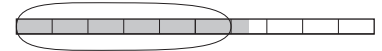
MMMaive 1 1 2 2 3 3 4 4
MMLime 1 1 2 2 3 3 4 4

- Picture the amount shaded as out of 100.
- Count the known parts.
- Compare to common parts like one half equals 50%.

Q. What percent is shown on the bar?



A. 65%



6 out of 10 parts are shaded.
That much is 60%



Plus half of another part.
So add another 5%.

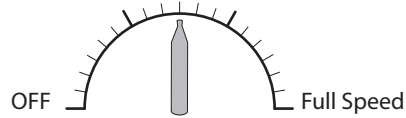
a) Estimate the percent of the line between the arrows.



2 out of 5 parts

40%

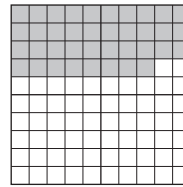
b) What percent of full speed has been reached?



c) What percent of the file has been transferred?



d) What percent of the grid is shaded?

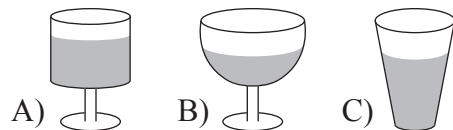


e) What percent of data has been sent?

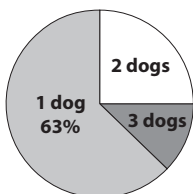
Sending data (..... % done)



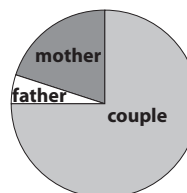
f) Which glass is 75% full?



g) What percent of dog owners own 3 dogs?



h) In Australia 5% of adolescents live with their father. What percent of children live with their mother?



Skill 6.2 Finding the remaining percent.

- Subtract the given percents, from one whole or 100%, to find the remaining percent.

Q. An aluminum solder is made up of 65% zinc, 20% aluminum and the rest copper. What percent is copper?

A. $100\% - 65\% - 20\%$
 $= 15\%$

a) A lingerie item was made up of 67% polyamide, 14% elastane and cotton. What percent was cotton?

$100\% - 67\% - 14\%$ =

b) German silver is made up of 55% copper, 25% zinc and the rest nickel. What percent is nickel?

..... =

c) The energy in walnuts comes from proteins, carbohydrates and fats. If 5% comes from proteins and 5% from carbohydrates, how much energy is supplied by fats?

..... =

d) Australia's water use is divided between 16% urban/industrial, 77% irrigation and the rest, "other rural". What percent is "other rural"?

..... =

e) Lou's coat is made up of 3% spandex, 21% nylon and the rest rayon. How much rayon is in the coat?

..... =

f) A café latté is made up of 30% coffee, 5% froth and the rest is milk. What percent of a café latté is milk?

..... =

g) The slopes at Niseko, Japan are classified 30% beginner terrain, 44% intermediate and the remainder advanced. What percent are advanced slopes?

..... =

h) The slopes at Kiroro, Japan are classified 38% beginner terrain, 24% intermediate and the remainder advanced. What percent are advanced slopes?

..... =

i) 1% of the earth's atmosphere is a mixture of gases, 78% is nitrogen, and the rest is oxygen. How much of our atmosphere is oxygen?

..... =

j) Normann Stadler, winner of the 2006 World Triathlon Championships, spent 11% of his time swimming, 53% riding and the rest running. What percent of time did he run?

..... =

Skill 6.3 Finding a percent of a multiple of 100.

- Change the % to a fraction out of 100.

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

- Change 'of' to '×'.
- Change the whole number to a fraction over 1, i.e. $3 = \frac{3}{1}$
- Cross simplify the fractions before multiplying.
(see skill 5.2, page 51)

OR

- First find 10%.
- Then multiply by the amount needed to make the required percent.

Hint:

To find $10\% = \frac{1}{10} \Rightarrow$ divide by 10

$5\% =$ half of 10%

$20\% = \frac{1}{5} \Rightarrow$ divide by 5

$25\% = \frac{1}{4} \Rightarrow$ divide by 4

Q. 60% of $300 =$

A. $\frac{60}{100} \times \frac{300}{1} =$ *Simplify: $\div 100$* **OR** **A.** $\frac{1}{10} \times \frac{300}{1} =$ *Find 10%*

$= 60 \times 3$ $= 30$ *Multiply by 6 to get 60%*

$= \mathbf{180}$ $= 30 \times 6$

$= \mathbf{180}$

a) 40% of $200 =$ *Divide by 100*

$\frac{40}{100} \times \frac{200}{1}$

$=$ 80

b) 10% of $500 =$

$\frac{10}{100} \times \frac{500}{1}$

$=$ 50

c) 20% of $300 =$ *First find 10%*

$=$ 60

d) 3% of $700 =$

$=$ 21

e) 25% of $300 =$

$=$ 75

f) 8% of $400 =$

$=$ 32

g) 70% of $600 =$

$=$ 420

h) 2% of $700 =$

$=$ 14

i) 5% of $300 =$

$=$ 15

j) 55% of $1000 =$

$=$ 550

k) 75% of $2000 =$

$=$ 1500

l) 6% of $3000 =$

$=$ 180

Skill 6.5 Finding a percent of a quantity (1).

