R6. Percentage Change

OCR

17 Ella bought a ring for £3000.
The value of the ring increased by 4% for **each** of the next 3 years.

(a) Show that the value of the ring after 3 years is £3375, correct to the nearest pound.

[3]

(b) After 3 years, Ella sold the ring for £3375.

Calculate her overall percentage profit.

(b) .... % [3]

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The value of the ring increased by 4% for **each** of the next 3 years.

(a) Show that the value of the ring after 3 years is £3375, correct to the nearest pound.

[3]

£3000 × 1.04 × 1.04 × 1.04

$\times 1.04^3$ = £3374.59

= £3375 ✓

(b) After 3 years, Ella sold the ring for £3375.

Calculate her overall percentage profit.

$\dfrac{\text{diff}}{\text{original}} \times 100$

$\dfrac{375}{3000} \times 100$

= 12.5%

(b) .... % [3]

15 In July the price of a holiday is £500.

In August the price increases by 25%.

In September the price drops to £500 again.

Rb

R9a

Work out the percentage decrease from the August price to the September price.

.... % **[4]**

15 In July the price of a holiday is £500.
In August the price increases by 25%.
In September the price drops to £500 again.

Rb

R9a

Work out the percentage decrease from the August price to the September price.

July = £500

25% of £500 = £125

August £625

% decrease $\frac{diff}{original} \times 100$

August → Sept
625   500

$= \frac{125}{625} \times 100$

=

20%

.... % [4]

21 Shari buys a box of 60 candles for £125.
She sells the candles for £2.25 each.

R6   v

Calculate her percentage profit.

.... % **[4]**

21 Shari buys a box of 60 candles for £125.
She sells the candles for £2.25 each.

R6

Calculate her percentage profit.

% profit

She make   60 × £2.25

= £135

$$\frac{diff}{original} \times 100$$

$$\frac{10}{125} \times 100$$

8%

.... % **[4]**

Country	Population
England	5.35×10^7
Wales	3.07×10^6
Scotland	5.31×10^6
Northern Ireland	1.82×10^6

(c)   The total population of the UK is predicted to reach 73.3 million in 2037.

Calculate the predicted percentage increase in the UK population from 2012 to 2037.
Give your answer correct to 2 significant figures.

(c)   .... % **[4]**

Country	Population
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(c) The total population of the UK is predicted to reach 73.3 million in 2037.

R6

Calculate the predicted percentage increase in the UK population from 2012 to 2037.
Give your answer correct to 2 significant figures.

Total 63,700,000 = 63.7 million

2037 → 73.3 million

$\dfrac{Diff}{original} \times 100$

$\dfrac{9.6}{63.7} \times 100 =$

(c) .... 15 % [4]

7   Gustavo invests £520 for 6 years in a bank account paying simple interest.
R6   At the end of 6 years, the amount in the bank account is £629.20.

R10   Calculate the annual rate of interest.

.... % [4]

7   Gustavo invests £520 for 6 years in a bank account paying simple interest.
     At the end of 6 years, the amount in the bank account is £629.20.

R6

R10   Calculate the annual rate of interest.

$$\frac{diff}{original} = \frac{18.20}{520}$$

Int for 6 years

$$= 0.035$$

$$= \begin{array}{r} 629.20 \\ - 520.00 \\ \hline £109.20 \end{array} \cdots 1 \, yr \; (\div 6)$$

3.5 .... % [4]

18.20 interest in one year.

Video created by Will Neill

11 The price of a washing machine is reduced by 20% for a sale.
Afterwards, the sale price is increased by 30%.

R6

Joachim says

   The washing machine is now 10% more expensive than before the sale.

Explain Joachim's error and work out the correct percentage change in the price of the washing
machine from before the sale to after the sale.

Joachim's error is ....

....

Correct percentage change is .... % [6]

11 The price of a washing machine is reduced by 20% for a sale.
Afterwards, the sale price is increased by 30%.

R6

Joachim says

Pretend ... £100

The washing machine is now 10% more expensive than before the sale.

