original   increased by 5% for 10 years.

⇓   ⇓

100%   105%

$$\text{original} \times 105\%^{10}$$

Compound Increase/Decrease

original   decreasing by 5% for 10 years.

⇓   ⇓

100%   95%

$$\text{original} \times 95\%^{10}$$

1.

Elfed invests £3500 for 2 years at 1·5% per annum compound interest.
Calculate the value of his investment at the end of the 2 years.
Give your answer correct to the nearest penny. [4]

original × 101·5%   B)

3500 × 101·5%^{2} = £3605.79   M)

OR $3500 \times 1.015^2 =$ A)

          A)

2.

Grace invests £8240 for 2 years at 3% per annum compound interest.
Find the compound interest earned in the 2 years.
Your answer should be given correct to the nearest penny. [4]

$8240 \times 103\%^2 = £8741.82$ B)

OR 8240×1.03^2 ↑ In account   M)

Interest earned = $8741.82 - 8240 = 501.82$ A)

          A)

3.

Eleri invests £3700 for 3 years at 2% per annum compound interest.
Calculate the value of her investment at the end of the 3 years.
Give your answer correct to the nearest penny.   [4]

$$3700 \times 102\%^3 = £3926.47$$

or 3700×1.02^3

B1

M)

A1

A1

4.

(a) A company was set up with 500 workers.
At the end of each of the first three years the company employed more workers.
The number of additional workers employed each year was equal to two-fifths of the number of workers that were there at the start of that year.

How many people worked for the company in the fourth year? [4]

Original amount = 100%

Increase $\frac{2}{5}$ = 40%   factor 140%   ~~(B)~~ A) M)

$500 \times 140\%^{3}$ = 1372 workers   M)

or 500×1.4^{3} A)

(b) Calculate the percentage increase in the number of workers from the first year to the fourth year. [3]

% change = $\dfrac{\text{amount of change}}{\text{original amount}} \times 100$ B)
(up or down)

$= \dfrac{872}{500} \times 100 = 174.4\%$ M)
   A)

5.

Each year, Enrico's car loses 12% of its value at the start of that year.
The car was worth £17 000 when it was new.
What was its value after 3 years?
Give your answer correct to the nearest £100. [4]

decrease factor $= 100\% - 12\% = 88\%$ B1

$17000 \times 88\%^3 = 11585.024$ M1

or $17000 \times 0.88^3 \qquad = £11600$ A1

    A1

6.

Rowena owns a car that Dafydd is planning to buy in 3 years' time.

Rowena's car is currently worth £3500.
Rowena estimates that her car will repeatedly depreciate by 24% of its value each year.

Dafydd has already saved £100.
Dafydd wants to set up a savings account to save a fixed amount of money each month to buy Rowena's car in 3 years' time.

(a) What would be the minimum amount of money, to the nearest pound, that Dafydd should pay into his savings account each month?
You must show all your working.   [7]

depreciation factor = $100\% - 24\% = 76\%$ B1

$3500 \times 76\%^3 = 1536.42$ M1

$= £1540$ worth after 3 years.   A1

3 years = 36 months.

Needs to save $1540 - 100 = 1440$ B1

So his monthly savings $= 1440 \div 36 = £40$ per month   M1

A1

A1

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(b) Do you think that this amount saved each month will guarantee that Dafydd will have enough money to buy Rowena's car?
You must give a reason for your answer. [1]

No, because Rowena estimates the car will depreciate by 24%, it might fall by less and still be worth more

Yes, because Dafydd will earn interest on his savings so will have more than this amount in his account.

Marking Scheme

1.

		✓	Mark	Comments
June 2015 **UNIT 1 Foundation**				

14.	3500
	  52·50
	3552·50
	  53.28(75)
	
	3605.78(75)
	
	(£) 3605.79 OR 360579(p)
		✓
		
		✓
		✓
			B1
			
			M1
			
			A1
			A1
				For the evaluation of a correct 1·5%
				OR Sight of 1·015
				(105 or 3605 imply use of 2× 52·5 and gain B1)
				For correctly attempting to find 2 different 1·5%.
				OR $3500 \times 1·015^2$.
				C.A.O.
				F.T. one arithmetic error. Must be to nearest penny.
				Accept £3605.79p. Do not accept 3605.79p.
				Mark final value of investment
				(i.e. do not penalise if they continue to give £105.79
				*If extra year OR depreciation mark accordingly, then
				penalise −1.*

2.

		B1	Comments

4.	8240
	  247.2(0)
	8487.2(0)
	  254.61(6)
	
	8741.81(6) or 8741.82 OR 247.2(0) and 254.61(6)
	
	(£)501.82
		B1
		
		M1
		
		A1
		
		A1
		
		4
			For the evaluation of a correct 3% OR Sight of 1·03
			(494.4 implies 2× 247.2 and gains B1).
			For attempting to find 2 different 3%.
			OR $8240 \times 1·03^2$.
			
			F.T. one error. Must be given correct to the nearest penny.
			(£)501.81 is B1M1A1A0.
			Treat depreciation as a mis-read.

3.

		Mark	Comments

15.	3700
	  74
	3774
	  75.48
	3849.48
	  76.98(96)
	3926.46(96)
	(£) 3926.47 OR 392647(p)
		B1
		
		M1
		
		A1
		A1
		
		4
			For the evaluation of a correct 2% OR Sight of 1·02
			(222 and 3922 imply use of 3× 74 and gain B1)
			
			For attempting to find 3 different 2%.
			OR $3700 \times 1·02^3$.
			