- Change the % to a fraction out of 100.

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

- Change 'of' to 'x'.
- Change the whole number to a fraction over 1, i.e. $3 = \frac{3}{1}$
- Cross simplify the fractions before multiplying.
(see skill 5.2, page 51)

OR

- First find 10%.
- Then multiply by the amount needed to make the required percent.

Hint:

To find 1% = $\frac{1}{100} \Rightarrow$ divide by 100

$0.5\% =$ half of 1%

$12.5\% = \frac{1}{8} \Rightarrow$ divide by 8

$33\frac{1}{3}\% = \frac{1}{3} \Rightarrow$ divide by 3

$66\frac{2}{3}\% = \frac{2}{3} \Rightarrow$ divide by 3
multiply by 2

Q. 1% of 79 m =

A. $\frac{1}{100} \times \frac{79}{1} =$ *Multiply* **OR** **A.** $79 \div 100 =$ *÷ by 100 to get 1%*
 $= \frac{79}{100}$ *2 zeros, 2 places left*
 $= 0.79 m$ *1 m = 1000 mm*
 $= 0\widehat{7}9.0 \div 100$
 $= 0.79 m$ *2 zeros, 2 places left*

a) 14% of 50 km = $\frac{14}{100} \times \frac{50}{1}$ *Simplify: ÷ 10 then ÷ 5* = $14 \div 2 = 7 \text{ km}$

b) 8% of 600 g = _____ = _____ g

c) 13% of 300 L = _____ = _____ L

d) 30% of 70 kg = _____ = _____ kg

e) 15% of 50 MB = _____ = _____ MB

f) 20% of 75 m = _____ = _____ m

g) 1% of 45 kg = _____ = _____ kg

h) 12.5% of \$16 = _____ = _____ \$

i) $66\frac{2}{3}\%$ of 60 seconds = _____ = _____ s

j) 0.5% of 260 cm = _____ = _____ cm

k) $33\frac{1}{3}\%$ of 72 days = _____ = _____ days

l) 0.1% of 300 km = _____ = _____ km

Skill 6.5 Finding a percent of a quantity (2).MMMaive 1 1 2 3 3 4 4
MMLime 1 1 2 2 3 3 4 4

- Write a number sentence from the information given.
- Calculate the percent of the given amount. (see skill 6.4, page 62)

$$\text{Commission} = \% \times \text{Selling price}$$

- Q.** Jai sells a property for \$118,000 and gets 3% commission. How much is Jai's commission?

$$\begin{aligned} \text{A. } \frac{3}{100} \times \frac{118,000}{1} &= \text{Simplify: } \div 100 \\ &= 3 \times 1180 \\ &= \mathbf{\$3540} \end{aligned}$$

- m)** A TV was repaired for \$175, then 10% tax was added to the price. What was the total cost of the TV repairs?

$$\frac{10}{100} \times \frac{175}{1} = 17.5 \quad \text{Simplify: } \div 10$$

$$175 + 17.5 = \mathbf{\$192.50}$$

- n)** Archie leaves an extra 5% of the restaurant bill as a tip. The bill was \$150. How much was the tip?

$$= \mathbf{\$}$$

- o)** A surfboard costing \$700 is sold at a loss of 12%. Calculate the selling price.

$$= \mathbf{\$}$$

- p)** Kate is a car sales person, and she sells a car for \$84,000. If her commission is 2%, how much is Kate's commission?

$$= \mathbf{\$}$$

- q)** In 2006 we consumed on average 500 g of carbohydrate per day. In 1980 we consumed 80% of this amount. How many grams of carbohydrate did we consume per day in 1980?

$$= \mathbf{g}$$

- r)** Fairy puts up 20% as a down payment on a shuttle board table. The table costs \$380. She will then make 4 equal payments of the balance. What will the last payment be?

$$= \mathbf{\$}$$

- s)** The tap was repaired for \$308. If tax of 10% was included, how much was the tax?

$$= \mathbf{\$}$$

- t)** Tim pays \$160,000 for a property and sells it for 5% less. Calculate the loss.

$$= \mathbf{\$}$$

Skill 6.6 Finding a percent of a decimal number.

