3.8 Percentage Change: 2-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Elif buys a laptop for £480 and sells it for £372. Work out Elif's percentage loss.

(Total for Question 1 is 3 marks)

2 A jacket cost £45 last month. This month it costs £54. Work out the percentage increase in price. Give your answer to the nearest whole percent if necessary.

(Total for Question 2 is 3 marks)

3 A pair of trainers is reduced by 20% and now costs £56. Work out the original price of the trainers.

(Total for Question 3 is 2 marks)

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4 Aaliyah buys 80 candles for £60. She sells 50 of the candles for £1.40 each. She sells the remaining candles for 90p each. Work out Aaliyah's percentage profit. Give your answer correct to 1 decimal place.

(Total for Question 4 is 4 marks)

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5 Decrease £340 by 35%.

(Total for Question 5 is 3 marks)

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6 A cafe's weekly takings rise from £2150 to £2310. Work out the percentage increase in the takings. Give your answer correct to 1 decimal place.

(Total for Question 6 is 3 marks)

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7 A charity's donations fall from £18400 to £16950. Work out the percentage decrease in donations. Give your answer correct to 3 significant figures.

(Total for Question 7 is 3 marks)

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8 Two football clubs both increased their season ticket prices. Club A: from £24 to £27.60. Club B: from £30 to £34.20. Work out which club had the greater percentage increase. You must show your working.

(Total for Question 8 is 4 marks)

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9 The population of a small town is 1200. It falls by 5% one year and then rises by 10% the next year. Work out the population after these two changes. Give your answer to the nearest whole person.

(Total for Question 9 is 3 marks)

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10 A jacket costs £85. It is reduced by 15% in a sale. Work out the sale price of the jacket to the nearest penny.

(Total for Question 10 is 2 marks)

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11 Tariq buys a 4 kg bag of sweets for £10. He repackages it into 80 g bags and sells each bag for 45p. Work out Tariq's percentage profit.

(Total for Question 11 is 4 marks)

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12 Nadia buys 90 second-hand paperback books for £45. She is unable to sell 15 of them and donates them to a charity shop. She sells each of the remaining books for 90p. Work out Nadia's percentage profit.

(Total for Question 12 is 4 marks)

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13 A shirt originally costs £30. It is reduced by 40% in a sale and the reduced price is then further reduced to £9 by a second sale. Work out the percentage reduction in the second sale. Give your answer as a percentage.

(Total for Question 13 is 3 marks)

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14 A TV is sold with 20% discount and then a further 10% off the reduced price. The original price was £450.
Work out the final selling price. Give your answer to the nearest penny.

(Total for Question 14 is 3 marks)

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15 A smartphone price increases from £320 to £400.
Work out the percentage increase. Give your answer correct to 1 decimal place.

(Total for Question 15 is 3 marks)

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16 A shop increases the price of a kettle by 25%. In a clearance sale, the new price is then reduced by 20%. The original price of the kettle was £32.

(a) Work out the sale price of the kettle. **(3)**

(b) Comment on how the sale price compares with the original price of £32, and explain why this happens. **(1)**

(Total for Question 16 is 4 marks)

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17 A car's value is depreciated by 12% each year. Its current value is £16,200.
Work out the value of the car after 2 years. Give your answer to the nearest pound.

(Total for Question 17 is 4 marks)

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18 A shop shows an item with price £48 including 20% VAT. Work out the price of the item before VAT. Give your answer to the nearest penny.

(Total for Question 18 is 5 marks)

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19 A car's value decreased by 22% over one year. At the end of the year it was worth £10530. Work out the value of the car at the start of the year.

(Total for Question 19 is 4 marks)

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20 A trader buys a batch of 200 garden ornaments for a total of £900. She also pays a delivery charge of £60. She wants to make an overall percentage profit of 45% on her total costs, including delivery. Work out the price she should charge for each ornament, if she sells all 200 of them.

