3.8 Percentage Change: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out 10% of 230.

(Total for Question 1 is 1 mark)

2 An item costs £60. It is reduced by 30% in a sale. Work out the sale price.

(Total for Question 2 is 2 marks)

3 Winston buys a house for £268,000. He sells the house for £291,500. Calculate the percentage profit Winston makes. Give your answer correct to 3 significant figures.

(Total for Question 3 is 3 marks)

4 A runner's training time changed from 80 minutes to 104 minutes a week.
Work out the percentage increase.

(Total for Question 4 is 3 marks)

© Revision Library | revisionlibrary.co.uk

5 In 2010 the population of a town was 84 600. In 2020 the population was 91 250. Work out the percentage increase in the population. Give your answer correct to 1 decimal place.

(Total for Question 5 is 3 marks)

---

6 Callum buys a crate of 60 mangoes for £24. He finds that 6 of the mangoes are bad and cannot be sold. He sells the remaining mangoes for 70p each. Work out Callum's percentage profit.

(Total for Question 6 is 4 marks)

---

7 A book costs £200. First it is increased by 10%, then the new price is decreased by 10%. Work out the final price.

(Total for Question 7 is 3 marks)

© Revision Library | revisionlibrary.co.uk

8 Using p pounds for the original price of an item, show that increasing the price by 15% and then decreasing the new price by 15% is equivalent overall to a decrease of 2.25% on the original price.

(Total for Question 8 is 4 marks)

---

9 A fund grows by 6% per year compounded annually.

(a) Show that after n years the amount is $A = P(1.06)^n$. **(3)**

(b) Find the smallest whole number n such that $A \geq 2P$ when $P = 8000$. **(5)**

(Total for Question 9 is 8 marks)

© Revision Library | revisionlibrary.co.uk

10 A machine is sold after 4 years. Its value follows $V = 60\,000 \times (0.74)^t$, where t is the age in years.

(a) Work out the value after 4 years. **(3)**

(b) The owner expects the value to be at least £20,000. Use the formula to show whether this expectation is met after 6 years. Give a brief justification with your answer. **(4)**

(c) Find t when V first falls below £25,000. Give answer to 1 decimal place. **(5)**

(Total for Question 10 is 12 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 3.8 Percentage Change: Test Pack

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

Question 1

23 cao	**B1**

Answer: 23

Question 2

calculate 30% of 60 or multiply by 0.70	**M1**
£42 cao	**A1**

Answer: £42

Question 3

23500 seen (291500 - 268000)	**M1**
23500/268000 x 100 (oe)	**M1**
awrt 8.77% (3sf)	**A1**

Answer: 8.77%

Question 4

24 (difference) found	**M1**
24 / 80 x 100	**M1**
30%	**A1**

Answer: 30%

Question 5

6650 seen (91250 - 84600)	**M1**
6650/84600 x 100 (oe)	**M1**
awrt 7.9%	**A1**

Answer: 7.9%

Question 6

60 - 6 = 54 (mangoes sold)	**M1**
54 x 0.70 = 37.80 (total revenue)	**M1**
37.80 - 24 = 13.80 (profit), dependent on both M1s	**dM1**
57.5% cao	**A1**

Answer: 57.5%

Question 7

first increase: 200 x 1.10 = 220 or show 10% of 200 = 20 and add	**M1**
then decrease 10% of 220 = 22 or multiply 220 by 0.90	**M1**
£198 cao	**A1**

Answer: £198

Question 8

forms the increased price, 1.15p (oe)	**M1**
multiplies their increased value by 0.85 (dep on M1)	**M1**
obtains 0.9775p oe	**A1**
correct conclusion: 0.9775p is 97.75% of p, i.e. an overall decrease of 2.25%, with supporting working shown	**B1**

Answer: Overall equivalent to a 2.25% decrease (multiplier 0.9775)

Question 9

(a) state amount after 1 year = P(1 + 0.06), after 2 years = $P(1.06)^2$	**M1**
(a) state pattern and generalise for n years	**M1**
(a) A = $P(1.06)^n$ cao	**A1**

(a) Answer: A = $P(1.06)^n$

(b) set up $(1.06)^n \geq 2$	**M1**
(b) take logs or use growth table / calculator to solve n ≥ ln2 / ln1.06	**M1**
(b) calculate ln2 / ln1.06 = approx 11.897... (or use log10 equivalent)	**M1**
(b) state n must be integer ≥ 11.897	**A1**
(b) n = 12 years cao	**A1**

(b) Answer: 12

Question 10

(a) substitute t = 4: 60000 x 0.74^4 shown	**M1**
(a) evaluate 0.74^4 = 0.299865... or equivalent	**M1**
(a) 17991.95 to 2 d.p. (nearest penny) cao	**A1**

(a) Answer: 17991.95

(b) substitute t = 6: 60000 x 0.74^6 shown	**M1**
(b) evaluate 0.74^6 approx= 0.1642 (or equivalent) and multiply	**M1**
(b) calculate value approx= 9852.4 (or approx 9852) and compare with 20000	**M1**
(b) conclude value < 20000 and expectation not met cao	**A1**

(b) Answer: No; value approx= 9852 (< 20000)

(c) set up inequality 60000 x 0.74^t < 25000	**M1**
(c) rearrange: 0.74^t < 25000/60000 = 5/12	**M1**
(c) take logs: t ln0.74 < ln(5/12) and solve for t	**M1**
(c) compute t > ln(5/12)/ln(0.74) approx= 2.91... and choose first t where value falls below	**A1**
(c) t = 2.9 years (1 d.p.) cao	**A1**

(c) Answer: 2.9

© Revision Library | revisionlibrary.co.uk