- First find 10%.
- Divide the decimal number by 10 by moving the decimal point 1 place to the left.
- Multiply or divide by the amount needed to make the required percent.

OR

- Write the percent as a decimal number.
- Multiply the decimal numbers.

Hint:

To find 10% = $\frac{1}{10} \Rightarrow$ divide by 10

5% = half of 10%

20% = $\frac{1}{5} \Rightarrow$ divide by 5

25% = $\frac{1}{4} \Rightarrow$ divide by 4

50% = $\frac{1}{2} \Rightarrow$ divide by 2

Q. 20% of 8.4 =

A. 20% of 8.4 =
 10% of 8.4 \leftarrow Find 10%
 = $\widehat{8.4} \div 10$
 = 0.84
 = 0.84×2 \leftarrow Multiply by 2 to get 20%
 = **1.68**

OR A. 20% of 8.4 $\left(20\% = \frac{1}{5}\right)$
 = $8.4 \div 5$ \leftarrow Divide by 5
 = **1.68**

a) 5% of 7.6 = \leftarrow Find 10%

10% of 7.6 = $\widehat{7.6} \div 10 = 0.76$

$0.76 \div 2$ \leftarrow Divide by 2 to get 5% = **0.38**

b) 10% of 32.5 =

..... =

c) 50% of 9.8 =

..... =

d) 1% of 24.7 =

..... =

e) 40% of 35.6 =

..... =

f) 25% of 32.8 =

..... =

g) 20% of 2.7 =

..... =

h) 30% of 3.6 =

..... =

Skill 6.7 Working with more than 100%.

- Change the % to a fraction out of 100.

Example: $120\% = \frac{120}{100}$

- Change 'of' to '×'.
- Change the whole number to a fraction over 1, i.e. $3 = \frac{3}{1}$
- Cross simplify the fractions before multiplying.
(see skill 5.2, page 51)

OR

- First find 100% or other multiples of 100%.
- Then find the remaining percent.
- Add the results.

Hint:

To find $10\% = \frac{1}{10} \Rightarrow$ divide by 10

$5\% =$ half of 10%

$20\% = \frac{1}{5} \Rightarrow$ divide by 5

$25\% = \frac{1}{4} \Rightarrow$ divide by 4

$200\% = \frac{2}{1} \Rightarrow$ multiply by 2

Q. 200% of 45 =

A. $\frac{200}{100} \times \frac{45}{1} =$ *Simplify: ÷ 100*
 $= 2 \times 45$
 $= 90$

OR **A.** 100% is 45.
 So 200% is double that or 90.

a) 120% of 30 =

$= \frac{120}{100} \times \frac{30}{1}$ *Simplify: ÷ 10, twice*
 $= 12 \times 3 = \boxed{36}$

b) 110% of 160 =

$100\% \text{ of } 160 = 160$ *First find 100%*
 $10\% \text{ of } 160 = 16$ *Then find 10%*
 $160 + 16 = \boxed{}$ *Add the results*

c) 200% of 70 =

$ = \boxed{}$

d) 300% of 28 =

$ = \boxed{}$

e) 120% of 30 =

$ = \boxed{}$

f) How much is 400% of 34?

$ = \boxed{}$

g) How much is 150% of 450?

$ = \boxed{}$

h) 105% of 32 =

$ = \boxed{}$

i) 110% of 230 =

$ = \boxed{}$

j) How much is 101% of 400?

$ = \boxed{}$

k) 125% of 80 inches =

$ = \boxed{} \text{ in.}$

l) 105% of 380 yards =

$ = \boxed{} \text{ yd}$

Skill 6.8 Finding a number knowing a percent of that number (1).

- Write the words as an equation.

EITHER

- Bring the percent to 100% by methods like doubling or first finding 1%, 5% or 10%.

OR

- Use algebra.

Q. 25% of = 145

A. $\frac{25}{100} \times x = 145$ *Simplify: $\div 25$*
 $x = 145 \times \frac{100}{25}$
 $x = 145 \times 4$
 $x = 580$

Write the % as a fraction.

Get the unknown amount (x) alone on one side of the equation.

Simplify by dividing both the top and the bottom of the equation by common factors.