(Total for Question 20 is 4 marks)

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21 A population increases by 8% each year for 3 years and then decreases by 5% in the fourth year.
Starting population = 12 500.
Work out the population after the 4 years. Give your answer to the nearest whole number.

(Total for Question 21 is 6 marks)

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22 The price of a laptop is increased by 30%. It is then reduced by y% in a clearance sale. The final price is 4% more than the original price. Work out the value of y.

(Total for Question 22 is 4 marks)

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23 A company's revenue increased by 12% in its first year of trading, then increased by a further 8% in its second year. At the end of the second year, the revenue was £302400. Work out the company's revenue before either increase, that is, at the start of the first year.

(Total for Question 23 is 4 marks)

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24 A piece of machinery depreciates in value by the same percentage each year. After 2 years its value is £2178. After 3 years its value is £1960.20. Work out the annual percentage rate of depreciation. Give your answer correct to 1 decimal place.

(Total for Question 24 is 4 marks)

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25 A shop's revenue changed over three consecutive years. Year 1 to Year 2: increased by 15%. Year 2 to Year 3: decreased by 8%. Year 3 to Year 4: increased by r%. Over the three years, from Year 1 to Year 4, the overall percentage change in revenue was an increase of 26.96%. Work out the value of r.

(Total for Question 25 is 4 marks)

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Mark scheme · 3.8 Percentage Change: 2-hour Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

108 seen (480 - 372)	**M1**
108/480 x 100 (oe)	**M1**
22.5% cao	**A1**

Answer: 22.5%

Question 2

find change 54 - 45 = 9	**M1**
express change as fraction of original 9/45 and convert to percent	**M1**
20% cao	**A1**

Answer: 20%

Question 3

recognise original = 56 ÷ 0.8 or equivalent method	**M1**
£70 cao	**A1**

Answer: £70

Question 4

50 x 1.40 = 70 and 30 x 0.90 = 27, both seen	**M1**
70 + 27 = 97 (total revenue)	**M1**
97 - 60 = 37 (profit), dependent on both M1s	**dM1**
awrt 61.7%	**A1**

Answer: 61.7%

Question 5

finds 35% of 340 (= 119), or uses multiplier 0.65	**M1**
subtracts their 35% from 340 (oe)	**M1**
221 (pounds) cao	**A1**

Answer: £221

Question 6

160 seen (2310 - 2150)	**M1**
160/2150 x 100 (oe)	**M1**
awrt 7.4%	**A1**

Answer: 7.4%

Question 7

1450 seen (18400 - 16950)	**M1**
1450/18400 x 100 (oe)	**M1**
awrt 7.88% (3sf)	**A1**

Answer: 7.88%

Question 8

3.60 seen (27.60 - 24) and 4.20 seen (34.20 - 30)	**M1**
Club A: 3.60/24 x 100 (= 15%)	**M1**
Club B: 4.20/30 x 100 (= 14%)	**M1**
Club A, with correct comparison (15% > 14%), ft from their two percentages	**A1**

Answer: Club A (15% increase vs 14% increase)

Question 9

apply decrease: 1200 x 0.95 = 1140	**M1**
apply increase: 1140 x 1.10 = 1254	**M1**
1254 people cao	**A1**

Answer: 1254 people

Question 10

calculate 15% of 85 or apply 85 x 0.85 method	**M1**
£72.25 cao	**A1**

Answer: 72.25

Question 11

4000/80 = 50 (bags)	**M1**
50 x 0.45 = 22.50 (total revenue)	**M1**
22.50 - 10 = 12.50 (profit), dependent on both M1s	**dM1**
125% cao	**A1**

Answer: 125%

Question 12

90 - 15 = 75 (books sold)	**M1**
75 x 0.90 = 67.50 (total revenue)	**M1**
67.50 - 45 = 22.50 (profit), dependent on both M1s	**dM1**
50% cao	**A1**