Explain Joachim's error and work out the correct percentage change in the price of the washing machine from <u>before the sale</u> to <u>after the sale</u>.

Joachim's error is ...... he needed to find 30% of the sale price which would give a different answer.

Reduce £100 by 20% (£20)

= £80

Increase £80 by 30%.   80+24

10% = £8
30% = £24

= £104

% change $\frac{diff}{original}$

$\frac{4}{100} = 0.04$
$= 4\%$

Correct percentage change is ...... 4% ..... % **[6]**

Edexcel

17 Riddington and Greenwick are two small villages.

The population of Riddington has increased from 80 people to 120 people.
The population of Greenwick has decreased from 200 people to 120 people.

Show that Riddington has had the greater percentage change in its population.
You must show all your working.

(Total for Question 17 is 3 marks)

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Show that Riddington has had the greater percentage change in its population.
You must show all your working.

$$\text{Percentage Change} = \frac{\text{Diff}}{\text{Original}} \times 100$$

Greenwick

$$\frac{80}{200} \times 100 = 40\% \text{ decrease}$$

Riddington

$$\frac{40}{80} \times 100 = 50\% \text{ increase}$$

Riddington has greater Change. ✓

(Total for Question 17 is 3 marks)

18 Last month the cost of using the air pump at a garage was 20p.
This month the cost of using the air pump is 50p.

Tom says,

"50 ÷ 20 = 2.5 so the cost of using the air pump has increased by 250%"

(a) Is Tom correct?
Explain your answer.

R6

....

....

....

(1)

18 Last month the cost of using the air pump at a garage was 20p.
This month the cost of using the air pump is 50p.

Tom says,

   "50 ÷ 20 = 2.5 so the cost of using the air pump has increased by 250%"

(a) Is Tom correct?
    Explain your answer.

R6

% increase $\dfrac{\text{diff}}{\text{original}} \times 100$

No, Tom is not
    correct

$\dfrac{30}{20} \times 100 = 150\%$

(1)

17 Emily buys a pack of 12 bottles of water.
The pack costs £5.64

Emily sells all 12 bottles for 50p each.

Work out Emily's percentage profit.
Give your answer correct to 1 decimal place.

....%

(Total for Question 17 is 3 marks)

17 Emily buys a pack of 12 bottles of water.
The pack costs £5.64

Emily sells all 12 bottles for 50p each.

Work out Emily's percentage profit.
Give your answer correct to 1 decimal place.

Spends £5.64

She makes 50p × 12 = £6.00

% profit

$$\frac{diff}{original} \times 100$$

$$\frac{36}{564} \times 100$$

$$\frac{0.36}{5.64}$$

6.4

.... %

(Total for Question 17 is 3 marks)

21 Renee buys 5 kg of sweets to sell.
She pays £10 for the sweets.

R2

R6 Renee puts all the sweets into bags.
She puts 250 g of sweets into each bag.
She sells each bag of sweets for 65p.

Renee sells all the bags of sweets.

Work out her percentage profit.

....%

(Total for Question 21 is 4 marks)

Renee buys 5 kg of sweets to sell.
She pays £10 for the sweets.

R2

R6 Renee puts all the sweets into bags.
She puts 250 g of sweets into each bag.
She sells each bag of sweets for 65p.

Renee sells all the bags of sweets.

Work out her percentage profit.

$5kg = 5000g$

$\nearrow \times 20$

$250g$

20 bags of sweets @ 65p

$20 \times 65p = £13 \checkmark$

$\times 10 = 650p$
$\times 2 = 1300p$

Profit = £3

$\dfrac{diff}{original} = \dfrac{3}{10}$

$30 \checkmark$ %

(Total for Question   is 4 marks)

22 A bonus of £2100 is shared by 10 people who work for a company.

40% of the bonus is shared equally between 3 managers.

R6

The rest of the bonus is shared equally between 7 salesmen.

R7

R8   One of the salesmen says,

"If the bonus is shared equally between all 10 people I will get 25% more money."