Complete the multiplication.

a) 20% of = 90

If 20% of x is 90 then 10% is half, so 45

$100\% = 10\% \times 10 = 45 \times 10 = 450$

b) 5% of = 20

If 5% of x is 20 then 10% is

Find 100%

c) 6% of = 21 *Use algebra*

d) 60% of = 150

e) 11% of = 22

$x = 22 \times \frac{100}{11}$

$x =$

f) 12% of = 54

$x =$

$x =$

g) 80% of = 76

$x =$

$x =$

h) 75% of = 525

i) 30% of = 54

j) 15% of = 75

Skill 6.8 Finding a number knowing a percent of that number (2).

MMMaive 11 22 33 44
MMLime 11 22 33 44

Q. If 75% or 24 students in the class are boys, how many students are in the class?

A. $\frac{75}{100} \times x = 24$
 $x = 24 \times \frac{100}{75}$
 $x = 8 \times 4$
 $x = 32$

Simplify: ÷ 25 then ÷ 3

Write the words as an equation.

Get the unknown amount alone on one side of the equation.

Simplify by dividing both the top and the bottom of the fractions by common factors.

Complete the multiplication.

k) If 20% of the cost is \$13, what is the total cost?

If 20% of x is \$13 then 10% is half or \$6.50

$100\% = 10\% \times 10 = \6.50×10 \$65

Find 100%

l) Maria's iPod has 400 songs, and only 20% of the iPod's memory is full. How many more songs can Maria load on her iPod?

m) Your tank is 5% full and has 200 gallons of water in it. How much water would the tank hold when full?

gal

n) In a bag of potatoes, 7 are rotten. If this is 25% of the bag, how many potatoes are in the bag all together?

o) Chris Johnson played 45 minutes of the football game. If this is 75% of the match duration, how long is the total game?

min

p) Population in County Galway has increased by 10% in the last 6 years to 250,800 people. What was the population of County Galway 6 years ago?

q) In the railway carriage there are 95 people. This is 25% more than the number of seats. How many seats are in this carriage?

$\frac{125}{100} \times x = 95$

Simplify: ÷ ?

x =

x =

r) Gasoline in Australia has gone up 75% in the last 3 years to \$1.40 cents per liter. How much per liter was gasoline 3 years ago?

x =

x =

\$

Skill 6.9 Increasing an amount by a percent.

- Calculate the percent of the given amount. (see skill 6.4, page 62 and skill 6.5, page 63)
 - Add this result to the given amount.
- Hint: If an amount is increased by 20% it will become 120% of its original value.*

Q. Increase 30 by 20%.

A. $\frac{20}{100} \times \frac{30}{1} =$ *Simplify: $\div 10$, twice*

$= 2 \times 3 = 6$

$6 + 30$ *Add the 20% to 30*

$= 36$

a) Increase 400 by 2%.

1% is 4 so 2% is 8

$8 + 400 = \boxed{408}$

b) Increase 70 by 10%.

$\dots = \boxed{}$

c) Increase 310 by 50%.

$\dots = \boxed{}$

d) Increase 80 by 20%.

$\dots = \boxed{}$

e) Increase 600 by 1%.

$\dots = \boxed{}$

f) Increase 56 by 25%.

$\dots = \boxed{}$

g) Increase 40 by 15%.

$\dots = \boxed{}$

h) Increase 300 by 12%.

$\dots = \boxed{}$

i) Increase 52 by 50%.

$\dots = \boxed{}$

j) Increase 80 by 75%.

$\dots = \boxed{}$

k) Increase 64 by 12.5%.

$\dots = \boxed{}$

l) Increase 300 by 2%.

$\dots = \boxed{}$

m) Increase 15 by 80%.

$\dots = \boxed{}$

n) Increase 60 by 45%.

$\dots = \boxed{}$

o) Increase 90 by 60%.

$\dots = \boxed{}$

Skill 6.10 Decreasing an amount by a percent.

MMMaive 1 1 2 2 3 3 4 4
MMLime 1 1 2 2 3 3 4 4

- Calculate the percent of the given amount. (see skill 6.4, page 62 and skill 6.5, page 63)
 - Subtract this result from the given amount.
- Hint: If an amount is decreased by 20% it will become 80% of its original value.*

Q. Decrease \$35 by 5%. **A.** $\frac{5}{100} \times \frac{35}{1} =$ *Multiply*

$$= \frac{175}{100} = \$1.75$$

$$\$35 - \$1.75 =$$
 Subtract the 5% from \$35

$$= \mathbf{\$33.25}$$

a) Reduce 700 by 1%.

