

### PERCENTAGES

Start by watching this 1-minute video on Why Percentages

<https://www.bbc.co.uk/teach/skillswise/percentages/z74vxyc>

A longer video to watch:

<https://www.homeschoolmath.net/teaching/percent/percent.php>

Percentage means per 100. In fractions it means something/100

$$42\% = \frac{42}{100}$$

$$95.3\% = \frac{95.3}{100}$$

$$61\% = \frac{61}{100}$$

This also means that

$100\% = \frac{100}{100} = 1$  whole – which is the whole amount. So 100% of something is ALL OF IT!

$10\% = \frac{10}{100} = \frac{1}{10}$  which is 1 tenth

$25\% = \frac{25}{100} = \frac{1}{4}$  which is 1 quarter

$50\% = \frac{50}{100} = \frac{1}{2}$  which is 1 half

Try this quiz:

[https://www.transum.org/software/SW/Starter\\_of\\_the\\_day/Students/Percentages.asp](https://www.transum.org/software/SW/Starter_of_the_day/Students/Percentages.asp)



## QUESTION 1

Find these percentage amounts of the figures listed

$$100\% \text{ of } 42 = \underline{\hspace{2cm}}$$
$$= \underline{\hspace{2cm}}$$

$$10\% \text{ of } 20 = \underline{\hspace{2cm}}$$
$$= \underline{\hspace{2cm}}$$

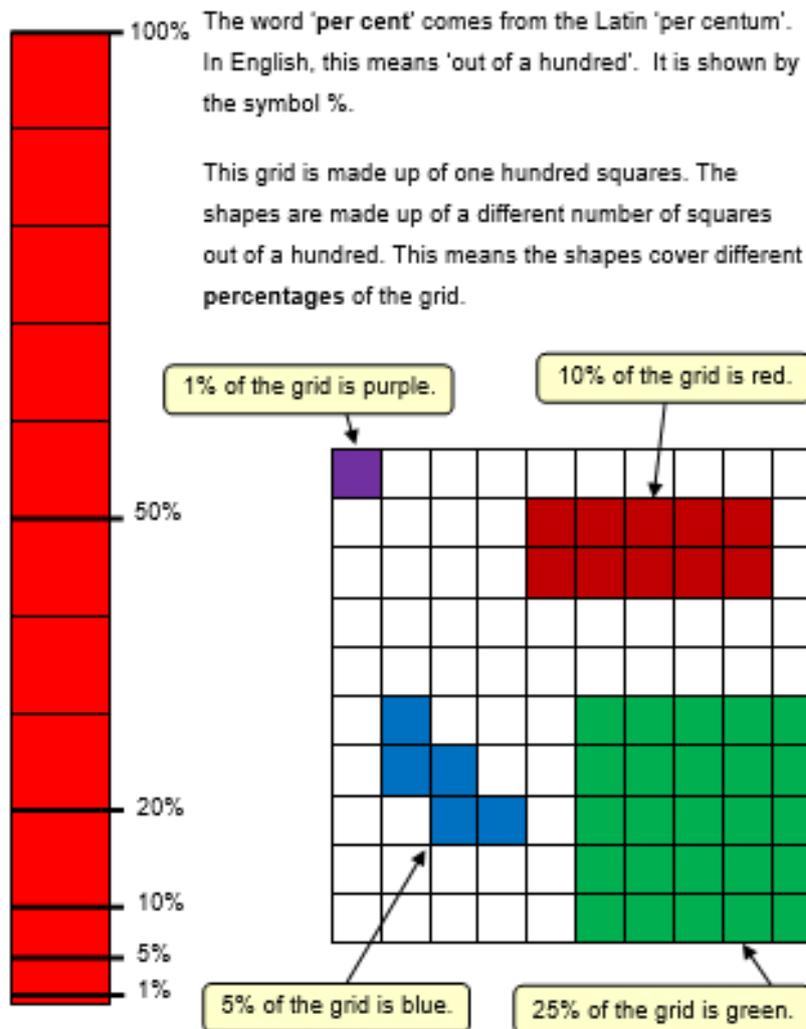
$$50\% \text{ of } 50 = \underline{\hspace{2cm}}$$
$$= \underline{\hspace{2cm}}$$