			Or sight of (£)74 AND (£)75.48 AND (£)76.98(..)
			F.T. one error.
			Accept £3926.47p. Do not accept 3926.47p.
			Mark final value of investment
			(i.e. do not penalise if they continue to give £226.47)

4.

Ribbon marking for 14(a) and 14(b).		✓	Mark	Comments

14. (a)	$500 + 500 \times {}^2/_5$ or equivalent
	          = 700
	
	Two further correct steps.
	(Number of workers =) 1372
		✓
		✓
		
		✓
		✓
			M1
			A1
			
			M1
			A1
				Allow M1A0 for '200'. Allow M1A1 for '200 extra'.
				M1A1 implied by sight of 1100 (or 1300).
				
				Ignore continuing to an additional year.
				C.A.O. Mark final answer.
				Alternative method.
				            $500 \times (1·4)^3$ *M2*
				            = 1372 *A2*
				    Allow
				          $500 \times (1·4)^4$ *M2*
				          = 1920·8 (or 1921) *A1*

(b)	$(1372 - 500 =) 872$ $872 / 500 \times 100$ = 174(·4%)		B1 M1 A1	F.T. 'their 1372'. FT 'their 1372 − 500' If no marks gained then allow SC1 for an answer of 274(·4%) or equivalent on F.T.

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5.

| 14. | 17000
  2040
14960
  1795.2(0)
13164.8(0)
  1579.77(6)
11585.02(4)
          (£)11600 | B1

M1

A1

A1

4 | For the evaluation of a correct 12% OR Sight of $0·88$ (6120, 10880 or 23120 implies 3×2040 and gains B1).

For attempting to find and subtract 3 different 12%. OR $17000 \times 0·88^3$.

F.T. one error.
Treat calculation for 2 or 4 years as a misread.
Penalise an appreciation calculation −1. |

6.

2015 November Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
14.(a)		*If an error is made with $1 - 0.24$ or equivalent, i.e. working with e.g. uniquely 0.66 or 0.86, penalise -1 once only*
(Rowena's car depreciated value) (£)3500×0.76^3	M2	M1 for 3500×0.76 or $3500 - 3500 \times 0.24$ or 2660, or allow M1 for $3500 - 3500 \times 0.24^3$, or M1 for simple **depreciation** $3500 - 3 \times 840$ (= £980) **M1 for appreciation 3500×1.24**
(£)1536(.416)	A1	CAO, but accept 1540 from correct working or a value rounding to (£)1536
(Dafydd needs to save a total of £1536(.416) - £100) (£)1436(.416)	B1	FT 'their 1536' – 100 evaluated correctly provided at least M1 awarded *If no marks so far due to working with £3400, then award* *SC3 for (£)1492.51(84) or (£)1492.52, or* *SC2 for 3400×0.76^3, or* *SC1 for sight of 3400×0.76 or $3400 - 3400 \times 0.24$ or allow for sight of $3400 - 3400 \times 0.24^3$ <u>or $3400 - 3 \times 816$ (=952)</u>*
(Dafydd needs to save, per month £) 1436(.416) ÷ 36	M1	FT 'their 1436(.416)' ÷ 36, i.e. what they think the car is now worth, but **do not** FT for $3500 \div 36$ or $3400 \div 36$ Note: £1536(.416) ÷ 36 – (£)100 ÷ 36 is equivalent to B1, M1
(£) 40	A2	A1 for (£)39.88... to (£)39.90(00...) FT for A2 provided rounding is necessary, otherwise maximum of FT A1 only. When rounding is necessary, accept rounding up or down to the nearest pound if number of pence is <50 *An answer of (£)43 is from (£)1536(.416) ÷ 36 evaluated correctly with answer to the nearest £, this is awarded M2, A1, B0, then FT M1 and A2 (or A1 for (£)42.6(....) <u>or (£)42.70</u>* **<u>'Trial and improvement' method leading to (£)40 gets full marks</u>**
(b) Conclusion stated or implied with a suitable reason, e.g. 'yes, because he might get interest on his money so have more than he needs', or 'no, because Rowena only estimated the value (and the car could be worth more)', **<u>'don't know because Rowena may decide to sell it for more or less than its value after depreciation'</u>**	E1	Do not accept contradictions given in the response, **<u>unless the candidate is clearly discussing uncertainty.</u>** **<u>Accept 'don't know' or 'unsure' within a reasoned answer.</u>** **<u>Candidates need to express uncertainty of depreciation or relate to a rounding of their answer for Dafydd's saving plan</u>** **<u>Accept 'yes, as Rowena's car could depreciate more than 24% (a year)'</u>** **<u>Accept 'no' or 'yes' as appropriate with 'Dafydd's saving is rounded to the nearest pound' (yes if rounding was up in (a), no if rounding was down in (a)) or with calculations to show there is less/more in his account than what he thinks he needs, or reverse working to show amount saved × 36 < or > depreciated value.</u>** **<u>Do not accept the statement 'I think the amount Dafydd is saving each month will be enough to buy the car'</u>**
H8	8	**<u>without a valid reason or calculation(s)</u>**