6.4 Repeated Percentage Change: 2-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The number of members of a club falls by 50% in one year and then rises by 25% in the next. Work out the overall percentage change.

(Total for Question 1 is 3 marks)

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2 £14400 is invested. Compound interest is paid at 8% in the first year and 6% in the second year. Work out the value of the investment at the end of year 2. Give your answer to the nearest penny.

(Total for Question 2 is 3 marks)

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3 £6750 is put into a bond paying 3.5% compound interest each year. Work out the value after 4 years. Give your answer to the nearest penny.

(Total for Question 3 is 3 marks)

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4 £7500 is invested at 8% compound interest per year. After how many whole years will the investment first be worth more than £11250? You must show your working.

(Total for Question 4 is 4 marks)

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5 £3750 is put into a bond paying 5% compound interest each year. Work out the value after 3 years. Give your answer to the nearest penny.

(Total for Question 5 is 3 marks)

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6 £9600 is invested. Compound interest is paid at 3% in the first year and 8% in the second year. Work out the value of the investment at the end of year 2. Give your answer to the nearest penny.

(Total for Question 6 is 3 marks)

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7 The number of members of a club falls by 30% in one year and then rises by 50% in the next. Work out the overall percentage change.

(Total for Question 7 is 3 marks)

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8 £3500 is invested at 6% compound interest per year. After how many whole years will the investment first be worth more than £4550? You must show your working.

(Total for Question 8 is 4 marks)

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9 £10000 is put into a bond paying 8% compound interest each year. Work out the value after 4 years. Give your answer to the nearest penny.

(Total for Question 9 is 3 marks)

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10 The price of a ticket is increased by 15% and then the new price is decreased by 5%. Work out the overall percentage change.

(Total for Question 10 is 3 marks)

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11 £3300 is invested. Compound interest is paid at 8% in the first year and 4% in the second year. Work out the value of the investment at the end of year 2. Give your answer to the nearest penny.

(Total for Question 11 is 3 marks)

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12 The number of members of a club falls by 40% in one year and then rises by 50% in the next. Work out the overall percentage change.

(Total for Question 12 is 3 marks)

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13 £5500 is invested at 8% compound interest per year. After how many whole years will the investment first be worth more than £11000? You must show your working.

(Total for Question 13 is 4 marks)

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14 Ben invests £2400 in an account paying 2.5% per annum compound interest. He makes no further deposits or withdrawals.

(a) Show that the value of Ben's investment after 2 years is £2521.50 **(2)**

(b) Work out the value of Ben's investment after 5 years. Give your answer to the nearest penny. **(3)**

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(Total for Question 14 is 5 marks)

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15 A laptop depreciates in value by 18% each year. After 3 years, the laptop is worth £468.66.

Work out the value of the laptop when it was new. Give your answer to the nearest pound.

(Total for Question 15 is 3 marks)

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16 A tractor was bought for £45000. It depreciates by 12% per year for the first 2 years, then by 8% per year after that.

(a) Show that the value of the tractor after 2 years is £34848 **(3)**

(b) Work out the value of the tractor after a total of 4 years. Give your answer to the nearest pound. **(3)**

(Total for Question 16 is 6 marks)

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17 Grace's salary was £28000. It increased by 4% in year 1, by 3% in year 2, and by 2.5% in year 3.

(a) Work out Grace's salary after year 3. Give your answer to the nearest penny. **(3)**

(b) Work out the overall percentage increase in Grace's salary over the three years. Give your answer correct to 1 decimal place. **(2)**

(Total for Question 17 is 5 marks)

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18 Write down the single decimal multiplier that is equivalent to two successive percentage increases of 10% and then 5%.

(Total for Question 18 is 2 marks)

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19 A house is valued at £180,000. Its value increases by 4% each year for 2 years. Find its new value.

(Total for Question 19 is 2 marks)

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20 A phone costs £900 new. It loses 18% of its value each year. Find its value after 2 years, to the nearest penny.

(Total for Question 20 is 2 marks)

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21 Priya invests £4,000 in a savings account paying 2.2% compound interest per annum. Work out how much interest (not the total value) she has earned after 3 years. Give your answer to the nearest penny.

(Total for Question 21 is 3 marks)

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22 Two towns have populations that grow each year.
Town A: population 12000, grows by 5% per year.
Town B: population 15000, grows by 2% per year.

Determine, with working, whether Town A's population will exceed Town B's population within 10 years. If so, state after how many complete years this first happens.

(Total for Question 22 is 5 marks)

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23 A car was bought for £24000. After 3 years it is worth £14739. The car depreciates by the same percentage each year.

Work out the annual rate of depreciation.

(Total for Question 23 is 4 marks)

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24 Sam invested a sum of money in an account that pays 3.5% per annum compound interest. She makes no further deposits or withdrawals. After 6 years, the investment is worth £2458.51.

Work out how much Sam originally invested. Give your answer to the nearest penny.

(Total for Question 24 is 4 marks)

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25 Savings of £1,200 earn compound interest at 1.8% per annum. Find the value of the savings after 5 years, to the nearest penny.

(Total for Question 25 is 2 marks)

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26 A van is bought for £24,000. Three years later it is valued at £14,739. It depreciated by the same percentage each year. Find the annual percentage rate of depreciation.