$$50\% \text{ of } 150 = \underline{\hspace{2cm}}$$
$$= \underline{\hspace{2cm}}$$

$$25\% \text{ of } 72 = \underline{\hspace{2cm}}$$
$$= \underline{\hspace{2cm}}$$

$$25\% \text{ of } 12 = \underline{\hspace{2cm}}$$
$$= \underline{\hspace{2cm}}$$

## What is a percentage?



Why compare fractions and percentages? Watch the video here

<http://www.bbc.co.uk/skillswise/topic/comparing-fractions>



## QUESTION 2

Find these percentage amounts of the figures listed (try to do these in your head)

a) 100% of 48 = \_\_\_\_\_ = \_\_\_\_\_

b) 100% of 36 = \_\_\_\_\_ = \_\_\_\_\_

c) 50% of 52 = \_\_\_\_\_ = \_\_\_\_\_

d) 50% of 38 = \_\_\_\_\_ = \_\_\_\_\_

e) 50% of 112 = \_\_\_\_\_ = \_\_\_\_\_

f) 50% of 1680 = \_\_\_\_\_ = \_\_\_\_\_

g) 50% of 280 = \_\_\_\_\_ = \_\_\_\_\_

h) 25% of 48 = \_\_\_\_\_ = \_\_\_\_\_

i) 25% of 40 = \_\_\_\_\_ = \_\_\_\_\_

j) 25% of 56 = \_\_\_\_\_ = \_\_\_\_\_

k) 25% of 400 = \_\_\_\_\_ = \_\_\_\_\_

l) 25% of 100 = \_\_\_\_\_ = \_\_\_\_\_

m) 25% of 200 = \_\_\_\_\_ = \_\_\_\_\_

n) 10% of 80 = \_\_\_\_\_ = \_\_\_\_\_

o) 10% of 860 = \_\_\_\_\_ = \_\_\_\_\_

p) 10% of 45 = \_\_\_\_\_ = \_\_\_\_\_

q) 10% of 56 = \_\_\_\_\_ = \_\_\_\_\_

r) 10% of 820 = \_\_\_\_\_ = \_\_\_\_\_

s) 10% of 11460 = \_\_\_\_\_ = \_\_\_\_\_

t) 1% of 1100 = \_\_\_\_\_ = \_\_\_\_\_

u) 1% of 2500 = \_\_\_\_\_ = \_\_\_\_\_



### QUESTION 3

First find 10% of the following amounts, then find the amount listed. (try to do these in your head as much as possible)

AMOUNT	10%	20%	40%	80%
4420				
380				
100				
10				
940				
200				
56				



### QUESTION 4

First find 10%, then 1% of the following amounts, then find the amount listed. (try to do these in your head as much as possible)

AMOUNT	10%	1%	2%	4%	5%	7%
360						
240						
1100						
1300						
5000						
10000						



### QUESTION 5

Use a calculator to find the percentages of the following:

a) 13% of 279= \_\_\_\_\_ = \_\_\_\_\_

b) 18% of 492= \_\_\_\_\_ = \_\_\_\_\_

c) 99% of 990= \_\_\_\_\_ = \_\_\_\_\_

d) 54% of 260= \_\_\_\_\_ = \_\_\_\_\_

e) 12.5% of 1145.70= \_\_\_\_\_ = \_\_\_\_\_

f) 21.2% of 68203.42= \_\_\_\_\_ = \_\_\_\_\_

### PERCENTAGE OFF

Percentage OFF something – Most often used with regards to money, sales and discounts

Percentage OFF something means find that percentage, and take it off the original price.