Is the salesman correct?

You must show how you get your answer.

(Total for Question 22 is 5 marks)

22 A bonus of £2100 is shared by 10 people who work for a company.
40% of the bonus is shared equally between 3 managers.
The rest of the bonus is shared equally between 7 salesmen.

One of the salesmen says,

"If the bonus is shared equally between all 10 people I will get 25% more money."

Is the salesman correct?
You must show how you get your answer.

R6
R7
R8

$$40\% \text{ of } £2100$$
$$10\% = £210$$
$$40\% = £840$$

$$60\%$$
$$£2100 - 840$$
$$840$$
$$\overline{1260} \rightarrow 7 \text{ salesmen}$$

$$180 \quad \dots \text{ each salesman gets } \quad £180$$
$$7\overline{)1260}$$

if shared equally ... 10% of £2100
$$= £210 \checkmark$$

$25\% \left(\frac{1}{4}\right)$ of £180 $\dots$ £45

if he got 25% more $\dots$ £180 + £45 = £225

No he is not correct as £225 < £210

(Total for Question is 5 marks)

21 Last year Jo paid £245 for her car insurance.
This year she has to pay £883 for her car insurance.

R6

Work out the percentage increase in the cost of her car insurance.

....%

(Total for Question 21 is 3 marks)

21 Last year Jo paid £245 for her car insurance.
This year she has to pay £883 for her car insurance.

R6

Work out the percentage increase in the cost of her car insurance.

% increase ... $\dfrac{\text{Diff}}{\text{original}}$ = $\dfrac{638}{245}$

Diff ... 883
$\quad$ − 245
$\quad\quad$ 638

= 2.604 × 100

260.4 $\quad$ %

(Total for Question is 3 marks)

22 In a sale, the price of a cooker is reduced by 50%
At the end of the sale, the sale price of the cooker is increased by 50%

Betty says,

"The cooker is now the same price as it was before the sale."

Is Betty correct?
Explain why.

....

....

....

(Total for Question 22 is 2 marks)

22 In a sale, the price of a cooker is reduced by 50%
At the end of the sale, the sale price of the cooker is increased by 50%

Betty says,

"The cooker is now the same price as it was before the sale."

Is Betty correct?
Explain why.

Cooker = £120

Reduced by 50%

50% of £120 = £60

→ New Cost = £60

Increase by 50%

50% of £60 = £30

+ } £90

(Total for Question   is 2 marks)

No, I have used a counter example to show why

14 $g = \dfrac{Gm}{r^2}$

R6 The value of r is decreased by 20%

R9 The value of G and the value of m are not changed.

Calculate the percentage increase in the value of g.

....%

(Total for Question 14 is 3 marks)

14 $g = \dfrac{Gm}{r^2}$

$20\% \text{ of } 10 = 2$

$10 - 2 = 8$

R6 The value of r is decreased by 20%

R9 The value of G and the value of m are not changed.

Calculate the percentage increase in the value of g.

Make up some numbers

$G = 100$

$M = 50$

$r = 10$

$g = \dfrac{Gm}{r^2}$

$g = \dfrac{100 \times 50}{10^2}$

$g = 50$

$g = \dfrac{Gm}{r^2}$

$g = \dfrac{100 \times 50}{8^2}$

$g = 78.125$

$\%\text{ increase} = \dfrac{diff}{org} \times 100$

$\dfrac{28.125}{50} \times 100$

$56.25 \quad \%$

(Total for Question 14 is 3 marks)

11 Jack and Sadia work for a company that sells boxes of breakfast cereal.

The company wants to have a special offer.

R6 Here is Jack's idea for the special offer.

> Put 25% more cereal into each box and do **not** change the price.

Here is Sadia's idea.

> Reduce the price and do **not** change the amount of cereal in each box.

Sadia wants her idea to give the same value for money as Jack's idea.

By what percentage does she need to reduce the price?

