Number Patterns and Finance: exam practice

10 questions · 25 marks · worked solutions and markschemes

Name _____ Date _____ Score / 25

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/hlai/number-patterns-and-finance-exam-practice

1. **3 marks · Paper 1 style · calculator allowed**

Calculate $(6.4 \times 10^{7}) \div (1.6 \times 10^{-3})$ and $(2.5 \times 10^{4})^{2}$, giving each in the form $a \times 10^{k}$.

Find both values. **[3]**

2. **2 marks · Paper 1 style · calculator allowed**

A hard drive holds 2 terabytes (2×10^{12} bytes). A photo uses 4.5×10^{6} bytes.

Find the number of photos the drive can hold, in the form $a \times 10^{k}$, with a to 3 significant figures. **[2]**

3. **2 marks · Paper 1 style · calculator allowed**

A company's sales grow by 5% each year. Sales in the first year are $\$80\,000$.

Find the total sales over the first 10 years. **[2]**

4. **2 marks · Paper 1 style · calculator allowed**

Light travels 9.46×10^{12} km in a year. A star is 4.2 light years away.

Find its distance in km in the form $a \times 10^{k}$. **[2]**

5. **2 marks · Paper 2 style · calculator allowed**

Find the time, in years, for $\$2000$ to double at 6% per year compounded monthly.

Find the time. **[2]**

6. **2 marks · Paper 1 style · calculator allowed**

Write $\dfrac{3.6 \times 10^{-4}}{9 \times 10^{-7}} + 2.1 \times 10^{2}$ in the form $a \times 10^{k}$.

Find the value. **[2]**

7. **2 marks · Paper 2 style · calculator allowed**

Inflation is 2.5% per year. A meal costs $\$18$ today.

Find the cost of the same meal in 8 years, if prices rise with inflation. **[2]**

8. **3 marks · Paper 1 style · calculator allowed**

The mass of the Earth is 5.97×10^{24} kg and the mass of the Moon is 7.35×10^{22} kg.

Find how many times heavier the Earth is than the Moon, and their total mass in the form $a \times 10^{k}$. **[3]**

9. **3 marks · Paper 2 style · calculator allowed**

A machine bought for $\$45\,000$ depreciates by 18% each year.

Find its value after 6 years and the total depreciation. **[3]**

10. **4 marks · Paper 2 style · calculator allowed**

Kim invests $\$6000$ at 3.2% per year compounded monthly. Lee invests $\$6000$ at 3.3% per year compounded annually.

Find the value of each investment after 7 years and say who has more. **[4]**

Answers and worked solutions

Question 1 — 3 marks

Answer: 4×10^{10}; 6.25×10^{8}

4×10^{10} **A1**

6.25×10^{8} **A1A1**

Question 2 — 2 marks

Answer: 4.44×10^{5}

$\dfrac{2 \times 10^{12}}{4.5 \times 10^{6}}$ **M1**

4.44×10^{5} **A1**

Question 3 — 2 marks

Answer: $\$1\,006\,231$

$\dfrac{80000(1.05^{10} - 1)}{0.05}$ **M1**

$\$1\,006\,231$ **A1**

Question 4 — 2 marks

Answer: 3.97×10^{13} km

$4.2 \times 9.46 \times 10^{12}$ **M1**

3.97×10^{13} km **A1**

Question 5 — 2 marks

Answer: 11.6 years

$\left(1 + \dfrac{0.06}{12}\right)^{12n} = 2$ **M1**

11.6 years **A1**

Question 6 — 2 marks

Answer: 6.1×10^{2}

$400 + 210$ **M1**

6.1×10^{2} **A1**

Question 7 — 2 marks

Answer: $\$21.93$

$18(1.025)^{8}$ **M1**

$\$21.93$ **A1**

Question 8 — 3 marks

Answer: 81.2; 6.04×10^{24} kg

$\dfrac{5.97 \times 10^{24}}{7.35 \times 10^{22}} = 81.2$ **A1**

$5.97 \times 10^{24} + 0.0735 \times 10^{24}$ **M1**

6.04×10^{24} kg **A1**

Question 9 — 3 marks

Answer: $\$13\,680.30$; $\$31\,319.70$

$45000(0.82)^{6}$ **M1**

$\$13\,680.30$ **A1**

$\$31\,319.70$ **A1**

Question 10 — 4 marks

Answer: Kim $\$7504.19$, Lee $\$7531.01$; Lee

Kim:

$6000\left(1 + \dfrac{0.032}{12}\right)^{84} = \$7504.19$

$M1$**A1**

Lee:

$6000(1.033)^{7} = \$7531.01$ **A1**

Lee **A1**

Every solution is also on ibmathrevision.com/hlai/number-patterns-and-finance-exam-practice
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