This is a two-step calculation.

### EXAMPLE

What is 12% **off** 480

$$12\% \text{ of } 480 = 57.60$$

$$\text{So } 12\% \text{ off is } 480 - 57.60$$

$$422.40$$

Do you know of another way to decrease 480 by 12%?

Write the method down here:

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## WHAT PERCENTAGE IS?

What percentage is something?

To find the percentage something is of a whole, take  $\frac{\text{what you want}}{\text{the total there is}} \times 100$ .

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### EXAMPLE

What percent is 482 of 1780

$$\frac{\text{what you want}}{\text{the total there is}} \times 100$$
$$\frac{482}{1780} \times 100 = 27.08\%$$



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### QUESTION 6

1. What percentage of 65 is 13?

2. If 12 out of 21 students in a class are girls, then, to the nearest percent, what percent of the class is composed of girls?

3. In a laboratory test on 360 light globes, 16 globes were found to be defective. What percentage were satisfactory (to one decimal place)?

4. After three rounds of a basketball competition, a basketball team had scored 300 points and had 360 points scored against them. Express the points scored by the team as a percentage of the points scored against them.

5. In a population of  $3\frac{1}{4}$  million people, 2115000 are under the age of 16. Calculate the percentage, to two decimal places, of the population who are under the age of 16.

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## PERCENTAGE INCREASE AND DECREASE

When increasing or decreasing a quantity by a given percentage, the percentage increase or decrease is always calculated as a percentage of the original amount.

**Example:** Sally's daily wage of \$175 is increased by 15%. Calculate her new weekly wage.

$$\begin{aligned} 15\% \text{ of } 175 &= \frac{15}{100} \times 175 \\ &= 26.25 \end{aligned}$$

$$\begin{aligned} \text{Sally's new salary} &= 175 + 26.26 \\ &= \$201.25 \end{aligned}$$



5. Due to the closure of a large business in the area, a school is expecting an 11% drop in its student numbers for the next year. If the current enrolment is 684 students, what is the anticipated enrolment for the next year?

Try this quiz:

[https://www.transum.org/software/SW/Starter\\_of\\_the\\_day/Students/PercentageChange.asp](https://www.transum.org/software/SW/Starter_of_the_day/Students/PercentageChange.asp)

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### FINDING THE WHOLE FROM A GIVEN PERCENTAGE

If a percentage of an amount is known, then the whole amount can be found by using the unitary method. This involves dividing to find 1% then multiplying by 100 to find 100%

**Example:** If 15% of an unknown number is \$9, find the whole amount

1% is 9 divided by 15 = \$0.6 (or 60 cents)

The whole (100%) =  $0.6 \times 100$   
= \$60 ie \$9 is 15% of \$60

**Example:** A TV discounted by 20% now sells for \$2100. What was the original price?

A 20% discount means that that \$2100 is 80% of the original price. The original price is 100% and 20% off leaves 80%.

1% is 2150 divided by 80 = 26.25

The whole (100%) =  $26.25 \times 100$  = \$2625



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#### QUESTION 8

1. Find the whole amount if 75% is 150 km.

2. 245 students at a school voted for a new uniform. If this is 35% of the school population, what is the school population?

3. The cost of a holiday is discounted by 25%. The holiday now costs \$4800. What was the original cost of the holiday?

4. The profit on an iPod is 65% of the cost price. If the profit is \$106, find the cost price correct to the nearest dollar

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**QUESTION 1**

Thomas told me that there was to be a big clearance sale of books, and they were 50% off the already 50% off prices. I said – are you serious? They are giving them away for free? Are the books free? Support your answer using mathematics.

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**QUESTION 2**

When doing moderate exercise, a relatively fit person should have a heart rate between 120-170 (for under 20 year olds). This is between 60% and 85% of the maximum heart rate. What is the maximum heart rate for this age group?