Answer: 50%

Question 13

find price after first reduction: 30 x 0.60 = 18	**M1**
find fraction for second reduction: (18 - 9) / 18 or 9/18	**M1**
50% cao	**A1**

Answer: 50%

Question 14

apply first reduction: 450 x 0.80 = 360 or show method	**M1**
apply second reduction: 360 x 0.90 = 324 or equivalent	**M1**
£324.00 cao	**A1**

Answer: 324.00

Question 15

calculate change 400 - 320 = 80 and form 80/320	**M1**
evaluate 80/320 = 0.25 and convert to percent	**M1**
25.0% cao	**A1**

Answer: 25.0

Question 16

(a) 32 x 1.25 (= 40)	**M1**
(a) their 40 x 0.8 (oe)	**M1**
(a) 32 (pounds) cao	**A1**

(a) Answer: £32

(b) states the sale price equals the original price, because the combined multiplier 1.25 x 0.8 = 1, so the two percentage changes exactly cancel out	**B1**

(b) Answer: The sale price equals the original price (1.25 x 0.8 = 1, so the changes exactly cancel)

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Question 17

use factor 0.88 for one year and show one step	**M1**
apply factor twice: 16200 x 0.88 x 0.88 or 16200 x 0.88^2	**M1**
12545.28 to 2 d.p. (intermediate) ft	**A1**
£12545 (nearest pound) cao	**A1**

Answer: 12545

Question 18

identify that 48 is 120% of the pre-VAT price or use reverse percentage	**M1**
set up 48 = 1.20 x original and divide: original = 48 / 1.20	**M1**
calculate 48 / 1.20 = 40.0	**M1**
£40.00 cao	**A1**
state check: 40 x 1.20 = 48 oe	**B1**

Answer: 40.00

Question 19

recognises 10530 represents 78% (0.78) of the value at the start of the year	**M1**
sets up start value x 0.78 = 10530 (oe)	**M1**
10530/0.78 (oe)	**M1**
13500 (pounds) cao	**A1**

Answer: £13500

Question 20

900 + 60 = 960 (total cost)	**M1**
960 x 1.45 (oe, total revenue needed = 1392)	**M1**
1392/200 (oe)	**M1**
6.96 (pounds) cao	**A1**

Answer: £6.96 (per ornament)

Question 21

use growth factor 1.08 for each of first 3 years	**M1**
use decrease factor 0.95 for year 4	**M1**
combine factors: 12500 x 1.08^3 x 0.95	**M1**
evaluate 1.08^3 = 1.259712 (or equivalent) and multiply through	**M1**
14959.08 (intermediate) ft	**A1**
14959 people (nearest whole number) cao	**A1**

Answer: 14959

Question 22

sets up 1.3(1 - y/100) = 1.04 (oe)	**M1**
(1 - y/100) = 1.04/1.3 = 0.8 (oe, evaluated)	**M1**
y/100 = 1 - 0.8 = 0.2 (oe)	**M1**
y = 20, cao	**A1**

Answer: y = 20

Question 23

recognises the combined multiplier 1.12 x 1.08 = 1.2096 (oe)	**M1**
sets up original x 1.2096 = 302400 (oe)	**M1**
302400/1.2096 (oe)	**M1**
250000 (pounds) cao	**A1**

Answer: £250000

Question 24

recognises that dividing the year-3 value by the year-2 value gives the annual multiplier (1 - r/100), independent of the original value	**M1**
1960.20/2178 correctly set up and evaluated	**M1**
0.9 (or 90%) for the multiplier	**A1**
10.0% cao (1dp)	**A1**

Answer: 10.0% per annum

Question 25

combines the first two multipliers: 1.15 x 0.92 = 1.058 (oe)	**M1**
sets up 1.058(1 + r/100) = 1.2696 (oe)	**M1**
(1 + r/100) = 1.2696/1.058 = 1.2 (oe, evaluated)	**M1**
r = 20, cao	**A1**

Answer: r = 20

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