Name: SOLUTIONS

GCSE (1 - 9)

Buy me a coffee

Repeated Percentage Change

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These questions are compiled from *released* Pearson Edexcel GCSE maths exam papers
They contain exam questions from up until the ***Autumn 2021*** exam series
More recent exam papers do exist but are withheld for mock exams
As new exam papers are released these worksheets will gradually be updated
The ***most current*** version of these worksheets will always be available at: kennethstafford.co.uk
These worksheets were made using examq.co.uk

Question	Paper where the question appeared
1	Edexcel, GCSE, Autumn 2021, Paper 2H, Q10
2	Edexcel, GCSE, Autumn 2021, Paper 3H, Q19
3	Edexcel, GCSE, Autumn 2020, Paper 2H, Q8
4	Edexcel, GCSE, Autumn 2019, Paper 2H, Q13
5	Edexcel, GCSE, Summer 2019, Paper 3H, Q2
6	Edexcel, GCSE, Autumn 2018, Paper 2H, Q4
7	Edexcel, GCSE, Summer 2018, Paper 2H, Q9
8	Edexcel, GCSE, Summer 2018, Paper 3H, Q9
9	Edexcel, GCSE, Autumn 2017, Paper 2H, Q13
10	Edexcel, GCSE, Autumn 2017, Paper 2H, Q18
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12	Edexcel, GCSE, Summer 2017, Paper 2H, Q6

1

Louise invests £x in Better Investments for 3 years.
Sadiq invests £x in County Bank for 3 years.

Better Investments
Compound Interest
2.5% per annum

County Bank
Compound Interest
2% per annum for the first two years 3.5% per annum for each extra year

At the end of the 3 years, the value of Louise's investment is £344 605

Work out the value of Sadiq's investment at the end of the 3 years.

Louise

$x \times 1.025^3 = 344605$

$x = \dfrac{344605}{1.025^3}$

$x = 320{,}000$

Sadiq

$320{,}000 \times 1.02^2 \times 1.035 = £344{,}580.48$

£ 344,580.48

(Total for Question 10 is 4 marks)

[Edexcel, GCSE, Autumn 2021, Paper 2H, Q10]

2

At the start of year n, the number of animals in a population is P_n

At the start of the following year, the number of animals in the population is P_{n+1} where

$$P_{n+1} = kP_n$$

At the start of 2017 the number of animals in the population was 4000
At the start of 2019 the number of animals in the population was 3610

Find the value of the constant k.

$P_{2017} = 4000$

$\times k$

$P_{2018} = 4000k$

$\times k$

$P_{2019} = 3610 = 4000k^2$

$k^2 = \frac{3610}{4000} = 0.9025$

$k = \sqrt{0.9025} = 0.95$

(Total for Question 19 is 3 marks)

[Edexcel, GCSE, Autumn 2021, Paper 3H, Q19]

3

Tariq buys a laptop.

He gets a discount of 5% off the normal price.
Tariq pays £551 for the laptop.

100 - 5 = 95%

(a) Work out the normal price of the laptop.

95% = 551
÷95 ↓ ↓ ÷95
1% = 5.8
×100 ↓ ↓ ×100
100% = 580

£ 580

(2)

Joan invests £6000 in a savings account.
The savings account pays compound interest at a rate of

2.4% for the first year — 100 + 2.4 = 102.4% = 1.024
1.7% for each extra year. — 100 + 1.7 = 101.7% = 1.017

(b) Work out the value of Joan's investment at the end of 3 years.

$6000 \times 1.024 \times 1.017^2 = 6354.6716$

£ 6354.67

(3)

(Total for Question 8 is 5 marks)

[Edexcel, GCSE, Autumn 2020, Paper 2H, Q8]

4

Sakira invested £3550 in a savings account for 3 years.

She was paid 2.6% per annum compound interest for each of the first 2 years.
She was paid R% interest for the third year.

Sakira had £3819.21 in her savings account at the end of the 3 years.

Work out the value of R.
Give your answer correct to 1 decimal place.

100 + 2.6
= 102.6%
= 1.026

$3550 \times 1.026^2 \times y = 3819.21$

$3736.9998\,y = 3819.21$

$y = \frac{3819.21}{3736.9998}$

$y = 1.021999$

$= 102.2\%$

$R = 2.2$

(Total for Question 13 is 3 marks)

[Edexcel, GCSE, Autumn 2019, Paper 2H, Q13]

5

Katy invests £200 000 in a savings account for 4 years.
The account pays compound interest at a rate of 1.5% per annum.

100 + 1·5 = 101·5%
= 1·015

Calculate the total amount of interest Katy will get at the end of 4 years.

$200,000 \times 1{\cdot}015^4$

$= 212,272{\cdot}71$

$212,272{\cdot}71 - 200,000 =$ £ 12,272·71

(Total for Question 2 is 3 marks)

[Edexcel, GCSE, Summer 2019, Paper 3H, Q2]

6

Northern Bank has two types of account.
Both accounts pay compound interest.

Cash savings account
Interest
2.5% per annum

Shares account
Interest
3.5% per annum

Ali invests £2000 in the cash savings account.
Ben invests £1600 in the shares account.