(Total for Question 26 is 4 marks)

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Mark scheme · 6.4 Repeated Percentage Change: 2-hour Pack

Question 1

both multipliers identified	**M1**
0.5 x 1.25 = 0.625	**M1**
37.5% decrease cao	**A1**

Answer: 37.5% decrease

Question 2

a correct multiplier used for one year	**M1**
14400 x 1.08 x 1.06	**M1**
£16485.12 cao	**A1**

Answer: £16485.12

Question 3

multiplier 1.035 identified	**M1**
6750×1.035^4 oe	**M1**
£7745.78 cao	**A1**

Answer: £7745.78

Question 4

multiplier 1.08	**M1**
tests values for successive years	**M1**
value after 5 years £11019.96 (not enough)	**A1**
6 years cao	**A1**

Answer: 6 years

Question 5

multiplier 1.05 identified	**M1**
3750×1.05^3 oe	**M1**
£4341.09 cao	**A1**

Answer: £4341.09

Question 6

a correct multiplier used for one year	**M1**
9600 x 1.03 x 1.08	**M1**
£10679.04 cao	**A1**

Answer: £10679.04

Question 7

both multipliers identified	**M1**
0.7 x 1.5 = 1.05	**M1**
5% increase cao	**A1**

Answer: 5% increase

Question 8

multiplier 1.06	**M1**
tests values for successive years	**M1**
value after 4 years £4418.67 (not enough)	**A1**
5 years cao	**A1**

Answer: 5 years

Question 9

multiplier 1.08 identified	**M1**
10000×1.08^4 oe	**M1**
£13604.89 cao	**A1**

Answer: £13604.89

Question 10

both multipliers identified	**M1**
1.15 x 0.95 = 1.0925	**M1**
9.25% increase cao	**A1**

Answer: 9.25% increase

Question 11

a correct multiplier used for one year	**M1**
3300 x 1.08 x 1.04	**M1**
£3706.56 cao	**A1**

Answer: £3706.56

Question 12

both multipliers identified	**M1**
0.6 x 1.5 = 0.9	**M1**
10% decrease cao	**A1**

Answer: 10% decrease

Question 13

multiplier 1.08	**M1**
tests values for successive years	**M1**
value after 9 years £10994.53 (not enough)	**A1**
10 years cao	**A1**

Answer: 10 years

Question 14

(a) 2400 x 1.025 x 1.025 (oe)	**M1**
(a) 2521.50 cso, answer given	**A1**

(a) Answer: £2521.50 (shown)

(b) multiplier 1.025 identified	**B1**
(b) 2400×1.025^5 (oe, ft)	**M1**
(b) 2715.38 (awrt) cao	**A1**

(b) Answer: £2715.38

Question 15

0.82^3 (= 0.551368) oe	**M1**
468.66 / their 0.551368 (ft)	**M1**
£850 (awrt, accept £849 to £851) cao	**A1**

Answer: £850

Question 16

(a) 45000 x 0.88 (= 39600)	**M1**
(a) 39600 x 0.88 (or 45000 x 0.88^2)	**M1**
(a) 34848 cso, answer given	**A1**

(a) Answer: £34848 (shown)

(b) 0.92^2 (= 0.8464) oe	**M1**
(b) 34848 x 0.8464 (ft their (a))	**M1**
(b) £29495 (awrt, nearest pound) cao	**A1**

(b) Answer: £29495

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Question 17

(a) 1.04 x 1.03 x 1.025 (oe) used as combined multiplier	**M1**
(a) 28000 x their combined multiplier	**M1**
(a) £30743.44 cao	**A1**

(a) Answer: £30743.44

(b) (their (a) - 28000) / 28000 x 100 (oe, ft)	**M1**
(b) 9.8% (awrt) cao	**A1**

(b) Answer: 9.8%

Question 18

1.10 * 1.05 oe	**M1**
1.155 cao	**A1**

Answer: 1.155

Question 19

$180000 * 1.04^2$ oe	**M1**
194688 cao	**A1**

Answer: £194,688

Question 20

$900 * 0.82^2$ oe	**M1**
605.16 cao	**A1**

Answer: £605.16

Question 21

1.022^3 (or equivalent repeated multiplication) oe	**M1**
$4000 * 1.022^3$ (= total value) oe	**M1**
awrt £269.85	**A1**

Answer: £269.85

Question 22

correct method for Town A, 12000×1.05^n, evaluated for at least one value of n	**M1**
correct method for Town B, 15000×1.02^n, evaluated for at least one value of n	**M1**
values at n = 7 correct: Town A awrt 16885, Town B awrt 17230 (Town B still ahead)	**A1**
values at n = 8 correct: Town A awrt 17729, Town B awrt 17575 (Town A now ahead)	**A1**
correct conclusion: Yes, after 8 complete years (dep on both previous A1s)	**A1**

Answer: Yes, after 8 complete years

Question 23

14739 / 24000 (= 0.614125) oe	**M1**
cube root of their 0.614125	**M1**
0.85 oe (multiplier) cao	**A1**
15% cao	**A1**

Answer: 15%

Question 24

multiplier 1.035 identified	**B1**
1.035^6 (= 1.229255...) oe	**M1**
2458.51 / their 1.229255	**M1**
£2000.00 (awrt) cao	**A1**

Answer: £2000.00

Question 25

$1200 * 1.018^5$ oe	**M1**
awrt £1311.96	**A1**

Answer: £1,311.96

Question 26

14739 / 24000 (= 0.614125) identified as the 3-year multiplier oe	**M1**
cube root of 0.614125 oe	**M1**
multiplier = 0.85	**A1**
15% cao (decrease)	**A1**

Answer: 15% per year

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