3.7 Percentage Change and Multipliers: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The cost of a ticket changed from 40 to 44. Work out the percentage increase.

(3)

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2 After a 20% reduction, the price of a watch is £96. Work out the original price.

(3)

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3 (a) Write down the multiplier for an 8% decrease.
(b) Use your multiplier to decrease 150 by 8%.

(2)

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4 (a) Write down the multiplier for a 4% increase.
(b) Use your multiplier to increase 300 by 4%.

(2)

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5 A car is worth £200. Its value is increased by 15% in the first year and then increased by 5% of its new value in the second year. Work out its value at the end of the second year.

(3)

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6 The price of a TV is £60 before VAT. VAT is charged at 5%. Work out the price including VAT.

(2)

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7 A coat costs £40. In a sale its price is reduced by 10%. Work out the new price.

(2)

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8 Increase £25 by 10%.

(2)

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9 A car is worth £400. Its value is decreased by 10% in the first year and then decreased by 10% of its new value in the second year. Work out its value at the end of the second year.

(3)

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10 Increase £120 by 40%.

(2)

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11 A bike costs £90. A shop offers 25% off. A second shop sells the same bike for £72.50. Which shop is cheaper, and by how much?

(3)

---

12 The price of a bike changed from 20 to 18. Work out the percentage decrease.

(3)

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13 A school dinner costs £2.40. Each year the price increases by 5%. Work out the cost after 2 years, correct to the nearest penny.

(3)

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14 A bike costs £80. A shop offers 15% off. A second shop sells the same bike for £73. Which shop is cheaper, and by how much?

(3)

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15 A player's weekly pay changed from 120 to 60. Work out the percentage decrease.

(3)

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16 A car is worth £500. Its value is increased by 20% in the first year and then decreased by 15% of its new value in the second year. Work out its value at the end of the second year.

(3)

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17 A player's weekly pay changed from 50 to 60. Work out the percentage increase.

(3)

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18 (a) Write down the multiplier for a 3% decrease.
(b) Use your multiplier to decrease 40 by 3%.

(2)

---

19 A bike costs £300. A shop offers 30% off. A second shop sells the same bike for £215. Which shop is cheaper, and by how much?

(3)

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20 The cost of a ticket changed from 200 to 220. Work out the percentage increase.

(3)

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21 A ticket costs £240. The price rises by 15%. Work out the new price.

(2)

---

22 A printer cartridge is reduced by 20% in January and then by a further 10% in February. The original price was £45. Work out the price after the two reductions, giving your answer to the nearest 10p.

(3)

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23 Increase £200 by 20%.

(2)

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24 After a 40% increase, the price of a bicycle is £210. Work out the original price.

(3)

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25 A coat is on sale for £84 after a 30% reduction. Work out the original price of the coat.

(3)

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26 An item costs £48 and is later £54. Work out the percentage change, stating whether it is an increase or a decrease. Give your answer to one decimal place.

(2)

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27 An item costs £60 and is later sold for £75. Work out the percentage increase.

(2)

---

28 A price drops from £90 to £72. Work out the percentage decrease.

(2)

---

29 Write down the single multiplier equivalent to a 20% increase followed by a further 10% increase.

(2)

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30 A quantity is decreased by 25% and then decreased again by 20%. Write down the overall multiplier for these two decreases, as a decimal.

(2)

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31 A washing machine normally costs £480. In a sale it is reduced by 15%, and a loyalty card gives a further 5% off the sale price. Work out the final price after both reductions.

(3)

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32 A car's value decreases by 18% each year. If the car is bought for £15,000, work out its value after 2 years, giving your answer to the nearest pound.

(3)

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33 After a 24% discount, the sale price of a bicycle is £190. Work out the original price of the bicycle, giving your answer to the nearest penny.

(3)

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34 A company's revenue was £84,000 in year 1. Revenue increased by 25% in year 2, then decreased by 12% in year 3. Work out the revenue in year 3, and state the percentage difference between this and the year 1 revenue.

(3)

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35 A backpack costing £45 is reduced by 20%. Work out the sale price.

(1)

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36 Stretch question. A games console originally costs £300. Its price is increased by r%, and then a discount of 10% is applied to the new price. The final price is £297. Work out the value of r.

(3)

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37 Write down the multiplier used to increase an amount by 12%.

