Reverse Compound Percentages

Practice Worksheet (Problem Solving)

I Do

A car decreases in value by 12% each year. The car is currently worth £15, 400. Work out the value of the car 3 years ago. Give your answer to the nearest pound.

(Total for Question is 3 marks)

We Do

A boat decreases in value by 15% each year. The boat is currently worth £24, 500. Work out the value of the boat 4 years ago. Give your answer to the nearest pound.

(Total for Question is 3 marks)

You Do 1

A piece of industrial machinery decreases in value by 8% each year. It is currently worth £8, 500. Work out its value 2 years ago. Give your answer to the nearest pound.

(Total for Question is 3 marks)

You Do 2

An antique painting increases in value by 5% each year. It is currently worth £12, 600. Work out its value 3 years ago. Give your answer to the nearest pound.

(Total for Question is 3 marks)

Video walkthrough

You Do 3

A house increases in value by 3.5% each year. It is currently worth £340, 000. Work out its value 5 years ago. Give your answer to the nearest £100.

(Total for Question is 3 marks)

Challenge 1

An investment fund decreases by 10% in the first year, and then increases by 15% in the second year. The fund is currently worth £18, 630. Work out the original value of the investment fund 2 years ago.

(Total for Question is 4 marks)

Challenge 2

A motorcycle decreases in value by 20% each year. Over a 3-year period, its total value dropped by exactly £4, 880. Work out the original value of the motorcycle.

(Total for Question is 5 marks)

Extreme Challenge

A rare coin increases in value by r% each year. Exactly 4 years ago, the coin was worth £2, 500. It is now worth £3, 660.25. Work out the exact value of r.

$r =$ .....

(Total for Question is 4 marks)

Answers & Worked Solutions

I Do

Let the original value of the car 3 years ago be V.
The multiplier for a 12% decrease is $1 - 0.12 = 0.88$.
The compound depreciation over 3 years is modelled by:
$V \times 0.88^3 = 15400$
To find the original value, divide the current value by the multiplier:
$V = \frac{15400}{0.88^3}$
$V = \frac{15400}{0.681472}$
$V = 22598.1404...$
Rounding to the nearest pound, the value was **£22,598**.

We Do

Let the original value of the boat be V.
The multiplier for a 15% decrease is $1 - 0.15 = 0.85$.
Equation: $V \times 0.85^4 = 24500$
$V = \frac{24500}{0.85^4}$
$V = \frac{24500}{0.52200625}$
$V = 46934.303...$
Rounding to the nearest pound, the value was **£46,934**.

You Do 1

The multiplier for an 8% decrease is $1 - 0.08 = 0.92$.
Equation: $V \times 0.92^2 = 8500$
$V = \frac{8500}{0.92^2} = \frac{8500}{0.8464}$
$V = 10042.533...$
Rounding to the nearest pound, the value was **£10,043**.

You Do 2

The multiplier for a 5% increase is $1 + 0.05 = 1.05$.
Equation: $V \times 1.05^3 = 12600$
$V = \frac{12600}{1.05^3} = \frac{12600}{1.157625}$
$V = 10884.353...$
Rounding to the nearest pound, the value was **£10,884**.

You Do 3

The multiplier for a 3.5% increase is $1 + 0.035 = 1.035$.
Equation: $V \times 1.035^5 = 340000$
$V = \frac{340000}{1.035^5} = \frac{340000}{1.1876863...}$
$V = 286270.8767...$
Rounding to the nearest £100, the value was **£286,300**.

Challenge 1
The multiplier for a 10% decrease is 0.90.
The multiplier for a 15% increase is 1.15.
The overall multiplier for the 2 years is $0.90 \times 1.15 = 1.035$.
Equation: $V \times 1.035 = 18630$
$V = \frac{18630}{1.035}$
$V = 18000$
The original value of the investment was **£18,000**.

Challenge 2
Let the original value of the motorcycle be V.
The multiplier for a 20% decrease is 0.8.
The value after 3 years is $V \times 0.8^3 = 0.512V$.
The total drop in value is the original value minus the final value:
Drop $= V - 0.512V = 0.488V$.
We are given that this drop is £4,880.
$0.488V = 4880$
$V = \frac{4880}{0.488}$
$V = 10000$
The original value of the motorcycle was **£10,000**.

Extreme Challenge
Let the multiplier for an r% increase be m.
Equation: $2500 \times m^4 = 3660.25$
Divide by 2500:
$m^4 = \frac{3660.25}{2500}$
$m^4 = 1.4641$
To find m, take the 4th root of 1.4641 (or take the square root twice):
$\sqrt{1.4641} = 1.21$
$\sqrt{1.21} = 1.1$
The multiplier $m = 1.1$.
A multiplier of 1.1 represents a 10% increase (since $1.1 - 1 = 0.1 = 10\%$).
Therefore, the exact value of r is **10**.