

Percentage Multipliers

Starter

1. **(Review of last lesson)** A cylinder has a height of 15 cm and its volume is 135π cm³. Calculate its radius.
2. **(Review of last lesson)** A cylindrical cup has radius 2.5 cm and height 12 cm. The cup is to be painted on its outside. What is the area to be painted? Give your answer to 3 s.f..
3. Convert these percentages to decimals:
(a) 27 % (b) 4 % (c) 189 % (d) 32.6 %
4. (a) Without a calculator, find 35 % of £84.
(b) Express 35 % as a decimal.
(c) Write down the single multiplication which would find 35 % of £84.
Hint: 'of' means ...?
Check your calculation by doing it on your calculator.

Notes

With percentages it is quicker to use **multipliers**, especially when the percentage is awkward.

Find a percentage of

From the starter, it can be seen that the **multiplier** for 'finding percentage of' questions is found by **converting the percentage into a decimal**.

E.g. 1 State the multiplier when finding the following percentage of a quantity:

- (a) 64 % (b) 2 % (c) 561 % (d) 8.3 %

Working: (a) $64 \% = \frac{64}{100} = 0.64$ Multiplier is 0.64

E.g. 2 Write down the single calculation needed to find:

- (a) 9 % of 38 (b) 137 % of 54 (c) 6.7 % of 190

Increase by a percentage

- E.g. 3** (a) Without a calculator, increase 120 km by 43 % .
(b) If we start with 100 % and add 43 % , what percentage do we have? Express this percentage as a decimal.
(c) Write down the single multiplication which would increase 120 km by 43 % .
Hint: 'of' means ...?
Check your calculation by doing it on your calculator.

E.g. 4 State the multiplier when **increasing** by the following percentages:

- (a) 17 % (b) 8 % (c) 146 % (d) 9.5 %

Working: (a) $100\% + 17 \% = 117 \% = 1.17$ Multiplier is 1.17

To find the multiplier when **increasing** by a percentage, **add** the percentage to 100 % and **convert to a decimal**.

E.g. 5 Write down the single calculation needed to **increase**:

- (a) 85 by 16 % (b) 540 by 6.34 % (c) 37 by 138 %

Decrease by a percentage

- E.g. 6** (a) Without a calculator, decrease 900 kg by 14 % .
(b) If we start with 100 % and take away 14 % , what percentage do we have?
Express this percentage as a decimal.
(c) Write down the single multiplication which would increase 900 kg by 14 % .
Hint: 'of' means ...?
Check your calculation by doing it on your calculator.

E.g. 7 State the multiplier when **decreasing** by the following percentages:

- (a) 26 % (b) 7 % (c) 83 % (d) 4.7 %

Working: (a) $100\% - 26\% = 74\% = 0.74$ Multiplier is 0.74

To find the multiplier when **decreasing** by a percentage, **subtract** the percentage from 100 % and **convert to a decimal**.

E.g. 8 Write down the single calculation needed to **decrease**:

- (a) 54 by 13 % (b) 76 by 5 % (c) 726 by 8.4 %

Video: [Multipliers](#)
Video: [Percentage of amount](#)

[Solutions to Starter and E.g.s](#)

Exercise

Worksheet: Percentage — do it in one
See below

Summary

From the starter, it can be seen that the **multiplier** for '**finding percentage of**' questions is found by **converting the percentage into a decimal**.

To find the multiplier when **increasing** by a percentage, **add** the percentage to 100 % and **convert to a decimal**.

To find the multiplier when **decreasing** by a percentage, **subtract** the percentage from 100 % and **convert to a decimal**.

Questions

1. Copy and complete the following table:

Question	Percentage	To find	To increase by	To decrease by
Example	70 %	$\times 0.7$	$\times 1.7$	$\times 0.3$
(a)	46 %			
(b)	3 %			
(c)	6.5 %			
(d)		$\times 0.61$		
(e)			$\times 1.36$	
(f)				$\times 0.84$
(g)			$\times 1.583$	
(h)				$\times 0.649$
(i)		$\times 1.45$		

2. State the multiplier for:

- | | |
|------------------------|--------------------------|
| (a) decreasing by 67 % | (b) finding 18 % of |
| (c) increasing by 32 % | (d) decreasing by 7.2 % |
| (e) finding by 27 % | (f) increasing by 9.52 % |

3. Write down the single calculation to:

- | | |
|--------------------------|---------------------------|
| (a) increase 549 by 23 % | (b) find 47 % of 285 |
| (c) decrease 64 by 7.4 % | (d) increase 439 by 458 % |
| (e) find 281 % of 87 | (d) decrease 384 by 8.3 % |

4. Suggest two suitable questions when the multiplier is:

- | | | | |
|----------|-----------|-----------|----------|
| (a) 0.83 | (b) 1.79 | (c) 0.29 | (d) 3 |
| (e) 0.56 | (f) 1.069 | (g) 0.726 | (h) 2.71 |

5. State a percentages question which has the same multiplier as:

- | | | |
|-----------------------|------------------------|----------------------|
| (a) find 60 % of | (b) increase by 31 % | (c) decrease by 12 % |
| (d) increase by 7.2 % | (e) decrease by 6.32 % | (f) find 241 % of |