PERCENTAGES PAST PAPER QUESTIONS - ANSWERS

1. $964 \times 0{\cdot}85^3 = 592$, 590 pupils (to the nearest 10)

2. $240\,000 \times 1{\cdot}028^2 = £253\,628{\cdot}16$, £253 628 (to the nearest pound)

3. 1st Jan – 94kg
   1st Feb – $94 \times 0{\cdot}93 = 87{\cdot}42$kg
   1st Mar - $87{\cdot}42 \times 0{\cdot}93 = 81{\cdot}3006$kg
   1st Apr - $81{\cdot}3006 \times 0{\cdot}93 = 75.609558$kg
   1st May - $75{\cdot}609558 \times 0{\cdot}93 = 70{\cdot}31688894$kg
   Target weight will be achieved in April

4. $2{\cdot}69\text{million} \times 1{\cdot}04^3 = 3{\cdot}02588416$ million, 3·03 million (to 3 significant figures)

5. $28 \times 1{\cdot}1^4 = 40{\cdot}9948$, 41 miles

6. $42\,000 \times 1{\cdot}08^3 = 52\,907{\cdot}904$, 52 900 tonnes (to 3 significant figures)

7. $5000 \times 1{\cdot}006^3 = 5090{\cdot}54108$, 5 090 bacteria (to 3 significant figures)

8. $84\,000 \times 0{\cdot}75^3 = 35\,437{\cdot}5$, 35 400 tonnes (to 3 significant figures)

9. $0{\cdot}8^3 = 0{\cdot}512$, 51·2% of the fat will remain so the company will not achieve its target.

10. $600 \times 1{\cdot}045^3 = 684{\cdot}699675$, £684·70 (to nearest penny)

11. $12\text{ million} \times 1{\cdot}05^3 = 13{\cdot}8915$ million, 13·9 million people (to 1 decimal place)

12. $5000 \times 0{\cdot}88^3 = 3407{\cdot}36$, 3410 monkeys (to the nearest 10)

13. $250 \times 0{\cdot}8^3 = 128$mg

14. 15th May: 500 – 100 = 400 owed
    1st June: $400 \times 1{\cdot}025 = £410$ outstanding
    15th June: 410 – 100 = £310 owed
    1st July: $310 \times 1{\cdot}025 = 317{\cdot}75$ outstanding
    15th July: 317·75 – 100 = 217·75 owed
    1st Aug: $217{\cdot}75 \times 1{\cdot}025 = 223{\cdot}19375 = £223{\cdot}19$ outstanding

15. $90\,000 \times 1{\cdot}05^3 = 104\,186{\cdot}25$
    $60\,000 \times 0{\cdot}92^3 = 46\,721{\cdot}28$
    Total value = 104 186·25 + 46 721·28 = £150 907·53

16. 1 year: worth 80% of original value
2 years: $0{\cdot}8^2 = 0{\cdot}64$, worth 64% of original value
3 years: $0{\cdot}8^3 = 0{\cdot}512$, worth 51·2% of original value
4 years: $0{\cdot}8^4 = 0{\cdot}4096$, worth 40·96% of original value
The machine should be replaced after 4 years.

17. 2020: 85% of emissions remaining
2030: $0{\cdot}85^2 = 0{\cdot}7225$, 72·25% of emissions remaining
2040: $0{\cdot}85^3 = 0{\cdot}614125$, 61·4125% of emissions remaining
2050: $0{\cdot}85^4 = 0{\cdot}52200625$, 52·2% of emissions remaining
The scientists' recommendations will NOT have been achieved by 2050.

18. $134\,750 \times 1{\cdot}0315^3 = 147\,889{\cdot}2038$, £147 900 (to 4 significant figures)

19. $176\,500 \times 0{\cdot}9575^3 = 154\,939{\cdot}1102$, £155 000 (to 3 significant figures)

20. 2007: $3000 \times 1.11 = 3\,330$ books
2008: $3\,330 \times 0{\cdot}9 = 2997$ books
The sales in 2008 were less than the sales in 2006.

21. $50\,000 \times 1{\cdot}045^4 = 59\,625{\cdot}93003$, £9 625.93 interest earned

22. $28\,400 \times 1{\cdot}023^3 = 30\,405{\cdot}01634$, £30 405 (to the nearest pound)

23. a) $3\,000 \div 35\,000 \times 100 = 8{\cdot}571428571$, = 8·57%
b) $32\,000 \times 0{\cdot}9143^3 = 24\,457{\cdot}72951$, £24 500 (to the nearest hundred pounds)

24. $28 \times 0{\cdot}96^3 = 24{\cdot}772608$, 25°C (to the nearest degree)

25. $77\,900 \times 1{\cdot}025^3 = 83\,889{\cdot}77969$, £83 890 (to the nearest pound)

26.

1 year:	Newton – $50\,000 \times 1{\cdot}05 = 52\,500$	Coaltown – $108\,000 \times 0{\cdot}8 = 86\,400$
2 years	Newton – $52\,500 \times 1{\cdot}05 = 55\,125$	Coaltown – $86\,400 \times 0{\cdot}8 = 69\,120$
3 years	Newton – $55\,125 \times 1{\cdot}05 = 57\,881$	Coaltown – $69\,120 \times 0{\cdot}8 = 55\,296$

It will take 3 years until the population of Newton is greater than the population of Coaltown.

REVERSE PERCENTAGES

1. 80% - 480 000
1% - $480\,000 \div 80 = 6000$
100% - $6000 \times 100 = 600\,000$ tickets available.

2. 85% - 297·50
1% - $297{\cdot}50 \div 85 = 3{\cdot}50$
100% - $3{\cdot}5 \times 100 =$ £350

3. 80% - 45
1% - $45 \div 80 = 0{\cdot}5625$
100% - $0{\cdot}5625 \times 100 =$ £56·25

4. 72% - 1296
1% - 1296 ÷ 72 = 18
28% - 18 × 28 = 504 failed

5. 104% - 894·40
1% - 894·40 ÷ 104 = 8·60
100% - 8·60 × 100 = £860

6. 84% - 3780
1% - 3780 ÷ 84 = 45
100% - 45 × 100 = £4500

7. 120% - 900
1% - 900 ÷ 120 = 7·5
100% - 7·5 × 100 = 750g

8. 117·5% - 150
1% - 150 ÷ 117·5 = 1·276595745
100% - 1.276595745 × 100 = £127·28

9. 130% - 260
1% - 260 ÷ 130 = 2
100% - 2 × 100 = £200

10. 110% - 148·50
1% - 148·50 ÷ 110 = 1·35
100% - 1·35 × 100 = £135

11. 108% - 324
1% - 324 ÷ 108 = 3
100% - 3 × 100 = £300

12. 87½% - 10 500
1% - 10 500 ÷ 87½ = 120
100% - 120 × 100 = £12 000

13. 112·5% - 450
1% - 450 ÷ 112·5 = 4
100% - 4 × 100 = 400g