1% of 700 is 7

$$700 - 7 = \boxed{693}$$

b) Decrease 4000 by 11%.

$$\dots\dots\dots = \boxed{}$$

c) Reduce 500 by 10%.

$$\dots\dots\dots = \boxed{}$$

d) Decrease 2300 by 4%.

$$\dots\dots\dots = \boxed{}$$

e) Decrease 500 by 75%.

$$\dots\dots\dots = \boxed{}$$

f) Reduce 20 by 15%.

$$\dots\dots\dots = \boxed{}$$

g) Reduce 75 by 20%.

$$\dots\dots\dots = \boxed{}$$

h) Decrease 120 by 5%.

$$\dots\dots\dots = \boxed{}$$

i) Reduce 120 by 40%.

$$\dots\dots\dots = \boxed{}$$

j) Decrease 350 by 2%.

$$\dots\dots\dots = \boxed{}$$

k) Reduce 600 by 95%.

$$\dots\dots\dots = \boxed{}$$

l) Decrease 25 by 4%.

$$\dots\dots\dots = \boxed{}$$

m) Reduce 55 by 60%.

$$\dots\dots\dots = \boxed{}$$

n) Reduce 800 by 9%.

$$\dots\dots\dots = \boxed{}$$

o) Decrease 220 by 30%.

$$\dots\dots\dots = \boxed{}$$

Skill 6.11 Increasing or decreasing a quantity by a percent.

- Calculate the percent of the given amount. (see skill 6.4, page 62 and skill 6.5, page 63)
- To increase, add this result to the given amount. (see skill 6.9, page 69)
Hint: If an amount is increased by 20% it will become 120% of its original value.
- To decrease, subtract this result from the given amount. (see skill 6.10, page 70)
Hint: If an amount is decreased by 20% it will become 80% of its original value.

Q. Tickets purchased on weekdays get a 30% discount. If a Sunday ticket costs \$45, what does a Monday ticket cost?

$$\begin{aligned} \text{A. } \frac{30}{100} \times \frac{45}{1} &= \text{Simplify: } \div 10 \\ &= \frac{135}{10} = 13.5 \\ \$45.00 - \$13.5 &= \text{Subtract the result from the original value} \\ &= \mathbf{\$31.50} \end{aligned}$$

a) The sale of small cars increased by 15% in July. There were 40 small cars sold in June. How many small cars were sold in July?

$$\begin{aligned} \frac{15}{100} \times \frac{40}{1} &= \text{Simplify: } \div 10 \\ &= \frac{60}{10} = 6 \quad \text{Simplify: } \div 10 \end{aligned}$$

$$6 + 40 \quad \text{Add the result to the original value} = \boxed{}$$

b) The global population reached 6 billion in 1999. What will the global population be in 2025 if it grows by 30%?

$$= \boxed{}$$

c) The average life expectancy at birth in 1995 was 64 years. If in 2025 it grows by 12.5%, what will life expectancy be?

$$= \boxed{}$$

d) Last year Sandra invested \$5000 in shares. In the past 12 months they lost 25% of their value. What is the value of her investment?

$$= \$ \boxed{}$$

e) The population of Whyalla in South Australia increased by 20% in the 20 years to 1981. If the population was 13,600 in 1961, what was it in 1981?

$$= \boxed{}$$

f) You get 15% off your car insurance (cost = \$350) and house insurance (cost = \$450) if you combine the two payments. What would the joint payment be?

$$= \$ \boxed{}$$

Skill 6.12 Finding a percent change (1).

- Find the difference between the amounts (amount of change).
- Divide the amount of change by the original amount.
- Multiply by 100 to find the percent.

$$\text{percent change} = \frac{\text{amount of change}}{\text{original amount}} \times \frac{100}{1} \%$$

Q. Find the percent decrease:
3000 to 1950

A. $3000 - 1950 = 1050$ *Subtract to find the amount of change*

$$\frac{1050}{3000} \times \frac{100}{1} \%$$

Simplify: $\div 100$ then $\div 10$

$$= \frac{105}{300} \%$$

Simplify: $\div 3$

$$= \frac{35}{1} \%$$

$$= 35\%$$

a) Find the percent increase:
72 to 126

$$126 - 72 = 54$$

$$\frac{54}{72} \times \frac{100}{1} \%$$

Simplify: $\div 9$ then $\div 2$

$$= \frac{300}{4} \%$$

$$= \boxed{75\%}$$

b) Find the percent increase:
26 to 39

$$39 - 26 =$$

$$= \boxed{}$$

c) Find the percent decrease:
160 to 140

d) Find the percent decrease:
500 to 360

$$= \boxed{}$$

$$= \boxed{}$$

e) Find the percent increase:
240 to 420

f) Find the percent increase:
440 to 462

$$= \boxed{}$$

$$= \boxed{}$$

g) Find the percent increase:
85 ft to 102 ft

h) Find the percent decrease:
\$960 to \$816

$$= \boxed{}$$

$$= \boxed{}$$