.... %

(Total for Question 11 is 3 marks)

11 Jack and Sadia work for a company that sells boxes of breakfast cereal.

The company wants to have a special offer.

R6 Here is Jack's idea for the special offer.

> Put 25% more cereal into each box and do **not** change the price.

Here is Sadia's idea.

> Reduce the price and do **not** change the amount of cereal in each box.

Sadia wants her idea to give the same value for money as Jack's idea.

By what percentage does she need to reduce the price?

Use an example

Jack

$£2$

$400g$

$25\% \text{ of } 400g$

$= 100g$

$500g = £2$

Sadia wants to keep same value

So Jack $500g = £2$

$100g = £0.40$

$400g = £1.60$

Sadia $= £1.60 = 400g$

Was $£2$ *now* $£1.60$ $\dfrac{diff}{orig} = \dfrac{40}{200} = \dfrac{20}{100}$

20%

.... %

(Total for Question 11 is 3 marks)

10 Robert makes 50 litres of green paint by mixing litres of yellow paint and litres of blue paint in the ratio 2:3

R6

R15a Yellow paint is sold in 5 litre tins.
Each tin of yellow paint costs £26

Blue paint is sold in 10 litre tins.
Each tin of blue paint costs £48

Robert sells all the green paint he makes in 10 litre tins.
He sells each tin of green paint for £66.96

Work out Robert's percentage profit on each tin of green paint he sells.

....%

(Total for Question 10 is 5 marks)

10 Robert makes 50 litres of green paint by mixing litres of yellow paint and litres of blue paint in the ratio $2:3$

Yellow paint is sold in 5 litre tins.
Each tin of yellow paint costs £26

Blue paint is sold in 10 litre tins.
Each tin of blue paint costs £48

Robert sells all the green paint he makes in 10 litre tins.
He sells each tin of green paint for £66.96

Work out Robert's percentage profit on each tin of green paint he sells.

R6
R15a

Y   B
2 : 3

50L green   20L : 30L

×4   ×3

Sells

5 tins × £66.96
= £334.80

Costs   Yellow = £26 × 4 = £104
Blue = £48 × 3 = £144
£248

% = diff/orig = 86.80/248

35 %

7/20

(Total for Question 10 is 5 marks)

AQA

24 The table shows information about the population of a city.

R6

Population in 2001	Population in 2011
420 000	480 000

Liam claims,

"From 2011 to 2021 the population of the city will increase by the same percentage as from 2001 to 2011"

He works out,

population increase from 2001 to 2011 = 480 000 − 420 000

= 60 000

population in 2021 = 480 000 + 60 000

= 540 000

Does the population of 540 000 match his claim?

You **must** show your working.

[3 marks]

Answer _____

The table shows information about the population of a city.

Liam's Claim

R6

Population in 2001	Population in 2011	2021
420 000	480 000	540,000

Liam claims,

$2001 \rightarrow 2011$

"From 2011 to 2021 the population of the city will increase by
the same percentage as from 2001 to 2011"

$\%\ change = \dfrac{diff}{original}$

He works out,

population increase from 2001 to 2011 = 480 000 – 420 000
= 60 000

$= \dfrac{60,000}{420000} = \dfrac{1}{7}$

14.28%

$\%\ change$

population in 2021 = 480 000 + 60 000   2011   2021
= 540 000

$= \dfrac{60000}{480000} = \dfrac{1}{8}$

Does the population of 540 000 match his claim?

You **must** show your working.

No it does not match   [3 marks]

his claim ... 14.28% ≠ 12.5% ✓

= 12.5%

Answer _____

30

Work out the percentage increase from 80 to 280

[3 marks]

R6

_____

_____

_____

_____

_____

Answer _____ %

30   Work out the percentage increase from 80 to 280

[3 marks]

R6

$$\frac{diff}{original} \times 100$$

$$\frac{200}{80} \qquad \frac{20}{8} \qquad \frac{10}{4} \qquad \frac{5}{2} = 2.5$$

$$2.5 \times 100$$

Answer   250   %