(1)

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Mark scheme · 3.7 Percentage Change and Multipliers: 2-hour Pack

Question 1

change = 4 found	M1
4 ÷ 40 x 100 (change over original)	M1
10% increase cao	A1

Answer: **10% increase**

Question 2

multiplier 0.8 (or 80% = £96)	M1
£96 ÷ 0.8	M1
£120 cao	A1

Answer: **£120**

Question 3

(a) 0.92	B1
(b) 138	B1

Answer: **(a) 0.92, (b) 138**

Question 4

(a) 1.04	B1
(b) 312	B1

Answer: **(a) 1.04, (b) 312**

Question 5

first change: £230 (or multiplier 1.15)	M1
second change applied to the new value	M1
£241.50 cao	A1

Answer: **£241.50**

Question 6

5% of 60 = 3 found or multiplier 1.05	M1
£63 cao	A1

Answer: **£63**

Question 7

10% of 40 = 4 or a multiplier of 0.9 used	M1
£36 cao	A1

Answer: **£36**

Question 8

10% of 25 = 2.5 or a multiplier of 1.1 used	M1
£27.50 cao	A1

Answer: **£27.50**

Question 9

first change: £360 (or multiplier 0.9)	M1
second change applied to the new value	M1
£324 cao	A1

Answer: **£324**

Question 10

40% of 120 = 48 or a multiplier of 1.4 used	M1
£168 cao	A1

Answer: **£168**

Question 11

first shop price £67.50 found	M1
compares £67.50 with £72.50	M1
The first shop is cheaper by £5 cao	A1

Answer: **The first shop is cheaper by £5**

Question 12

change = 2 found	M1
2 ÷ 20 x 100 (change over original)	M1
10% decrease cao	A1

Answer: **10% decrease**

Question 13

use of multiplier 1.05 twice or equivalent method	M1
correct intermediate value 2.40 x 1.05 = 2.52 or evidence of both steps	M1
2.65 (pounds) cao	A1

Answer: **2.65**

Question 14

first shop price £68 found	M1
compares £68 with £73	M1
The first shop is cheaper by £5 cao	A1

Answer: **The first shop is cheaper by £5**

Question 15

change = 60 found	M1
60 ÷ 120 x 100 (change over original)	M1
50% decrease cao	A1

Answer: **50% decrease**

Question 16

first change: £600 (or multiplier 1.2)	M1
second change applied to the new value	M1
£510 cao	A1

Answer: **£510**

Question 17

change = 10 found	M1
10 ÷ 50 x 100 (change over original)	M1
20% increase cao	A1

Answer: **20% increase**

Question 18

(a) 0.97	B1
(b) 38.8	B1

Answer: **(a) 0.97, (b) 38.8**

Question 19

first shop price £210 found	M1
compares £210 with £215	M1
The first shop is cheaper by £5 cao	A1

Answer: **The first shop is cheaper by £5**

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Question 20

change = 20 found	M1
20 ÷ 200 x 100 (change over original)	M1
10% increase cao	A1

Answer: **10% increase**

Question 21

15% of 240 = 36 or a multiplier of 1.15 used	M1
£276 cao	A1

Answer: **£276**

Question 22

use of multiplier 0.8 then 0.9 or combined multiplier 0.72	M1
calculation 45 x 0.72 = 32.4 or equivalent two-step shown	M1
£32.40 cao	A1

Answer: **32.4**

Question 23

20% of 200 = 40 or a multiplier of 1.2 used	M1
£240 cao	A1

Answer: **£240**

Question 24

multiplier 1.4 (or 140% = £210)	M1
£210 ÷ 1.4	M1
£150 cao	A1

Answer: **£150**

Question 25

recognition that 84 = 70% of original or use 84 / 0.7	M1
division to find original price	M1
£120 cao	A1

Answer: **£120**

Question 26

correct method: (54 - 48)/48 x 100 or equivalent	M1
12.5% increase cao	A1

Answer: **12.5% increase**

Question 27

(75-60)/60 x 100	M1
25% cao	A1

Answer: **25%**

Question 28

(90-72)/90 x 100	M1
20% cao	A1

Answer: **20%**

Question 29

1.2 x 1.1	M1
1.32 cao	A1

Answer: **1.32**

Question 30

0.75 x 0.8	M1
0.6 cao	A1

Answer: **0.6**

Question 31

apply first multiplier: 480 x 0.85 = 408	M1
apply second multiplier: 408 x 0.95	M1
£387.60 cao	A1

Answer: **£387.60**

Question 32

apply multiplier once: 15 000 x 0.82 = 12 300	M1
apply multiplier again: 12 300 x 0.82	M1
£10,086 cao	A1

Answer: **£10,086**

Question 33

recognise 190 = 76% of original	M1
divide: 190 / 0.76	M1
£250 cao	A1

Answer: **£250**

Question 34

apply increase: 84 000 x 1.25 = 105 000	M1
apply decrease: 105 000 x 0.88 = 92 400	M1
£92,400, which is 10% higher than year 1 cao	A1

Answer: **£92,400; 10% higher than year 1**

Question 35

£36 cao	B1

Answer: **£36**

Question 36

form the equation 300 x (1 + r/100) x 0.9 = 297	M1
solve for the increase multiplier: (1 + r/100) = 297 / 270 = 1.1	M1
r = 10 cao	A1

Answer: **r = 10**

Question 37

1.12 cao	B1

Answer: **1.12**

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