(a) Work out who will get the most interest by the end of 3 years.
You must show all your working.

Ali

$2000 \times 1.025^3 = 2153.78$

$2153.78 - 2000$
$= 153.78$

Ben

$1600 \times 1.035^3 = 1773.95$

$1773.95 - 1600$
$= 173.95$

Ben gets the most interest.

(4)

In the 3rd year the rate of interest for the shares account is changed to 4% per annum.

(b) Does this affect who will get the most interest by the end of 3 years?
Give a reason for your answer.

No. Ben will get even more so will still earn the most interest.

(1)

(Total for Question 4 is 5 marks)

[Edexcel, GCSE, Autumn 2018, Paper 2H, Q4]

7

Jean invests £12 000 in an account paying compound interest for 2 years.

In the first year the rate of interest is $x\%$
At the end of the first year the value of Jean's investment is £12 336

In the second year the rate of interest is $\frac{x}{2}\%$

What is the value of Jean's investment at the end of 2 years?

$\frac{12\,336}{12000} = 1.028$ 2.8% interest

Half = 1.4%

12336 x 1.014 = 12,508.70

£.....

(Total for Question 9 is 4 marks)

[Edexcel, GCSE, Summer 2018, Paper 2H, Q9]

8

$T = \sqrt{\frac{w}{d^3}}$

$d^3 = (1.4 \times 10^{-4})^3 = 2.744 \times 10^{-12}$

$w = 5.6 \times 10^{-5}$
$d = 1.4 \times 10^{-4}$

(a) Work out the value of T.
Give your answer in standard form correct to 3 significant figures.

$T = \sqrt{\frac{5.6 \times 10^{-5}}{2.744 \times 10^{-12}}} = \sqrt{20408163.27}$

$= 4517.539$

$T = 4.52 \times 10^3$

(2)

w is increased by 10% 1.1
d is increased by 5% 1.05

Lottie says,

"The value of T will increase because both w and d are increased."

(b) Lottie is wrong.
Explain why.

$\sqrt{\frac{1.1}{1.05^3}} = 0.97...$

T will get smaller. The overall affect is that it will reduce by around 3%.

(2)

(Total for Question 9 is 4 marks)

[Edexcel, GCSE, Summer 2018, Paper 3H, Q9]

9

At the beginning of 2009, Mr Veale bought a company.
The value of the company was £50 000

Each year the value of the company increased by 2%. 100+2 = 102% = 1·02

(a) Calculate the value of the company at the beginning of 2017
Give your answer correct to the nearest £100

2009 ⟶ 2017
8 years

50000 × 1·02^8 = 58,582·97

£ 58,600

(2)

At the beginning of 2009 the value of a different company was £250 000
In 6 years the value of this company increased to £325 000

This is equivalent to an increase of x% each year.

(b) Find the value of x.
Give your answer correct to 2 significant figures.

$\frac{325,000}{250,000} = 1·3$

$\sqrt[6]{1·3} = 1·04469$

$= 104·47\%$

4·5 %

(3)

(Total for Question 13 is 5 marks)

[Edexcel, GCSE, Autumn 2017, Paper 2H, Q13]

10

At time $t = 0$ hours a tank is full of water.

Water leaks from the tank.
At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

$$V_0 = 2000$$
$$V_{t+1} = kV_t$$

write down the value of k.

$100 - 2\% = 98\%$
$= 0.98$

$k =$ 0.98

(Total for Question 18 is 1 mark)

[Edexcel, GCSE, Autumn 2017, Paper 2H, Q18]

11

Jack bought a new boat for £12 500

The value, £V, of Jack's boat at the end of n years is given by the formula

$$V = 12\,500 \times (0.85)^n$$

(a) At the end of how many years was the value of Jack's boat first less than 50% of the value of the boat when it was new?

$0.85^4 = 0.522$

$0.85^5 = 0.4437$

5 years

(2)

A savings account pays interest at a rate of R% per year.
Jack invests £5500 in the account for one year.

At the end of the year, Jack pays tax on the interest at a rate of 40%.
After paying tax, he gets £79.20 → so 60%

(b) Work out the value of R.

60% = 79.20

÷6 ↓ 10% = 13.20 ↓ ÷6

×10 ↓ 100% = 132 ↓ ×10

$\frac{132}{5500} = 0.024$

2.4

(3)

(Total for Question 9 is 5 marks)

[Edexcel, GCSE, Autumn 2017, Paper 3H, Q9]

12

Anil wants to invest £25 000 for 3 years in a bank.

Personal Bank	**Secure Bank**
Compound Interest	Compound Interest
2% for each year	4.3% for the first year 0.9% for each extra year

Which bank will give Anil the most interest at the end of 3 years?
You must show all your working.

Personal Bank

$25,000 \times 1{\cdot}02^3$

$= £26,530{\cdot}20$

Secure Bank

$25,000 \times 1{\cdot}043 \times 1{\cdot}009^2$

$= £26,546{\cdot}46$

Secure Bank

(Total for Question 6 is 3 marks)

[Edexcel, GCSE, Summer 2017, Paper 2H, Q6]